

## **Appendix A: Regional Haze Definitions**

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# Appendix A Chapter 1 Introduction

## ***Regional Haze Definitions***

The following definitions apply to this implementation plan, and can be separated into four categories: (A) general definitions from Section 301(40 CFR 51.301) related to visibility, some of which were added or revised upon adoption of the Regional Haze Rule in 1999; (B) specific definitions for the fire. (C) General definitions as taken from the Visibility Information Exchange Web System (VIEWS) at: <http://views.cira.colostate.edu/web/Glossary.aspx>

### **A. General Definitions from Section 301 related to Visibility:**

***BART-eligible source*** means an existing stationary facility as defined in this section.

***Best Available Retrofit Technology (BART)*** means an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant, which is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, taking into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology.

***Deciview*** means a measurement of visibility impairment. A deciview is a haze index derived from calculated light extinction, such that uniform changes in haziness correspond to uniform incremental changes in perception across the entire range of conditions, from pristine to highly impaired. The deciview haze index is calculated based on the following equation (for the purposes of calculating deciview, the atmospheric light extinction coefficient must be calculated from aerosol measurements):

$$\text{Deciview haze index} = 10^{-1} n_e (b_{\text{ext}}/10 \text{ Mm}^{-1}).$$

Where  $b_{\text{ext}}$  = the atmospheric light extinction coefficient, expressed in inverse megameters ( $\text{Mm}^{-1}$ ).

***Existing stationary facility*** means any of the following stationary sources of air pollutants, including any reconstructed source, which was not in operation prior to August 7, 1962, and was in existence on August 7, 1977, and has the potential to emit 250 tons per year or more of any air pollutant. In determining potential to emit, fugitive emissions, to the extent quantifiable, must be counted.

Fossil-fuel fired steam electric plants of more than 250 million British thermal units per hour heat input,  
Coal cleaning plants (thermal dryers),  
Kraft pulp mills,  
Portland cement plants,  
Primary zinc smelters,  
Iron and steel mill plants,  
Primary aluminum ore reduction plants,  
Primary copper smelters,  
Municipal incinerators capable of charging more than 250 tons of refuse per day,  
Hydrofluoric, sulfuric, and nitric acid plants,  
Petroleum refineries,  
Lime plants,  
Phosphate rock processing plants,  
Coke oven batteries,  
Sulfur recovery plants,  
Carbon black plants (furnace process),  
Primary lead smelters,  
Fuel conversion plants,  
Sintering plants,  
Secondary metal production facilities,  
Chemical process plants,  
Fossil-fuel boilers of more than 250 million British thermal units per hour heat input,  
Petroleum storage and transfer facilities with a capacity exceeding 300,000 barrels,  
Taconite ore processing facilities,  
Glass fiber processing plants, and  
Charcoal production facilities.

***Federal Class I area*** means any Federal land that is classified or reclassified Class I.

***Federal Land Manager*** means the Secretary of the department with authority over the Federal Class I area (or the Secretary's designee) or, with respect to Roosevelt-Campobello International Park, the Chairman of the Roosevelt-Campobello International Park Commission.

***Federally enforceable*** means all limitations and conditions which are enforceable by the Administrator under the Clean Air Act including those requirements developed pursuant to 40 CFR Parts 60 and 61, requirements within any applicable State Implementation Plan, and any permit requirements established pursuant to 40 CFR 52.21 of this chapter or under regulations approved pursuant to CFR Parts 51, 52, or 60.

**Implementation plan** means, for the purposes of this part, any State Implementation Plan, Federal Implementation Plan, or Tribal Implementation Plan.

**Indian tribe or tribe** means any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village, which is federally recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

**In existence** means that the owner or operator has obtained all necessary preconstruction approvals or permits required by Federal, State, or local air pollution emissions and air quality laws or regulations and either has (1) begun, or caused to begin, a continuous program of physical on-site construction of the facility or (2) entered into binding agreements or contractual obligations, which cannot be cancelled or modified without substantial loss to the owner or operator, to undertake a program of construction of the facility to be completed in a reasonable time.

**Least impaired days** means the average visibility impairment (measured in deciviews) for the twenty percent of monitored days in a calendar year with the lowest amount of visibility impairment.

**Major stationary source and major modification** mean major stationary source and major modification, respectively, as defined in 40 CFR 51.166.

**Mandatory Class I Federal Area** means any area identified in 40 CFR Part 81, Subpart D.

**Most impaired days** means the average visibility impairment (measured in deciviews) for the twenty percent of monitored days in a calendar year with the highest amount of visibility impairment.

**Natural conditions** includes naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration.

**Potential to emit** means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.

**Reasonably attributable** means attributable by visual observation or any other technique the state deems appropriate.

**Reasonably attributable visibility impairment** means visibility impairment that is caused by the emission of air pollutants from one, or a small number of sources.

**Regional haze** means visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic area. Such sources include, but are not limited to, major and minor stationary sources, mobile sources, and area sources.

**State** means "State" as defined in section 302(d) of the CAA.

**Stationary Source** means any building, structure, facility, or installation, which emits or may emit any air pollutant.

**Visibility impairment** means any humanly perceptible change in visibility (light extinction, visual range, contrast, coloration) from that which would have existed under natural conditions.

## **B. Definitions for the Fire**

1. **Fire** means any wildfire, wildland fire, prescribed fire, and agricultural burning that is conducted on Federal, State, and private wildlands and farmlands. Except where "prescribed fire" is noted, the term "fire" shall apply to the sources identified herein.
2. **Land Manager** means any federal, state, local, or private entity that owns, administers, directs, oversees or controls the use of public or private land, including the application of fire to the land.
3. **Prescribed fire** or **prescribed burn** means any fire ignited by management actions to meet specific objectives, such as achieving resource benefits.
4. **Wildland Fire Used for Resource Benefits** means naturally ignited wildland fire that is managed to accomplish specific prestated resource management objectives in predefined geographic areas.

### **General Definitions:**

**2000-04 Baseline:**Refers to a WRAP emissions or modeling scenario based on the designated planning emissions inventories, including a 5 year average of fire emissions. Also referred to as Plan02 analysis series.

**2002 Base Case:**Refers to a WRAP emissions or modeling scenario based on 2002 emissions inventories, including actual fire emissions for 2002. Also referred to as Base02 analysis series.

**2018 Base Case:**Refers to a WRAP emissions or modeling scenario based on 2018 emissions inventories estimated by applying rules on the books in late 2004, generated in early 2006. Also referred to as Base18 analysis series.

**2018 Preliminary Reasonable Progress:**Refers to a WRAP emissions or modeling scenario based on the preliminary reasonable progress emissions inventories, generated in early 2007. Includes corrections, refinements and additions to the 2018 Base Case, as well as estimates of controlling SO<sub>2</sub> and some NO<sub>x</sub> from special coal-fired power plants, called BART sources. Also referred to as PRP18 analysis series.

A

**Abrasion mode:**A size range of particles, typically larger than about 3 micrometers in diameter, primarily generated by abrasion of solids.

**Absorption:**A class of processes by which one material is taken up by another.

**Absorption coefficient:**A measure of the ability of particles or gases to absorb photons; a number that is proportional to the number of photons removed from the sight path by absorption per unit length.

**Absorption cross section:**The amount of light absorbed by a particle divided by its physical cross section.

**Accumulation mode:**A size range of particles, from about 0.1 to 3 micrometers, formed largely by accumulation of gases and particles upon smaller particles. They are very effective in scattering light.

**Acid deposition:**Wet and/or dry deposition of acidic materials to water or land surfaces. The chemicals found in acidic deposition include nitrate, sulfate, and ammonium.

**Acid precipitation:**Typically is rain with high concentrations of acids produced by the interaction of water with oxygenated compounds of sulfur and nitrogen which are the by-products of fossil fuel combustion.

**Acid rain:**(or Acid Mist) The deposition of acid chemicals (incorporated into rain, snow, fog, or precipitation) from the atmosphere to water or land surfaces. The pH of rain is considered acid when it is below about 5.2 pH.

**Adverse impact:**A determination that an air-quality related value is likely to be degraded within a Class I area.

**Aerometric Information Retrieval System (AIRS):**A computer-based repository of US air pollution information administered by the EPA Office of Air Quality Planning and Standards.

**Aerosol:**Suspensions of tiny liquid and/or solid particles in the air.

**Aerosol extinction:**See reconstructed light extinction.

**aerosol\_bext:**VIEWES parameter: Aerosol extinction; Type Code: CALC; Units: Inverse megameters

**Aethalometer:**An aerosol monitoring instrument that continuously measures particle light absorption (aerosol black carbon) on a quartz fiber filter.

**AGf:**VIEWES parameter: Silver (Fine); Description: Silver Elemental Concentration FINE Size Fraction; CAS Number: 7440-22-4; AQS Code: 84166; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Agglomeration:**The process of collisions of particles that stick together to become larger particles.

**Air light:**Light scattered by air (molecules or particles) toward an observer, reducing the contrast of observed images.

**Air parcel:**A volume of air that tends to be transported as a single entity.

**Air pollutant:**An unwanted chemical or other material found in the air.

**Air pollution:**Degradation of air quality resulting from unwanted chemicals or other materials occurring in the air.

**Air quality (In context of the national parks):**The properties and degree of purity of air to which people and natural and heritage resources are exposed.

**Air Quality Values (AQRVs):**Including visibility, flora, fauna, cultural and historical resources, related values odor, soil, water, and virtually all resources that are dependent upon and affected by air quality. "These values include visibility and those scenic,

cultural, biological, and recreation resources of an area that are affected by air quality" (43 Fed. Reg. 15016).

**AIRS:** Aerometric Information Retrieval System (of USEPA)

**AIRWeb:** Air Resources Web, an air quality information retrieval system for US parks and wildlife refuges developed by the Air Resources Division of the National Park Service and the Air Quality Branch of the US Fish and Wildlife Service.

**Al2O3:** VIEWS parameter: Aluminum Oxide; CAS Number: 1344-28-1; Units: UG/CU Meter (LC)

**Albedo:** The fraction of total light incident on a reflecting surface that is reflected back omnidirectionally.

**ALc:** VIEWS parameter: Aluminum (Coarse); CAS Number: 7429-90-5; AQS Code: 83101; Type Code: COARSE; Units: UG/CU Meter (LC)

**ALf:** VIEWS parameter: Aluminum (Fine); CAS Number: 7429-90-5; AQS Code: 88104; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Ambient air:** Air that is accessible to the public.

**ammNO3:** Ammonium nitrate.

**ammNO3f:** VIEWS parameter: Ammonium Nitrate (Fine); CAS Number: 6484-52-2; AQS Code: 88344; Type Code: PM2.5; Units: UG/CU Meter (LC)

**ammNO3f\_bext:** VIEWS parameter: Ammonium Nitrate Extinction (Fine); CAS Number: 6484-52-2; Type Code: CALC; Units: Inverse megameters

**ammNO3f\_Large:** VIEWS parameter: Ammonium Nitrate (Fine), Large Fraction; Type Code: CALC; Units: UG/CU Meter (LC)

**ammNO3f\_Small:** VIEWS parameter: Ammonium Nitrate (Fine), Small Fraction; Type Code: CALC; Units: UG/CU Meter (LC)

**ammSO4:** Ammonium sulfate.

**ammSO4f:** VIEWS parameter: Ammonium Sulfate (Fine); Description: If particulate Sulfur (Sf) is non-null, then ammSO4f is calculated as  $4.125 * \text{Sulfur}$ . Otherwise, it is calculated as  $1.375 * \text{Sulfate (SO4f)}$ . If the concentration of the base parameter (Sf or SO4f) is below the minimum detection limit, then  $0.5 * \text{MDL}$  is used. (NOTE: The calculation procedure for RHR datasets differs from this. Please see the RHR guidance documents detailed calculation procedures.); CAS Number: 7783-20-2; AQS Code: 88339; Type Code: PM2.5; Units: UG/CU Meter (LC)

**ammSO4f\_bext:** VIEWS parameter: Ammonium Sulfate Extinction (Fine); CAS Number: 7783-20-2; Type Code: CALC; Units: Inverse megameters

**ammSO4f\_Large:** VIEWS parameter: Ammonium Sulfate (Fine), Large Fraction; Type Code: CALC; Units: UG/CU Meter (LC)

**ammSO4f\_Small:** VIEWS parameter: Ammonium Sulfate (Fine), Small Fraction; Type Code: CALC; Units: UG/CU Meter (LC)

**Anion:** A negative ion, such as sulfate, nitrate, or chloride.

**Anthropogenic:** Produced by human activities.

**Anthropogenic Fire Sources:** Combustion emissions from agricultural burning by farmers and ranchers and restoration burning activities of wildland managers. These sources are computed as daily point source events.

**Apparent contrast:** Contrast at the observer of a target with respect to some background, usually an element of horizon sky directly above the target.

**Apparent spectral contrast:**Percent difference in radiant energy associated with an object and its background when the object is observed at some distance r.

**Apportionment:**To distribute or divide and assign proportionately.

**Area Sources:**Non-point land-based emissions sources that are treated as being spread over a spatial extent (usually a county or air district) and that are not movable (as compared to nonroad mobile and on-road mobile sources). Because it is not possible to collect the emissions at each point of emission, they are estimated over larger regions. These sources are computed as being spread over a spatial extent based on population, economic activity data, or other factors, and estimated with factors developed from special studies. Examples of stationary area sources are residential heating and architectural coatings.

**Artifact:**Any component of a signal or measurement that is extraneous to the variable represented by the signal or measurement.

**Atmospheric clarity:**An optical property related to the visual quality of the landscape viewed from a distance.

**Atomic absorption spectroscopy:**A method of chemical analysis based on the absorption of light of specific wavelengths of light by disassociated atoms in a flame or high temperature furnace. It is sensitive only to elements.

**Attainment area:**A geographic area in which levels of a criteria air pollutant meet the health-based National Ambient Air Quality Standard for that specific pollutant.

**Attenuation:**The diminution of quantity. In the case of visibility, attenuation or extinction refers to the loss of image-forming light as it passes from an object to the observer.

**Audit:**An investigation of the ability of a system of procedures and activities to produce data of a specified quality.

**Avg\_bp:**VIEWES parameter: Average barometric pressure; Description: Average barometric pressure during sampling; Type Code: MET

**Avg\_Temp:**VIEWES parameter: Average temperature; Description: Average temperature during sampling; Type Code: TMP; Units: DEGREES, CENTIGRADE

**B**

**babs:**VIEWES parameter: Light absorption coefficient; Description: Light Absorption Coefficient (Non-corrected); Type Code: OPT

**Back trajectory:**The modeled path of an air parcel as it is projected backward in time.

**Background luminance:**A measure of light power reflected or emitted from the background of an object within a solid angle of one steradian per unit area projected in a given direction.

**BAf:**VIEWES parameter: Barium (Fine); Description: Barium Elemental Concentration FINE Size Fraction; CAS Number: 7440-39-3; AQS Code: 84107; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_EC\_PM25:**VIEWES parameter: SEARCH Best Estimate EC PM2.5; CAS Number: 7440-44-0; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_MASS\_PM25:**VIEWES parameter: SEARCH Best Estimate MASS PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_MMO\_PM25:**VIEWES parameter: SEARCH Best Estimate MMO PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_NH4\_PM25:**VIEWS parameter: SEARCH Best Estimate NH4 PM2.5; CAS Number: 14798-03-9; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_NO3\_PM25:**VIEWS parameter: SEARCH Best Estimate NO3 PM2.5; CAS Number: 12033-49-7; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_OM\_PM25:**VIEWS parameter: SEARCH Best Estimate OM PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_OTHER\_PM25:**VIEWS parameter: SEARCH Best Estimate OTHER PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**BE\_SO4\_PM25:**VIEWS parameter: SEARCH Best Estimate SO4 PM2.5; CAS Number: 14808-79-8; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Best Available Control Technology (BACT):**A source emission limitation, based on the maximum degree of reduction for each pollutant, that must be applied by sources subject to the Prevention of Significant Deterioration program.

**Best Available Retrofit Technology (BART):**A source emission limitation, based on the maximum degree of reduction for each pollutant, that must be achieved by sources subject to the Prevention of Significant Deterioration program.

**Bext:**See extinction.

**Bias:**An unfair influence, inclination, or partiality of opinion.

**Bimodal distribution:**A plot of the frequency of occurrence of a variable versus the variable. A bimodal distribution exists if there are two maxima of the frequency of occurrence separated by a minimum. See mode.

**Biogenic Sources:**Carbon and nitrogen emissions from plant and animal activities. These sources are computed by applying meteorological data by land use type over a spatial extent (an emissions model grid cell, cross-referenced to a county or air district).

**Biological effects:**Ecological studies to determine the nature or extent of air pollution injury to biological systems.

**Brc:**VIEWS parameter: Bromine (Coarse); CAS Number: 7726-95-6; AQS Code: 83109; Type Code: COARSE; Units: UG/CU Meter (LC)

**Brf:**VIEWS parameter: Bromine (Fine); CAS Number: 7726-95-6; AQS Code: 88109; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Brightness:**A measure of the light received from an object, adjusted for the wavelength response of the human eye, so as to correspond to the subjective sensation of brightness. For visually large objects, the brightness does not depend on the distance from the observer.

**Brightness contrast:**The ratio of the difference in brightness between two objects to the brightness of the brighter of the two. It varies from 0 to -1.

**Bscat:**Scattering coefficient. Measured directly by a nephelometer, the scattering coefficient includes scattering due to particles and atmospheric gases (Rayleigh scattering). Standard reporting units are inverse megameters (Mm<sup>-1</sup>).

**bsp:**VIEWS parameter: Light scattering coefficient; Description: Light Scattering Coefficient (Bsp); Type Code: OPT; Units: Inverse megameters

**Budget:**See light extinction budget.

**C**

**Ca:**VIEWS parameter: Calcium Ion; Description: Calcium Ion; CAS Number: 7440-70-2; Type Code: AQU; Units: MILLIGRAMS/LITER

**CAA:**Clean Air Act (including all of its amendments)

**CAAA:**Clean Air Act Amendments (generally refers to Clean Air Act Amendments of 1999)

**CAC:**VIEWWS parameter: Calcium (Coarse); CAS Number: 7440-70-2; AQS Code: 83111; Type Code: COARSE; Units: UG/CU Meter (LC)

**CAF:**VIEWWS parameter: Calcium (Fine); Description: Mass of calcium particles < 2.5 um in diameter; CAS Number: 7440-70-2; AQS Code: 88111; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Calibration:**The process of submitting samples of known value to an instrument, in order to establish the relationship of value to instrumental output.

**Camera:**Device for recording visual range on film.

**CaO:**VIEWWS parameter: CaO; Units: UG/CU Meter (LC)

**car\_car:**VIEWWS parameter: Carbon Carbonate (Fine); Description: AIRS calculated; CAS Number: 7440-44-0; Type Code: CALC; Units: UG/CU Meter (LC)

**Carbon Monoxide:**One of the six criteria pollutants. A colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels.

**Cascade impactor:**An instrument that samples particles by impacting on solid surfaces via jets of air. After passing the first surface, the air is accelerated toward the next surface by a higher speed jet, in order to capture smaller particles than could be captured by the previous one.

**CAt:**VIEWWS parameter: Calcium (Tsp); Description: Mass of calcium particles from open inlet (no size cut); CAS Number: 7440-70-2; AQS Code: 12111; Type Code: TSP; Units: UG/CU Meter (LC)

**CDf:**VIEWWS parameter: Cadmium (Fine); CAS Number: 7440-43-9; AQS Code: 84110; Type Code: PM2.5; Units: UG/CU Meter (LC)

**CEf:**VIEWWS parameter: Cerium (Fine); CAS Number: 7440-45-1; Type Code: PM2.5; Units: UG/CU Meter (LC)

**CENRAP:**Central States Regional Air Partnership, one of five RPOs. Includes the states and tribal areas encompassed by Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Missouri, Arkansas, and Louisiana. Affiliated with CenSARA.

**CenSARA:**Central States Air Resource Agencies. Represents the states of Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Missouri, Arkansas, and Louisiana.

**cf\_vcode:**VIEWWS parameter: cf\_vcode; Type Code: FLAG

**Charge neutralization:**A process of removing static electric charges. This is done to particle- sampling filters in order to prevent electrostatic forces from distorting the apparent weight of the sample.

**Chemical Speciation Network (CSN):**The CSN was established to meet the regulatory requirements for monitoring speciated PM2.5 to determine the chemical composition of these particles. The purpose of the CSN is to determine, over a period of several years, trends in concentration levels of selected ions, metals, carbon species, and organic compounds in PM2.5. The program began in 1999 with 54 Speciation Trends Network (STN) sites across the nation located primarily in or near larger Metropolitan Statistical Areas (MSAs) and has increased to 200 sites nationwide. In the database and in most of the references on the VIEWWS website, this network is currently referred to as the "EPA PM2.5 Speciation - Daily" network.

**CHL:**Chloride. Primary measurement used to calculate sea salt in the revised IMPROVE algorithm.

**CHLf:** VIEWS parameter: Chloride (Fine); Description: Chloride Elemental Concentration FINE Size Fraction; CAS Number: 16887-00-6; AQS Code: 88203; Type Code: PM2.5; Units: UG/CU Meter (LC)

**CHLt:** VIEWS parameter: Chloride (Tsp); Description: Chloride ion concentration from open inlet (no size cut); Type Code: TSP; Units: UG/CU Meter (LC)

**Cl:** VIEWS parameter: Chlorine Ion; Description: Chlorine Ion; Type Code: AQU; Units: MILLIGRAMS/LITER

**Clarity:** Relative distinctness or sharpness of perceived scene elements.

**Class I Area:** As defined by the Clean Air Act, include national parks greater than 6,000 acres, wilderness areas and national memorial parks greater than 5,000 acres, and international parks that existed as of August 1977.

**Class II Areas:** Areas of the country protected under the Clean Air Act, but identified for somewhat less stringent protection from air pollution damage than Class I, except in specified cases.

**CLc:** VIEWS parameter: Chlorine (Coarse); CAS Number: 7782-50-5; AQS Code: 83115; Type Code: COARSE; Units: UG/CU Meter (LC)

**Clean Air Act:** Originally passed in 1963, the current national air pollution control program is based on the 1970 version of the law. Substantial revisions were made by the 1990 Clean Air Act Amendments.

**Clean fuels:** Low-pollution fuels that can replace ordinary gasoline, including gasohol, natural gas, and propane.

**CLf:** VIEWS parameter: Chlorine (Fine); CAS Number: 7782-50-5; AQS Code: 88115; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Cloud condensation nuclei:** Particles of liquids or solids upon which condensation of water vapor begins in the atmosphere.

**CM\_bext:** VIEWS parameter: Coarse Mass Extinction; Type Code: CALC; Units: Inverse megameters

**CM\_calculated:** VIEWS parameter: Mass, PM2.5 - PM10 (Coarse); Description: Calculated coarse mass; AQS Code: 81103; Type Code: COARSE; Units: UG/CU Meter (LC)

**CM\_measured:** VIEWS parameter: PM2.5-10: mass (SFU); Description: Gravimetric coarse mass; Type Code: COARSE; Units: UG/CU Meter (LC)

**CMAQ:** Community Multiscale Air Quality modeling system

**CO:** Carbon monoxide

**Coagulation:** The process by which small particles collide with and adhere to one another to form larger particles.

**Coarse mode:** A size range of particles between 2.5 microns and 10 microns. Coarse particles are mostly composed of soils. The sum of the masses of coarse and fine particles (all particles smaller than 10 microns) is called PM10.

**COf:** VIEWS parameter: Cobalt (Fine); CAS Number: 7440-48-4; AQS Code: 84113; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Color:** A qualitative sensation described by hue, brightness, and saturation

**Color contrast or difference:** Contrast between two adjacent scene element colors. Any difference in color hue, saturation, or brightness, between two perceived objects.

**Colorimetric analysis:** Chemical analysis based on the colors of dyes formed by the reaction of the analysis with reagents.

**Condensation:**A process by which molecules in the atmosphere collide and adhere to small particles.

**Condensation counternuclei:**An instrument that counts nucleation mode particles by causing them to grow in a humid atmosphere, and observing light reflections from the individual enlarged particles.

**Condensation nuclei:**The small nuclei or particles with which gaseous constituents in the atmosphere (e.g., water vapor) collide and adhere.

**Continuous sampling device:**An air analyzer that measures air quality components continuously. (See also monitoring, integrated sampling device).

**Contrast:**Relative difference in light coming from a target compared to the surrounding background, usually the horizon sky. Any difference in the optical quality of two adjacent images.

**Contrast change threshold:**Minimum change in contrast perceptible to an observer.

**Contrast threshold:**Minimum apparent contrast at which a target is just perceptible.

**Contrast transmittance:**Ratio between apparent and inherent spectral contrast. When the object is darker than its background, it has a value between 0 and -1. For objects brighter than their background, the value varies from 0 to infinity. When the contrast transmittance is equal to zero, the object cannot be seen.

**CRc:**VIEWES parameter: Chromium (Coarse); CAS Number: 7440-47-3; AQS Code: 83112; Type Code: COARSE; Units: UG/CU Meter (LC)

**CRf:**VIEWES parameter: Chromium (Fine); CAS Number: 7440-47-3; AQS Code: 88112; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Criteria Pollutant:**EPA uses six "criteria pollutants" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter and lead.

**CSf:**VIEWES parameter: Cesium (Fine); CAS Number: 7440-46-2; Type Code: PM2.5; Units: UG/CU Meter (LC)

**CUc:**VIEWES parameter: Copper (Coarse); CAS Number: 7440-50-8; AQS Code: 83114; Type Code: COARSE; Units: UG/CU Meter (LC)

**CUf:**VIEWES parameter: Copper (Fine); Description: Copper Elemental Concentration FINE Size Fraction; CAS Number: 7440-50-8; AQS Code: 88114; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Current conditions:**Refers to contemporary, or modern, atmospheric conditions that are affected by human activity.

**D**

**DataBrowser Submit button:**The large button in the middle of the Data Browser toolbar that has a green arrow pointing to the word "Submit".

**DataBrowser tabs:**The series of simulated "folder tabs" that appear along the top of the main Data Browser panel. The first of these tabs is labeled "Select Report".

**Datalogger:**An electronic device for measuring analog or digital signals and recording the results on a storage media. Many of them can record inputs on a number of separate locations, reporting them as separate "channels."

**Deciview:**The unit of measurement of haze, as in the haze index (HI) defined below.

**Deliquescence:**The process that occurs when the vapor pressure of the saturated aqueous solution of a substance is less than the vapor pressure of the water in the ambient air. Water vapor is collected until the substance is dissolved and in equilibrium with its environment.

**Dew point:**The temperature at which humidity in the air will condense upon a solid surface.

**Dichotomous:**Any particle sampler that separately collects coarse and fine particles sampler from one atmosphere. Often refers to virtual impactor instruments.

**Diffraction:**Modification of the behavior of a light wave resulting from limitations of its lateral extent by an obstacle. For example, the bending of light into the “shadow area” behind a particle.

**Diffusion:**A process by which substances, heat, or other properties of a medium are transferred from regions of higher concentration to regions of lower concentration.

**Direct effects:**The optical effects of aerosols on climate modification referring to absorption and scattering of solar radiation by airborne particles.

**Dirtiest, or haziest, days of the year.:**

**Discoloration:**Any change in the apparent color of an image. Often refers to the loss of blue sky color due to air pollution.

**Dose-response:**The relationship between the dose of a pollutant and its effect on a biological system.

**Dry deposition:**Also known as dryfall, includes gases and particles deposited from the atmosphere to water and land surfaces. This dryfall can include acidifying compounds such as nitric acid vapor, nitrate and sulfate particles, and acidic gases.

**dv:**IEWS parameter: deciview; Type Code: CALC; Units: Deciview

**E**

**E-GRID:**Emissions & Generation Resource Integrated Database

**EC:**Elemental carbon (see LAC).

**EC1f:**IEWS parameter: Carbon, Elemental Fraction 1 (Fine); CAS Number: 7440-44-0; AQS Code: 88329; Type Code: PM2.5; Units: UG/CU Meter (LC)

**EC2f:**IEWS parameter: Carbon, Elemental Fraction 2 (Fine); CAS Number: 7440-44-0; AQS Code: 88330; Type Code: PM2.5; Units: UG/CU Meter (LC)

**EC3f:**IEWS parameter: Carbon, Elemental Fraction 3 (Fine); CAS Number: 7440-44-0; AQS Code: 88331; Type Code: PM2.5; Units: UG/CU Meter (LC)

**ECf:**IEWS parameter: Carbon, Elemental Total (Fine); Description: From TOR carbon fractions (E1+E2+E3-OP); CAS Number: 7440-44-0; AQS Code: 88321; Type Code: PM2.5; Units: UG/CU Meter (LC)

**ECf\_bext:**IEWS parameter: Carbon, Elemental Extinction (Fine); CAS Number: 7440-44-0; Type Code: CALC; Units: Inverse megameters

**ECf\_NIOSH:**IEWS parameter: Carbon, Elemental Total (Fine) (NIOSH); Description: Organic Carbon from STN (NIOSH); CAS Number: 7440-44-0; Type Code: PM2.5; Units: UG/CU Meter (LC)

**EChf:**IEWS parameter: Eh IMPROVE Pm2.5 LC; CAS Number: 7440-44-0; AQS Code: 88323; Type Code: PM2.5; Units: UG/CU Meter (LC)

**ECOS:**Environmental Council of the States

**Edge sharpness:**Characteristic of landscape features. Landscape features with sharp edges contain scenic features with abrupt changes in brightness.

**EFF:** VIEWS parameter: Rain Gauge Efficiency Ratio; Description: Rain Gauge Efficiency Ratio (Svol/Ppt); Type Code: AQU

**EI:** Emission Inventory

**Electrical aerosol:** A particle sampler that puts electrical charges on particles and sorts analyze them by their different drift rates in an electric field.

**Elevated layer:** A pollution distribution that is not in contact with the ground.

**Emissions:** Gaseous or particulate pollutants entering the atmosphere due to a man-made or natural process.

**EPA:** Environmental Protection Agency

**Equilibration:** A balancing or counter balancing to create stability, often with a standard measure or constant.

**Equivalent contrast:** Any scene can be fourier decomposed into light and dark bars of various frequencies and intensities modulated in accordance with a sine wave function. Equivalent contrast is the average contrast of those sine waves within a specified range of spatial frequencies.

**EUf:** VIEWS parameter: Europium (Fine); CAS Number: 7440-53-1; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Externally mixed:** Particulate species that co-exist as separate particles without co-mingling or combining.

**Extinction:** The attenuation of light due to scattering and absorption as it passes through a medium.

**Extinction budget:** Apportioning the extinction coefficient to atmospheric constituents to analysis estimate the change in visibility caused by a change in constituent concentrations.

**Extinction coefficient:** A measure of the ability of particles or gases to absorb and scatter photons from a beam of light; a number that is proportional to the number of photons removed from the sight path per unit length. See absorption.

**Extinction cross section:** The amount of light scattered and absorbed by a particle divided by its physical cross section.

F

**f(RH):** Light scattering enhancement factor due to the uptake of water by certain aerosol species, based on relative humidity. There are several versions of the f(RH) function used in the original and revised IMPROVE algorithms.

**fabs:** VIEWS parameter: Filter Absorption Coefficient; Description: Filter Absorption Coefficient (Non-corrected); AQS Code: 63102; Type Code: OPT

**Fe<sub>2</sub>O<sub>3</sub>:** VIEWS parameter: Fe<sub>2</sub>O<sub>3</sub>; CAS Number: 1309-37-1; Units: UG/CU Meter (LC)

**FEc:** VIEWS parameter: Iron (Coarse); CAS Number: 7439-89-6; AQS Code: 83126; Type Code: COARSE; Units: UG/CU Meter (LC)

**FEf:** VIEWS parameter: Iron (Fine); CAS Number: 7439-89-6; AQS Code: 88126; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Field Cond:** VIEWS parameter: Field Conductance; Description: Conductance of the precipitation sample as measured in the field laboratory, reported in microsiemens per centimeter.; Type Code: MET; Units: MICROSIEMENS/CENTIMETER

**Fine particles:** Particulate matter with an aerodynamic diameter of 2.5 microns or less (PM<sub>2.5</sub>). Fine particles are responsible for most atmospheric particle-induced extinction. Ambient fine particulate matter consists basically of five species

**Fine particulate matter:**Particulate matter with an aerodynamic diameter less than 2.5 microns(PM2.5).

**FIP:**Federal Implementation Plan

**FLM:**Federal Land Manager

**fIRH:**IEWS parameter: Large particle size fRH; Type Code: CALC; Units: Unspecified

**fRH:**IEWS parameter: Relative Humidity Factor; Type Code: MET

**fRHgrid:**IEWS parameter: Relative Humidity Factor (Climatological Monthly); Description: Based on climatological monthly average RH from EPA; Type Code: CALC; Units: PERCENT

**FRM\_EC\_PM25:**IEWS parameter: SEARCH FRM Equivalent EC PM2.5; CAS Number: 7440-44-0; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_Mass:**IEWS parameter: FRM Mass; Units: UG/CU Meter (LC)

**FRM\_Mass\_non-Blank:**IEWS parameter: FRM Mass non-Blank; Units: UG/CU Meter (LC)

**FRM\_MASS\_PM25:**IEWS parameter: SEARCH FRM Equivalent MASS PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_MMO\_PM25:**IEWS parameter: SEARCH FRM Equivalent MMO PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_NH4:**IEWS parameter: FRM NH4; CAS Number: 14798-03-9; Units: UG/CU Meter (LC)

**FRM\_NH4\_PM25:**IEWS parameter: SEARCH FRM Equivalent NH4 PM2.5; CAS Number: 14798-03-9; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_NO3:**IEWS parameter: FRM NO3; CAS Number: 12033-49-7; Units: UG/CU Meter (LC)

**FRM\_NO3\_PM25:**IEWS parameter: SEARCH FRM Equivalent NO3 PM2.5; CAS Number: 12033-49-7; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_OM\_PM25:**IEWS parameter: SEARCH FRM Equivalent OM PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_OTHER\_PM25:**IEWS parameter: SEARCH FRM Equivalent OTHER PM2.5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**FRM\_SO4:**IEWS parameter: FRM SO4; CAS Number: 14808-79-8; Units: UG/CU Meter (LC)

**FRM\_SO4\_PM25:**IEWS parameter: SEARCH FRM Equivalent SO4 PM2.5; CAS Number: 14808-79-8; Type Code: PM2.5; Units: UG/CU Meter (LC)

**fsRH:**IEWS parameter: Small particle size fRH; Type Code: CALC; Units: Unspecified

**fssRH:**IEWS parameter: Sea salt fRH; Type Code: CALC; Units: Unspecified

**Fugitive Dust:**Emissions associated with anthropogenic mechanical processes affecting the release of dust and organic carbon from disturbed or undisturbed lands. These sources are computed as being spread over a spatial extent (a county or air district).

## G

**GAf:**IEWS parameter: Gallium (Fine); Description: Fine (PM2.5) particles of elemental Gallium (GA); CAS Number: 7440-55-3; AQS Code: 84124; Type Code: PM2.5; Units: UG/CU Meter (LC)

**GEf:** VIEWS parameter: Germanium (Fine); Description: Germanium Elemental Concentration FINE Size Fraction; CAS Number: 7440-56-4; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Glide Path:** The Regional Haze Rule mathematical curve between baseline (2000-04) conditions and natural (2064) conditions. Also called Glide Slope.

**Glide Slope:** The Regional Haze Rule mathematical curve between baseline (2000-04) conditions and natural (2064) conditions. Also called Glide Path.

## H

**H1:** VIEWS Status Flag: Historical data that have not been assessed or validated.; Source: NARSTO

**Hazardous air pollutants (HAP):** Airborne chemicals that cause serious health and environmental effects.

**Haze:** An atmospheric aerosol of sufficient concentration to be visible. The particles are so small that they cannot be seen individually, but are still effective in scene distortion and visual range restriction. See an example of uniform and Layered Hazes.

**Hf:** VIEWS parameter: Hydrogen (Fine); Description: Hydrogen Elemental Concentration FINE Size Fraction; CAS Number: 1333-74-0; AQS Code: 88337; Type Code: PM2.5; Units: UG/CU Meter (LC)

**HFf:** VIEWS parameter: Hafnium (Fine); CAS Number: 7440-58-6; AQS Code: 88127; Type Code: PM2.5; Units: UG/CU Meter (LC)

**HgConc:** VIEWS parameter: Total Mercury Concentration

**HgDep:** VIEWS parameter: Total Mercury Deposition

**HGf:** VIEWS parameter: Mercury (Fine); CAS Number: 7439-97-6; AQS Code: 84142; Type Code: PM2.5; Units: UG/CU Meter (LC)

**High volume:** A simple particle sampler consisting of a filter holder and a vacuum sampler cleaner blower, in a simple rain shelter. Some units have flow measuring or controlling features.

**HNO3:** VIEWS parameter: Nitric Acid; CAS Number: 7697-37-2; AQS Code: 42305; Type Code: GAS; Units: UG/CU Meter (LC)

**Homogenous nucleation:** Process by which gases interact and combine with droplets made up of their own kind. For instance, the collision and subsequent adherence of water vapor to a water droplet is homogenous nucleation. See nucleation.

**Hue:** Attribute of color that determines whether it is red, yellow, green, blue, or other color. It is most strongly related to wavelength of light.

**Humidity:** Water in air, as a gas. Often measured as a percentage, compared to the maximum amount of water vapor the air can contain at that temperature.

**Hydrocarbons:** Compounds containing only hydrogen and carbon. Examples

**Hydrophobic:** Lacking affinity for water, or failing to adsorb or absorb water.

**Hygroscopic:** Readily absorbing moisture, as from the atmosphere.

## I

**I0:** VIEWS Status Flag: Invalid value - unknown reason; Source: VIEWS

**I1:** VIEWS Status Flag: Invalid value - known reason; Source: VIEWS

**I2:** VIEWS Status Flag: Invalid value (-999), though sample-level flag seems valid (SEM); Source: VIEWS

**Illumination:** Application of visible radiation to an object.

**Impairment:**The degree to which a scenic view or distance of clear visibility is degraded by man-made pollutants.

**IMPROVE:**Interagency Monitoring of PROtected Visual Environments; a collaborative monitoring program established in the mid-1980s as part of the Federal Implementation Plans. IMPROVE objectives are to provide data needed to assess the impacts of new emission sources, identify existing man-made visibility impairment, and assess progress toward the national visibility goals that define protection of the 156 Class I areas.

**IMPROVE algorithm, original:**Algorithm used to calculate light extinction from IMPROVE monitoring data, developed in the 1980s.

**IMPROVE algorithm, revised:**Algorithm used to calculate light extinction from IMPROVE monitoring data, developed in 2005. The revised algorithm includes: variable scattering efficiencies for sulfates, nitrates, and organic matter; a larger multiplier to calculate organic mass from organic carbon; inclusion of site-specific Rayleigh scattering; inclusion of extinction from sea salt; and inclusion of extinction from NO<sub>2</sub> (optional).

**Indirect effects:**Non-optical atmospheric effects of aerosols on cloud albedo and formation, e. g., as condensation nuclei for cloud droplets.

**Inf:**VIEWS parameter: Indium (Fine); Description: Indium Elemental Concentration FINE Size Fraction; CAS Number: 7440-74-6; AQS Code: 84131; Type Code: PM<sub>2.5</sub>; Units: UG/CU Meter (LC)

**Inhalable particulate matter:**Particles smaller than about 12 micrometers in diameter, capable of being drawn into the human bronchial system. Larger particles tend to be filtered out in the upper respiratory tract.

**Inherent spectral contrast:**Percent difference in radiant energy associated with an object and its background at an observer distance equal to zero.

**Integral vistas:**Scenic views which extend beyond Class I boundaries, that are critical to the enjoyment of the area.

**Integrated Database:**The primary VIEWS relational database where data from individual programs are normalized and integrated into a common schema. This integration enables the management, analysis, and visualization of disparate source data formats by a common set of tools.

**Integrated Planning Model (IPM):**An electric utility planning model that EPA uses to estimate air emission changes, incremental electric power system costs, changes in fuel use and prices, and other impacts of various approaches to air pollution control.

**Integrated sampling:**An air sampling device that allows estimation of air quality components device over a period of time (e.g., 24 hours to two weeks) through laboratory analysis of the sampler's medium.

**Integrating nephelometer:**An instrument that measures the amount of light scattered (scattering coefficient).

**Internally mixed:**Refers to the situation where individual particles contain one or more species. For example, water is internally mixed with its hygroscopic hosts.

**invalidcode:**VIEWS parameter: Sample Invalidation Code; Description: A series of codes assigned to samples which are considered invalid by NADP/NTN for the purposes of computing weighted-mean concentrations, depositions, and data completeness estimates. The codes indicate the reasons for invalidation. b = bulk sample (Collector was open continuously.); u = undefined sample (Collector was open for > 6 hours and less than the

entire sampling interval when no precipitation was occurring; f = field protocol departure; c = contaminated sample; v = inadequate volume for analysis; e = extended sampling interval (> 8 days); l = lab error; i = incomplete chemical analyses; n = no sample collected; p = precipitation amount unknown; x = reasons other than described above.; Type Code: FLAG

**Inversion:**See temperature inversion.

**Ion:**A charged molecular group or atom.

**Ion chromatography:**A method of separating ions by their different speeds of passage through an ion-exchange resin. The ions are usually detected by their conductivity.

**IRf:**VIEWS parameter: Iridium (Fine); CAS Number: 7439-88-5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Isopleth:**A line drawn on a map through all points having the same numerical value.

**Isotropic:**A situation where a quantity (or its spatial derivatives) are independent of position or direction.

**Isotropic scattering:**The process of scattering light equally in all directions.

J

**Just noticeable change:**A variation of just noticeable difference that relates directly to human visual perception. A JNC corresponds to the amount of optical change in the atmosphere required to evoke human recognition of a change in a given landscape (scenic) appearance. The change in atmospheric optical properties may be expressed as the number of JNC's between views of a given scene at different intervals of time.

**Just noticeable difference:**Measure of change in image appearance that affects image sharpness. Counting the number of JND's (detectable changes) in scene appearance is regarded as an alternative method of quantifying visibility reduction (light extinction).

K

**K:**VIEWS parameter: Potassium Ion; Description: Potassium Ion; CAS Number: 7440-09-7; Type Code: AQU; Units: MILLIGRAMS/LITER

**K2O:**VIEWS parameter: K2O; CAS Number: 12136-45-7; Units: UG/CU Meter (LC)

**Kc:**VIEWS parameter: Potassium (Coarse); CAS Number: 7440-09-7; AQS Code: 83180; Type Code: COARSE; Units: UG/CU Meter (LC)

**Kf:**VIEWS parameter: Potassium (Fine); Description: Mass of potassium particles < 2.5 um in diameter; CAS Number: 7440-09-7; AQS Code: 88180; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Kf\_ion:**VIEWS parameter: Potassium ion (Fine); Description: Mass of potassium particles < 2.5 um in diameter, EPA Speciation ions; CAS Number: 7440-09-7; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Koschmeider constant:**The constant in the reciprocal relationship between standard visual range and the extinction coefficient.

**Kt:**VIEWS parameter: Potassium (Tsp); Description: Mass of potassium particles from open inlet (no size cut); CAS Number: 7440-09-7; AQS Code: 12180; Type Code: TSP; Units: UG/CU Meter (LC)

L

**Lab Cond:**VIEWS parameter: Lab Conductance; Description: Conductance of the precipitation sample as measured at the CAL, reported in microsiemens per centimeter.; Type Code: MET; Units: MICROSIEMENS/CENTIMETER

**Lab Type:** VIEWS parameter: Lab Type; Description: A code indicating the condition of the sample upon arrival at the CAL.; Type Code: FLAG

**LAC:** Light absorbing carbon (see EC).

**LADCO:** Lake Michigan Air Directors Consortium. Represents states of Illinois, Indiana, Michigan, and Wisconsin.

**Laf:** VIEWS parameter: Lanthanum (Fine); Description: Lanthanum Elemental concentration FINE Size Fraction ; CAS Number: 7439-91-0; AQS Code: 84146; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Large Fraction:** Pertains to the revised IMPROVE algorithm. Measured sulfate, nitrate, and organic matter are assumed to be the combination of large and small size distributions, each with separate extinction efficiencies and f(RH) functions.

**Layered haze:** Haze that obscures a horizontal layer of a vista.

**Light:** Radiant energy that is capable of exciting the retina and producing a visual sensation. This definition is the one most meaningful for display professionals, although it differs from the definition frequently used by physicists. Our definition excludes ultraviolet (UV) and infrared (IR) wavelengths. UV is shorter in wavelength than light as we've defined it, and IR is longer. The visible wavelengths of the electromagnetic spectrum extend from about 380 to 770 nm. The unit of light energy is the lumen second.

**Light energy:** Electromagnetic energy in the visibility spectrum, i.e. wave lengths between 0.4 and 0.7 micrometers.

**Light extinction budget:** The percent of total atmospheric extinction attributed to each aerosol and gaseous component of the atmosphere.

**Liquid water:** The water present within a cloud expressed as a percent of total cloud constituents, or liquid phase water in an aerosol.

**Long path measurement:** An atmospheric measurement process that is made over distances in excess of a few hundred meters.

**Luminance:** A measure of light power reflected or emitted from an object within a solid angle of one steradian per unit area area projected in a given direction. The SI unit is the candela per square meter, which is sometimes called a nit. See Brightness, Luminance, and Confusion from Information Display, March 1993 by Charles P. Halsted at <http>

**Luminous flux:** Visible power, or light energy per unit of time. It is measured in lumens. One watt of radiant power at 555 nm--the wavelength at which the typical human eye is most sensitive--is equivalent to a luminous flux of 680 lumens. See brightness, luminance, and confusion from Information Display, March 1993 by Charles P. Halsted at <http>

**Luminous intensity:** The luminous flux per solid angle emitted or reflected from a point. The unit of measure is the lumen per steradian, or candela (cd). (The steradian is the unit of measurement of a solid angle.

## M

**M1:** VIEWS Status Flag: Missing value because no value is available; Source: NARSTO

**M2:** VIEWS Status Flag: Missing value because invalidated by data originator; Source: NARSTO

**M3:** VIEWS Status Flag: Missing value due to clogged filter; Source: NARSTO

**Major source:** A stationary facility that emits a regulated pollutant in an amount exceeding the threshold level (100 or 250 tons per year, depending on the type of facility).

**MARAMA:**Mid-Atlantic Regional Air Management Association. Represents the states of Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia, the city of Philadelphia and the District of Columbia.

**Matrix filter:**A filter that is formed of a mat or matrix of fibers. It is physically thick, and particles are trapped deep in its structure.

**Max\_bp:**IEWS parameter: Maximum barometric pressure; Description: Maximum barometric pressure during sampling; Type Code: MET

**Max\_Temp:**IEWS parameter: Maximum temperature; Description: Maximum temperature during sampling; Type Code: TMP; Units: DEGREES, CENTIGRADE

**Membrane filter:**A thin filter, usually made of a synthetic polymer, with microscopic holes in it. Particles are collected only on the surface facing the air flow.

**Metadata:**Data about data. In data processing, meta-data is definitional data that provides information about or documentation of other data managed within an application or environment.

**MF:**IEWS parameter: Mass, PM2.5 (Fine); Description: Gravimetric fine mass; AQS Code: 88502; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Mg:**IEWS parameter: Magnesium Ion; Description: Magnesium Ion; CAS Number: 7439-95-4; Type Code: AQU; Units: MILLIGRAMS/LITER

**MGc:**IEWS parameter: Magnesium (Coarse); Description: Magnesium Elemental Concentration FINE Size Fraction; CAS Number: 7439-95-4; AQS Code: 83140; Type Code: COARSE; Units: UG/CU Meter (LC)

**MGf:**IEWS parameter: Magnesium (Fine); Description: Mass of magnesium particles < 2.5 um in diameter; CAS Number: 7439-95-4; AQS Code: 88140; Type Code: PM2.5; Units: UG/CU Meter (LC)

**MGt:**IEWS parameter: Magnesium (Tsp); Description: Mass of magnesium particles from open inlet (no size cut); CAS Number: 7439-95-4; AQS Code: 12140; Type Code: TSP; Units: UG/CU Meter (LC)

**Micron:**A unit of length equal to one millionth of a meter; the unit of measure for wavelength.

**Midwest RPO:**One of the five RPOs. Affiliated with LADCO. Includes the states and tribal areas encompassed by Illinois, Indiana, Michigan, Ohio, and Wisconsin.

**Mie scattering:**The attenuation of light in the atmosphere by scattering due to particles of a size comparable to the wavelength of the incident light. This is the phenomenon largely responsible for the reduction of atmospheric visibility. Visible solar radiation falls into the range from 0.4 to 0.8  $\mu\text{m}$ , roughly with a maximum intensity around 0.52  $\mu\text{m}$ .

**Min\_bp:**IEWS parameter: Minimum barometric pressure; Description: Minimum barometric pressure during sampling; Type Code: MET

**Min\_Temp:**IEWS parameter: Minimum temperature; Description: Minimum temperature during sampling; Type Code: TMP; Units: DEGREES, CENTIGRADE

**Mixing layer:**An unstable layer of air that has turbulent mixing, usually due to solar heating of the ground. It is often capped by a stable layer of air.

**MM5:**Mesoscale Meteorological Model. A numerical model for weather prediction on scales from continental to one km.

**MNc:**IEWS parameter: Manganese (Coarse); CAS Number: 7439-96-5; AQS Code: 83132; Type Code: COARSE; Units: UG/CU Meter (LC)

**MNf:**VIEWWS parameter: Manganese (Fine); CAS Number: 7439-96-5; AQS Code: 88132; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Mobile sources:**Moving objects that release regulated air pollutants, (e.g., cars, trucks, buses, airplanes, trains, motorcycles, and gas-powered lawn mowers). See also source; stationary source.

**Mode:**The maximum point in a plot of the frequency of occurrence of a variable versus the variable.

**Models-3/CMAQ:**Community Multiscale Air Quality model is a unique numerical grid model capable of operating as part of the Models-3 framework for the purpose of estimating pollutant concentrations for multiple pollutants (including ozone, particulate matter, precursor and component species, regional haze, air toxins, etc.) in "one-atmosphere" model applications.

**Modulation transfer function (MTF):**Mathematical function which describes contrast transmittance in spatial-frequency space. It is the ratio between scene equivalent contrast at the observer and equivalent contrast at the object. When the object of interest is small compared to its surroundings, the modulation transfer function and contrast transmittance reduce to the same value.

**MOf:**VIEWWS parameter: Molybdenum (Fine); CAS Number: 7439-98-7; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Monitoring:**Measurement of air pollution and related atmospheric parameters. See also continuous sampling device, integrated sampling device.

**Most impaired days:**Data representing a subset of the annual measurements that correspond to the

**Most Recent Data:**Any new data we receive is imported into our integrated database. Though much of our data is also available in static ASCII text files, those files are regenerated periodically and may not include the most recent data updates as a result.

**MOU:**Memorandum of Understanding.

**MT:**VIEWWS parameter: Mass, PM10 (Total); Description: Gravimetric mass < 10 um in diameter; AQS Code: 85101; Type Code: PM10; Units: UG/CU Meter (LC)

## N

**N2f:**VIEWWS parameter: Nitrite (Fine); CAS Number: 14797-65-0; AQS Code: 88338; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Na:**VIEWWS parameter: Sodium Ion; Description: Sodium Ion; CAS Number: 7440-23-5; Type Code: AQU; Units: MILLIGRAMS/LITER

**NA:**VIEWWS Status Flag: Not available from source data; Source: VIEWWS

**NAc:**VIEWWS parameter: Sodium (Coarse); Description: Sodium Elemental Concentration FINE Size Fraction; CAS Number: 7440-23-5; AQS Code: 83184; Type Code: COARSE; Units: UG/CU Meter (LC)

**NAf:**VIEWWS parameter: Sodium (Fine); Description: Mass of sodium particles < 2.5 um in diameter; CAS Number: 7440-23-5; AQS Code: 88184; Type Code: PM2.5; Units: UG/CU Meter (LC)

**NAf\_ion:**VIEWWS parameter: Sodium ion (Fine); Description: Mass of sodium particles < 2.5 um in diameter, EPA Speciation ions; CAS Number: 7440-23-5; Type Code: PM2.5; Units: UG/CU Meter (LC)

**NAS:**National Academy of Sciences

**NAt:** VIEWS parameter: Sodium (Tsp); Description: Mass of sodium particles from open inlet (no size cut); CAS Number: 7440-23-5; AQS Code: 12184; Type Code: TSP; Units: UG/CU Meter (LC)

**National Acid Precipitation Assessment (NAPAP):** The 10-year (1980-1990) interagency research program designed to investigate acid deposition and its effects nationwide. The products of this program are the series of State of the Science and Technology Program documents that summarize what we know about the severity of acid deposition and the resources it affects.

**National Ambient Air Quality Standards:** Permissible levels of criteria air pollutants established to protect public health and welfare. Established and maintained by EPA under authority of the Clean Air Act.

**National Atmospheric Program:** A national network of about 200 sites where wet deposition is collected weekly and sent to the Central Analytical Laboratory in Illinois for Deposition chemical analysis. This network has operated since 1977 and is funded (NADP) by seven federal agencies, and numerous cooperators in agencies, universities, and industry. This network of predominately rural sites is designed to represent broad, regional patterns of deposition.

**Natural conditions:** Prehistoric and pristine atmospheric states, i. e., atmospheric conditions that are not affected by human activities.

**Natural Conditions II:** Alternate method for calculating natural conditions. Used in conjunction with the revised IMPROVE algorithm.

**Natural Fire Sources:** Combustion emissions from wildfire, wildland fire use, non-federal rangeland burning, and maintenance burning activities of wildland managers. These sources are computed as daily point source events.

**Nbf:** VIEWS parameter: Niobium (Fine); CAS Number: 7440-03-1; Type Code: PM2.5; Units: UG/CU Meter (LC)

**NC II:** Natural conditions II. Alternate method for calculating natural conditions. Used in conjunction with the revised IMPROVE algorithm.

**Nephelometer:** An instrument used to measure the light scattering component of light extinction.

**Network:** A collection of environmental monitoring locations operated according to a common set of protocols and objectives. Often synonymous with "Program".

**Neutron activation:** A method of chemical analysis in which the sample is bombarded with analysis neutrons in a nuclear reactor. The nuclei of various elements in the sample are modified to radioactive forms, and the concentrations of the elements are then determined by the intensities and wavelengths of the radiation emitted.

**NGM:** Nested Grid Model, a regional atmospheric model.

**NH3:** VIEWS parameter: Ammonia (vapor phase only); CAS Number: 7664-41-7; Type Code: GAS; Units: UG/CU Meter (LC)

**NH4:** VIEWS parameter: Ammonium Ion; Description: Ammonium Ion; CAS Number: 14798-03-9; Type Code: AQU; Units: MILLIGRAMS/LITER

**NH4f:** VIEWS parameter: Ammonium Ion (Fine); Description: Mass of ammonium particles < 2.5 um in diameter; CAS Number: 14798-03-9; Type Code: PM2.5; Units: UG/CU Meter (LC)

**NH4t:** VIEWS parameter: Ammonium Ion (Tsp); Description: Mass of ammonium particles from open inlet (no size cut); CAS Number: 14798-03-9; Type Code: TSP; Units: UG/CU Meter (LC)

**NIc:** VIEWS parameter: Nickel (Coarse); CAS Number: 7440-02-0; AQS Code: 83136; Type Code: COARSE; Units: UG/CU Meter (LC)

**NI f:** VIEWS parameter: Nickel (Fine); CAS Number: 7440-02-0; AQS Code: 88136; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Nitrogen dioxide:** A gas (NO<sub>2</sub>) consisting of one nitrogen and two oxygen atoms. It absorbs blue light and therefore has a reddish-brown color associated with it.

**NO:** Nitrous oxide

**NO<sub>2</sub>:** Nitrogen dioxide

**NO<sub>3</sub>:** VIEWS parameter: Nitrate Ion; Description: Nitrate Ion; CAS Number: 12033-49-7; Type Code: AQU; Units: MILLIGRAMS/LITER

**NO<sub>3</sub>\_whatman:** VIEWS parameter: Nitrate from whatman; Description: Nitrate from CASTNet filter pack whatman; CAS Number: 12033-49-7; Type Code: UNS; Units: UG/CU Meter (LC)

**NO<sub>3</sub> f:** VIEWS parameter: Nitrate (Fine); Description: Mass of nitrate particles < 2.5 um in diameter; CAS Number: 12033-49-7; AQS Code: 88306; Type Code: PM2.5; Units: UG/CU Meter (LC)

**NO<sub>3</sub> sum:** VIEWS parameter: Nitrate (total tsp & vapor); Description: Sum of HNO<sub>3</sub> and particle NO<sub>3</sub>-; CAS Number: 12033-49-7; Type Code: CALC; Units: UG/CU Meter (LC)

**NO<sub>3</sub> t:** VIEWS parameter: Nitrate (Tsp); Description: Mass of nitrate particles from open inlet (no size cut); CAS Number: 12033-49-7; AQS Code: 12306; Type Code: TSP; Units: UG/CU Meter (LC)

**Nonattainment area:** A geographic area in which the level of a criteria air pollutant is higher than the level allowed by the federal standards. For NAAQS, where the pattern of "violations of standard" is sufficient to require remedial action; a boundary is determined around the location of the violations. The area within that boundary is designated to be in non-attainment of the particular NAAQS standard and an enforceable plan is developed to prevent additional violations.

**NO<sub>x</sub>:** Oxides of nitrogen (NO + NO<sub>2</sub>). One of the six criteria pollutants. The term used to describe the sum of nitric oxide (NO), nitric dioxide (NO<sub>2</sub>), and other oxides of nitrogen, which plays a major role in the formation of ozone. The major sources of man-made NO<sub>x</sub> emissions are high temperature combustion processes, such as those occurring in automobiles and power plants.

**NSPS:** New Source Performance Standard. A standard for emissions from new stationary sources. These sources are divided into several categories.

**NSR:** New Source Review. Federal air program that establishes control technologies and emission limits for new major sources and for major modifications at existing sources.

**Nucleation:** Process by which a gas interacts and combines with droplets. See homogenous nucleation.

**Nuclei mode:** A size range of particles below about 0.1 micrometer in diameter. These particles are the nuclei around which larger particles grow.

**nv\_nitrate:** VIEWS parameter: Non-Volatile Nitrate (Fine); Description: AIRS calculated; CAS Number: 12033-49-7; Type Code: CALC; Units: UG/CU Meter (LC)

## O

**O3:** VIEWS parameter: Ozone; CAS Number: 10028-15-6; AQS Code: 44201; Type Code: GAS; Units: PARTS PER BILLION

**OAQPS:** Office of Air Quality Planning and Standards (of USEPA)

**OAR:** Office of Air and Radiation

**Object luminance:** A measure of light power reflected or emitted from an object itself within a solid angle of one steradian per unit area projected in a given direction.

**OC:** Organic carbon.

**OC1f:** VIEWS parameter: Carbon, Organic Fraction 1 (Fine); CAS Number: 7440-44-0; AQS Code: 88332; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OC2f:** VIEWS parameter: Carbon, Organic Fraction 2 (Fine); CAS Number: 7440-44-0; AQS Code: 88333; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OC3f:** VIEWS parameter: Carbon, Organic Fraction 3 (Fine); CAS Number: 7440-44-0; AQS Code: 88334; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OC4f:** VIEWS parameter: Carbon, Organic Fraction 4 (Fine); CAS Number: 7440-44-0; AQS Code: 88335; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OCf:** VIEWS parameter: Carbon, Organic Total (Fine); Description: From TOR carbon fractions (OC1+OC2+OC3+OC4+OP); CAS Number: 7440-44-0; AQS Code: 88320; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OCf\_NIOSH:** VIEWS parameter: Carbon, Organic Total (Fine) (NIOSH); Description: Organic Carbon from STN (NIOSH); CAS Number: 7440-44-0; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OCf\_NIOSHadj:** VIEWS parameter: Carbon, Organic Total (Fine) (NIOSH Adjusted); Description: Organic Carbon from STN (NIOSH Adjusted for blank correction); CAS Number: 7440-44-0; Type Code: CALC; Units: UG/CU Meter (LC)

**OCHf:** VIEWS parameter: Oh IMPROVE Pm2.5 LC; CAS Number: 7440-44-0; AQS Code: 88322; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OCMf\_NIOSH:** VIEWS parameter: Carbon, Organic Mass (Fine) (NIOSH Adjusted); Description:  $1.4 * OCf\_NIOSHadj$ ; CAS Number: 7440-44-0; Type Code: CALC; Units: UG/CU Meter (LC)

**OCX2f:** VIEWS parameter: Carbon, Organic Fraction 2 (Fine) (NIOSH); Description: EPA PM 2.5 Chemical Speciation Network, NIOSH 5040; CAS Number: 7440-44-0; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Off-Road Mobile Sources:** Emissions sources from vehicular and otherwise movable sources not traveling on roadways. These sources are computed as being spread over a spatial extent (a county or air district). Off-road mobile source emissions are estimated as the products of emissions factors and activity estimates. Examples of nonroad mobile sources include locomotives, lawn and garden equipment, construction vehicles, and boat emissions.

**Off-Shore Sources:** Emissions sources occurring in the open ocean distinctly separated from land-based activities. These sources are computed by applying activity location data by emissions activity type over a spatial extent (marine shipping in an emissions model grid cell) or emissions sources that are identified by point locations (oil drilling and production platforms). The emissions from off-shore marine shipping are in the international portions of the open ocean, not associated with port activities; the emissions from ships, tugboats, and cruise vessels in and around ports and harbors are included in

the nonroad mobile sources category and are regulated by states, counties, and/or air districts.

**OMC:**Organic mass estimated from the IMPROVE organic carbon measurement (see POM).

**OMCf:**VIEWES parameter: Carbon, Organic Mass (Fine) (1.8\*OC); Description: 1.8 \* OC; CAS Number: 7440-44-0; AQS Code: 88350; Type Code: PM2.5; Units: UG/CU Meter (LC)

**OMCf\_1.4:**VIEWES parameter: Carbon, Organic Mass (Fine) (1.4\*OC); Description: 1.4 \* OC; CAS Number: 7440-44-0; Type Code: CALC; Units: UG/CU Meter (LC)

**OMCf\_bext:**VIEWES parameter: Carbon, Organic Extinction (Fine); CAS Number: 7440-44-0; Type Code: CALC; Units: Inverse megameters

**OMCf\_Large:**VIEWES parameter: Organic Carbon Mass (Fine), Large Fraction; CAS Number: 7440-44-0; Type Code: CALC; Units: UG/CU Meter (LC)

**OMCf\_Small:**VIEWES parameter: Organic Carbon Mass (Fine), Small Fraction; CAS Number: 7440-44-0; Type Code: CALC; Units: UG/CU Meter (LC)

**On-Road Mobile Sources:**Emissions sources from vehicles certified for highway use. Sources can be computed either as being spread over a spatial extent or as being assigned to a line location, and on-road inventories can be reflected as either emissions or activity data. On-road mobile source emissions are estimated as the products of emissions factors and activity estimates. Samples of on-road mobile sources include light-duty gasoline vehicles and heavy-duty diesel vehicles

**OPf:**VIEWES parameter: Carbon, Organic Pyrolyzed (Fine); CAS Number: 7440-44-0; AQS Code: 88328; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Optical depth:**The degree to which a cloud or haze prevents light from passing through it. It is a function of physical composition, size distribution, and particle concentration. Often used interchangeably with "turbidity."

**Optical monitoring:**Optical monitoring refers to directly measuring the behavior of light in the ambient atmosphere.

**Optical particle:**An instrument which measures the size of individual particles by the counter amount of reflected light from a microscopic illuminated volume.

**Organic compounds:**Chemicals that contain the element carbon.

**Orifice audit device:**A device which measures air flow based on the known relationship of air flow through and orifice to the pressure drop across it.

**Origins:**Particle origins can be anthropogenic (man-made) or natural. Another origin classification is primary (particles that are emitted into the atmosphere as particles, such as organic and soot particles in smoke plumes or soil dust particles), and secondary (those formed from gas-to-particle conversion in the atmosphere, such as sulfates, nitrates, and secondary organics).

**OTC:**Ozone Transport Commission. One of the five RPOs, affiliated with the Northeast States for Coordinated Air Use Management Association (NESCAUM) and the Mid-Atlantic Regional Air Management Association (MARAMA). Includes the states and tribal areas encompassed by Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Northern Virginia, the District of Columbia, and suburbs of Washington, D.C.

**Ozone:**One of the six criteria pollutants. Ozone (O<sub>3</sub>) is a photochemical oxidant and the major component of smog.

## P

**Parameter:**A substance or variable that is measured, calculated, or modeled. Examples are "Sulfate, PM2.5", "Aerosol Optical Depth", "Relative Humidity", etc.

**Particle sampler:**An instrument to measure particulate matter in ambient air.

**Particle scattering coefficient:**Proportion of incident light scattered by particles per unit distance (Mm-1).

**Path radiance:**Or "airlight," a radiometric property of the air resulting from light scattering processes along the sight line, or path, between a viewer and the object (target).

**PBc:**VIEWS parameter: Lead (Coarse); CAS Number: 7439-92-1; AQS Code: 83128; Type Code: COARSE; Units: UG/CU Meter (LC)

**PBf:**VIEWS parameter: Lead (Fine); CAS Number: 7439-92-1; AQS Code: 88128; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Pc:**VIEWS parameter: Phosphorus (Coarse); CAS Number: 7723-14-0; AQS Code: 83152; Type Code: COARSE; Units: UG/CU Meter (LC)

**PCM1\_Mass:**VIEWS parameter: PCM1 Mass; Units: UG/CU Meter (LC)

**PCM1\_NH4:**VIEWS parameter: PCM1 NH4; CAS Number: 14798-03-9; Units: UG/CU Meter (LC)

**PCM1\_NO3:**VIEWS parameter: PCM1 NO3; CAS Number: 12033-49-7; Units: UG/CU Meter (LC)

**PCM1\_SO4:**VIEWS parameter: PCM1 SO4; CAS Number: 14808-79-8; Units: UG/CU Meter (LC)

**PCM1\_TEF\_NH4:**VIEWS parameter: PCM1 Teflon NH4; Units: UG/CU Meter (LC)

**PCM1\_TEF\_NO3:**VIEWS parameter: PCM1 Teflon NO3; Units: UG/CU Meter (LC)

**PCM1\_VOL\_NH4:**VIEWS parameter: PCM1 Vol NH4; Units: UG/CU Meter (LC)

**PCM1\_VOL\_NO3:**VIEWS parameter: PCM1 Vol NO3; Units: UG/CU Meter (LC)

**PCM2\_CL:**VIEWS parameter: PCM2 CL; CAS Number: 16887-00-6; Units: UG/CU Meter (LC)

**PCM2\_NH4:**VIEWS parameter: PCM2 NH4; CAS Number: 14798-03-9; Units: UG/CU Meter (LC)

**PCM2\_NO3:**VIEWS parameter: PCM2 NO3; CAS Number: 12033-49-7; Units: UG/CU Meter (LC)

**PCM2\_SO4:**VIEWS parameter: PCM2 SO4; CAS Number: 14808-79-8; Units: UG/CU Meter (LC)

**PCM3\_EC:**VIEWS parameter: PCM3 EC; CAS Number: 7440-44-0; Units: UG/CU Meter (LC)

**PCM3\_OC:**VIEWS parameter: PCM3 OC; CAS Number: 7440-44-0; Units: UG/CU Meter (LC)

**Pdf:**VIEWS parameter: Palladium (Fine); Description: Palladium Elemental Concentration FINE Size Fraction; CAS Number: 7440-05-3; AQS Code: 84151; Type Code: PM2.5; Units: UG/CU Meter (LC)

**PEC:**Primary elemental carbon

**Perceived Visual Air Quality (PVAQ):**An index that relates directly to how human observers perceive changes in visual air quality.

**Perceptible:**Capable of being seen.

**Pf:**VIEWS parameter: Phosphorus (Fine); CAS Number: 7723-14-0; AQS Code: 88152; Type Code: PM2.5; Units: UG/CU Meter (LC)

**pH Field:** VIEWS parameter: Field pH; Description: The pH of the sample as measured in the field laboratory, reported as the negative log of hydrogen ion concentration.; Type Code: MET; Units: PH UNITS

**pH Lab:** VIEWS parameter: Lab pH; Description: Negative log of the hydrogen ion concentration as measured at the CAL, in pH units.; Type Code: MET; Units: PH UNITS

**Phase function:** Relationship of scattered to incident light as a function of scattering angle; volume scattering function.

**Phase shift:** A change in the periodicity of a wave-form such as light.

**phf\_vcode:** VIEWS parameter: Field pH Validity Code; Description: p = the field measurement passes all of the screening criteria; f = the field measurement fails to pass all of the screening criteria; i = incomplete information. Some of the information required to complete the screening is unavailable, and none of the information that IS available would warrant the assignment of a field validity code of "f".; Type Code: FLAG

**Photochemical:** Any chemical reaction which is initiated by light. Such processes are process important in the production of ozone and sulfates in smog.

**Photometer:** Instrument for measuring photometric quantities such as luminance, illuminance, luminous intensity, and luminous flux. An instrument for measuring the brightness of an object. It has been suggested that this name be reserved for those instruments which have been adjusted to match the wavelength response of the human eye, but established usage is not yet this consistent, and radiometers are sometimes called photometers.

**Photometry:** Instrumental methods, including analytical methods, employing measurement of light intensity. See telephotometer.

**Photon:** A bundle of electromagnetic energy that exhibits both wave-like and particle-like characteristics.

**Photopic:** Vision or wavelength response of the cones of a normal eye when exposed to a luminance of at least 3.4 candelas per square meter.

**Plume:** Airborne emissions from a specified source and the path through the atmosphere of these emissions.

**Plume blight:** Visual impairment of air quality that manifests itself as a coherent plume. [See an example of plume blight.](#)

**PM10:** Measure of particulate matter (pollutants from combustion and natural sources); denotes particles with a nominal size less than 10 micrometers in diameter.

**PM2.5:** Measure of particulate matter (pollutants from combustion and natural sources); denotes particles smaller than 2.5 micrometers in diameter.

**PM25\_MajorMetalOxides:** VIEWS parameter: PM25 MajorMetalOxides; Units: UG/CU Meter (LC)

**PMC:** Coarse particulate matter (PM10 - PM2.5)

**PMFINE:** Fine particulate matter (PM2.5)

**PNO3:** Particulate nitrate

**PO4:** VIEWS parameter: Phosphate Ion; Description: Phosphate Ion; CAS Number: 14265-44-2; Type Code: AQU; Units: MILLIGRAMS/LITER

**POA:** Primary organic aerosol

**Point source:** A source of pollution that is point-like in nature. An example is the smoke stack of a coal-fired power plant or smelter. See source.

**Point Sources:**Emissions sources that are identified by point locations, typically because they are regulated and their locations are available in regulatory reports. The characteristics of these sources are generally very well understood, with detailed information available about stack height, emissions rates, chemical composition, and operating schedules. Point sources can be further subdivided into electric generating unit (EGU) sources and non-EGU sources, particularly in criteria inventories in which EGUs are a primary source of NO<sub>x</sub> and SO<sub>2</sub>. Examples of non-EGU major point sources include chemical manufacturers, refineries, smelters, and pulp and paper mills.

**Polar nephelometer:**An instrument that measures the amount of light scattered in a specific direction. See integrating nephelometer.

**Polarization:**A property of light. Light can be linearly polarized in any direction perpendicular to the direction of travel, circularly polarized (clockwise or counterclockwise), unpolarized, or mixtures of the above.

**POM:**Particulate organic matter (see OMC).

**Ppb:**Parts per billion (1 in 10<sup>9</sup>).

**Ppm:**Parts per million (1 in 10<sup>6</sup>).

**Ppt:**Parts per trillion (1 in 10<sup>12</sup>).

**Ppt Nws:**VIEWS parameter: NWS Stick Gauge Reading; Description: Precipitation amount as measured by the NWS stick rain gage, in mm. Trace amounts are indicated by -7.; Type Code: MET; Units: MILLIMETERS (RAINFALL)

**Ppt Rec:**VIEWS parameter: Rain Gauge Reading; Description: Precipitation amount as measured by the recording rain gage, in mm. Trace amounts are indicated by -7.; Type Code: MET; Units: MILLIMETERS (RAINFALL)

**Precursor:**A substance or condition whose presence generally precedes the formation of another, more notable, condition or substance.

**Precursor emissions:**Emissions from point or regional sources that transform into pollutants with varied chemical properties.

**Prescribed burn:**A wildland fire whose progress has been controlled by a combination of strategies, including

**Prevention of Significant Deterioration:**A program established by the Clean Air Act that limits the amount of additional air pollution that is allowed in Class I and Class II areas.

**Primary particles:**Primary particles are suspended in the atmosphere as particles from the time of emission, e. g., dust and soot.

**Program:**An organized effort to obtain related environmental data on a regular or periodic basis, usually by means of the routine operation of a monitoring network or special study. Often synonymous with "Network".

**PSAT:**PM Source Apportionment Technology (PSAT) is a modeling tool which performs source apportionment based on user-defined source groups. A source group is the combination of a geographic source region and an emissions source category. Examples of source regions include states, nonattainment areas, and counties. Examples of source categories include mobile sources, biogenic sources, and elevated point sources.

**PSD:**Prevention of Significant Deterioration; a program established by the Clean Air Act that limits the amount of additional air pollution that is allowed in Class I and Class II areas.

**PSO4:**Particulate sulfate

**Psychophysical:**The branch of psychology that deals with the relationships between physical stimuli and resulting sensations and mental states.

**Psychrometer:**An instrument for measuring humidity based on the temperature drop of a thermometer with a wet wick on the bulb.

**PVAQ:**See Perceived Visual Air Quality.

**Pyranometer:**Instrument that measures directly the loss of total solar radiance under clear sky conditions.

## Q

**QR Code:**VIEWS parameter: Quality Rating Code; Description: A code indicating the relative quality of the sample.; Type Code: FLAG

**QTAG:**Ozone transport Assessment Group. A national workgroup that addressed the problem of ground level ozone (smog) and the long-range transport of air pollution across the Eastern United States.

**QTAQ:**Office of Transportation and Air Quality (of USEPA)

**Quadratic detection model:**Model used to predict the amount of change in equivalent contrast or perceived landscape structure required to evoke a single noticeable change in landscape appearance.

**Quality assurance:**An overall plan undertaken to quantify, control, and perhaps improve the quality of data acquired by a system.

**Quality control:**Actions routinely taken to maintain a specified level of quality of acquired data.

## R

**RACT:**Reasonably Available Control Technology

**Radiometer:**A name for light-measuring instruments which do not match the wavelength response of the human eye.

**RAVI:**Reasonably Attributable Visibility Impairment; visibility impairment caused by a single or small number of sources.

**RBEXT:**VIEWS parameter: RBext

**Rbf:**VIEWS parameter: Rubidium (Fine); CAS Number: 7440-17-7; AQS Code: 88176; Type Code: PM2.5; Units: UG/CU Meter (LC)

**RCFM:**VIEWS parameter: Mass, PM2.5 Reconstructed (Fine); Type Code: PM2.5; Units: UG/CU Meter (LC)

**RCTM:**VIEWS parameter: Reconstructed Total Mass; Type Code: CALC; Units: UG/CU Meter (LC)

**Receptor Modeling:**The application of multivariate statistical methods to the identification and quantitative apportionment of air pollutants to their sources.

**Reconstructed light extinction:**The relationship between atmospheric aerosols and the light extinction coefficient. Can usually be approximated as the sum of the products of the concentrations of individual species and their respective light extinction efficiencies.

**Reflectance:**Ratio of reflected to incident light.

**Reflection:**Return of radiation by a surface without a change of frequency.

**Refraction:**The change of direction of a ray of light in passing obliquely from one medium into another in which the speed of propagation differs.

**Regional haze:**A cloud of aerosols extending up to hundreds of miles across a region and promoting noticeably hazy conditions. Condition of the atmosphere in which uniformly

distributed aerosol obscures the entire vista irrespective of direction or point of observation. Is not easily traced visually to a single source.

**Regional Haze Rule:**A rule enacted in 1999 by the EPA that calls for state and federal agencies to work together to improve visibility in 156 national parks and wilderness areas such as the Grand Canyon, Yosemite, the Great Smokies and Shenandoah. The rule requires the states, in coordination with the Environmental Protection Agency, the National Park Service, U.S. Fish and Wildlife Service, the U.S. Forest Service, and other interested parties, to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment. The first State plans for regional haze are due in the 2003-2008 timeframe. Five multi-state regional planning organizations are working together now to develop the technical basis for these plans.

**Relative Response Factor:**Estimated or expected change in aerosol species monitoring concentration between 2 different years, based on model results from both years. WRAP used 3 methods to develop relative response factors (RRFs): Specific Days (designated by EPA); Quarterly Weighted; and Monthly Weighted. These methods are described in more detail under the TSS Methods page.

**REMSAD:**Regulatory Modeling System for Aerosols and Deposition; a numerical grid model for rapid scoping and strategy assessments for particulate matter, regional haze, PM species, and deposition of air toxins.

**Report:**Organized and formatted data, often displayed as a web page or data file.

**Residence Time:**The fraction of time an air parcel spends in a defined region (model grid cell). Residence time maps are generated by summarizing back trajectories over a period of time of interest.

**RFP:**Request for Proposal

**RH:**VIEWES parameter: Relative Humidity (Station Hourly); Description: Hourly RH measured at Nephelometer Station; AQS Code: 68110; Type Code: MET; Units: PERCENT

**RHgrid:**VIEWES parameter: Relative Humidity (Climatological Monthly); Description: Climatological monthly average RH from EPA; Type Code: CALC; Units: PERCENT

**Road Dust:**Emissions associated with mechanical re-entrainment of dust materials from paved and unpaved road surfaces by vehicular traffic. These sources are computed as being spread over a spatial extent (a county or air district).

**RPO:**Regional Planning Organization

**RRF:**See Relative Response Factor.

**S**

**S\_Rayleigh:**VIEWES parameter: Site Rayleigh; Type Code: CALC; Units: Inverse megameters

**Saturation:**One part of the description of color, it qualitatively corresponds to the purity of color

**SBf:**VIEWES parameter: Antimony (Fine); CAS Number: 7440-36-0; AQS Code: 84102; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Sc:**VIEWES parameter: Sulfur (Coarse); CAS Number: 7704-34-9; AQS Code: 83169; Type Code: COARSE; Units: UG/CU Meter (LC)

**Scattering (light):**An interaction of a light wave with an object that causes the light to be redirected in its path. In elastic scattering, no energy is lost to the object.

**Scattering angle:**The angle between the direction of propagation of the scattered and incident light (or transmitted light)

**Scattering coefficient:**A measure of the ability of particles or gases to scatter photons out of a beam of light; a number that is proportional to the amount of photons scattered per unit length.

**Scattering cross section:**The amount of light scattered by a particle divided by its physical cross section.

**Scattering efficiency:**The relative ability of aerosols and gases to scatter light. A higher scattering efficiency means more light scattering per unit mass or number of particles, this in turn means poorer visibility. In general, fine particles (diameter less than 2.5 microns) are efficient scatterers of visible light.

**Scene element:**Discrete segment of a landscape scene.

**Scene monitoring:**Scene monitoring is the monitoring of a specific vista or target. Optical and aerosol monitoring measure an abstract, but easily quantifiable parameter of the atmosphere. Scene monitoring captures the effects of all atmospheric parameters simultaneously, but in an inherently difficult manner to quantify. It is, for example, difficult to determine quantitatively which of two photographs represent "better" visibility conditions. Scene monitoring is generally done to help relate quantitative data in a "user-friendly" format.

**Scf:**VIEWES parameter: Scandium (Fine); CAS Number: 7440-20-2; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Sea Salt:**Particulate matter generated by wind on the ocean, approximated from measurements of chloride or chlorine in an aerosol sampler.

**SeaSaltf:**VIEWES parameter: Sea Salt (Fine); Description: 1.8 x [Chloride], or 1.8 x [Chlorine] if the chloride measurement is below detection limits, missing or invalid.; CAS Number: 7647-14-5; Type Code: PM2.5

**SeaSaltf\_bext:**VIEWES parameter: Sea Salt (Fine), Light Extinction; Description: Light Extinction due to Fine (PM2.5) Sea Salt; Type Code: CALC

**Secondary aerosols:**Aerosol formed by the interaction of two or more gas molecules and/or primary aerosols.

**Secondary particles:**Form in the atmosphere by a gas-to-particle conversion process.

**SEf:**VIEWES parameter: Selenium (Fine); CAS Number: 7782-49-2; AQS Code: 88154; Type Code: PM2.5; Units: UG/CU Meter (LC)

**SESARM:**Southeast States Air Resource Managers. Affiliated with Southern Appalachian Mountain Initiative (SAMI). Represents the states of Alabama, Georgia, Kentucky, North Carolina, South Carolina, and Tennessee.

**Sf:**VIEWES parameter: Sulfur (Fine); CAS Number: 7704-34-9; AQS Code: 88169; Type Code: PM2.5; Units: UG/CU Meter (LC)

**SGA:**Southern Governors Association.

**SIc:**VIEWES parameter: Silicon (Coarse); CAS Number: 7440-21-3; AQS Code: 83165; Type Code: COARSE; Units: UG/CU Meter (LC)

**SIf:**VIEWES parameter: Silicon (Fine); CAS Number: 7440-21-3; AQS Code: 88165; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Sight path:**The straight line between the observation point and the target.

**SiO2:**VIEWES parameter: Sand; CAS Number: 14808-60-7; Units: UG/CU Meter (LC)

**SIP:**State Implementation Plan; a detailed description of the measures a state will use to carry out its responsibilities under the Clean Air Act.

**Skinny Format:**A report format in which parameter concentrations are displayed as a single column of data next to a Parameter Code column. This format is normalized for relational databases and results in a longer file.

**SL:**IEWS parameter: Sample Level Code; Description: A code indicating departures from field or laboratory standard operating procedures.; Type Code: FLAG

**Small Fraction:**Pertains to the revised IMPROVE algorithm. Measured sulfate, nitrate, and organic matter are assumed to be the combination of large and small size distributions, each with separate extinction efficiencies and f(RH) functions.

**SMf:**IEWS parameter: Samarium (Fine); CAS Number: 7440-19-9; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Smog:**A mixture of air pollutants, principally ground-level ozone, produced by chemical reactions involving smog-forming chemicals. See also haze.

**SMOKE:**Sparse Matrix Object Kernel Emission-EPA processor for preparation of emission data.

**SNf:**IEWS parameter: Tin (Fine); CAS Number: 7440-31-5; AQS Code: 84160; Type Code: PM2.5; Units: UG/CU Meter (LC)

**SO2:**IEWS parameter: Sulfur Dioxide; CAS Number: 7446-09-5; AQS Code: 42401; Type Code: GAS; Units: UG/CU Meter (LC)

**SO2\_whatman:**IEWS parameter: Sulfur dioxide from whatman; Description: Sulfur dioxide from CASTNet filter pack, whatman filter (used with SO4\_ nylon to calculate SO2); CAS Number: 7446-09-5; Type Code: UNS; Units: UG/CU Meter (LC)

**SO4:**IEWS parameter: Sulfate Ion; Description: Sulfate Ion; CAS Number: 14808-79-8; Type Code: AQU; Units: MILLIGRAMS/LITER

**SO4\_ nylon:**IEWS parameter: Sulfate from nylon; Description: Sulfate from CASTNet filter pack, nylon filter (used with SO2\_whatman to calculate SO2); CAS Number: 14808-79-8; Type Code: UNS; Units: UG/CU Meter (LC)

**SO4f:**IEWS parameter: Sulfate (Fine); Description: Mass of sulfate particles < 2.5 um in diameter; CAS Number: 14808-79-8; AQS Code: 88403; Type Code: PM2.5; Units: UG/CU Meter (LC)

**SO4t:**IEWS parameter: Sulfate (Tsp); Description: Mass of sulfate particles from open inlet (no size cut); CAS Number: 14808-79-8; AQS Code: 12403; Type Code: TSP; Units: UG/CU Meter (LC)

**SOILf:**IEWS parameter: Soil (Fine); AQS Code: 88348; Type Code: PM2.5; Units: UG/CU Meter (LC)

**SOILf\_bext:**IEWS parameter: Soil Extinction (Fine); Type Code: CALC; Units: Inverse megameters

**SOILPART:**IEWS parameter: Particles: Soil composition; Description: Derived from information on the NAtChem website.; Units: NG/Cu Meter (LC)

**Soot:**Black particles with high concentrations of carbon in graphitic and amorphous elemental forms. It is a product of incomplete combustion of organic compounds.

**SOP:**Standard Operating Procedure

**Source:**In atmospheric chemistry, the place, places, group of sites, or areas where a substance is injected into the atmosphere. Can include point sources, elevated sources, area sources, regional sources, multiple sources, etc.

**Southern Appalachian Mountain Initiative (SAMI):**A consortium of government agencies, industry, and environmental groups, formed to investigate the status of air quality and its effects in the highland regions of the southeastern United States. The objective of this regional cooperative is to determine the current and future impacts of regional air pollutants, such as ozone and acid deposition, and to recommend regional air management strategies to control the formation of these pollutants.

**SP:**VIEWS parameter: Sample Protocol Code; Description: A code indicating departures from standard sample collection procedures that may have compromised sample integrity.; Type Code: FLAG

**Spatial frequency:**The reciprocal of the distance between sine wave crests (or troughs) measured in degrees of angular subtense of a sine wave grating. Spatial frequency is a general term for the frequencies associated with the image radiance in a scene along the path of radiance (path of sight). Landscape features contain multiple landscape scenic elements. Each element generates its own image radiance with its own frequency and intensity.

**Spectral:**An adjective implying a separation of wavelengths of light or other waves into a spectrum or separated series of wavelengths.

**Srf:**VIEWS parameter: Strontium (Fine); CAS Number: 7440-24-6; AQS Code: 88168; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Stable air mass:**An air mass which has little vertical mixing. See temperature inversion.

**Stagnant:**Referring to meteorological conditions that are not conducive to atmospheric mixing.

**Stagnation episodes:**See stagnation periods.

**Stagnation periods:**Lengths of time during which little atmospheric mixing occurs over a geographical area, making the presence of layered hazes more likely. See temperature inversion.

**Standard visual range:**Reciprocal of the extinction coefficient. The distance under daylight and uniform lighting conditions at which the apparent contrast between a specified target and its background becomes just equal to the threshold contrast of an observer, assumed to be 0.02.

**STAPPA/ALAPCO:**State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officers. The two national associations representing air pollution control agencies in the 54 states and territories and over 150 major metropolitan areas across the United States.

**State Implementation Plan:**A collection of regulations used by the state to carry out its Implementation responsibilities under the Clean Air Act.

**Stationary source:**A fixed source of regulated air pollutants (e.g., industrial facility). See also source; mobile sources.

**Std2local\_cf:**VIEWS parameter: STP to Loc conversion factor; Description: Numeric factor for converting from Standard Temperature and Pressure (STP) to Local Temperature and Pressure

**Stratification:**The process of separating a database into different groups according to (of data) some detail of their origin, for the purposes of improving statistical sensitivity.

**Strip chart recorder:**A device for making a time record of some signal, usually an applied voltage. The signal drives a pen in one direction, while paper is moved under the pen in the perpendicular direction at a uniform rate.

**SubPpt:** VIEWS parameter: Substituted Precipitation; Description: Precipitation amount used by NADP in calculating weighted-mean concentrations, depositions and precipitation totals, in mm. In most cases sub\_ppt equals the recording rain gauge reading. Where rain gauge reading is a trace amount, a value of 0.127mm is assigned; in cases where the recording rain gauge reading is missing or invalid, the NWS stick rain gauge amount is used; in cases where both rain gauge readings are missing or invalid, the equivalent depth of the sample volume is used (for this conversion, the area of the sample bucket is 678.9 square centimeters).; Type Code: MET; Units: MILLIMETERS (RAINFALL)

**Substitute Data:** Some IMPROVE monitoring sites did not meet EPA Regional Haze Rule data completeness requirements for the baseline period (2000-04). For these sites data were substituted for missing samples based on a methodology developed by WRAP. For more information see <http://matar.cira.colostate.edu/views/web/documents/substitutedata.aspx>

**SULF:** Sulfuric acid

**Sulfur dioxide:** A gas (SO<sub>2</sub>) consisting of one sulfur and two oxygen atoms. Of interest because sulfur dioxide converts to an aerosol that is a very efficient light scatterer. Also, it can convert into acid droplets consisting primarily of sulfuric acid.

**Sun angle:** Refers to the angle of the sun above the horizon of the earth.

**Sun radiometer:** A device for measuring the intensity of sunlight falling on the ground. If the sky is cloudless and the angle of the sun is known, then a measure of the clarity of the air can be had by this measurement.

**Super-VHS:** A high definition video format which is capable of achieving horizontal resolution of over 400 lines. A tape recorded in S-VHS format cannot be played on a recorder which is designed to accommodate only the VHS format. See also VHS.

**Surface layer:** A concentration of air pollution that extends from the ground to an elevation where the top edge of a pollution layer is visible.

**Svol:** VIEWS parameter: Sample Volume; Description: Volume of sample captured in the sample bucket, in ml.; Type Code: MET; Units: MILLILITERS

**SVR:** VIEWS parameter: Standard Visual Range; Type Code: CALC; Units: KILOMETERS (VISIBILITY)

T

**TAf:** VIEWS parameter: Tantalum (Fine); CAS Number: 7440-25-7; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Target:** Object in the distance observed by a person or instrument for visibility measurements.

**TBf:** VIEWS parameter: Terbium (Fine); CAS Number: 7440-27-9; Type Code: PM2.5; Units: UG/CU Meter (LC)

**TCMf:** VIEWS parameter: Carbon, Total Mass (Fine); Description: OMCf + ECf; Type Code: PM2.5

**TCMf\_NIOSH:** VIEWS parameter: Carbon, Total Mass (Fine) (NIOSH Adjusted); Description: OMCf\_NIOSH + ECf\_NIOSH; Type Code: CALC; Units: UG/CU Meter (LC)

**Telephotometer:** An instrument that measures the brightness of a specific point in either the sky or vista.

**Temperature:** Weather condition in which warm air sits atop cooler air, promoting inversion stagnation and increased concentrations of air pollutants. A condition of a layer of atmosphere in which temperature increases with altitude. Such a layer is stable, and pollutants migrate through it very slowly. Also known as an inversion layer.

**Temperature inversion:** In meteorology, a departure from the normal decrease of temperature with increasing altitude such that the temperature is higher at a given height in the inversion layer than would be expected from the temperature below the layer. This warmer layer leads to increased stability and limited vertical mixing of air.

**Texture:** Roughness of the landscape.

**Threshold contrast:** A measure of human eye sensitivity to contrast. It is the smallest increment of contrast perceptible by the human eye.

**TiC:** VIEWS parameter: Titanium (Coarse); CAS Number: 7440-32-6; AQS Code: 83161; Type Code: COARSE; Units: UG/CU Meter (LC)

**TiF:** VIEWS parameter: Titanium (Fine); CAS Number: 7440-32-6; AQS Code: 88161; Type Code: PM2.5; Units: UG/CU Meter (LC)

**TiO<sub>2</sub>:** VIEWS parameter: Titanium Dioxide; CAS Number: 13463-67-7; Units: UG/CU Meter (LC)

**TIP:** Tribal Implementation Plan; a detailed description of the measures a tribe will use to carry out its responsibilities under the Clean Air Act.

**Total carbon:** Sum of the light absorbing carbon and organic carbon.

**Total light extinction:** The sum of scattering (including Rayleigh scattering) and absorption coefficients. See also extinction coefficient.

**Total suspended particulates:** Total particulate matter in a sample of ambient air.

**total\_bext:** VIEWS parameter: Total extinction, aerosol + rayleigh; Type Code: CALC; Units: Inverse megameters

**Toxic air pollutants:** See hazardous air pollutants.

**TPINT:** VIEWS parameter: Internal instrument temperature; Description: Internal temperature as recorded inside instrument; Type Code: TMP; Units: DEGREES, CENTIGRADE

**Tracer elements:** An element which is emitted most strongly by a specific source or class of sources, and can therefore be used as evidence for an impact by such a source when the element is detected in an air pollution sample.

**Transmission gauge:** A device for determining the amount of particles collected on a filter by the attenuation of light passing through the filter. Beta rays are sometimes used in place of visible light, and the resulting instrument is called a beta gauge.

**Transmissometer:** An instrument that measures the amount of light attenuation over a specified path length.

**Transmittance:** The fraction of initial light from a light source that is transmitted through the atmosphere. Light is attenuated by scattering and absorption from gases and particles.

**Tribal Implementation Plan (TIP):** A collection of regulations used by the Indian tribes to carry out its responsibilities under the Clean Air Act.

**Turbidity:** A condition that reduces atmospheric transparency to radiation, especially light. The degree of cloudiness, or haziness, caused by the presence of aerosols, gases, and dust.

U

**Uniform haze:**Pollutants that are uniformly distributed both horizontally and vertically from the ground to a height well above the highest terrain.

**Unstable air mass:**An air mass that is vertically well mixed. See also stable air mass, temperature inversion.

**USEPA:**United States Environmental Protection Agency.

V

**v\_nitrate:**VIEWES parameter: Volatile Nitrate (Fine); Description: 12033-49-7; Type Code: CALC; Units: UG/CU Meter (LC)

**V0:**VIEWES Status Flag: Valid value; Source: NARSTO

**V1:**VIEWES Status Flag: Valid value but comprised wholly or partially of below detection limit data; Source: NARSTO

**V2:**VIEWES Status Flag: Valid estimated value; Source: NARSTO

**V3:**VIEWES Status Flag: Valid interpolated value; Source: NARSTO

**V4:**VIEWES Status Flag: Valid value despite failing to meet some QC or statistical criteria; Source: NARSTO

**V5:**VIEWES Status Flag: Valid value but qualified because of possible contamination; Source: NARSTO

**V6:**VIEWES Status Flag: Valid value but qualified due to non-standard sampling conditions; Source: NARSTO

**V7:**VIEWES Status Flag: Valid value set equal to the detection limit (DL) since the value was below the DL; Source: NARSTO

**valcode:**VIEWES parameter: Sample Validity Code; Description: A code which indicates whether a sample is considered valid according to NADP/NTN data validation rules. In the case of a valid sample, the code indicates how the sample is used in calculations of weighted-mean concentrations, depositions and data completeness estimates. ( = invalid sample; t = valid trace sample; d = valid dry collection period; w, wa, wd = valid sample of lab type w, wa, or wd) Only samples with valcodes of w, wa and wd are used by NADP/NTN in calculating weighted-mean concentrations and depositions.; Type Code: FLAG

**Vc:**VIEWES parameter: Vanadium (Coarse); CAS Number: 7440-62-2; AQS Code: 83164; Type Code: COARSE; Units: UG/CU Meter (LC)

**Vf:**VIEWES parameter: Vanadium (Fine); CAS Number: 7440-62-2; AQS Code: 88164; Type Code: PM2.5; Units: UG/CU Meter (LC)

**VIEW:**Visibility Intensive Experiment in the West, a project of the US EPA, with cooperation of the National Park Service, to measure visibility at many stations throughout the western United States to document current visibility and examine trends.

**Violation of standard:**A regulatory situation, (i.e., NAAQS), where the pattern of "exceedences of standard" is greater than the frequency allowable under that standard.

**Virtual impactor:**A type of dichotomous sampler which separates large particles from an air stream by impacting them on the "virtual surface" of a slowly moving column of air.

**Visibility:**Refers to the visual quality of the view, or scene, in daylight with respect to color rendition and contrast definition. The ability to perceive form, color, and texture.

**Visibility indexes:**Have been formalized for aerosol, optical, and scenic attributes. Aerosol indexes include mass concentrations, particle concentrations, physical characteristics, and size distributions. The optical indexes include coefficients for

scattering, extinction, and absorption. Scenic indexes comprise visual range, contrast, radiance, color, and just noticeable changes.

**Visibility Metric:**A statistical summary of a set of visibility data including the median (or mean) of the cleanest 20% of the samples, the median (or mean) of all samples, and the median (or mean) of the dirtiest 20% of the samples.

**Vista contrast:**See Contrast.

**VISTAS:**Visibility Improvement States and Tribal Association of the Southeast, one of the five RPOs. Includes the states and tribal areas encompassed by Alabama, Tennessee, Virginia, West Virginia, Georgia, Kentucky, Florida, Mississippi, North Carolina, and South Carolina. Affiliated with SASARM.

**Visual air quality:**Air quality evaluated in terms of pollutant particles and gases that affect how well one can see through the atmosphere.

**Visual image processing:**The digitizing, calibration, modeling, and display of the effects of atmospheric optical parameters on a scene. The process starts with a photograph of landscape features viewed in clean atmospheric conditions and models the effects of changes in atmospheric composition.

**Visual range:**The distance at which a large black object just disappears from view.

**Visual reduction:**Is the impairment or degradation of atmospheric clarity. Becomes significant when the color and contrast values of a scene to the horizon are altered or distorted by airborne impurities.

**VM:**VIEWS Status Flag: Valid modeled value; Source: VIEWS

**VOC:**Volatile organic carbons

## W

**Washout:**The process by which particles are removed from air by capture by raindrops.

**Wavelength:**The distance, measured in the direction of propagation of a wave, between two successive points in the wave that are characterized by the same phase of oscillation.

**Weighted Emissions:**Specific to the Weighted Emissions Potential (WEP) analysis on the TSS. Gridded emissions were weighted by gridded residence times and distance from a class I area, and normalized.

**Weighted Emissions Potential:**Specific to the Weighted Emissions Potential (WEP) analysis on the TSS. Gridded emissions were weighted by gridded residence times and distance from a class I area, and normalized. The results of this analysis are interpreted as the potential for sources within specific grid cells to impact visibility at a class I area, and thus provide a screening tool for planners. The results are not scientifically rigorous as it contains no method for accounting for chemistry and deposition.

**WESTAR:**Western States Air Resources Council. Represents the states of Alaska, California, Oregon, Washington, Hawaii, Arizona, New Mexico, Montana, Nevada, Colorado, Idaho, North Dakota, Oregon, South Dakota, Utah, and Wyoming.

**Wet deposition:**The deposit of atmospheric gases and particles (incorporated into rain, snow, fog, or mist) to water or land surfaces.

**Wide Format:**A report format in which parameter concentrations are displayed as multiple columns across the page. This results in a wider file.

**Wildfire:**Any wildland fire that requires a suppression response. A controlled burn may be declared a wildfire if part of it escapes from the control line or if weather conditions deteriorate and become unacceptable, as described in the burning plan.

**Windblown Dust:**Emissions associated with aeolian re-entrainment affecting the release of dust and organic carbon from disturbed or undisturbed lands by land use type. These sources are computed by applying meteorological data by land use type over a spatial extent (an emissions model grid cell, cross-referenced to a county or air district).

**wolf:**VIEWES parameter: WOLF; Description: AQS STN Calculated; Type Code: CALC

**WRAP:**Western Regional Air Partnership, one of five RPOs. Includes the states and tribal areas encompassed by Arizona, California, Colorado, Idaho, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. Affiliated with WESTAR.

**WRAP Area Oil and Gas Sources:**Non-point land-based emissions sources that are uniquely associated with the drilling, maintenance, production, and distribution of oil and gas. These sources are computed as being spread over a spatial extent (the production basin portion of a county or air district). In a given state, there are also point sources of emissions that are uniquely associated with the drilling, maintenance, production, and distribution of oil and gas - each state has a different definition of oil and gas sources that are counted or regulated as area or point sources.

**Yf:**VIEWES parameter: Yttrium (Fine); CAS Number: 7440-65-5; AQS Code: 84183; Type Code: PM2.5; Units: UG/CU Meter (LC)

**Znc:**VIEWES parameter: Zinc (Coarse); CAS Number: 7440-66-6; AQS Code: 83167; Type Code: COARSE; Units: UG/CU Meter (LC)

**Znf:**VIEWES parameter: Zinc (Fine); CAS Number: 7440-66-6; AQS Code: 88167; Type Code: PM2.5; Units: UG/CU Meter (LC)

**ZRf:**VIEWES parameter: Zirconium (Fine); CAS Number: 7440-67-7; AQS Code: 88185; Type Code: PM2.5; Units: UG/CU Meter (LC)

## **Abbreviations and Acronyms**

**BACT** - Best Available Control Technology

**BART** - Best Available Retrofit Technology

**Btu** - British thermal unit

**CAA** - Clean Air Act

**CAMx** – Comprehensive Air Model with extensions

**CERR** – Consolidated Emission Reporting Rule

**CMAQ** – Community Multi-Scale Air Quality Model

**dv** - Deciview

**EC** – Elemental Carbon

**EDMS** – Emissions Data Management System

**ENVIRON** – Environmental Consulting Firm

**EPA** - Environmental Protection Agency

**FETS** – Fire Emission Tracking System

**FLM** – Federal Land Manager

**FR** - Federal Register

**GCVTC** - Grand Canyon Visibility Transport Commission

**HI** – Haze Index

**IMPROVE** – Interagency Monitoring of Protected Visual Environments

**IOA** – International Origin Anthropogenic

**IOC** – Initiatives Oversight Committee

**IWG** – Implementation Work Group

**kWh** - Kilowatt\_hour

**LAC** – Light Absorbing Carbon

**LAER** - Lowest Achievable Emission Rate

**LEV** – Low Emission Vehicle

**LTS** - Long Term Strategy **RPGs** - Reasonable Progress Goals

**NH<sub>3</sub>** - Ammonia

**NO<sub>x</sub>** - A mixture of NO<sub>2</sub> (nitrogen dioxide), nitric oxide (NO), and other nitrogen oxide gases

**NSPS** - New Source Performance Standards

**NTEC** – National Tribal Environmental Council

**OC** – Organic Carbon

**PM<sub>2.5</sub>** – Particulate of 2.5 microns or less

**PM<sub>10</sub>** – Particulate of 10 microns or less

**RH** – Regional Haze

**PSAT** – Particulate-matter Source Apportionment Technology

**RHR** - Regional Haze Rule

**RMC** – Regional Modeling Center

**RPG** – Reasonable Progress Goal

**RPO** - Regional Planning Organization

**RRF** – Relative Reduction Factor

**SCR** - Selective Catalytic Reduction

**SIP** - State Implementation Plan

**SOA** – State Origin Anthropogenic

**SO<sub>2</sub>** – Sulfur dioxide

**TOC** – Technical Oversight Committee

**TSS** – Technical Support System

**TSSA** - Tagged Species Source Apportionment

**URP** – Uniform Rate of Progress

**VOC** – Volatile Organic Compound

**WEP** – Weighted Emission Potential

**WGA** – Western Governors Association

**WRAP** – Western Regional Air Partnership