

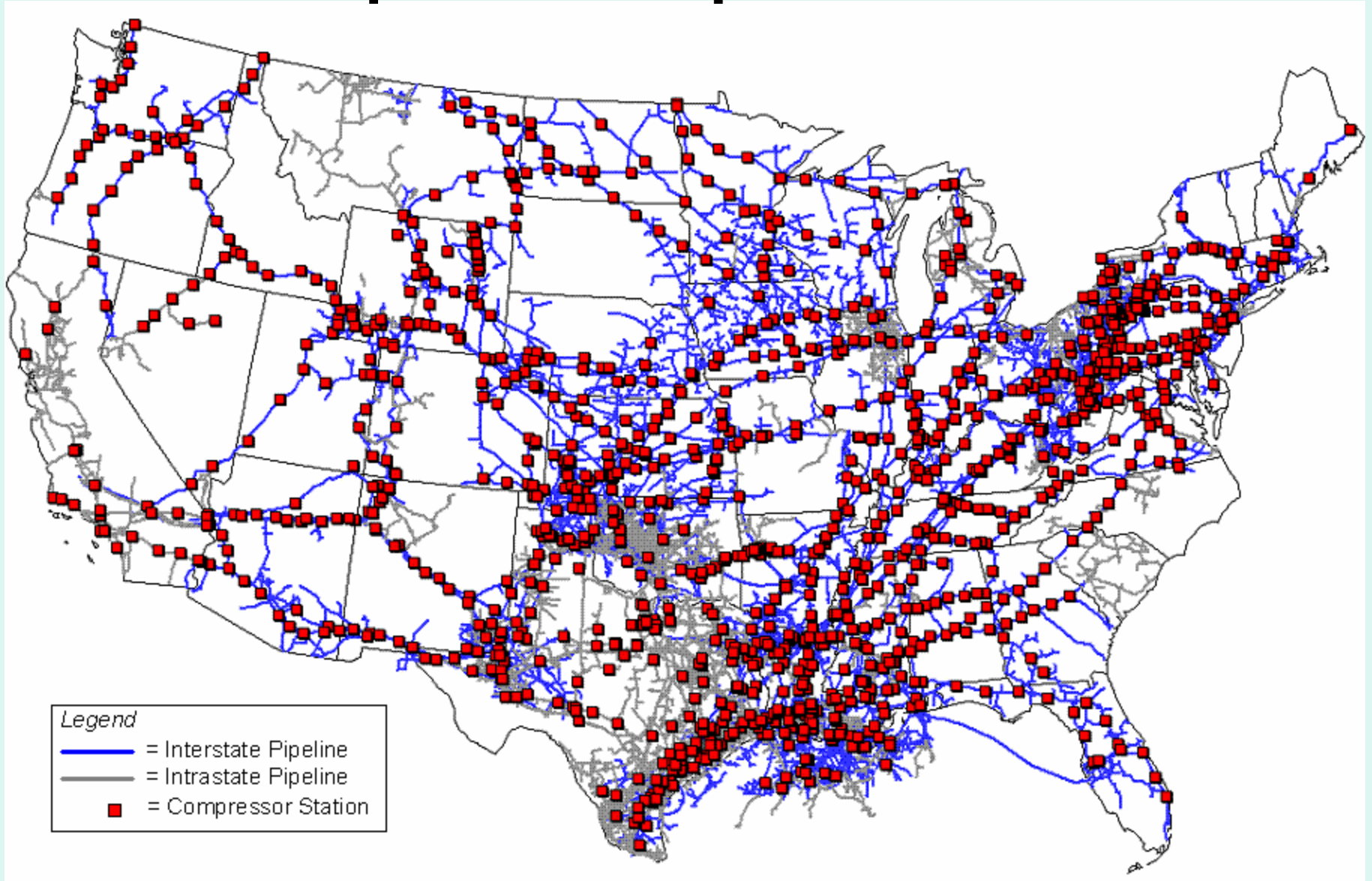
Health Impacts from Natural Gas Infrastructure and Gas-fueled Power Plants

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June 29, 2015

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USA: Pipeline Compressor Stations



Source: www.eia.gov

Figure 5.1 The U.S. Natural Gas Infrastructure, Including Gas Consuming Sectors

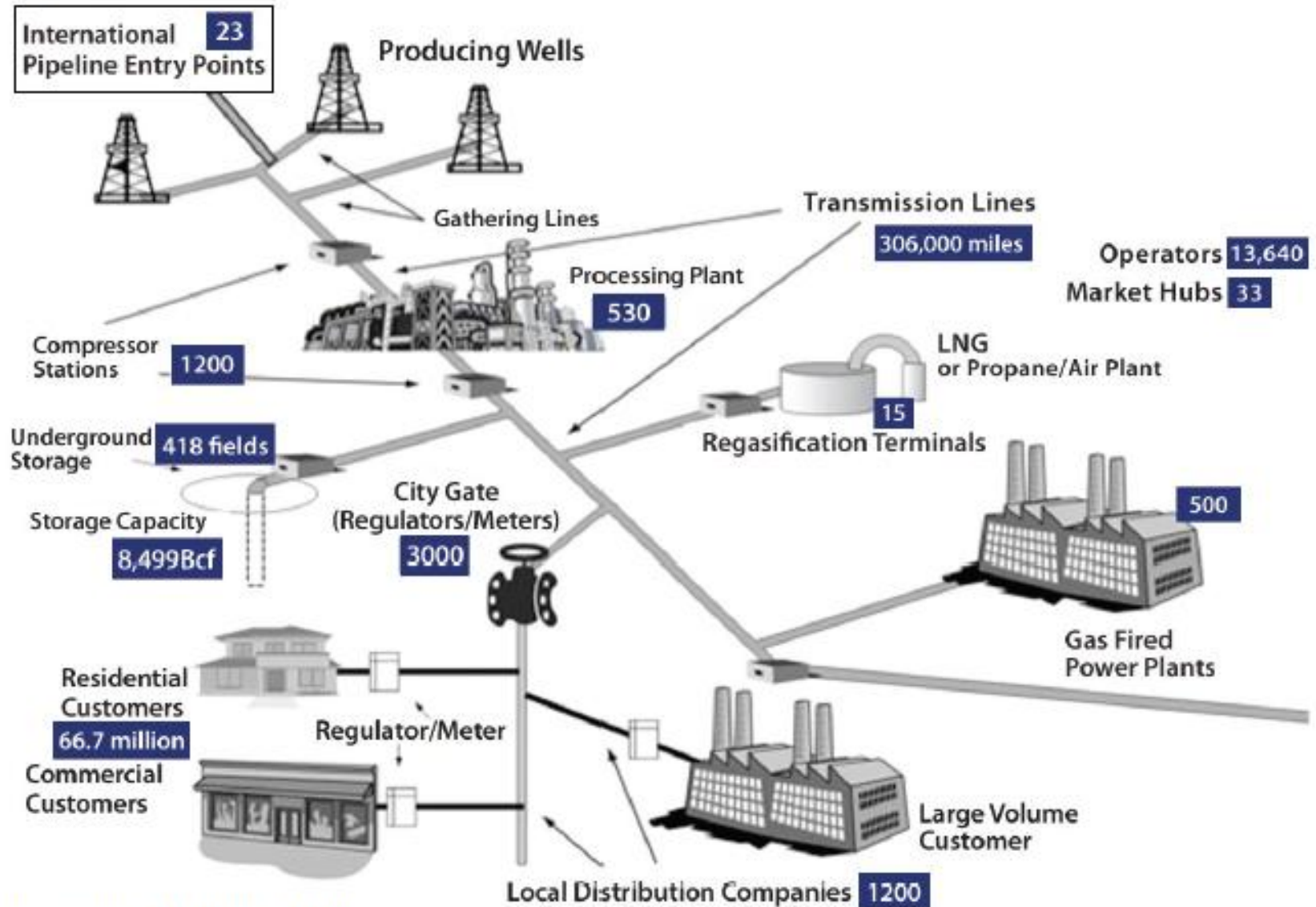
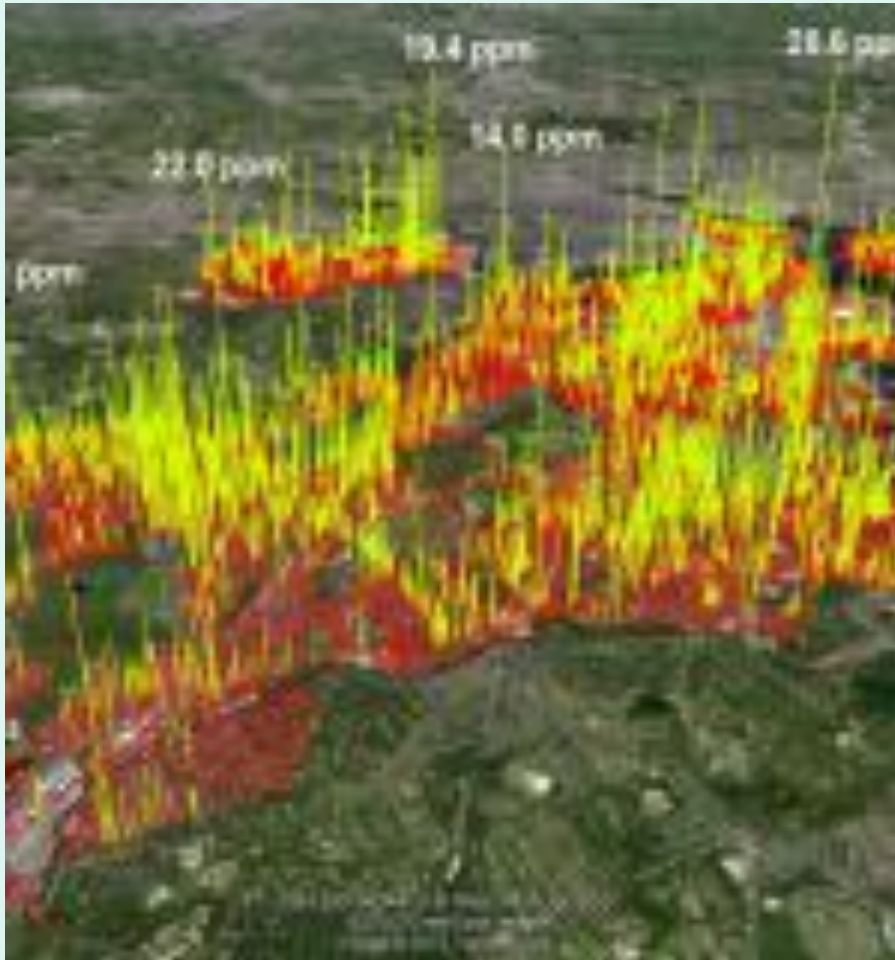


Image modified from CHK

Fugitive Methane Emissions Across Boston Pipeline



- Methane is invisible
- BUT...CAN be seen with infra-red camera

Methane is not the ONLY toxicant to escape from natural gas infrastructure components.

Other toxicants include:

- VOCs (volatile organic compounds)
- Nitrogen oxides
- Particulate matter
- Carbon monoxide
- Sulfur dioxide

Pipeline and Compressor Station Problems

- Leakage of toxic material and explosions can occur anywhere along the pipeline pathway, due to:
 - internal corrosion
 - external corrosion
 - faulty seam weldings between infrastructure components
 - unintentional accidents which disturb the integrity of the pipeline
 - intentional and unintentional venting of compressor stations
 - natural disasters such as:
 - flooding
 - tornados
 - hurricanes
 - lightning storms
 - landslides
 - intentional disasters such as terrorism

Compressor Stations and other Infrastructure Components

- Compressor stations push natural gas through the pipeline, by re-pressurizing the gas with very high pressure.
-
- All infrastructure components (CS, metering stations, regulating stations) release combustion products: nitrogen oxides and volatile organic compounds (VOCs), carbon monoxide, sulfur dioxide, particulate matter and other pollutants that contaminate air quality
- VOCs combine with heat and sunlight to produce ground level ozone
- Ground level ozone impacts respiratory system and cardiovascular system.
(cause or exacerbate asthma, Chronic obstructive pulmonary disease and cardiac conditions)

More About Compressor Stations

- Each compressor station emits thousands of tons of toxic pollutants into air, annually.
- Each component of project individually evaluated by Federal Energy Regulatory Commission and other agencies
- Cumulative impacts of entire project have not been not assessed.
(particularly Health Impact Assessment).
- Significant increase in air pollutants by expansion of natural gas infrastructure
- Region is already a ***nonattainment zone for air quality standards*** according to EPA.

Chemicals in Air Emissions From Compressor Stations

Courtesy: Wilma Subra, Subra Company, Iberia, LA

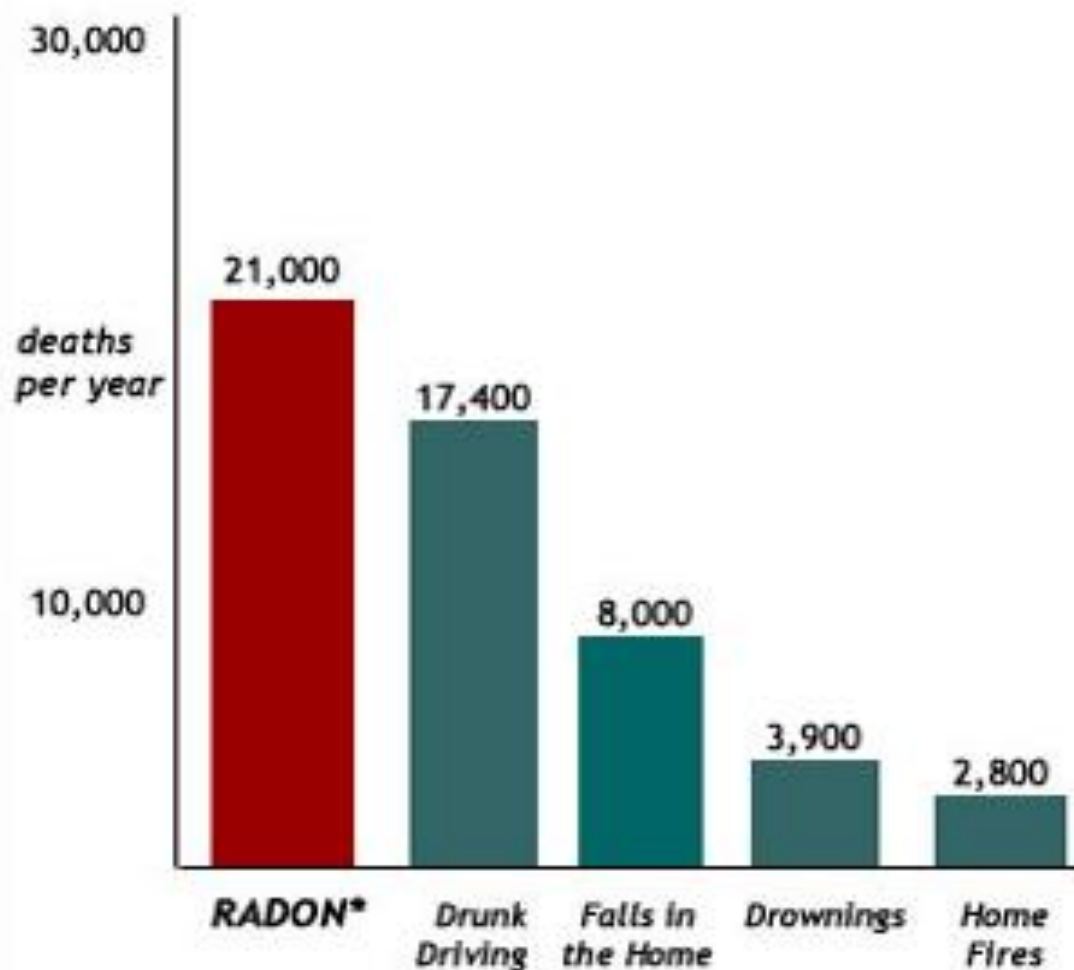
- Benzene
- Formaldehyde
- Methyl Ethyl Disulfide
- Naphthalene
- 1,1,1, 2-Tetrachloroethane
- Trichloroethylene
- Trimethyl Benzene
- 1,2,4-Trimethyl Benzene
- Styrene
- Methane
- Ethane
- Butane
- Propane
- n-Butyl Alcohol
- Carbon
- Chlorobenzene
- Chloromethane Disulfide
- Carbonyl Sulfide
- 1, 2-Dichloroethane
- Diethyl Benzene
- Dimethyl Disulfide
- Toluene
- Nitrogen Oxide
- Ethylbenzene
- 1,3-Butadiene

Health Effects of Radioactive Elements

- Known effects of certain radioactive elements :
 - Radon and its breakdown products are the number 1 cause of lung cancer mortality in non-smokers
 - Radon is the number 2 cause of lung cancer mortality in smokers.
 - Other radioactive materials (radium) are associated with other cancers as well.
 - Increased risk for cataracts

EPA Estimates for Deaths due to Radon

(from "A Citizen's Guide to Radon")



Health Effects of Chemicals

- Formaldehyde and benzene are known carcinogens.
- Endocrine disruptors cause reproductive disorders, such as infertility, miscarriage, stillborn and neonatal deaths and low birth weight.
- Endocrine disruptors also cause metabolic disorders such as obesity, diabetes and associated cardiac disease.
- Neurotoxic agents cause irreversible cognitive problems, lower IQ, behavioral disorders, psychosocial disorders.
(Well-established for lead and other heavy metals)
- Neurotoxicants can also cause severe headaches, visual disturbances and convulsions
- These chemicals can cross the placental barrier and expose developing embryos and fetuses to adverse health outcomes.

More Health Effects of Chemicals

- Immunological suppression:
 - greater likelihood for cancers to develop
 - greater vulnerability to infectious diseases
- Dermatologic conditions (rashes)
- Gastrointestinal conditions (nausea, vomiting, abdominal pain)
- Sensory organs (irritation to mucosal surfaces of eyes, nose and throat)
- Vascular (nosebleeds)

New York Physicians Care !!

- **The Medical Society of the State of New York (MSSNY), May 2015:
adopts Resolution concerning health affects associated with natural gas infrastructure:**
- **Resolved, that the Medical Society of the State of New York (MSSNY) recognizes the potential impact on human health and the environment associated with natural gas infrastructure, and be it further**
- **Resolved, that MSSNY support governmental assessment of the health and environmental risks that are associated with natural gas pipelines, and be it further,**
- **Resolved, that a copy of this resolution be transmitted to the AMA for consideration in its House of Delegates.**

AMA Physicians Care !!

- Policy adopted June 6, 2015:
- **PROTECTING PUBLIC HEALTH FROM NATURAL GAS INFRASTRUCTURE:**
- Our American Medical Association recognizes the potential impact on human health associated with natural gas infrastructure and will support legislation that would require a comprehensive Health Impact Assessment regarding the health risks that may be associated with natural gas pipelines.

CPV Valley Energy Center Wawayanda, Orange County

- 630 megawatt natural gas powered electric generating facility using natural gas from the Millennium pipeline
- Two-combined cycle combustion generators
- Heat recovery steam generator
- Steam turbine generator
- Low Nitrogen Oxide natural gas auxiliary boiler
- Back up fuel ultra-low sulfur distillate oil -965,000 gallon storage tank
- 15,000 gallon aqueous ammonia storage tank
- 400,000 gallon demineralized water tank
- Process water – treated waste water from the City of Middletown Sewage Treatment Plant

Source: Wilma Subra; Earthworks

Emission Limits from CPV Energy Center (tons per year)

• Carbon Monoxide	344	
• Nitrogen Oxide	186.8	
• PM 2.5	95	
• Volatile Organic Compounds	65	
• Sulfur Dioxide		42
• Sulfuric Acid	13	
• Carbon Dioxide	2,164,438	

Source: Wilma Subra: Earthworks

Emission Reduction Credits

- Volatile Organic Compounds 75 tons per year
- Purchased Emission Reduction Credits from:
 - Arbill Industries, Inc. PA 17 tons/year
 - S. Walter Packaging Corp. PA 58 tons/year
- Total VOC 65 ton/year +75 ton/year = 140 tons/year

- Nitrogen Oxide 216 tons per year
- Purchased Emission Reduction Credits from:
 - American Video Glass LLC (Sony) PA 216 tons/year
- Total NOX Emissions
- 186.8 tons/year + 216 tons/year = 402.8 tons/year

Emissions from Valley Energy Center Power Plant Greater than Emissions from Minisink Compressor Facility

- Volatile Organic Compounds 43 times greater
- Nitrogen Oxide 14 times greater
- Carbon Monoxide 12 times greater
- PM 2.5 9 times greater
- Sulfur Dioxide 6 times greater

Possible Health Impacts Associated with the Emissions to be Released by the Valley Energy Center Power Plant

- The same classes of chemicals will be released by the Valley Energy Center Power Plant as are being released by the Minisink compressor facility, except in much higher/larger concentrations.
- Thus the same exposure and health impacts could be experienced by individuals in the area of the power plant.
- To reduce the health impacts, individuals must reduce their exposure by increasing their distance from the source of pollution from the Valley Energy Center Power Plant.

Our Purpose and Responsibility



- **Protect our future generations**
- **Ensure good health and quality of life, by preserving:**
 - **Clean air**
 - **Clean water**
 - **Healthy food supply**
 - **Safe environment**