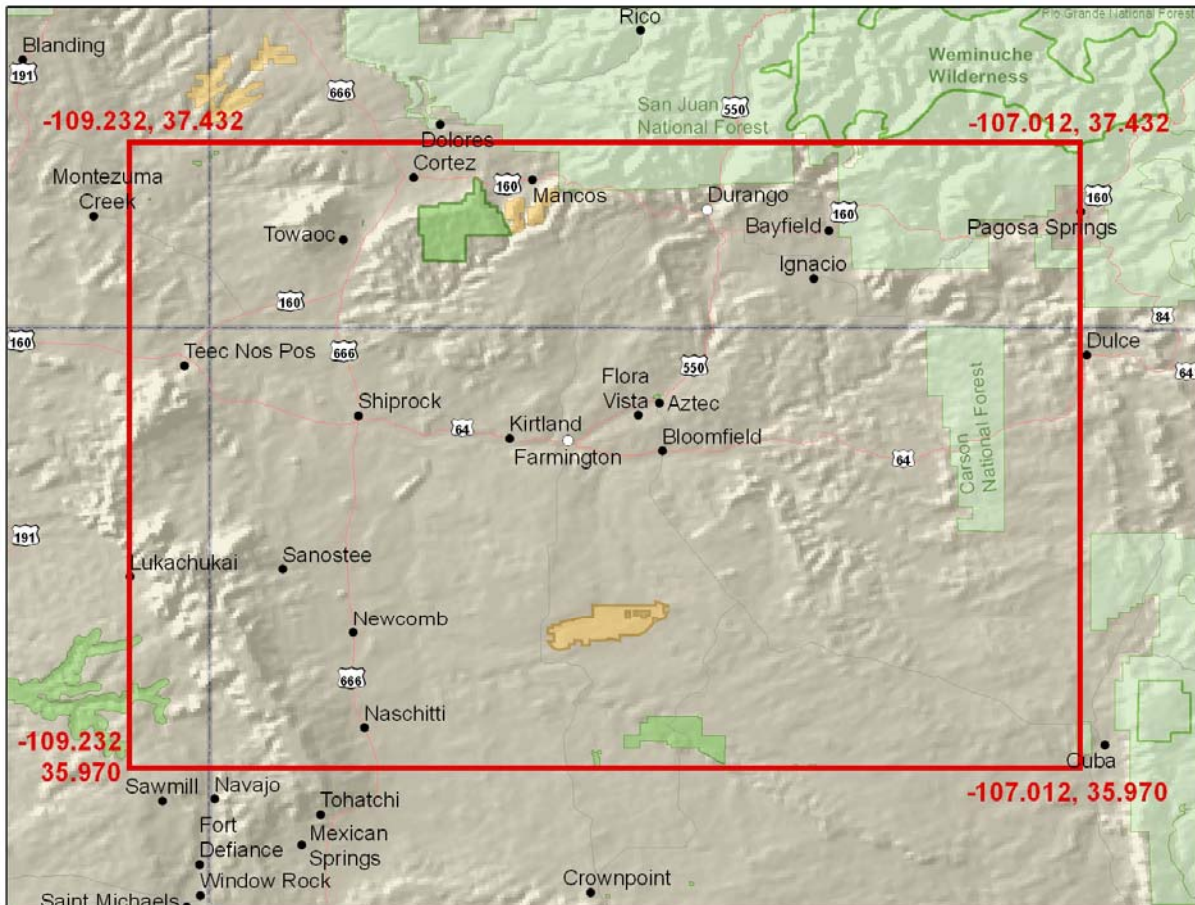


# APPENDICES

## Four Corners Air Quality Task Force Report of Mitigation Options



**November 1, 2007**

**The report is a compilation of mitigation options drafted by members of the Four Corners Air Quality Task Force. This is not a document to be endorsed by the agencies involved, but rather, a compendium of options for consideration following completion of the Task Force's work in November 2007.**

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# *Acronyms*

## Acronyms

µeq/L	micro-equivalents per liter
µg/L	micrograms per liter
µg/m <sup>3</sup>	micrograms per cubic meter
<	less than
>	greater than
°C	degrees Centigrade
°F	degrees Fahrenheit
4CAQTF	Four Corners Air Quality Task Force
AAQS	Ambient Air Quality Standards
AC	Alternating Current
ACI	Activated Carbon Injection
A/F	Air/Fuel
AFR(s)	Air/Fuel Ratio
AFRC(s)	Air/Fuel Ratio Controllers
AFUDC	Allowance For Funds During Construction
aka	also known as
ANGEL	Airborne Natural Gas Emission LIDAR
APCD	Air Pollution Control Division
APD	Application for Permit to Drill
APS	Arizona Public Service
AQI	Air Quality Index
AQRV	Air Quality Related Value
AQS	Air Quality Standard
AQTSD	Air Quality Technical Support Document
ARM	Air Resource Management
ARS	Agricultural Resource Service
ASTM	American Society for Testing and Materials
ASU	Air Separation Unit
AWMA	Air & Waste Management Association
AZ	Arizona
B&W	Babcock and Wilcox
BACM	Best Available Control Measure
BACT	Best Available Control Technology
BAGI	Backscatter Absorption Gas Imaging
BART	Best Available Retrofit Technology
Bbl/day	barrels per day
Bcf	billion cubic feet
bhp	Brake Horsepower
BHP	BHP Billiton, Ltd.
BLM	Bureau of Land Management (U.S. Department of the Interior)
BMP(s)	Best Management Practices
BTEX	Benzene, Toluene, Ethyl-benzene, Xylene
Btu/kw-hr	British Thermal Units per Kilowatt Hour
CA	California
CAA	Clean Air Act
Ca	Calcium
CaCl	Calcium Chloride
CaCO <sub>3</sub>	Calcium Carbonate

CAIR	Clean Air Interstate Rule
CAMR	Clean Air Mercury Rule
CALPUFF	California PUFF Dispersion Model
CaO	Calcium Oxide (Lime)
CARB	California Air Resources Board
CARE	Citizens Against Ruining our Environment
CAS	Chemical Abstracts Service
CASAC	Clean Air Scientific Advisory Committee
CaSO <sub>4</sub>	Calcium Sulfate
CASTNET	Clean Air Status and Trends Network
CB-DPF	Catalyst-Based Diesel Particulate Filter
CBM	Coal Bed Methane
CBNG	Coalbed Natural Gas
CCAG	Climate Change Advisory Group (New Mexico)
CCC	Colorado Climate Center
CCR	Colorado Code of Regulations
CCS	Carbon Capture and Sequestration
CCV	Closed Crankcase Ventilation
CCX	Chicago Climate Exchange
CDNR	Colorado Department of Natural Resources
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CDPHE-APCD	Colorado Department of Public Health and Environment – Air Pollution Control Division
CE	Cumulative Effects
CEC	California Energy Commission
CEDF	Clean Environment Development Facility
CEM	Continuous Emission Monitor
CEMS	Continuous Emission Monitoring System
CFB	Circulating Fluidized Bed and/or Coal-fired Boiler
CFLs	Compact Fluorescent Light bulbs
CFR	Code of Federal Regulations
Cfs	Cubic Feet per Second
CGS	Colorado Geological Survey
CH <sub>2</sub>	Methylene
CH <sub>3</sub>	Methyl Group
CH <sub>4</sub>	Methane
CHP	Combined Heat and Power
CI	Compression Ignition
Cl	Chloride
CNG	Compressed Natural Gas
CO	Carbon Monoxide and/or Colorado
CO <sub>2</sub>	Carbon Dioxide
COA	Conditions of Approval
CoAgMet	Colorado Agricultural Meteorological Network
COBRA	CO-Benefits Risk Assessment
COE	Cost of Energy
COGCC	Colorado Oil and Gas Conservation Commission
COM	Continuous Opacity Monitor
CPANS/ PNWIS	Canadian Prairie and Northern Section/Pacific Northwest International Section

CTG	Control Techniques Guideline
CWCS	Comprehensive Wildlife Conservation Strategy
DC	Direct Current
DCS	Distributed Control System
DEIS	Draft Environmental Impact Statement
DEP	Department of Environmental Protection
DEQ	Department of Environmental Quality
DER	Distributed Energy Resources
DIAL	Differential Absorption LIDAR
DLN	Dry Low NOX
DO	Dissolved Oxygen
DOAS	Differential Optical Absorption Spectroscopy
DOC	Diesel Oxidation Catalyst
DOE	U.S. Department of Energy
DPA	Dinè Power Authority
DREF	Desert Rock Energy Facility
DPF	Diesel Particulate Filter
DR	Demand Response
DRMP	Draft Resource Management Plan
DSIRE	Database of State Incentives for Renewable Energy
DV	Deciview
E	East
E&P	Exploration and Production
EA	Environmental Assessment
EAC	Early Action Compact
EBETS	Economic Incentives-Based Emission Trading System
ECBMR	Enhanced Coal Bed Methane Recovery
ECM	Electronic Control Module
EE	Energy Efficiency
EEREC	Energy Efficiency, Renewable Energy and Conservation
EGR	Exhaust Gas Recirculation
eGRID	Emissions and Generation Integrated Resource Database
EGU	Electric Generating Unit
EIS	Environmental Impact Statement
ENGR	Enhanced Natural Gas Recovery
EOR	Enhanced Oil Recovery
EPA	U.S. Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
EPD	Environmental Protection Division
EPRI	Electric Power Research Institute
ERMS	Emission Reduction Market System
ESP	Electrostatic Precipitator
ETC	Environmental Technology Council
ETS	Emission Trading System
F	degrees Fahrenheit
F-T	Fischer-Tropsch
FAQs	Frequently Asked Questions
FBC	Fuels Borne Catalyst
FCOTF	Four Corners Ozone Task Force
FCPP	4 Corners Power Plant
FEIS	Final Environmental Impact Statement

FGD	Flue Gas Desulfurization
FIP	Federal Implementation Plan
FLAG	Federal Land Managers' AQRV Workgroup
FLM	Federal Land Manager
FR	Federal Register
FS	Forest Service (U.S. Department of Agriculture)
Ft	feet
FTF(s)	Flow Through Filter
FY	Fiscal Year
G	gram
g/bhp-hr	grams per brake horsepower-hour
g/hp-hr	grams per horsepower-hour
GF	Growth Fund
GHG(s)	Greenhouse Gases
GIS	Geographic Information System
GOR	Gas Oil Ratio
GVW	Gross Vehicle Weight
GWh/yr	Gigawatt hours per year
H+	Hydrogen ion
H <sub>2</sub> O	Water
H <sub>2</sub> S	Hydrogen Sulfide
H <sub>2</sub> SO <sub>4</sub>	Sulfuric Acid
HAP(s)	Hazardous Air Pollutants
HC(s)	Hydrocarbons
HF	Hydrogen Fluoride
Hg	Mercury
HCHO	Formaldehyde
HNO <sub>3</sub>	Nitric Acid
hp	Horsepower
HRSG	Heat Recovery Steam Generator
HRVOC(s)	Highly Reactive Volatile Organic Compounds
I&M	Inspection and Maintenance
IBEMP	Innovation Technology and Best Energy-Environment Management Practices
ICE	Internal Combustion Engine
IGCC	Integrated Gasification Combined Cycle
IMPROVE	Interagency Monitoring of Protected Visual Environment
ISA	Instrument Systems and Automation Society
ISCST3	Industrial Source Complex – Short Term Dispersion Model, Version 3
IWAQM	Inter-Agency Work Group on Air Quality Modeling
K	One Thousand Dollars or Potassium
kg/ha-yr	Kilograms per Hectare-Year
km	kilometer
Kwh	kilowatt hour
LAER	Lowest Achievable Emission Rate
lb	pound
lbs/mmBtu	pounds of emissions/million btu heat input
lbs/MWh	pounds of emission/Megawatt-hour
LDAR	Leak Detection and Repair
LEED	Leadership in Energy Efficiency and Design
LiCl	Lithium Chloride
LIDAR	Light Detection and Ranging

LLC	Limited Liability Company
LNC	Lean NOX Catalyst
LNG	Liquefied Natural Gas
LoTOx	Low Temperature Oxidation Technology
LP	Limited Partnership
LPG	Liquefied Petroleum Gas
LTO	Low Temperature Oxidation
LWV	League of Women Voters
MACT	Maximum Achievable Control Technology
MC	Multi-Contact
mcf	one thousand cubic feet
MDN	Mercury Deposition Network
Mg	Magnesium
mg/L	milligrams per liter
mg/m <sup>3</sup>	micrograms per cubic meter
microg/g	micrograms per gram
MIT	Massachusetts Institute of Technology
MM	One Million Dollars
Mm <sup>-1</sup>	Inverse Megameters
mmBtu	One Million British Thermal Units
MMcf/day	million cubic feet per day
MMscf/day	million standard cubic feet per day
MMV	Measurement, Monitoring and Verification Techniques
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	Miles Per Hour
MPO	Metropolitan Planning Organization
MSI	Mountain Studies Institute
MW	Megawatt
N	Nitrogen
N <sub>2</sub>	Nitrogen gas
N <sub>2</sub> O	Nitrous Oxide
N <sub>2</sub> O <sub>3</sub>	Nitrogen Oxide
N <sub>2</sub> O <sub>5</sub>	Nitric Pentoxide
NA	Not Applicable
Na	Sodium
NAAQS	National Ambient Air Quality Standard
NADP	National Atmospheric Deposition Program
NEG	Net Excess Generation
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NG	Natural Gas
NGCC	Natural Gas Combined Cycle
NGL	natural gas liquids
NH <sub>3</sub>	Ammonia
NI	no information
NM	New Mexico
NMED-AQB	New Mexico Environment Department-Air Quality Bureau
NMEMNRD	New Mexico Energy, Minerals and Natural Resources Department
NMHC	Non-Methane Hydrocarbon
NMOC	Non-Methane Organic Compounds
NMOCD	New Mexico Oil Conservation Division



NMOG	Non-Methane Organic Gas
NMOGA	New Mexico Oil and Gas Association
NMRPC	New Mexico Public Regulation Commission
NMUSA	New Mexico Utility Shareholders Alliance
NNEPA	Navajo Nation Environmental Protection Agency
No.	Number
NO	Nitric Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>3</sub>	Nitrate
NO <sub>x</sub>	Nitrogen Oxides
NO <sub>x</sub> /mmBtu	Nitrogen Oxides per million British Thermal Units
NOAA	National Oceanic & Atmospheric Administration
NP	National Park
NPS	National Park Service
NPV	Net Present Value
NRDC	Natural Resources Defense Council
NSCR	Non-Selective Catalytic Reduction
NSPS	New Source Performance Standards
NSR	New Source Review
NTN	National Trends Network
NW	Northwest
NWS	National Weather Service
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
O <sub>2</sub>	Oxygen
O <sub>3</sub>	Ozone
OCD	Oil Conservation Division
OCV	Open Crankcase Ventilation
OECA	Office of Enforcement and Compliance Assurance
OH	Hydroxide
ONG	Onshore Natural Gas
OP-FTIR	Open-Path Fourier Transform Infrared
Oz	Ounce
PAH(s)	Polycyclic Aromatic Hydrocarbon
PC	Pulverized Coal
P/H	Power to Heat Ratio
pH	Acidity Measurement Unit
PLC	Programmable Logic Controller
PM	Particulate Matter
PM <sub>10</sub>	Particulate Matter (effective diameter < 10 micrograms)
PM <sub>2.5</sub>	Fine Particulate Matter (effective diameter < 2.5 micrograms)
POWID	Power Industry Division
ppb	parts per billion
ppm	parts per million
PRO	Partner Reported Opportunities
PSD	Prevention of Significant Deterioration
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PSNM	Public Service of New Mexico
PV	Photovoltaic

QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
RACM	Reasonably Available Control Measures
RACT	Reasonably Available Control Technology
RAWS	Remote Automated Weather Stations
RC&D	Resource Conservation and Development
RE	Renewable Energy
REC(s)	Renewable Energy Credit
RH	Relative Humidity
RIA	Regulatory Impact Analyses
RICE	Reciprocating Internal Combustion Engine
RMP	Resource Management Plan
RMPPA	Resource Management Plan Planning Area
ROD	Record of Decision
ROG	Reactive Organic Gas
ROI	Return on Investment
RPM	Revolutions Per Minute
RPS	Renewable Portfolio Standards
RRC	Rebecca Reynolds Consulting
RVP	Reid Vapor Pressure
S	Sulfur
SAR	Specific Absorption Rate
scfh	standard cubic feet per hour of gas flow
SC	Supercritical
SCPC	Supercritical Pulverized Coal
SCR	Selective Catalytic Reduction
SEP(s)	Supplemental Energy Payment
SI	Spark-Ignition Engine
SIP	State Implementation Plan
SJ	San Juan
SJGS	San Juan Generating Station
SLAMS	State/Local Air Monitoring Stations
SNCR	Selective Non-Catalytic Reduction
SO <sub>2</sub>	Sulfur Dioxide
SO <sub>2</sub> /mmBtu	Sulfur Dioxide/one million British Thermal Units
SOTA	State of the Art
SO <sub>x</sub>	Sulfur Oxides
SPMS	Special Purpose Monitoring Stations
sq mi	Square Miles
SRI	Southern Research Institute
SRP	Salt River Project Agricultural Improvement and Power District
SUIT	Southern Ute Indian Tribe
SW	Southwest
SWD	Salt Water Disposal Well
SWEEP	Southwest Energy Efficiency Project
TAG	Technical Assessment Guide
TBD	To Be Determined
TDLAS	Tunable Diode Laser Absorption Spectroscopy
TDS	Total Dissolved Solids
TEG	Triethylene Glycol

TF	Task Force
THC	Total Hydrocarbons
TPH	Total Petroleum Hydrocarbons
tpy	tons per year
TSD	technical support document
U.S.C.	United States Code
ULSD	Ultra Low Sulfur Diesel
US	United States
USC	Ultra Supercritical Coal
USCPC	Ultra-Supercritical Pulverized Coal
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UT	Utah
VISTAS	Voluntary Innovative Strategies for Today's Air Standards Program
VLUA	Vallecito Land Use Association
VMT	Vehicle Miles Traveled
VOC(s)	Volatile Organic Compounds
VRM	Visual Resource Management
VRP	Visibility Reducing Particles
VRU	Vapor Recovery Unit
vs.	Versus
W	West
W/m <sup>2</sup>	Watts per square meter
W/O	without
WDEQ	Wyoming Department of Environmental Quality
WESTAR	Western States Air Resource Council
WRAP	Western Regional Air Partnership

# *Definitions*

## Definitions

**3-way catalyst:** A catalyst containing both reduction and oxidation catalyst materials that converts Oxides of Nitrogen (NO<sub>x</sub>), Carbon Monoxide (CO), and Non-Methane Hydrocarbons (NMHCs) to Nitrogen (N<sub>2</sub>), Carbon Dioxide (CO<sub>2</sub>), and water H<sub>2</sub>O.

**AP-42:** An U.S. EPA compendium of emission factors for different source types. An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e. g., kilograms of particulate emitted per megagram of coal burned). For additional information, see EPA's website at <http://www.epa.gov/ttn/chief/ap42/>.

**Absorption:** The process by which the energy of a photon is taken up by another entity.

**Acid Deposition:** A comprehensive term for the various ways acidic compounds precipitate from the atmosphere and deposit onto surfaces. It can include: 1) wet deposition by means of acid rain, fog, and snow; and 2) dry deposition of acidic particles (aerosols).

**Acid Rain:** Rain which is especially acidic (pH <5.2). Principal components of acid rain typically include nitric and sulfuric acid. These may be formed by the combination of nitrogen and sulfur oxides with water vapor in the atmosphere.

**Acid Rain Program:** The overall goal of the Acid Rain Program is to achieve significant environmental and public health benefits through reductions in emissions of sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>)—the primary causes of acid rain. To achieve this goal at the lowest cost to society, the program employs both traditional and innovative, market-based approaches for controlling air pollution. In addition, the program encourages energy efficiency and pollution prevention.

**Activated Carbon Injection (ACI) Technology:** In ACI technology, powdered activated carbon (PAC) sorbent is injected into the flue gas at a location in the duct preceding the particulate matter (PM) control device, which usually is an electrostatic precipitator or a fabric filter. The PAC sorbent binds with the mercury in the flue gas in the duct and in the PM control device. Subsequently, the mercury-containing PAC is captured in the PM control device.

**Carbon Capture and Sequestration (CCS):** Carbon capture and storage is an approach to mitigating climate change by capturing carbon dioxide (CO<sub>2</sub>) from large point sources such as power plants and subsequently storing it away safely instead of releasing it into the atmosphere. Technology for capturing of CO<sub>2</sub> is already commercially available for large CO<sub>2</sub> emitters, such as power plants. Storage of CO<sub>2</sub>, on the other hand, is a relatively untried concept and as yet (2007) no power plant operates with a full carbon capture and storage system. Currently, the United States government has approved the construction of the world's first CCS power plant, FutureGen, while BP has indicated that it intends to develop a 350 MW carbon capture and storage plant in Scotland, in which the carbon from a natural gas fired generator plant will be stripped out and pumped into the Miller field in the North Sea.

**Add-On Control Device:** An air pollution control device such as carbon absorber or incinerator that reduces the pollution in exhaust gas. The control device usually does not affect the process being controlled and thus is "add-on" technology, as opposed to a scheme to control pollution through altering the basic process itself. See also pollution prevention.

**Adsorber:** An emissions control device that removes volatile organic compounds (VOCs) from a gas stream as a result of the gas attaching (adsorbing) onto a solid matrix such as activated carbon.

**Adsorption (Physical and Chemical):** capability of all solid substances to attract to their surfaces molecules of gases or solutions with which they are in contact. Solids that are used to adsorb gases or dissolved substances are called adsorbents; the adsorbed molecules are usually referred to collectively as the adsorbate. An example of an excellent adsorbent is the charcoal used in gas mask.

**Adverse Health Effect:** A health effect from exposure to air contaminants that may range from relatively mild temporary conditions, such as eye or throat irritation, shortness of breath, or headaches to permanent and serious conditions, such as birth defects, cancer or damage to lungs, nerves, liver, heart, or other organs.

**Aerosol:** Particles of solid or liquid matter that can remain suspended in air from a few minutes to many months depending on the particle size and weight.

**Afterburner:** An air pollution abatement device that removes undesirable organic gases through incineration.

**Agricultural Burning:** The intentional use of fire for vegetation management in areas such as agricultural fields, orchards, rangelands, and forests.

**Air:** So called "pure" air is a mixture of gases containing about 78 percent nitrogen; 21 percent oxygen; less than 1 percent of carbon dioxide, argon, and other gases; and varying amounts of water vapor. See also ambient air.

**Air Monitoring:** Sampling for and measuring of pollutants present in the atmosphere.

**Air Pollutants:** Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation, and/or materials. (See also air pollution.)

**Air Pollution:** Degradation of air quality resulting from unwanted chemicals or other materials occurring in the air. (See also air pollutants.)

**Air Quality Index (AQI):** A numerical index used for reporting severity of air pollution levels to the public. The AQI incorporates five criteria pollutants -- ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide -- into a single index. The new index also incorporates the 8-hour ozone standard and the 24-hour PM<sub>2.5</sub> standard into the index calculation. AQI levels range from 0 (Good air quality) to 500 (Hazardous air quality). The higher the index, the higher the level of pollutants and the greater the likelihood of health effects. The AQI incorporates an additional index category -- unhealthy for sensitive groups -- that ranges from 101 to 150. In addition, the AQI comes with more detailed cautions.

**Air Quality Model:** A mathematical relationship between emissions and air quality which simulates on a computer the transport, dispersion, and transformation of compounds emitted into the air.

**Air Quality Standard (AQS):** The prescribed level of a pollutant in the outside air that should not be exceeded during a specific time period to protect public health. Established by both federal and state governments. (See also ambient air quality standards.)

**Air separation membranes:** Change the proportion of nitrogen to oxygen in air. A membrane can be optimized to either enrich the oxygen content or to enrich the nitrogen content.

**Airshed:** Denotes a geographical area that shares the same air because of topography, meteorology, and climate.

**Air to Fuel Ratio Controller (AFRC):** Device using a closed loop control based on the readings of an exhaust gas oxygen sensor to determine the air/fuel ratio.

**Air Toxics:** A generic term referring to a harmful chemical or group of chemicals in the air. Substances that are especially harmful to health, such as those considered under U.S. EPA's hazardous air pollutant program, are considered to be air toxics. Technically, any compound that is in the air and has the potential to produce adverse health effects is an air toxic.

**Alcohol Fuels:** Alcohol can be blended with gasoline for use as transportation fuel. It may be produced from a wide variety of organic feedstock. The common alcohol fuels are methanol and ethanol. Methanol may be produced from coal, natural gas, wood and organic waste. Ethanol is commonly made from agricultural plants, primarily corn, containing sugar.

**Alkane:** Chemical compounds that consist only of the elements carbon (C) and hydrogen (H) (i.e. hydrocarbons), where each of these atoms are linked together exclusively by single bonds.

**Alternative Fuels:** Fuels such as methanol, ethanol, natural gas, and liquid petroleum gas that are cleaner burning and help to meet mobile and stationary emission standards. These fuels may be used in place of less clean fuels for powering motor vehicles.

**Ambient Air:** The air occurring at a particular time and place outside of structures. Often used interchangeably with "outdoor air." (See also air.)

**Ambient Air Quality Standards (AAQS):** Health- and welfare-based standards for outdoor air which identify the maximum acceptable average concentrations of air pollutants during a specified period of time. (See also NAAQS and Criteria Air Pollutant.)

**American Society for Testing and Materials (ASTM):** A nonprofit organization that provides a forum for producers, consumers, and representatives of government and industry, to write laboratory test standards for materials, products, systems, and services. ASTM publishes standard test methods, specifications, practices, guides, classifications, and terminology.

**Amines:** Amines are organic compounds that contain nitrogen as the key atom. Structurally, amines resemble ammonia. The advantage of an amine CO<sub>2</sub> removal system is that it has a lower capital cost than any of the current physical solvent processes. The disadvantage is that an amine system uses large amounts of steam heat for solvent regeneration and energy to re-cool the amine, making it a less energy efficient process.

**Ammonia (NH<sub>3</sub>):** A pungent colorless gaseous compound of nitrogen and hydrogen that is very soluble in water and can easily be condensed into a liquid by cold and pressure. Ammonia reacts with NO<sub>x</sub> to form ammonium nitrate -- a major PM<sub>2.5</sub> component in the Western United States.

**Ammonia slip:** Ammonia emissions from SCR systems.

**Area Sources:** Those sources for which a methodology is used to estimate emissions. This can include area-wide, mobile and natural sources, and also groups of stationary sources (such as dry cleaners and gas stations). Sources which are not reported as individual point sources are included as area sources. The federal air toxics program defines a source that emits less than 10 tons per year of a single hazardous air pollutant (HAP) or 25 tons per year of all HAPs as an area source.

**Aromatic compounds:** An organic chemical compound that contains aromatic rings (arenes) like benzene, pyridine, or indole and possessing an aroma, fragrance, flavor, smell, or odor

**Asthma:** A chronic inflammatory disorder of the lungs characterized by wheezing, breathlessness, chest tightness, and cough.

**Atmosphere:** The gaseous mass or envelope of air surrounding the Earth. From ground-level up, the atmosphere is further subdivided into the troposphere, stratosphere, mesosphere, and the thermosphere.

**Attainment Area:** A geographical area identified to have air quality as good as, or better than, the national ambient air quality standards (NAAQS). An area may be an attainment area for one pollutant and a nonattainment area for others.

**Baghouse:** An air pollution control device that traps particulates by forcing gas streams through large permeable bags usually made of glass fibers.

**Banking:** A provision used in emissions trading programs that allows a facility to accumulate credits for reducing emissions beyond regulatory limits (emission reduction credits) and then use or sell those credits at a later date.

**Baseline:** A starting point or condition against which future changes are measured. For air quality emissions, the known emissions in a given year that future emissions can be measured against.

**Benzene, Toluene, Ethyl Benzene, Xylene (BTEX):** Group of volatile organic compounds (VOCs) found in petroleum hydrocarbons, such as gasoline, and other common environmental contaminants.

**Best Available Control Measure (BACM):** A term used to describe the "best" measures (according to U.S. EPA guidance) for controlling small or dispersed sources of particulate matter and other emissions from sources such as roadway dust, woodstoves, and open burning.

**Best Available Control Technology (BACT):** The most up-to-date methods, systems, techniques, and production processes available to achieve the greatest feasible emission reductions for given regulated air pollutants and processes. BACT is a requirement of NSR (New Source Review) and PSD (Prevention of Significant Deterioration).

**Best Available Retrofit Technology (BART):** An air emission limitation that applies to existing sources and is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source. (See also Best Available Control Technology.)

**Bioenergy:** Useful, renewable energy produced from organic matter, which may either be used directly as a fuel or processed into liquids and gases.

**Biofuels:** Liquid fuels and blending components produced from biomass (plant) feedstocks, used primarily for transportation.



**Biogenic Source:** Biological sources such as plants and animals that emit air pollutants such as volatile organic compounds. Examples of biogenic sources include animal management operations, and oak and pine tree forests. (See also natural sources.)

**Biomass:** Organic nonfossil matter of a biological origin available on a renewable basis. Biomass includes forest and mill residues, agricultural crops and wastes, wood and wood wastes, animal wastes, livestock operation residues, aquatic plants, fast-growing trees and plants, and municipal and industrial wastes.

**Boiler:** A device for generating steam for power, processing, or heating purposes or for producing hot water for heating purposes or hot water supply. A device where heat converts water to steam.

**Carbon (CO<sub>2</sub>) Capture and Storage:** CO<sub>2</sub> capture and storage involves capturing the CO<sub>2</sub> arising from the combustion of fossil fuels, as in power generation, or from the preparation of fossil fuels, as in natural-gas processing. Capturing CO<sub>2</sub> involves separating the CO<sub>2</sub> from some other gases. For example in the exhaust gas of a power plant other gases would include nitrogen and water vapor. The CO<sub>2</sub> must then be transported to a storage site where it will be stored away from the atmosphere for a long period of time. In order to have a significant effect on atmospheric concentrations of CO<sub>2</sub>, storage reservoirs would have to be large relative to annual emissions. (IPCC, 2001). Sometimes referred to as sequestration.

**Carbon Dioxide (CO<sub>2</sub>):** A colorless, odorless gas that occurs naturally in the Earth's atmosphere. Significant quantities are also emitted into the air by fossil fuel combustion.

**Carbon mass balance:** An accounting of material entering and leaving a system.

**Carbon Monoxide (CO):** A colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. CO is a criteria air pollutant.

**Carcinogen:** A cancer-causing substance. (See also cancer.)

**CAS Registry Number:** The Chemical Abstracts Service Registry Number (CAS) is a numeric designation assigned by the American Chemical Society's Chemical Abstract Service and uniquely identifies a specific compound. This entry allows one to conclusively identify a material regardless of the name or naming system used.

**Catalyst:** A substance that can increase or decrease the rate of a chemical reaction between the other chemical species without being consumed in the process.

**Catalyst Deactivation:** Poisoning is a primary factor in deactivation, with blockage and physical destruction of equal importance to catalyst life. When the surface or pores of the catalyst are blocked, flue gas/NO<sub>x</sub> cannot contact the catalyst.

**Catalytic converter:** The mechanism by which the catalyst will either oxidize (oxidation catalyst) a CO or fuel molecule or reduce (reduction catalyst) a NO<sub>x</sub> molecule.

**Cation:** A positively-charged ion, which has fewer electrons than protons. An ion is an atom or group of atoms which have lost or gained one or more electrons, making them negatively or positively charged.

**Cell Burner:** Cell burner boiler means a wall-fired boiler that utilizes two or three circular burners combined into a single vertically oriented assembly that results in a compact, intense flame. Cell burner boilers have closely spaced clusters of two or three burners (i.e., cells) that together result in a single flame. In addition, the boilers are, like many wall-fired boilers, relatively compactly designed with small furnaces.

**Chromatography:** A set of laboratory techniques for separation of mixtures. One such procedure includes passing a mixture dissolved in a "mobile phase" through a stationary phase, which separates the analyte to be measured from other molecules in the mixture and allows it to be isolated.

**Chronic Exposure:** Long-term exposure, usually lasting one year to a lifetime.

**Chronic Health Effect:** A health effect that occurs over a relatively long period of time (e.g., months or years). (See also acute health effect.)

**Class I Area:** Under the Clean Air Act, a Class I area is one in which visibility is protected more stringently than under the national ambient air quality standards; includes national parks, wilderness area, monuments and other areas of special national and cultural significance.

**Clean Air Act (CAA):** A federal law passed in 1970 and amended in 1974, 1977 and 1990 which forms the basis for the national air pollution control effort. Basic elements of the act include national ambient air quality standards for major air pollutants, mobile and stationary control measures, air toxics standards, acid rain control measures, and enforcement provisions.

**Clean Air Mercury Rule:** On March 15, 2005, EPA issued the Clean Air Mercury Rule to permanently cap and reduce mercury emissions from coal-fired power plants for the first time ever. This rule makes the United States the first country in the world to regulate mercury emissions from utilities.

**Cleaner-Burning Gasoline:** Gasoline fuel that results in reduced emissions of carbon monoxide, nitrogen oxides, reactive organic gases, and particulate matter, in addition to toxic substances such as benzene and 1,3-butadiene.

**Coal bed methane (CBM):** Methane found in coal seams.

**Code of Federal Regulations (CFR):** The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government pursuant to authority derived from the Clean Air, Water, and other environmental acts.

**Cogeneration:** See combined heat and power.

**Combined Cycle:** An electric generating technology in which electricity is produced from otherwise lost waste heat exiting from one or more gas (combustion) turbines. The exiting heat is routed to a conventional boiler or to a heat recovery steam generator for utilization by a steam turbine in the production of electricity. Such designs increase the efficiency of the electric generating unit.

**Combined Heat and Power (CHP) Plant:** A plant designed to produce both heat and electricity from a single heat source. Note: This term is being used in place of the term "cogenerator" that was used by EIA in the past. CHP better describes the facilities because some of the plants included do not produce heat and power in a sequential fashion and, as a result, do not meet the legal definition of cogeneration specified in the Public Utility Regulatory Policies Act (PURPA).

**Combustion:** The act or instance of burning some type of fuel such as gasoline to produce energy. Combustion is typically the process that powers automobile engines, oil and gas-field engines, and power plant generators.

**Compressed natural gas (CNG):** A substitute for gasoline (petrol) or diesel fuel, made by compressing methane extracted from natural gas.

**Concentrator:** A reflective or refractive device that focuses incident insolation onto an area smaller than the reflective or refractive surface, resulting in increased insolation at the point of focus.

**Conventional hydroelectric (hydropower) plant:** A plant in which all of the power is produced from natural streamflow as regulated by available storage.

**Condensate tank:** Tank for storing condensate from oil and gas activity.

**Condensate Tank Battery:** Comprised of a single storage tank or a group of storage tanks with a design capacity less than or equal to 10,000 barrels per tank, used for the storage of condensate and located at an exploration and production facility.

**Consent Decree:** When a court case has been filed, the parties can resolve the case short of having a trial by entering into a joint agreement or by consenting to a judgment.

**Continuous Emission Monitor (CEM):** A type of air emission monitoring system installed to operate continuously inside of a smokestack or other emission source.

**Continuous Sampling Device:** An air analyzer that measures air quality components continuously. (See also Integrated Sampling Device.)

**Control Techniques Guidelines (CTG):** Guidance documents issued by U.S. EPA that define reasonably available control technology (RACT) to be applied to existing facilities that emit excessive quantities of air pollutants; they contain information both on the economic and technological feasibility of available techniques.

**Cost-Effectiveness:** The cost of an emission control measure assessed in terms of dollars-per-pound, or dollars-per-ton, of air emissions reduced.

**Criteria Air Pollutant:** An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM<sub>10</sub> and PM<sub>2.5</sub>. The term "criteria air pollutants" derives from the requirement that the U.S. EPA must describe the characteristics and potential health and welfare effects of these pollutants. The U.S. EPA periodically reviews new scientific data and may propose revisions to the standards as a result.

**Cryogenic:** production of very low temperatures and the behavior of materials at those temperatures below -150C.

**Cyclone:** An air pollution control device that removes larger particles -- generally greater than one micron -- from an air stream through centrifugal force.

**Deciview:** A measurement of visibility. One deciview represents the minimal perceptible change in visibility to the human eye.

**Desiccant dehydrator:** Device that uses moisture-absorbing salts to remove water from natural gas. In general, there are only minor air emissions from desiccant systems.

**Diesel Engine:** A type of internal combustion engine that uses low-volatility petroleum fuel and fuel injectors and initiates combustion using compression ignition (as opposed to spark ignition that is used with gasoline engines).

**Diesel fuel emulsion:** Emulsion of diesel and other fuel intended to reduce peak engine combustion temperatures and increase fuel atomization and combustion efficiency.

**Diesel oxidation catalyst (DOC):** Device that uses a chemical process to break down pollutants in the exhaust stream into less harmful components. Diesel oxidation catalysts can reduce emissions of particulate matter (PM) by 20% and hydrocarbons (HC) by 50% and carbon monoxide (CO) by approximately 40%.

**Diesel particulate filter:** Filter that collects or traps particulate matter (PM) in the exhaust.

**Diffraction:** Diffraction refers to various phenomena associated with wave propagation, such as the bending, spreading and interference of waves such as visible light.

**Dispersion Model:** See air quality model above.

**Distributed Generation (Distributed Energy Resources):** Refers to electricity provided by small, modular power generators (typically ranging in capacity from a few kilowatts to 50 megawatts) located at or near customer demand.

**Dose:** The amount of a pollutant that is absorbed. A level of exposure which is a function of a pollutant's concentration, the length of time a subject is exposed, and the amount of the pollutant that is absorbed. The concentration of the pollutant and the length of time that the subject is exposed to that pollutant determine dose.

**Dose-Response:** The relationship between the dose of a pollutant and the response (or effect) it produces on a biological system.

**Drill rig:** General term used to describe a wide variety of machines that create holes (usually called boreholes) and/or shafts in the ground, or to install wells.

**Dry-bottom, Wall-fired:** Dry bottom means the boiler has a furnace bottom temperature below the ash melting point and the bottom ash is removed as a solid. Wall-fired boiler means a boiler that has pulverized coal burners arranged on the walls of the furnace. The burners have discrete, individual flames that extend perpendicularly into the furnace area.

**Dry Cooled Coal-Fired:** Dry cooling operates without evaporation by passing the steam from the turbines through a set of finned pipes immediately beside the turbine and cooling the water by having large volumes of air driven by fans to condense the steam in the pipes.

**Dust:** Solid particulate matter that can become airborne.

**Ecosystem:** A self-sustaining association of plants, animals, and the physical environment in which they live.

**Electric Generating Unit (EGU) – Clean Air Interstate Rule definition:**

(a) Except as provided in paragraph (b) of this definition, a stationary, fossil-fuel-fired boiler or stationary, fossil fuel fired combustion turbine serving at any time, since the start-up of a unit's combustion chamber, a generator with nameplate capacity of more than 25 MWe producing electricity for sale.

(b) For a unit that qualifies as a cogeneration unit during the 12-month period starting on the date the unit first produces electricity and continues to qualify as a cogeneration unit, a cogeneration unit serving at any time a generator with nameplate capacity of more than 25 MWe and supplying in any calendar year more than one-third of the unit's potential electric output capacity or 219,000 MWh, whichever is greater, to any utility power distribution system for sale. If a unit that qualifies as a cogeneration unit during the 12-month period starting on the date the unit first produces electricity but subsequently no longer qualifies as a cogeneration unit, the unit shall be subject to paragraph (a) of this definition starting on the day on which the unit first no longer qualifies as a cogeneration unit.

**Electric Utility:** A corporation, person, agency, authority, or other legal entity or instrumentality aligned with distribution facilities for delivery of electric energy for use primarily by the public. Included are investor-owned electric utilities, municipal and State utilities, Federal electric utilities, and rural electric cooperatives. A few entities that are tariff based and corporately aligned with companies that own distribution facilities are also included.

**Electrostatic Precipitator (ESP):** An air pollution control device that removes particulate matter from an air stream by imparting an electrical charge to the particles for mechanical collection at an electrode.

**Emission Factor:** For stationary sources, the relationship between the amount of pollution produced and the amount of raw material processed or burned. For mobile sources, the relationship between the amount of pollution produced and the number of vehicle miles traveled. By using the emission factor of a pollutant and specific data regarding quantities of materials used by a given source, it is possible to compute emissions for the source. This approach is used in preparing an emissions inventory.

**Emission Inventory:** An estimate of the amount of pollutants emitted into the atmosphere from major mobile, stationary, area-wide, and natural source categories over a specific period of time such as a day or a year.

**Emission Rate:** The weight of a pollutant emitted per unit of time (e.g., tons / year).

**Emission Standard:** The maximum amount of a pollutant that is allowed to be discharged from a polluting source such as an automobile or smoke stack.

**Emission trading system (ETS):** Program wherein the governing authority (e.g., agency) issues a limited number of allocations in the form of certificates consistent with the desired or targeted level of emissions in an identified region or area. The sources of a particular air pollutant (e.g., NOx) are allotted certificates to release a specified number of tons of the pollutant. The certificate owners may choose either to continue to release the pollutant at current levels and use the certificates or to reduce their emissions and sell the certificates.

**Enardo valve:** Brand name for a pressure relief valve installed on condensate and other oil storage tanks to control evaporation and fugitive emission losses that result from flammable and hazardous petroleum vapor-producing products.

**Energy Content:** The amount of energy available for doing work. For example, the amount of energy in fuel available for powering a motor vehicle.

**Energy Crops:** Crops grown specifically for their fuel value. These include food crops such as corn and sugarcane, and nonfood crops such as poplar trees and switchgrass. Currently, two energy crops are under development: short - rotation woody crops, which are fast - growing hardwood trees harvested in five to eight years, and herbaceous energy crops, such as perennial grasses, which are harvested annually after taking two to three years to reach full productivity.

**Energy Efficiency:** Energy efficiency refers to products or systems using less energy to do the same or better job than conventional products or systems. Energy efficiency saves energy, saves money on utility bills, and helps protect the environment by reducing the amount of electricity that needs to be generated. When buying or replacing products or appliances for your home, look for the ENERGY STAR® label — the national symbol for energy efficiency. For more information on ENERGY STAR® labeled products, visit the [ENERGY STAR® Web site](#).

**Enhanced Gas Recovery and/or Enhanced Coal Bed Methane Recovery:** To enhance coal bed methane recovery factors and production rates as a result of CO<sub>2</sub> injection. Burlington Resources has successfully injected CO<sub>2</sub> into relatively high permeability coalbeds in the San Juan basin in the USA for several years. They are stimulating coalbed methane production and recovery. The injected CO<sub>2</sub> is adsorbed into the coal matrix and remains in the ground after completion of gas production. However, further testing and demonstration are needed to apply this process to low permeability reservoirs.

**Enhanced Oil Recovery:** Using CO<sub>2</sub> injection to enhance production from oil reservoirs.

**Environmental Justice:** The fair treatment of people of all races and incomes with respect to development, implementation, and enforcement of environmental laws, regulations, and policies.

**EPA's Natural Gas STAR Program:** The Natural Gas STAR Program is a flexible, voluntary partnership between U.S. EPA and the oil and natural gas industry. Through the program, U.S. EPA works with companies that produce, process, and transmit and distribute natural gas to identify and promote the implementation of cost-effective technologies and practices to reduce emissions of methane, a potent greenhouse gas.

**Ethanol (also known as Ethyl Alcohol or Grain Alcohol, CH<sub>3</sub>-CH<sub>2</sub>OH):** A clear, colorless flammable oxygenated hydrocarbon with a boiling point of 173.5 degrees Fahrenheit in the anhydrous state. However it readily forms a binary azeotrope with water, with a boiling point of 172.67 degrees Fahrenheit at a composition of 95.57 percent by weight ethanol. It is used in the United States as a gasoline octane enhancer and oxygenate (maximum 10 percent concentration). Ethanol can be used in higher concentrations (E85) in vehicles designed for its use. Ethanol is typically produced chemically from ethylene, or biologically from fermentation of various sugars from carbohydrates found in agricultural crops and cellulosic residues from crops or wood. The lower heating value, equal to 76,000 Btu per gallon, is assumed for estimates in this report.

**Evacuated Tube:** In a solar thermal collector, an absorber tube, which is contained in an evacuated glass cylinder, through which collector fluids flows.

**Evaporative Emissions:** Emissions from evaporating gasoline, which can occur during vehicle refueling, vehicle operation, and even when the vehicle is parked. Evaporative emissions can account for two-thirds of the hydrocarbon emissions from gasoline-fueled vehicles on hot summer days.

**Exhaust Gas Recirculation (EGR):** An emission control method that involves recirculating exhaust gases from an engine back into the intake and combustion chambers. This lowers combustion temperatures and reduces NOx. (See also nitrogen oxides.)

**Exceedance:** A measured level of an air pollutant higher than the national or state ambient air quality standards. (See also NAAQS.)

**Federal Implementation Plan (FIP):** In the absence of an approved State Implementation Plan (SIP), a plan prepared by the U.S. EPA which provides measures that areas must take to meet the requirements of the Federal Clean Air Act.

**Feedstock:** The raw material that is required for some industrial process.

**Flaring:** Technique of igniting hydrocarbon gases to convert natural gas constituents (hydrocarbons, including BTEX and other Hazardous Air Pollutants) into less hazardous and atmospherically reactive compounds.

**Flash emissions:** Emissions resulting by a reduction in pressure and/or temperature when hydrocarbon liquids are dumped into the storage tank from the production separator.

**Flow through filters (FTF):** Filters for capture or oxidize particles, using a variety of media and regeneration strategies. The filter media can be either wire mesh or pertubated path metal foil.

**Flue gas:** Exhaust gases following combustion.

**Fly Ash:** Air-borne solid particles that result from the burning of coal and other solid fuel.

**Fossil Fuels:** Fuels such as coal, oil, and natural gas; so-called because they are the remains of ancient plant and animal life.

**Fugitive Dust:** Dust particles that are introduced into the air through certain activities such as soil cultivation, or vehicles operating on open fields or dirt roadways. A subset of fugitive emissions.

**Fugitive Emissions:** Emissions not caught by a capture system which are often due to equipment leaks, evaporative processes and windblown disturbances.

**Furnace:** A combustion chamber; an enclosed structure in which fuel is burned to heat air or material.

**FutureGen:** FutureGen is a project of the US government to build a near zero-emissions coal-fueled power plant that intends to produce hydrogen and electricity while using carbon capture and storage.

**Gas Turbine:** An engine that uses a compressor to draw air into the engine and compress it. Fuel is added to the air and combusted in a combustor. Hot combustion gases exiting the engine turn a turbine which also turns the compressor. The engine's power output can be delivered from the compressor or turbine side of the engine.

**Gasifier:** A device for converting solid fuel into gaseous fuel.

**Generation (Electricity):** The process of producing electric energy from other forms of energy; also, the amount of electric energy produced, expressed in wathours (Wh).

**Global Warming:** An increase in the temperature of the Earth's troposphere. Global warming has occurred in the past as a result of natural influences, but the term is most often used to refer to the warming predicted by computer models to occur as a result of increased emissions of greenhouse gases.

**GLYCALC:** A software program for estimating air emissions from glycol units using triethylene glycol (TEG), diethylene glycol (DEG) or ethylene glycol (EG).

**Glycol dehydrator:** Any device in which a liquid glycol (including ethylene glycol, diethylene glycol, or triethylene glycol) absorbent directly contacts a natural gas stream and absorbs water from the natural gas stream.

**Green Power:** Electricity that is generated from renewable energy sources is often referred to as “green power.” Green power products can include electricity generated exclusively from renewable resources or, more frequently, electricity produced from a combination of fossil and renewable resources. Also known as “blended” products, these products typically have lower prices than 100 percent renewable products. Customers who take advantage of these options usually pay a premium for having some or all of their electricity produced from renewable resources. To find out more about green power, visit EPA’s [Green Power Partnership Web site](#).

**Greenhouse Effect:** The warming effect of the Earth's atmosphere. Light energy from the sun which passes through the Earth's atmosphere is absorbed by the Earth's surface and re-radiated into the atmosphere as heat energy. The heat energy is then trapped by the atmosphere, creating a situation similar to that which occurs in a car with its windows rolled up. A number of scientists believe that the emission of CO<sub>2</sub> and other gases into the atmosphere may increase the greenhouse effect and contribute to global warming.

**Greenhouse Gases:** Atmospheric gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapor that slow the passage of re-radiated heat through the Earth’s atmosphere.

**Gypsum:** Gypsum is one of the most widely used minerals in the world. Most gypsum in the United States is used to make wallboard for homes, offices, and commercial buildings; a typical new American home contains more than seven metric tons of gypsum alone. Moreover, gypsum is used worldwide in concrete for highways, bridges, buildings, and many other structures that are part of our everyday life. Gypsum also is used extensively as a soil conditioner on large tracts of land in suburban areas, as well as in agricultural regions.

**Hazardous Air Pollutant (HAP):** An air pollutant listed under section 112 (b) of the federal Clean Air Act as particularly hazardous to health. Emission sources of hazardous air pollutants are identified by U.S. EPA, and emission standards are set accordingly.

**Haze (Hazy):** A phenomenon that results in reduced visibility due to the scattering of light caused by aerosols. Haze is caused in large part by man-made air pollutants.

**Health-Based Standard (Primary Standard):** A dosage of air pollution scientifically determined to protect against human health effects such as asthma, emphysema, and cancer.

**Heat Recovery Steam Generator (HRSG):** Recovers waste heat exhaust from a combustion turbine and generates steam

**"Hot Spot":** (See toxic hot spot.)



**Hydrated Lime Injection:** Calcium hydroxide, also known as slaked lime, is a chemical compound with the chemical formula  $\text{Ca}(\text{OH})_2$ . It is a colorless crystal or white powder, and is obtained when calcium oxide (called lime or quicklime) is slaked with water. It can also be precipitated by mixing an aqueous solution of calcium chloride and an aqueous solution of sodium hydroxide. A traditional name for calcium hydroxide is slaked lime, or hydrated lime.

Hydrated lime may be injected into the upper regions of a furnace where high temperatures are conducive to driving the reaction between the calcium and  $\text{SO}_2$  to achieve up to 70%  $\text{SO}_2$  removal.

**Hydrocarbons:** Compounds containing various combinations of hydrogen and carbon atoms. They may be emitted into the air by natural sources (e.g., trees) and as a result of fossil and vegetative fuel combustion, fuel volatilization, and solvent use. Hydrocarbons are a major contributor to smog.

**Hydrogen Sulfide ( $\text{H}_2\text{S}$ ):** A colorless, flammable, poisonous compound having a characteristic rotten-egg odor. It is used in industrial processes and may be emitted into the air.

**Incentives:** Subsidies and other Government actions where the Governments's financial assistance is indirect.

**Incineration:** The act of burning a material to ashes.

**Indirect emissions:** *See* Indirect Source.

**Indirect Source:** Any facility, building, structure, or installation, or combination thereof, which generates or attracts mobile source activity that results in emissions of any pollutant (or precursor) for which there is a state ambient air quality standard. Examples of indirect sources include employment sites, shopping centers, sports facilities, housing developments, airports, commercial and industrial development, and parking lots and garages.

**Industrial Source:** Any of a large number of sources -- such as manufacturing operations, oil and gas refineries, food processing plants, and energy generating facilities -- that emit substances into the atmosphere.

**Inert Gas:** A gas that does not react with the substances coming in contact with it.

**Inert gas blanket:** "Blanket" of inert (chemically non-reactive) gas that fills the space above the condensate/crude oil to minimize volatilization and vapor loss.

**Injection wells:** Well in which fluids are injected rather than produced, the primary objective typically being to maintain reservoir pressure. Two common types of injection gas and water. Separated gas from production wells or possibly imported gas may be reinjected into the upper gas section of the reservoir to maintain pressure.

**Inspection and Maintenance (I&M) Program:** A motor vehicle inspection program. The purpose of the I&M is to reduce emissions by assuring that cars are running properly. It is designed to identify vehicles in need of maintenance and to assure the effectiveness of their emission control systems on a biennial basis.

**Integrated Sampling Device:** An air sampling device that allows estimation of air quality components over a period of time through laboratory analysis of the sampler's medium.

**Internal Combustion Engine:** An engine in which both the heat energy and the ensuing mechanical energy are produced inside the engine. Includes gas turbines, spark ignition gas, and compression ignition diesel engines.

**Inversion:** A layer of warm air in the atmosphere that prevents the rise of cooling air and traps pollutants beneath it.

**Kilowatt (kW):** One thousand watts of electricity (See Watt).

**Kilowatthour (kWh):** One thousand watthours.

**Kimray pump:** Brand name of automated glycol pump used to circulate glycol in dehydrators.

**Laser ignition:** Ignition sequence replacing the conventional spark plugs with a laser beam that is focused to a point in the combustion chamber. There, the focused, coherent light ionizes the fuel-air mixture to initiate combustion.

**Lead:** A gray-white metal that is soft, malleable, ductile, and resistant to corrosion. Sources of lead resulting in concentrations in the air include industrial sources and crustal weathering of soils followed by fugitive dust emissions. Health effects from exposure to lead include brain and kidney damage and learning disabilities. Lead is the only substance which is currently listed as both a criteria air pollutant and a toxic air contaminant.

**Leadership in Energy Efficiency and Design certification (LEED):** The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

**Leak Detection and Repair (LDAR):** Leak detection protocol, using either Photo-ionization detectors or infrared cameras promises to prevent volatile organic compound and hazardous air pollutant emissions from leaking equipment.

**Lean Burn Engine:** An engine that employs a fuel mixture with a higher air content than fuel as regulated by the AFRC with a normal exhaust oxygen concentration of 2% by volume, or greater.

**Liquid Natural Gas (LNG):** Natural gas that has been processed to remove either valuable components (e.g. helium) or those impurities that could cause difficulty downstream (e.g. water and heavy hydrocarbons) and then condensed into a liquid.

**Lowest Achievable Emission Rate (LAER):** Under the Clean Air Act, the rate of emissions that reflects (1) the most stringent emission limitation in the State Implementation Plan of any state for a given source unless the owner or operator demonstrates such limitations are not achievable; or (2) the most stringent emissions limitation achieved in practice, whichever is more stringent.

**Low NOx Burners:** One of several combustion technologies used to reduce emissions of nitrogen oxides.

**Major Source:** A stationary facility that emits a regulated pollutant in an amount exceeding the threshold level depending on the location of the facility and attainment with regard to air quality status. (See Source.)

**Mass Spectrometry:** Analytical technique used to measure the mass-to-charge ratio of ions.

**Maximum Achievable Control Technology (MACT):** Federal emissions limitations based on the best demonstrated control technology or practices in similar sources to be applied to major sources emitting one or more federal hazardous air pollutants.

**Mean:** Average.

**Median:** The middle value in a population distribution, above and below which lie an equal number of individual values; midpoint.

**Megawatt (MW):** One million watts of electricity (See Watt).

**Melting Point:** The temperature at which a solid becomes a liquid. At this temperature, the solid and the liquid have the same vapor pressure.

**Mercury:** A chemical element in the periodic table that has the symbol Hg. A heavy, silvery transition metal, mercury is one of five elements that are liquid at or near room temperature and pressure.

**Mercury Deposition Network (MDN):** The objective of the MDN is to develop a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition. The data will be used to develop information on spatial and seasonal trends in mercury deposited to surface waters, forested watersheds, and other sensitive receptors. See <http://nadp.sws.uiuc.edu/mdn/>

**Mercury (Hg) Speciation:** Mercury can assume many forms and, through interactions with the environment, can be transformed into a variety of structures. The most commonly known forms of mercury include: Elemental Mercury, divalent mercury (mercuric chloride) and methyl mercury. The behavior of mercury in the atmosphere depends upon its form, or specie. Elemental mercury (Hgo) is typically not very reactive with global lifetime of a few months to a year and is thought to be transported significantly in the troposphere. Reactive gaseous mercury (RGM) species, are not well characterized chemically but are thought to be gaseous Hg(II)-bearing molecules such as HgCl<sub>2</sub>(g). RGM species are notable for being quickly deposited from the atmosphere to the surface and are thought to be readily available for conversion to methylmercury, a highly toxic form of mercury. Particulate mercury (Hg-P) is also quickly deposited and is often found in high concentrations near combustion sources. Although much lower in proportion than Hgo, the greater reactivity and deposition rates of RGM and Hg-P make them a larger environment concern. Chemical reactions that occur in the atmosphere can transform mercury between these various species.

**Mesosphere:** The layer of the Earth's atmosphere above the stratosphere and below the thermosphere. It is between 35 and 60 miles from the Earth.

**Methane:** A chemical compound with the molecular formula CH<sub>4</sub>. It is the simplest alkane, and the principal component of natural gas. Burning one molecule of methane in the presence of oxygen releases one molecule of CO<sub>2</sub> (carbon dioxide) and two molecules of H<sub>2</sub>O. It is also an important source of hydrogen in various industrial processes. Methane is a greenhouse gas.

**Methyl Mercury:** Mercury in the air eventually settles into water or onto land where it can be washed into water. Once deposited, certain microorganisms can change it into methylmercury, a highly toxic form that builds up in fish, shellfish and animals that eat fish. Fish and shellfish are the main sources of methylmercury exposure to humans. Methylmercury builds up more in some types of fish and shellfish than others. The levels of methylmercury in fish and shellfish depend on what they eat, how long they live and how high they are in the food chain. Mercury exposure at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages. Research shows that most people's fish consumption does not cause a health concern. However, it has been demonstrated that high levels of methylmercury in the bloodstream of unborn babies and young children may harm the developing nervous system, making the child less able to think and learn.

**Minor Source:** Any stationary source that does not qualify as a major source and directly emits, or has the potential to emit, less than one hundred tons per year or more of any air pollutant.

**Mobile Sources:** Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats, and airplanes. (See also stationary sources).

**Monitoring:** The periodic or continuous sampling and analysis of air pollutants in ambient air or from individual pollution sources.

**National Ambient Air Quality Standards (NAAQS):** Standards established by the United States EPA that apply for outdoor air throughout the country. There are two types of NAAQS. Primary standards set limits to protect public health and secondary standards set limits to protect public welfare.

**National Emission Standards for Hazardous Air Pollutants (NESHAPS):** Emissions standards set by the U.S. EPA for a hazardous air pollutant, such as benzene, which may cause an increase in deaths or in serious, irreversible, or incapacitating illness.

**Natural Sources:** Non-manmade emission sources, including biological and geological sources, wildfires, and windblown dust.

**Net Metering:** Arrangement that permits a facility (using a meter that reads inflows and outflows of electricity) to sell any excess power it generates over its load requirement back to the electrical grid to offset consumption.

**Neurotoxin:** A toxin that acts specifically on nerve cells.

**New Mexico Public Regulation Commission:** The New Mexico Public Regulation Commission (PRC) regulates the utilities, telecommunications, motor carriers and insurance industries to ensure fair and reasonable rates, and to assure reasonable and adequate services to the public as provided by law.

**New Source Performance Standards (NSPS):** Uniform national EPA air emission standards that limit the amount of pollution allowed from new sources or from modified existing sources.

**New Source Review (NSR):** A Clean Air Act requirement that State Implementation Plans must include a permit review, which applies to the construction and operation of new and modified stationary sources in nonattainment areas, to ensure attainment of national ambient air quality standards. The two major requirements of NSR are Best Available Control Technology and Emission Offsets.

**Nitrate (NO<sub>3</sub>):** A salt of nitric acid with an ion composed of one nitrogen and three oxygen atoms.

**Nitric Oxide (NO):** Precursor of ozone, NO<sub>2</sub>, and nitrate; nitric oxide is usually emitted from combustion processes. Nitric oxide is converted to nitrogen dioxide (NO<sub>2</sub>) in the atmosphere, and then becomes involved in the photochemical processes and / or particulate formation. (See Nitrogen Oxides.)

**Nitrogen:** Chemical element, which has the symbol N, and atomic number 7. Elemental nitrogen is a colorless, odorless, tasteless and mostly inert diatomic gas at standard conditions, constituting 78.1% by volume of Earth's atmosphere.

**Nitrogen Enrichment Mode:** NO<sub>x</sub> decreases while particulate emissions increase.

**Nitrogen Oxides (Oxides of Nitrogen, NO<sub>x</sub>):** A general term pertaining to compounds of nitric oxide (NO), nitrogen dioxide (NO<sub>2</sub>) and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO<sub>2</sub> is a criteria air pollutant, and may result in numerous adverse health effects.

**Nonattainment Area:** A geographic area identified by the U.S. EPA as not meeting the NAAQS for a given pollutant.

**Noncarcinogenic Effects:** Non-cancer health effects which may include birth defects, organ damage, morbidity, and death.

**Non-Industrial Source:** Any of a large number of sources -- such as mobile, area-wide, indirect, and natural sources -- which emit substances into the atmosphere.

**Non-Methane Hydrocarbon (NMHC):** The sum of all hydrocarbon air pollutants except methane. NMHCs are significant precursors to ozone formation.

**Non-Methane Organic Gas (NMOG):** The sum of non-methane hydrocarbons and other organic gases such as aldehydes, ketones and ethers.

**Non-Point Sources:** Diffuse pollution sources that are not recognized to have a single point of origin.

**Non-Road Emissions:** Pollutants emitted by a variety of non-road sources such as farm and construction equipment, gasoline-powered lawn and garden equipment, and power boats and outboard motors.

**NO<sub>x</sub> Traps:** Operate in a two-step cyclic process. In the first stage the NO<sub>x</sub> trap adsorbs NO<sub>x</sub> while the engine operates in a lean-burn mode. In the second stage, the engine operates with excess fuel in the exhaust. The fuel decomposes on the catalyst and reduces the NO<sub>x</sub> to molecular nitrogen and water.

**O<sub>2</sub> enrichment mode:** Produces a dramatic reduction in particulate emissions at the expense of increased NO<sub>x</sub> emissions.

**Opacity:** The amount of light obscured by particle pollution in the atmosphere. Opacity is used as an indicator of changes in performance of particulate control systems.

**Organic Compounds:** A large group of chemical compounds containing mainly carbon, hydrogen, nitrogen, and oxygen. All living organisms are made up of organic compounds.

**Oxidant:** A substance that brings about oxidation in other substances. Oxidizing agents (oxidants) contain atoms that have suffered electron loss. In oxidizing other substances, these atoms gain electrons. Ozone, which is a primary component of smog, is an example of an oxidant.

**Oxidation:** The chemical reaction of a substance with oxygen or a reaction in which the atoms in an element lose electrons and its valence is correspondingly increased.

**Oxidation catalysts:** Element using a catalytic conversion for control of hydrocarbon and CO emissions.

**Oxygenate:** An organic molecule that contains oxygen. Oxygenates are typically ethers and alcohols.

**Ozone (O<sub>3</sub>):** A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy and ozone precursors, such as hydrocarbons and oxides of nitrogen. Ozone exists in the upper atmosphere ozone layer (stratospheric ozone) as well as at the Earth's surface in the troposphere (ozone). Ozone in the troposphere causes numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

**Ozone Depletion:** The reduction in the stratospheric ozone layer. Stratospheric ozone shields the Earth from ultraviolet radiation. The breakdown of certain chlorine and / or bromine-containing compounds that catalytically destroy ozone molecules in the stratosphere can cause a reduction in the ozone layer.

**Ozone-Forming Potential:** (See Reactivity.)

**Ozone Layer:** A layer of ozone in the lower portion of the stratosphere -- 12 to 15 miles above the Earth's surface -- which helps to filter out harmful ultraviolet rays from the sun. It may be contrasted with the ozone component of photochemical smog near the Earth's surface which is harmful.

**Ozone Precursors:** Chemicals such as volatile organic compounds and oxides of nitrogen, occurring either naturally or as a result of human activities, which contribute to the formation of ozone, a major component of smog.

**Particulate Matter (PM):** Any material, except pure water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse, wind-blown dust particles to fine particle combustion products.

**Passive Solar:** A system in which solar energy alone is used for the transfer of thermal energy. Pumps, blowers, or other heat transfer devices that use energy other than solar are not used.

**Permit:** Written authorization from a government agency that allows for the construction and / or operation of an emissions generating facility or its equipment within certain specified limits.

**Persistence:** Refers to the length of time a compound stays in the atmosphere, once introduced. A compound may persist for less than a second or indefinitely.

**Photovoltaic (PV) Module:** An integrated assembly of interconnected photovoltaic cells designed to deliver a selected level of working voltage and current at its output terminals, packaged for protection against environment degradation, and suited for incorporation in photovoltaic power systems.

**Pilot scale:** Size of a system between the small laboratory scale (bench-scale) and full-size system.

**Plant Pathology:** The scientific study of plant diseases caused by pathogens (infectious diseases) and environmental conditions (physiological factors).

**Plume:** A visible or measurable discharge of a contaminant from a given point of origin that can be measured according to the Ringelmann scale. (See Ringelmann Chart.)

**Plunger Lift System:** Use gas pressure buildup in a well to lift a column of accumulated fluid out of the well. The plunger lift system helps to maintain gas production and may reduce the need for other remedial operations.

**PM<sub>2.5</sub>:** Includes tiny particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.

**PM<sub>10</sub> (Particulate Matter):** A criteria air pollutant consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns (about 1/7th the diameter of a single human hair). Their small size allows them to make their way to the air sacs deep within the lungs where they may be deposited and result in adverse health effects. PM<sub>10</sub> also causes visibility reduction.

**Pneumatic controls:** Control systems using either compressed gas or air.

**Point Sources:** Specific points of origin where pollutants are emitted into the atmosphere such as factory smokestacks. (See also Area-Wide Sources and Fugitive Emissions.)

**Polycyclic Aromatic Hydrocarbons (PAHs):** Organic compounds which include only carbon and hydrogen with a fused ring structure containing at least two benzene (six-sided) rings. PAHs may also contain additional fused rings that are not six-sided. The combustion of organic substances is a common source of atmospheric PAHs.

**Polymer:** Natural or synthetic chemical compounds composed of up to millions of repeated linked units, each of a relatively light and simple molecule.

**Pounds per million BTU (lb/mmBtu):** A measure of the mass (of a pollutant) emitted for each million British thermal units (Btu) of energy fed to a combustion source. A BTU is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

**Precipitator:** Pollution control device that collects particles from an air stream. (See Electrostatic Precipitator.)

**Prescribed Burning:** The planned application of fire to vegetation to achieve any specific objective on lands selected in advance of that application.

**Prevention of Significant Deterioration (PSD):** A permitting program for new and modified stationary sources of air pollution located in an area that attains or is unclassified for national ambient air quality standards (NAAQS). The PSD program is designed to ensure that air quality does not degrade beyond those air quality standards or beyond specified incremental amounts. The PSD permitting process requires new and modified facilities above a specified size threshold to be carefully reviewed prior to construction for air quality impacts. PSD also requires those facilities to apply BACT to minimize emissions of air pollutants. A public notification process is conducted prior to issuance of final PSD permits.

**Primary Particles:** Particles that are directly emitted from combustion and fugitive dust sources. (Compare with Secondary Particle.)

**Produced water:** Water extracted from the subsurface with oil and gas. It may include water from the reservoir, water that has been injected into the formation, and any chemicals added during the production/treatment process.

**Production Tax Credit (PTC):** an inflation - adjusted 1.5 cents per kilowatt-hour payment for electricity produced using qualifying renewable energy sources.

**Programmable logic controller (PLC):** Control software for engine mapping / reactant injection requirements used to control the SCR system.

**Public Utility Regulatory Policies Act of 1978 (PURPA):** One part of the National Energy Act, PURPA contains measures designed to encourage the conservation of energy, more efficient use of resources, and equitable rates. Principal among these were suggested retail rate reforms and new incentives for production of electricity by cogenerators and users of renewable resources.

**Pulverized coal:** is a coal that has been crushed to a fine dust in a grinding mill. It is blown into the combustion zone of a furnace and burns very rapidly.

**Radionuclides:** Atoms with an unstable nucleus, characterized by excess energy which is available to be imparted either to a newly-created radiation particle within the nucleus, or else to an atomic electron.

**Reactive Organic Gas (ROG):** A photochemically reactive chemical gas, composed of non-methane hydrocarbons, that may contribute to the formation of smog. Also sometimes referred to as Non-Methane Organic Gases (NMOGs). (See also Volatile Organic Compounds and Hydrocarbons.)

**Reactivity (or Hydrocarbon Photochemical Reactivity):** A term used in the context of air quality management to describe a hydrocarbon's ability to react (participate in photochemical reactions) to form ozone in the atmosphere. Different hydrocarbons react at different rates. The more reactive a hydrocarbon, the greater potential it has to form ozone.

**Reasonably Available Control Measures (RACM):** A broadly defined term referring to technologies and other measures that can be used to control pollution. They include Reasonably Available Control Technology and other measures. In the case of PM<sub>10</sub>, RACM refers to approaches for controlling small or dispersed source categories such as road dust, woodstoves, and open burning.

**Reasonably Available Control Technology (RACT):** Control techniques defined in U.S. EPA guidelines for limiting emissions from existing sources in nonattainment areas. RACTs are adopted and implemented by states.

**Reciprocating Internal Combustion Engine (RICE):** An engine in which air and fuel are introduced into cylinders, compressed by pistons and ignited by a spark plug or by compression. Combustion in the cylinders pushes the pistons sequentially, transferring energy to the crankshaft, causing it to rotate.

**Refraction:** The change in direction of a light wave due to a change in its speed when it passes from one medium to another.

**Regional Haze:** The haze produced by a multitude of sources and activities which emit fine particles and their precursors across a broad geographic area. National regulations require states to develop plans to reduce the regional haze that impairs visibility in national parks and wilderness areas.



**Regional Haze Rule:** The Regional Haze Rule 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.

**Regulatory Impact Analysis (RIA):** A tool used to assess the likely effects of a proposed new regulation or regulatory change.

**Reid Vapor Pressure:** Refers to the vapor pressure of the fuel expressed in the nearest hundredth of a pound per square inch (psi) with a higher number reflecting more gasoline evaporation.

**Renewable Energy:** Renewable Energy is energy derived from resources that are regenerative or, for all practical purposes, cannot be depleted.

**Renewable Energy Resources:** Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include: biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

**Renewable Portfolio Standard (RPS):** a mandate requiring that renewable energy provide a certain percentage of total energy generation or consumption.

**Retrofit or retrofitting:** The addition of new technology or features to older systems.

**Rich Burn Engine:** Any four-stroke spark ignited engine with a manufacturer's recommended operating air/fuel ratio divided by the stoichiometric air/fuel ratio at full load conditions is less than or equal to 1.1. Engines originally manufactured as rich burn engines, but modified prior to December 19, 2002 with passive emission control technology for NO<sub>x</sub> (such as pre-combustion chambers) will be considered lean burn engines. Existing engines where there are no manufacturer's recommendations regarding air/fuel ratio will be considered a rich burn engine if the excess oxygen content of the exhaust at full load conditions is less than or equal to 2 percent.

**Ringelmann Chart:** A series of charts, numbered 0 to 5, that simulate various smoke densities by presenting different percentages of black. A Ringelmann No. 1 is equivalent to 20 percent black; a Ringelmann No. 5 is 100 percent black. They are used for measuring the opacity or equivalent obscuration of smoke arising from stacks and other sources by matching the actual effluent with the various numbers, or densities, indicated by the charts.

**Risk Assessment:** An evaluation of risk which estimates the relationship between exposure to a harmful substance and the likelihood that harm will result from that exposure.

**Risk Management:** An evaluation of the need for and feasibility of reducing risk. It includes consideration of magnitude of risk, available control technologies, and economic feasibility.

**Risk Management Plan (RMP):** A document prepared by a project manager to foresee risks, estimate effectiveness, and to create response plans to mitigate them.

**Sanctions:** Actions taken against a state or local government by the federal government for failure to plan or to implement a State Implementation Plan (SIP). Examples include withholding of highway funds and a ban on construction of new sources of potential pollution.

**Scrubber:** An air pollution control device that uses a high energy liquid spray to remove aerosol and gaseous pollutants from an air stream. The gases are removed either by absorption or chemical reaction.

**Secondary Particle:** Particles that are formed in the atmosphere. Secondary particles are products of the chemical reactions between gases, such as nitrates, sulfur oxides, ammonia, and organic products.

**Selective Catalytic Reduction (SCR) or selective non-catalytic reduction (SNCR):** Selective catalytic reduction means a noncombustion control technology that destroys NO<sub>x</sub> by injecting a reducing agent (e.g., ammonia) into the flue gas that, in the presence of a catalyst (e.g., vanadium, titanium, or zeolite), converts NO<sub>x</sub> into molecular nitrogen and water.

**Selexol:** Selexol is the trade name for a physical solvent that is a mixture dimethyl ethers of polyethylene glycol. In the Selexol process, the solvent dissolves the CO<sub>2</sub> from the gas stream at a relatively high pressure, generally in the range of 300 – 1,000 psia. The resulting rich solvent can then either be let down in pressure and/or steam stripped to release and recover the CO<sub>2</sub>.

**Sensitive Groups:** Identifiable subsets of the general population that are at greater risk than the general population to the toxic effects of a specific air pollutant (e.g., infants, asthmatics, elderly).

**Sequestration:** Capture and long term storage of carbon. See also Carbon Capture and Storage

**Smog:** A combination of smoke and other particulates, ozone, hydrocarbons, nitrogen oxides, and other chemically reactive compounds which, under certain conditions of weather and sunlight, may result in a murky brown haze that causes adverse health effects.

**Smoke:** A form of air pollution consisting primarily of particulate matter (i.e., particles released by combustion). Other components of smoke include gaseous air pollutants such as hydrocarbons, oxides of nitrogen, and carbon monoxide. Sources of smoke may include fossil fuel combustion, prescribed and agricultural burning, and other combustion processes.

**Solar Energy:** The radiant energy of the sun, which can be converted into other forms of energy, such as heat or electricity.

**Solar Thermal Collector:** A device designed to receive solar radiation and convert it into thermal energy. Normally, a solar thermal collector includes a frame, glazing, and an absorber, together with the appropriate insulation. The heat collected by the solar thermal collector may be used immediately or stored for later use.

Solar Thermal Collector, Special: An evacuated tube collector or a concentrating (focusing) collector. Special collectors operate in the temperature (low concentration for pool heating) to several hundred degrees Fahrenheit (high concentration for air conditioning and specialized industrial processes).

**Soot:** Very fine carbon particles that have a black appearance when emitted into the air.

**Source:** Any place or object from which air pollutants are released. Sources that are fixed in space are stationary sources and sources that move are mobile sources.

**Spark ignition (SI):** Ignition of combustion within an engine using spark plugs with a high-intensity spark of timed duration to ignite a compressed fuel-air mixture within the cylinder. SI engines are available in sizes up to 5 MW. Natural gas is the preferred fuel in electric generation and CHP applications of SI.

**Stack Gas Bypass:** The practice of routing some portion of exhaust gas, often from a large boiler, around the pollution control equipment, and into the exhaust stack. This is usually done to introduce hot, unscrubbed, gas into the stack to mix with and raise the temperature of the cool, scrubbed gas above its acid dew point and/or to increase plume buoyancy and dispersion. If the gas cools to its acid dew point, acid mists and droplets may fall out near the stack, or corrode unprotected stack linings.

**State Implementation Plan (SIP):** The group of plans and regulations submitted by a state to the U.S. EPA for implementation of the federal Clean Air Act.

**Stationary Sources:** Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants. (See also mobile sources).

**Still vent column:** Emission point for regeneration of glycol streams, resulting in vapors of water, VOC and HAPs.

**Stoichiometric engine:** An engine with the chemically correct proportion of fuel to air in the combustion chamber during combustion.

**Storage Tank:** Any stationary container, reservoir, or tank, used for storage of liquids.

**Stratosphere:** The layer of the Earth's atmosphere above the troposphere and below the mesosphere. It extends between 10 and 30 miles above the Earth's surface and contains the ozone layer in its lower portion. The stratospheric layer mixes relatively slowly; pollutants that enter it may remain for long periods of time.

**Subsidy:** Financial assistance granted by the Government to firms and individuals.

**Sulfur Dioxide (SO<sub>2</sub>):** A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants, which may use coal or oil high in sulfur content, can be major sources of SO<sub>2</sub>. SO<sub>2</sub> and other sulfur oxides contribute to the problem of acid deposition. SO<sub>2</sub> is a criteria air pollutant.

**Sulfur Oxides (SO<sub>x</sub>):** Pungent, colorless gases (sulfates are solids) formed primarily by the combustion of sulfur-containing fossil fuels, especially coal and oil. Considered major air pollutants, sulfur oxides may impact human health and damage vegetation.

**Syngas:** Syngas is the gas product resulting from gasification processes and can be used as a fuel to drive power generation or a feedstock for chemical synthesis.

**Tailpipe emissions:** Products of burning fuel in the vehicle's engine emitted from the vehicle's exhaust system.

**Thief hatch:** Opening in the top of the stock tank that allows tank access to the interior of the tank for withdrawal or measurement of fluid.

**Title V:** A section of the 1990 amendments to the federal Clean Air Act that requires a federally enforceable operating permit for major sources of air pollution.

**Topography:** The configuration of a surface, especially the Earth's surface, including its relief and the position of its natural and man-made features.

**Total dissolved solids (TDS):** The combined content of all inorganic and organic substances contained in a liquid which are present in a molecular, ionized or micro-granular (colloidal sol) suspended form.

**Total Suspended Particulate (TSP):** Particles of solid or liquid matter -- such as soot, dust, aerosols, fumes, and mist -- up to approximately 30 microns in size.

**Toxic Hot Spot:** A location where emissions from specific sources may expose individuals and population groups to elevated risks of adverse health effects -- including but not limited to cancer -- and contribute to the cumulative health risks of emissions from other sources in the area.

**Trading Credits:** The basic concept of a cap and trade system is that the government turns a certain quantity of emissions into a marketable commodity, called a credit, which is then allowed to be bought and sold freely on the market. See <http://www.epa.gov/airmarkets/trading/basics.html>

**Transmission System (Electric):** An interconnected group of electric transmission lines and associated equipment for moving or transferring electric energy in bulk between points of supply and points at which it is transformed for delivery over the distribution system lines to consumers, or is delivered to other electric systems.

**Triethylene glycol (TEG) dehydrator:** Any device in which a liquid glycol (including, ethylene glycol, diethylene glycol, or triethylene glycol) absorbent directly contacts a natural gas stream and absorbs water.

**Troposphere:** The layer of the Earth's atmosphere nearest to the surface of the Earth. The troposphere extends outward about five miles at the poles and about 10 miles at the equator.

**Turbine:** A machine for generating rotary mechanical power from the energy of a stream of fluid (such as water, steam, or hot gas). Turbines convert the kinetic energy of fluids to mechanical energy through the principles of impulse and reaction, or a mixture of the two.

**Underground Storage Tank (UST):** Refers to tanks used to store gasoline underground.

**United States Environmental Protection Agency (U.S. EPA):** The federal agency charged with setting policy and guidelines, and carrying out legal mandates for the protection of national interests in environmental resources.

**Urea:** An organic compound of carbon, nitrogen, oxygen and hydrogen, with the formula  $\text{CON}_2\text{H}_4$  or  $(\text{NH}_2)\text{CO}_2$  or  $\text{CN}_2\text{H}_4\text{O}$ . Used as a catalyst for SCR applications.

**Vanadium:** A chemical element in the periodic table that has the symbol V and atomic number 23. A rare, soft and ductile element, vanadium is found combined in certain minerals and is used mainly to produce certain alloys.

**Vapor recovery unit (VRU):** A system composed of a scrubber, a compressor and a switch. Its main purpose is to recover vapors formed inside completely sealed crude oil or condensate tanks.

**Vehicle Miles Traveled (VMT):** The miles traveled by motor vehicles over a specified length of time (e.g., daily, monthly or yearly) or over a specified road or transportation corridor.

**Visibility:** A measurement of the ability to see and identify objects at different distances. Visibility reduction from air pollution is often due to the presence of sulfur and nitrogen oxides, as well as particulate matter.

**Visibility Reducing Particles (VRP):** Any particles in the atmosphere that obstruct the range of visibility.

**Volatile:** Any substance that evaporates readily.

**Volatile Organic Compounds (VOCs):** Carbon-containing compounds that evaporate into the air (with a few exceptions). VOCs contribute to the formation of smog and / or may themselves be toxic. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints.

**Watt (Electric):** The electrical unit of power. The rate of energy transfer equivalent to 1 ampere of electric current flowing under a pressure of 1 volt at unity power factor.

**Watt-hour (Wh):** The electrical energy unit of measure equal to 1 watt of power supplied to, or taken from, an electric circuit steadily for 1 hour.

**Weight of Evidence:** The extent to which the available information supports the hypothesis that a substance causes an effect in humans. For example, factors which determine the weight-of-evidence that a chemical poses a hazard to humans include the number of tissue sites affected by the agent; the number of animal species, strains, sexes, relationship, statistical significance in the occurrence of the adverse effect in treated subjects compared to untreated controls; and the timing of the occurrence of adverse effect.

**Welfare-Based Standard (Secondary Standard):** An air quality standard that prevents, reduces, or minimizes injury to agricultural crops and livestock, damage to and the deterioration of property, and hazards to air and ground transportation.

**Wet Flue Gas Desulfurization (FGD):** In wet scrubbers, the flue gas enters a large vessel (spray tower or absorber), where it is sprayed with water slurry (approximately ten percent lime or limestone). The calcium in the slurry reacts with the SO<sub>2</sub> to form calcium sulfite or calcium sulfate. A portion of the slurry from the reaction tank is pumped into the thickener, where the solids settle before going to a filter for final dewatering to about 50 percent solids. The calcium sulfite waste product is usually mixed with fly ash (approximately 1:1) and fixative lime (approximately five percent) and disposed of in landfills. Alternatively, gypsum can be produced from FGD waste, which is a useful by-product.

**Wind Energy:** Energy present in wind motion that can be converted to mechanical energy for driving pumps, mills, and electric power generators. Wind pushes against sails, vanes, or blades radiating from a central rotating shaft.

**Woodburning Pollution:** Air pollution caused by woodburning stoves and fireplaces that emit particulate matter, carbon monoxide and odorous and toxic substances.

**Zeolite:** Minerals that have a micro-porous structure.

**Zero Emissions Dehydrator:** A Zero Emissions Dehydrator combines several technologies that lower emissions. These technologies eliminate emissions from glycol circulation pumps, gas strippers and the majority of the still column effluent. Rather than being released as vapor, the water and hydrocarbons are collected from the glycol still column, and the condensable and non-condensable components are separated from each other. The two primary condensable products are wastewater, which can be disposed of with treatment; and hydrocarbon condensate, which can be sold. The non-condensable products (methane and ethane) are used as fuel for the glycol reboiler instead of venting to the atmosphere.

***Table of Mitigation Options  
Not Written with Rationale***

**Table of Mitigation Options Not Written with Rationale**

<b>SECTION</b>	<b>MITIGATION OPTION TITLE</b>	<b>RATIONALE FOR NOT WRITING</b>
Oil and Gas: Stationary RICE (Small and large engines)	Emission limit on existing engines (1g/hp hr and 2g/hp hr)	Will incorporate this into the NSPS mitigation option and note that it will apply to existing engines.
	Replacing ignition systems to decrease false starts	This option is generally covered in the Operation and Maintenance mitigation option
	Replace piston rod packing (pumps)	This will be added to the Operation and Maintenance mitigation option.
	Minimize (control?) engine blow downs	This is already a common industry practice and has been deleted as an option
	Utilize exhaust gas analyzers to adjust AFR	This was included in the Oxidation Catalysts and AFRC on Lean Burn Engines option.
	Smart AFRC (air-fuel-ratio-controller)	Included in the other AFRC options
	Replace gas engine starters with electric air compressors	Negligible emissions reductions for applying this option.
	Provide training for field personnel on engine maintenance with regard to AQ considerations	Incorporated into Option titled “Adherence to Manufacturers’ Operation and Maintenance Requirements”
Oil and Gas: Mobile and Non-Road		
Oil and Gas: Rig Engines	Analysis of all drill rigs – replace the dirtiest 20%	Will reference in Tier 2-4 Mitigation Option Development, but also move to overarching discussion to determine the priority on rig engine reductions
	Electric Powered Drill Rig	Not selected due to low feasibility around availability of electricity
Oil and Gas: Turbines		
Oil and Gas: Exploration & Production (Tanks)	Mufflers	Does not apply to Air Quality.
	Centralized Collection for Existing Sources	This option is not feasible for retrofit application in the San Juan Basin



<b>SECTION</b>	<b>MITIGATION OPTION TITLE</b>	<b>RATIONALE FOR NOT WRITING</b>
Oil and Gas: Exploration & Production (Dehydrators/Separators/Heaters)	Centralized Dehydrators	Already or will be incorporated in other papers on centralization
	Optimization and automation	Incorporated into the Option under Stationary RICE subsection.
	Low/Ultra low NOx burners	Application not appropriate for the San Juan Basin, because most burners commonly used in the Four Corners Area smaller than the technology is capable of providing emission reduction.
	Install VRU	Principle of the option as applied is explained in the Option titled "Install VRU" under subsection for E&P Tanks.
	Centralized Dehydrators	Principle of the option is incorporated into the Option under Stationary RICE. Additionally, the San Juan Basin does not have a high need for wellhead dehydration.
Oil and Gas: E&P Pneumatics/ Controllers/ Fugitives	Directed inspection and maintenance program	Addressed by Option title "Specific Direction for How to Meet NSPS and MACT Standards: Directed Inspection and Maintenance" in Midstream section.
Oil and Gas: Midstream Operations	Install Flares	Never submitted.
Oil and Gas: Overarching Issues		
Power Plants: Future	Integrated Gasification Combined Cycle (IGCC) Political Aspects and Incentives	Combined with Integrated Gasification Combined Cycle (IGCC) Technical Aspects and listed as mitigation option "Integrated Gasification Combined Cycle (IGCC)"
Power Plants: Overarching	Four Corners Area Mercury Studies	Combined with Participate and Support Mercury Deposition Studies
Other Sources:	Apply Uniform Regulations Between Jurisdictions for Dust Control	Never submitted.
	Fugitive Dust Road Mitigation Plan	See option papers on oil & gas road dust mitigation.
	Include Multi-Modal Transportation Options in 2035 Transportation Plan	Scope of this option is very large. A proposal was submitted to DOE.
	Pursue Clean Cities Designation for Western Slope	This was not awarded by DOE. Not clear just who would house and how funding could be sustainable.

SECTION	MITIGATION OPTION TITLE	RATIONALE FOR NOT WRITING
Other Sources:	Auto Licensing or Registration Additional Tax	Group determined this was unlikely to be economically feasible at this time.
	Oil and Gas Fleet Retrofit / Replacement	Numerous options were written as part of the oil & gas section dealing with vehicles.
	Consider Ambient Air Quality Before Burning Prescribed Fire	Never submitted.
	Develop Controls on Agricultural Burning in Colorado	Never submitted.
Energy Efficiency, Renewable Energy, Conservation	Corporate Rebate/incentives for Energy Efficiency	Combined with Building Standards for Increased Commercial and Residential Energy Efficiency (EE)
	Pilot Neighborhood project to Change Behavior to Reduce Energy Use – Increase Efficiency	Combined with Audits of Low Income Areas to find Simple Solutions
	Solar/PV Applications	Never submitted.
	Optimization of Compression	Incorporated into the Option under Stationary RICE subsection titled “Optimization and automation and Centralized Collection for New Sources”
	Micro Turbines	Incorporated into Option titled “Cogeneration/Combined Heat and Power”
	Product Capture/Maximize Efficiency	Never submitted.
	Multi-Phase Pipeline	Never submitted.
	Comprehensive Impacts of efficiency	Never submitted.
	Efficiency/Conservation on individual level	Never submitted.
	Sustainable business practices	Never submitted.
Zero Waste	Never submitted.	

## GENERAL: PUBLIC COMMENTS

### General Public Comments

#### Comment

Air quality in the Four Corners Area has been studied and cussed and discussed for several decades while the pollution problems grow and grow. We sincerely hope that measurable benefits to our environment will be the product of this massive piece of work by the Four Corners Air Quality Task Force.

Polluting industries and enforcement agencies cannot continue to "turn their backs" on what IS happening to the quality of our air. It is our right to breathe clean air.

We all know that San Juan County has serious air quality issues. San Juan County is ranked in the top 10% of worst counties in the United States for toxic releases to the environment according to Scorecard, a pollution information web site. These toxic releases include volatile organic compound emissions from oil and gas facilities, and power plant emissions such as particulate matter (PM) and sulfur dioxide. Many other toxic emissions are listed. All of these pollutants are threats to human health, the land and water.

Enough is Enough!

Now is the time to take action to clean up our environment! Regulatory agencies need to begin much stronger enforcement of current regulations and work toward more stringent regulations. Further degradation of our environment is not acceptable.

State cancer profiles show that this area has the highest rate of cancer in New Mexico. Respiratory disease is high in the Four Corners Area. A comprehensive health study for the entire Four Corners Area would most likely reveal even more alarming health problems among our population.

Clean up of area coal fired power plants and mandatory emissions controls and clean up of oil and gas facilities are necessary for the health and well being of the people.

Health is wealth.

**Comment**

I've not read all the details of the report but I think there seems to be something missing. I don't see any analysis of the future demand on this area in terms of energy.

There is a fast growing school of thought that indicates coal can provide the energy bridge the United States needs to exit the Middle East. I think people need to understand that the coal resources here in the San Juan Basin could become a big part of a new energy strategy for transportation. Electric cars and electric high speed trains could be used to help replace the demand for middle east oil being used now for gasoline and jet fuel. If this happens and I think it is coming in the next 10 years, what will we see here? Is any planning being done for that? If you think there is a lot of CO2 from 3 power plants, what if there were 20?

This may seem like bad news but it's not if we have a plan. For less than the cost of the Iraq war, we could install the infrastructure to convert the coal here into H2 and CO2. The H2 could be used in new power plants driving engines turning generators thereby reducing the requirement for steam from water and the CO2 could be captured and piped to Bakersfield to be injected into the heavy oils there in enhance oil recovery. The power grid will would require significant upgrades to accommodate the additional load in addition to providing ways for wind and solar power to come on the system.

Instead of planning for war, let's plan for peace. This is a big effort. We need a leader with some vision at the Federal level. Is there someone who could have understood the impact of the internet and pushed to develop that infrastructure? Internet super highway -> I say Energy Super Highway!

The Southern Ute Indian Tribe Growth Fund (SUGF) appreciates the opportunity provided to the public to allow for review and comment on the Draft Four Corners Air Quality Task Force Report (Version 7); furthermore SUGF, is appreciative of the tremendous undertaking of the various resources that have come together to develop a range of possible air quality mitigation options that may remedy air quality issues in the Four Corners area.

SUGF understands that this document is non-conclusive, and does not convey consensus of the various participating bodies regarding the mentioned mitigation options. It is further understood that these developed options may be considered by the various regulatory bodies to be implemented into air quality management strategies. At that time, it is recommended that public participation similar to this effort be duplicated.

As you may be aware, production of natural gas is critical to the Southern Ute Indian Tribe's (Tribe) economic base and growth. The SUGF, a private investment entity of the Tribe supports development of its natural resources, yet remains cognizant of its responsibility to protect the environment. This is exemplified through Tribal processes such as conditional approval(s) of future oil and gas development that will require significant mitigation measures involving installation of control technologies on compression units. Another significant development occurring is the continual development of the Tribe's Air Quality Program, through the establishment of the Southern Ute Indian Tribe/State of Colorado Environmental Commission.

BP believes that the establishment of the Four Corners Task Force is a very useful venue for stakeholders and regulators to discuss air quality issues with the ultimate goal of managing air quality in the region. Developing strategies to measurably improve air quality requires extensive technical, engineering and policy analyses. In addition, such analyses

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require time and should not be influenced by arbitrary schedules. BP believes that solutions to the issues should be crafted on the basis of air quality improvement and economic efficiency. Control requirements based on a "one size solution" may not result in measurable air quality improvements nor be the most economic solution for improving air quality. BP also believes that it is important for the Task Force to focus on understanding source receptor relations in the region through modeling and analysis of existing air quality data as well as emission data.

I could not find the Federal Register notification for this superficial 'public comment' period.

This process is fatally flawed as proper 'government to government meetings' have not been held. The formal notification has not been provided to all American Indian Nations and official respective American Indian Nation Tribal Council has not been officially made known. How will such federal mandates affect the sovereignty of American Indian Nations? This appears to violate basic principles of American Indian Nation Treaties as it does the Law of Nations. It appears, these federal agencies are recruiting non-profits to further international agendas for their federal acquisitions while attempting to impose hidden taxation. These federal regulatory actions certainly appear to emphasize regulation without representation as it promotes no accountability while encouraging implementation of un-ratified international conventions such as Kyoto.

I attended the first meeting held in Farmington New Mexico for the Four Corners area regarding Air Quality on November 4, 2005. I spoke with a federal officer in her official capacity who acknowledged this process was indeed implementing the Kyoto Treaty that is un-ratified by U.S. Congress. She also acknowledged that the way the federal agencies were working around this un-ratified treaty was by entering into Memorandums of Understanding (MOU) between the respective State governments. These MOU's are signed by State governors as is the case with New Mexico State Governor Bill Richardson. New Mexico Governor Richardson proposed adoption of a regional climate change scheme to California Governor Arnold Schwarzenegger as stated in Executive order June 9, 2005. New Mexico Governor Richardson displays a definite conflict of interest as he continues to enjoy the pleasure of the United Nations while acting as United Nations Ambassador and more of an International Citizen, during his term as New Mexico Governor. A man cannot serve two masters anymore than he can be a citizen of two countries.

I received an email from a member of Montezuma Vision Project May 2, 2007 who wrote in reference to membership; "Most of the people are progressives who are interested in promoting planning for good quality of life."

The main intent behind those who claim to be Progressives is to reduce "right" to privilege and "liberty" to servitude. Progressives enjoy collectivism implemented upon the masses while they enjoy their appointed and self anointed aristocracy oligarchy. The first U.S. Progressive Party formed in 1912 and has found its niche in liberalism and the environmental movement. There are Progressives connected to Democratic Socialist parties. Progressives believe and implement the old Roman Prodigal estate schemes promoted by IUCN (International Union for Conservation of Nature) which in reality is promoting Sustainable Development as specified in Agenda 21- 1992 Rio Summit Declaration.

The Kyoto Protocol was created by an Intergovernmental Panel on Climate Change

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established in 1988 jointly by World Meteorological Organization and the United Nations Environment Programme. The Convention (Kyoto Protocol To The United Nations Framework Convention On Climate Change) was adopted by the Conference of the Parties meaning Parties to the Convention, May 1992, while in New York. The Montreal Protocol on Substances that Deplete the Ozone Layer was adopted by the Conference of the Parties September 1987.

The federal officer while I was at November 4, 2005 meeting, acknowledged this entire process was truly implemented the United Nations, World Bank, IMF, Federal Reserve, and agenda for Sustainable Development which is also known as Agenda 21. The federal officer told me that there is a system in place for schemes that allow for a 'pay to pollute' program. She provided the example of power plants on the East Coast that do not have state of the art environmental equipment and cannot be fitted or converted with such state of the art environmental equipment. Certificates from power plants in Western U.S. who are newer and have up dated equipment as well as cleaner coal, would sell certificates to the Eastern U.S power plants as a means of offsetting Eastern power plant pollution. In reality, this is a pay to pollute scheme that mirrors the new-politically correct scheme of paying to have a 'Carbon Imprint or Footprint'. Example: a representative from Nature Conservancy conducts a Carbon Imprint intake of your life. The calculations are conducted on life style such as how often a person drives a car, fly's an airplanes, rides a bicycle, uses a microwave oven and so forth. Once the representative determines the Carbon Imprint number, the person is expected to pay an outrageous sum of money (Federal Reserve Notes) to an environmental non profit of his or her choice to off set the Carbon Imprint. In reality, this is extortion at its best while providing a steady source of income to environmental non profits who may not otherwise obtain such vast forms of income. It certainly appears this entire scheme is just another form of taxation forced upon the public.

While I was in attendance at November 4, 2005 meeting I listened to the key-note speaker talk of new EPA standards that must be implemented. In reality, he was telling the public this unfunded and unjustified federal mandate 'must' be complied to. Meanwhile, he mentioned the Four Corners area has dust & silt particles blown in from other larger cities as far away as Phoenix and Tucson Arizona and beyond.

There were a lot of charts on the walls and the mercury issue in the Four Corners was displayed as being mainly caused from the power plants that exist in the area. First of all, there is a natural occurrence of mercury in the San Juan Mountains. Second, plants are known to absorb mercury from the ground. If the plants and trees absorb this mercury from the ground and a wildfire of significant proportions occurs what is going to happen? The mercury will be released by residual ash and debris back into the ground and even into the water supply. This cycle was not demonstrated at this meeting nor is it ever discussed. This monitoring process and so called evidence collecting done in this entire process is fatally flawed while it certainly indicates fatal deficiencies in the precision in monitoring as it suggests other uncertainties.

The picture displayed upon the website depicting this proposed Four Corners Air Quality catastrophe is fatally flawed. Photographs can be easily manipulated to reflect whatever the crisis especially with today's technology. The pictures did not show what type of a day it was such as was it a cold day or a hot day? Sometimes in this area of the Four Corners depending upon what time of the morning and what moisture is in the air, visibility can be

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poor from the natural moisture in the air as well as wind passing through can cause dust from the ground to be in the air. The EPA expecting to regulate such natural processes in nature is absurd. The natural occurrences were not discussed at this meeting anymore than it was reflected in any of the charts or photographs.

I see this entire process as in terminal as it is fatally in error. Most of all, I see federal agencies and cohorts attempting to play God while trying to control nature. This is preposterous to claim the environment that includes animals, plants and all of nature is above humans. This is perversions of natural law at its best especially when EPA claims it can control wind, dust and weather while expecting an area such as the Four Corners to keep that dust from blowing in from other areas. It is just as absurd to create this hyped up crisis just to sell certificates to pollute and extort money from the public. Cease and desist all these actions of implementing un-ratified illegal international treaties through abusing MOU's and other such agreements. Stop trying to play God while creating a crisis just to extort money from the public and expand progressivism.