NEBRASKA

DEPT. OF WATER, ENERGY, AND ENVIRONMENT

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Air Pollutant Information

Air pollution affects all of us. The average adult breathes over 11,000 liters (3,000 gallons) of air every day. Children breathe even more air per pound of body weight and are more susceptible to the harmful effects of air pollution. Air pollution threatens the health of human beings and other living things on our planet. While often invisible, pollutants in the air create smog and acid rain, cause cancer or other serious health effects, diminish the protective ozone layer in the upper atmosphere, and contribute to the potential for world climate change. Following is a description of air pollutants, effects of each pollutant, sources, and prevention and control techniques.

Nitrogen Oxides (NO_x)

Description**:** Light brown gas at lower concentrations; in higher concentrations becomes an important component of unpleasant looking brown, urban haze.

Health effects**:** Can cause increased breathing difficulty for asthmatics.

Welfare effects**:** Can harm vegetation when concentrations are sufficiently high and is a primary component of ozone formation and acid rain.

Sources**:** Result of burning fuels in utilities, industrial boilers, and automobiles.

Prevention and control**:** Control motor vehicle and industrial combustion emissions. Conserve energy.

Sulfur Dioxide (SO_2)

Description**:** Colorless gas, odorless at low concentrations but pungent at high concentrations. It is generated through the combustion of fuels such as natural gas and coal. It reacts in the atmosphere to form acid rain.

Health effects**:** Aggravates heart and lung disease symptoms; obstructs breathing (especially in combination with other pollutants); and increases incidence of acute respiratory diseases including coughs and colds, asthma, bronchitis, and emphysema.

Welfare effects**:** In high concentrations, it is toxic to plant life. As a primary component of acid rain, it can destroy paint pigments, erode statues, corrode metals, and harm textiles.

Sources**:** Emitted largely from industrial, institutional, utility, and residential furnaces and boilers, as well as petroleum refineries, smelters, paper mills, and chemical plants.

Prevention and control**:** Reduce the use of high sulfur fuels (e.g. use low sulfur reformulated diesel or natural gas). Conserve energy.

Carbon Monoxide (CO)

Description**:** Colorless and odorless gas emitted in the exhaust of motor vehicles and engines where there is incomplete combustion of fossil fuels.

Health effects**:** Carbon monoxide (CO) interferes with the body's ability to carry oxygen, thus impairing perception and thinking, slowing reflexes and causing drowsiness. Prolonged exposure to high levels of CO can cause unconsciousness and even death. CO inhaled by pregnant women may threaten the unborn child's growth and mental development.

Sources**:** Emitted from automobiles, buses, trucks, small engines, power plants, and some industrial processes. High concentrations can be found in confined spaces like parking garages, poorly ventilated tunnels, or along roadsides during periods of heavy traffic. Heavy construction and farming equipment, open burning, and residential heating equipment can also contribute to increased CO levels.

Prevention and control**:** Control motor vehicle and industrial emissions. Use oxygenated gasoline during winter months. Conserve energy.

Ozone (O_3)

Description**:** Ozone is a colorless gas. In the upper atmosphere (stratosphere), ozone is beneficial, protecting us from the sun's harmful rays; however, it is the major constituent of photochemical smog at the earth's surface. Ozone is formed in the lower atmosphere as a result of chemical reactions between oxygen, volatile organic compounds (VOCs) and nitrogen oxides (NO_X) in the presence of sunlight, especially during hot weather.

Health effects**:** Ozone irritates mucous membranes in the respiratory system and can cause coughing, choking, impaired lung function, and reduced resistance to colds and other diseases such as pneumonia. Ozone can also aggravate chronic heart disease, asthma, bronchitis, and emphysema.

Welfare effects**:** Ozone corrodes materials such as rubber and paint. Prolonged exposure can injure and kill many varieties of vegetation.

Sources**:** Sources of the pollutants that make up ozone include vehicles, power plants, factories, landfills, industrial solvents, and numerous small sources such as gas stations and farm and lawn equipment.

Prevention and control**:** Reduce motor vehicle emissions and nitrogen oxide emissions through emission standards, reformulated fuels, inspection programs, and reduced vehicle use. Limit volatile organic and nitrogen oxide emissions from industrial sources such as power plants and refineries. Conserve energy.

Particulate Matter (PM)

Description**:** Solid matter or liquid droplets less than 100 microns in diameter from dust, smoke, fly ash and condensing fugitive vapors that are carried in the outdoor air. Air quality standards have been developed to protect public health from the potential effects of particulate matter less than 10 microns (PM_{10}) and particulate matter less than 2.5 microns ($PM_{2.5}$) in size.

Health effects**:** PM_{10} and $PM_{2.5}$ can carry heavy metals and cancer-causing organic compounds into the deepest and most susceptible part of the lungs. The smaller the size of particulate matter, the farther it can travel into the lungs. $PM_{2.5}$ is small enough that it bypasses the body's natural defenses and gets trapped in the air sacs of the lungs, causing an inflammatory response and increasing the potential for a heart attack. When inhaled with other pollutants, PM_{10} and $PM_{2.5}$ can increase the incidence and severity of respiratory diseases. Children, the elderly, and people suffering from heart or lung disease (like asthma) are especially at risk.

Welfare effects**:** PM can impair visibility, contaminate materials and buildings, and corrode metals.

Sources**:** Emitted from power plants, ethanol plants, manufacturing, smelters, automobiles, burning industrial fuels, wood smoke, dust from paved and unpaved roads, quarries, rock crushing operations, construction, and agricultural activities.

Prevention and control**:** Reduce combustion emissions from motor vehicles, equipment, industries, power plants, and agricultural and residential burning. Use precursor controls on industrial equipment that will prevent the fine particles from entering the air we breathe.

Lead (Pb)

Description**:** A toxic metal which can make up a portion of particulate matter.

Health effects**:** Lead can affect almost every organ system in the body, but the central nervous system is the most sensitive one. Children are particularly susceptible to lead due to normal hand-to-mouth activities that can result in greater ingestions of lead-contaminated soil, dust, and paint. Behavioral abnormalities, which include decreased learning ability and hyperactivity, have been demonstrated in children exposed to lead. Lead can also damage the kidneys and the reproductive system, and it may cause anemia, a blood disorder. Pregnant women are also susceptible to the ill effects of lead, which can cause miscarriages, still births, and deaths of newborns. Although eating and drinking are the principle means of entry into the body, lead can also be inhaled.

Sources**:** Emissions come from transportation sources using lead in their fuels, coal combustion, smelters, motor vehicle battery plants, combustion of garbage containing lead products, deterioration of lead paint, lead refining and processing plants, and other miscellaneous industrial processes.

Prevention and control**:** Control emissions from metal smelters. Replace lead-based paint with non-lead substitutes, or prevent lead–based paint from chipping, peeling, or cracking. Have your child tested for lead.

Hazardous Air Pollutants (HAPs)

Description**:** Pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects. Such pollutants (there are 188 HAPs regulated) include arsenic, asbestos, mercury, and benzene.

Health effects**:** Many HAPs are known or suspected to cause cancer, respiratory effects, birth defects, and reproductive and other serious health effects. Some can cause death or serious injury if accidentally released in large amounts. Some HAPs are dangerous to human health in small quantities; some cause health problems if the exposure extends over a longer period of time. The degree to which a HAP affects a person's health depends on many factors, including the quantity of

pollutant, the duration and frequency of the exposures, the toxicity of the chemical, and the person's state of health and susceptibility.

Sources**:** Some sources of HAPs include power plants (hydrochloric and hydrofluoric acids), solvents and glues (hexane), gasoline distribution (hexane), industrial processes, motor vehicle emissions and fuels, building materials containing asbestos, natural sources (volcanoes and forest fires), and painting operations.

Prevention and control**:** Reduce emissions from power plants and vehicles. Use water-based paints. Use less toxic cleaning solvents. Conserve energy. Drive less. Use certified asbestos professionals to properly remove asbestos-containing building materials.

Total Reduced Sulfur (TRS)

Description**:** Total Reduced Sulfur (TRS) is a group of gases including hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. Nebraska has developed air quality standards to protect the public health and environment from the potential effects of TRS.

Health effects**:** Can cause headaches, depression, fatigue, and nausea at low levels of exposure. At higher levels of exposure, health effects may include eye and respiratory irritation, olfactory nerve fatigue, and pulmonary edema. At extremely high levels, TRS can cause respiratory failure and death.

Sources**:** Sources of TRS include packing plants, leather tanneries, sewage treatment plants, livestock waste control facilities, composting operations, animal rendering plants, sugar beet processing plants, and oil and natural gas extraction sites.

Prevention and control**:** Use aerobic instead of anaerobic waste treatment processes. Cover anaerobic lagoons to capture emissions, then use scrubbers and flares to treat and control the emissions. Use scrubbers to capture emissions from vents and other processes that are not already enclosed or being controlled. Add chemicals such as ferric chloride to adjust waste treatment processes. Seal sanitary sewer system manholes. Cover splitter boxes at waste treatment facilities. Use Best Management Practices at livestock waste control facilities to maintain aerobic conditions.

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