Northeast Supply Enhancement (NESE) Project is a Public Threat – not a Public Convenience

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As Governor Murphy said in the press release for stakeholder meetings for the State's new Energy Master Plan (08/15/2018):

"Being responsible stewards of the environment is not a campaign promise, it's a moral, philosophical, and economic obligation that we have to ensure a strong economy and quality of life for all New Jersey residents today and for generations to come."

Air Quality & Health Impacts

I. Air Pollution from Compressor Station 206 and Health Risks
II. Health Impacts from Increased Risk of Flooding
III. Spreading Toxic Elements from Soils and Seafloor from Construction

In addition to threats to health from the toxic emissions from gas-fired compressor stations, the NESE Project's impact on climate change can be seen in flooding, temperature increases, other health risks, and displacement. As the climate warms and atmospheric carbon dioxide increases, the amount and potency of the allergens like ragweed and airborne fungi increases, with significant consequences for exacerbating asthma and other forms of respiratory distress. Other consequences could include higher cooling costs and a heightened risk of heat stroke. Warmer temperatures will also exacerbate the risk of vector-borne diseases like Lyme and West Nile Disease.

Extreme weather events not only result in damage to property, businesses, infrastructure and the environment, but also trigger stress and depression in people and are associated with costly health risks like water borne infections as well as increases in dampness and mold that trigger more allergies and respiratory disorders. Milder, shorter winters have increased the population of disease-carrying insects in our area. Longer and wetter seasons lead to more asthma, allergies and respiratory disorders. Flooding events are a pathway for pollution and bacteria to enter our waterways.

I. Air Pollution from Compressor Station 206 and Health Risks

The NJDEP recently adjusted reporting thresholds for Air Toxics (February 2018) and, using these more restrictive levels which are currently considered to be protective of human health, the "HAP emissions from <u>each</u> of the two Mars 100 turbines exceed reporting thresholds for formaldehyde, acetaldehyde, acrolein, benzene, ethylbenzene, naphthalene, and propylene oxide." [Accession No. 20180514-6168(32885359) on the FERC docket for NESE at CP17-101]

Emissions of caustic chemicals predicted by Williams/Transco for two (2) Solar MARS turbines at proposed Compressor Station 206 & NJDEP Reporting Thresholds (old & new)

EMITTED CHEMICAL	POUNDS PER YEAR			
	To be emitted		Reporting Thresholds (NJDEP)	
			new	*old*
	from one turbine	**from two turbines**	N.J.A.C. 7:27-17.9 (February 12, 2018)	N.J.A.C. 7:27-8 (February 27, 2015)
Formaldehyde	334	**668.6**	**3.5**	400
Acetaldehyde	44	**87.84**	**21**	1,800
Acrolein	7.02	**14.06**	**1**	8
Benzene	13.18	**26.36**	**6**	87.6 (0.01 lbs/hour)
Ethylbenzene	35.2	**70.26**	**19**	2,000
Naphthalene	1.428	**2.86**	**1.4**	2,000
Propylene Oxide	31.8	**63.68**	**12**	1,000
Toluene	142.5	**285.46**		2,000
Xylenes	70	**140.54**		2,000
Ammonia	14,790 *	**29,580 ***	** No threshold standards*	

NESE was given an Air Pollution permit (9/7/17) by the NJDEP before new, more protective standards were in effect. As seen in the table above, HAPs Emissions from one turbine exceed the current reporting thresholds used by NJDEP.

Relying on NAAQS as protective of human health overlooks the other toxic airborne emissions from CS206. Additionally, there are studies showing that NAAQS levels are not truly protective of human health (see below).

NJDEP is required to consider the health and safety needs of the community when reviewing applications.

Compressor Station 206 emissions:

210,000 cubic feet per minute (CFM) of exhaust at a temperature of 849.2 degrees Fahrenheit at the top of the two 50' smokestacks - In addition to emitting 130,942 tons per year of **Carbon Dioxide** (CO_2), the following airborne toxins will be emitted each year:

- 57 tons of **Carbon Monoxide** (CO)
- 23 tons of **Oxides of Nitrogen** (NO_x)
- 3 tons of **Sulfur Dioxide** (SO_2)
- 0.35 tons of **Formaldehyde**
- 18.9 tons of **Particulate Matter 2.5 micrometers** ($PM_{2.5}$)
- 18.9 tons of **Particulate Matter 10 micrometers** (PM_{10})
- 9.5 tons of **Volatile Organic Compounds** (VOCs)

Air Pollution & Health Issues about the proposed Compressor Station 206:

- Over 165,000 people live in Franklin Township + South Brunswick + Montgomery + Rocky Hill + Princeton, and the plumes of airborne pollutants from Compressor Station 206 could reach these communities, depending on weather conditions.
- The Buddhists, whose property is adjacent to the compressor station site, complete much of their religious practices outside, and their extended meditation trails would be extremely close to the compressor station. Their walking meditation trails would be 450-feet from CS206 construction and 1,225-feet from the CS206 building.

- The proposed Compressor Station 206 would be right next to an active mining operation, Trap Rock Quarry, and there was no accounting for the concentrated and synergistic impacts of emissions from these two industrial operations on local populations in any of the analyses done by FERC. The CS206 building would be 2,100-feet from the nearest face of Trap Rock Quarry.

- Ambient air quality samplings were taken from stations that are not in the immediate area. The separate stations in North Brunswick, East Brunswick, Elizabeth & Philadelphia do not measure all NAAQS (each only measures a particular air pollutant).

- No on-site (truly local) baseline for air pollution has been established by taking ambient air quality sampling from monitoring stations that should be on-site. This would include modeling of emissions from two turbines at Compressor Station 206 in combination with local ambient air sampling that would include air pollution from Trap Rock Quarry's operations.

- No analysis of high heat & high volume emissions to a rural pocket within densely populated Central Jersey was completed. This is worrisome because the manufacturer of the Solar Mars 100 turbines does not warranty emissions of SO_2, $PM_{10/2.5}$, VOCs, and formaldehyde due to erratic operation turbine as confirmed by "Any emissions warranty is applicable only for steady-state conditions." This actually refers to all emissions, and changes in turbine load produce erratic chemical emissions. Solar Mars 100 turbines are old technology, and their manufacturer confirmed that combustion exhaust temperature increases at lower than 100% load along with emitting more unburned fuel and chemical byproducts.

- There's no requirement to install on-site air monitors for continual monitoring of all the airborne chemical emissions.

- No separate evaluation and analysis of the anticipated emissions during planned and unplanned blowdowns at Compressor Station 206 was provided, and this is a concern because increased reporting of health issues has been found to correlate with timing of these events around other compressor stations.

- The health of all, especially vulnerable populations, is not truly protected by State and Federal standards, as was found in some studies showing statistically significant increases in health issues like kidney failure and death that were associated with long-term exposure to particulate matter levels that were BELOW the "safe" standards of the NAAQS.

- There are many senior citizens living very close to the proposed compressor station site, and they are one of the groups most at risk for complications from these chemical air emissions.

- The toxins can be carried downwind from the compressor station to residents in surrounding areas, impacting people living within a six mile radius of the compressor station. Emissions would include particulate matter and volatile organic compounds including benzene, toluene, hexane and xylene, and formaldehyde.

- We live in a nonattainment area for ozone, and emissions of NO_x and VOCS, precursors to ozone, would not aid attempts to reduce ozone which is highly correlated with significant health issues.

- No agency has agreed to conduct a Health Impact Assessment around CS206. Applications & reviews clearly omitted health impact assessments of continuous toxic airborne chemical emissions. No studies were provided about health impacts of all the chemical emissions (cumulative) – especially over time & also during peak emissions (blowdowns). This is especially important for the monks and congregants at the NJ Buddhist Vihara & Meditation Center where walking meditation is a regular practice, and outdoor activities for children happen often.

Health Risks from the Airborne Chemicals to be released from CS206:

The proposed compressor station will emit toxic chemicals that can cause health issues including cancer, childhood leukemia, birth defects, developmental delays, immunological disorders (including asthma and allergies) & increased risk for heart attacks, strokes, neurological issues, lung diseases, sleep issues, breathing disorders and kidney disease.

- Formaldehyde, Acetaldehyde and Benzene, that will be released by the proposed Compressor Station 206, are known carcinogens and mutagens (which are substances that cause genetic mutations).[2-4] Acetaldehyde's and Toluene's Hazardous Substance Fact Sheets clearly state in capital letters that the chemicals are known teratogens, which are substances that cause birth defects.[3,5] Acetaldehyde is implicated as the cause of fetal alcohol syndrome through its inhibiting effects on DNA synthesis, placental amino acid transport, and development of the fetal brain.[6]
- Children may be exposed to higher concentrations of Toluene since it is denser than air and its vapors stay closer to the ground. Also, children have faster breathing rates than adults and may therefore breathe in more Toluene. In older children and adolescents, repeated exposure to Toluene has been associated with loss of muscle control, loss of memory, poor balance, and decreased mental abilities. Some of these changes may last for a long time after Toluene has left the body. Exposure to Toluene during pregnancy has been associated with birth defects, including retardation of mental abilities and growth.[5,7]
- Repeated exposure to Benzene can cause aplastic anemia, a life-threatening blood disorder resulting from damage to the bone marrow and blood cell-producing stem cells, which leaves the individual vulnerable to sepsis and hemorrhage.[4]
- Acetaldehyde, Benzene, Toluene, Ethyl Benzene, Naphthalene, and Xylenes have been associated with neurological problems, including headache and dizziness.[3-5,8-10] Ethyl Benzene is a known hepatotoxin, producing liver damage.[8]
- Seizures and cardiac arrhythmias have been associated with high exposure to Benzene.[4] Repeated exposure to Xylenes can affect concentration and memory as well as vision and can lead to muscle coordination problems.[10]
- Toluene, Ethyl Benzene, Naphthalene (the active ingredient in moth balls), and Xylenes can damage the liver and/or kidneys.[5.8,9,10] Formaldehyde, Acetaldehyde and Naphthalene also cause skin allergies.[2,3,9] Repeated exposure of Naphthalene can lead to anemia.[9] Repeated exposure to Toluene can cause brain damage.[5]
- Formaldehyde, Benzene, Toluene, Ethyl Benzene, Naphthalene, and Xylenes are absorbed into the body via the lungs and skin thereby increasing the risk of exposure.[2,4,5,8-10] All the compounds released from Compressor Station 206 could cause skin, eye and/or respiratory irritation.[1-5,8-10]
- In addition to these human effects, wildlife is also subject to these effects as is our delicate ecosystem of the wetlands.

References:

1. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Ammonia.** http://www.nj.gov/health/eoh/rtkweb/documents/fs/0084.pdf Accessed 4/15/18.
2. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Formaldehyde.** http://nj.gov/health/eoh/rtkweb/documents/fs/0946.pdf Accessed 4/15/18.
3. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Acetaldehyde.** http://www.nj.gov/health/eoh/rtkweb/documents/fs/0001.pdf Accessed 4/15/18.
4. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Benzene.** http://nj.gov/health/eoh/rtkweb/documents/fs/0197.pdf Accessed 4/15/18.

5. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Toluene**. http://nj.gov/health/eoh/rtkweb/documents/fs/1866.pdf Accessed 4/15/18.
6. Gilbert-Barness E. Teratogenic causes of malformations. Ann Clin Lab Sci. 2010; 40(2): 99-114.http://www.annclinlabsci.org/content/40/2/99.full Accessed 4/15/18.
7. Agency for Toxic Substances and Disease Registry. **Public health statement on Toluene**. https://www.atsdr.cdc.gov/phs/phs.asp?id=159&tid=29 Accessed 4/15/18.
8. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Ethyl Benzene.** http://nj.gov/health/eoh/rtkweb/documents/fs/0851.pdf Accessed 4/15/18.
9. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Naphthalene.** http://nj.gov/health/eoh/rtkweb/documents/fs/1322.pdf Accessed 4/15/18.
10. New Jersey Department of Health. Right to Know Hazardous Substance Fact Sheet. **Xylenes.** http://nj.gov/health/eoh/rtkweb/documents/fs/2014.pdf Accessed 4/15/18.

NOTE: See end of this section for the CS206 Emissions - Health Impact Reference.

Risks of long-term exposure to airborne toxins from natural gas-fired compressor stations have been documented.

In the Application from Williams/Transco for NESE, they report an expectation, based on modeling, that $PM_{2.5}$ emissions for Compressor Station 206 and background air would approach the minimally "acceptable" thresholds:

Annual: 10.1 microgram/m^3 (EPA-NAAQS threshold: 12 microgram/m^3)
24-hour32.1 microgram/m^3 (EPA-NAAQS threshold: 35 microgram/m^3)

A study of nearly 2.5 million veterans followed for over eight years concluded that there is a significant association between exposure to airborne Particulate Matter ($PM_{2.5}$) and kidney disease. The authors found that levels of $PM_{2.5}$ that were below the EPA threshold of 12 microgram/m^3 were associated with risk of Chronic Kidney Disease (CKD) and end-stage renal disease (ESRD).

Source: Bowe, B., Xie, Y., Li, T., Yan, Y., Xian, H. & Al-Aly, Z. (2017, September 21). Particulate matter air pollution and the risk of incident CKD and progression to ESRD. Journal of American Society of Nephrology, 29: 218-230. Retrieved from http://jasn.asnjournals.org/content/29/1/218.full.pdf+html

Another study of over 60 million Medicare beneficiaries (2000 to 2012) looked at long-term exposure to $PM_{2.5}$ and ozone at levels below the NAAQS. Findings revealed significant evidence of adverse effects related to exposure to $PM_{2.5}$ and ozone at concentrations below the national standards. This showed increased risk of death in this population when they were exposed to levels that were below those considered to be protective of our health.

Source: Qian Di, M.S., Yan Wang, M.S., Antonella Zanobetti, Ph.D., Yun Wang, Ph.D., Petros Koutrakis, Ph.D., Christine Choirat, Ph.D., Francesca Dominici, Ph.D., and Joel D. Schwartz, Ph.D. (2017 June 29). Air Pollution and Mortality in the Medicare Population. The New England Journal of Medicine. N Engl J Med 2017; 376:26, 2513-22

The following was documented in the report, Health Effects Associated with Stack Chemical Emissions from NYS Natural Gas Compressor Stations: 2008-2014, a technical report prepared for the Southwest Pennsylvania Environmental Health Project, a non-profit organization of medical professionals and public health scientists, and highlighted in a summary in http://www.environmentalhealthproject-ny.org/ -

- Emissions occur continuously during normal operations, as hazardous pollutants carried with the gas are vented or leak from equipment. They can also occur during routine maintenance operations such as "blowdowns" when large amounts of chemical contaminants are released into the air intentionally.
- Emissions from natural gas compressor stations are known to cause both acute and chronic health impacts. Some occur at a relatively steady rate, while others occur in episodic peaks. Weather conditions and wind direction may affect an individual's actual exposure. As a result of these factors, **acute health symptoms may be persistent, episodic or temporary**.
- The episodic intense peak exposures, which may last for minutes to several hours, can precipitate acute health symptoms, even though the total emissions averaged over a 24-hour or longer period can appear to be much less.
- Exposure to the air contaminants increase an individual's risk for the development of or worsening of pre-existing respiratory or cardiovascular disease. In addition, some of the contaminants have adverse neurologic effects; others are carcinogenic.
- As with other air pollution, those at increased risk include children, developing fetuses, the elderly, and individuals with chronic respiratory or cardiovascular disease.
- ***Acute health effects from short-term exposures:***
  - *Headache*
  - *Dizziness*
  - *Fatigue*
  - *Insomnia*
  - *Coughing*
  - *Confusion*
  - *Nausea*
  - *Skin Irritation*
  - *Eye & throat irritation*
  - *Acute respiratory problems*
  - *COPD and asthma exacerbation*
  - *Memory problems*
  - *Acute cardiac events*
  - *Acute cardiac events*
  - *Chest pain*
- ***Chronic health impacts from long-term exposures:***
  - *Anemia*
  - *Lung and other respiratory cancers*
  - *Leukemia and lymphoma*
  - *Breast and genital cancers*
  - *Bladder and urinary cancers*
  - *Bone cancer*
  - *Lip and other oral cancers*
  - *Endocrine disruption*
  - *Permanent neurological problems*

Source: Russo, P.N. & Carpenter, D.O. (2017, October 12). Health effects associated with stack chemical emissions from NYS natural gas compressor stations: 2008-2014. Institute for Health and the Environment - A Pan American Health Organization / World Health Organization Collaborating Centre in Environmental Health, University at Albany. Accessed at: https://www.albany.edu/about/assets/Complete_report.pdf

Certain combinations of air pollutants have synergistic effects. For example, $PM_{2.5}$ and carcinogens are more dangerous together because particulate matter absorbs pollutants and then carries them deep into the lungs. According to the Southwestern Environmental Health Project's *Summary on compressor stations and health impacts* (2015, February 24), the combination of particles and chemicals effectively increases the dose of the chemical. Thus, the consequences are much greater than additivity would indicate.

Source: *Summary on compressor stations and health impacts*. (2015, February 24). Southwestern Environmental Health Project. Accessed at: http://www.environmentalhealthproject.org/files/Summary%20Compressor-station-emissions-and-health-impacts-02.24.2015.pdf

Emissions from gas-fired compressor stations are linked to significant health impacts – some other studies:

Compendium of scientific, medical, and media findings demonstrating risks and harms of fracking (unconventional gas and oil extraction) (5th ed.) (2018, March). Concerned Health Professionals of New York & Physicians for Social Responsibility. Accessed at: http://concernedhealthny.org/compendium/

Gottlieb, B. & Dyrszka, MD, L. (2017 February) Too Dirty, Too Dangerous: Why Health Professionals Reject Natural Gas - A Report from Physicians for Social Responsibility. Accessed at: http://www.psr.org/assets/pdfs/too-dirty-too-dangerous.pdf

Kloczko, N. (2015, November). A brief review of compressor stations. Southwest Pennsylvania Environmental Health Project. Accessed at: http://www.environmentalhealthproject.org/files/A%20Brief%20Review%20of%20Compressor%20Stations%2011.2015.pdf

Summary of Minisink Monitoring Results.
Accessed at: http://www.environmentalhealthproject.org/resources/10/click/5

The hazards of a compressor station: A town wakes up to the realities of corporate deception. (2015, November). Accessed at: http://350ma-berkshires.org/the-hazards-of-a-compressor-station-a-town-wakes-up-to-the-realities-of-corporate-deception/

> *Dr. Nordgaard's [Boston pediatrician] "main point was that the EPA limits do not closely reflect actual human health risks. The closer you are to the compressor station, the worse the symptoms experienced. Both doctors [Dr. Nordgaard & Dr. Sheila Bushkin-Bedient, physician at Albany's Institute for Environmental Health] agreed that many of these chemicals are known carcinogens and respiratory irritants, but that an even greater danger would come from their synergistic combinations, some of which have never before been tested on humans."*

II. An increased risk of flooding from construction as well as greenhouse gases was not assessed in terms of health risks to people.

- Floods and long-standing excess water can potentially increase transmission of communicable diseases:
  - Water-borne diseases (typhoid fever, cholera, leptospirosis, and hepatitis A)
  - Vector-borne diseases (West Nile Virus, Lyme Disease, & Zika Virus)

- Direct contact with contaminated waters leads to the risk of non-epidemic-prone wound infections, dermatitis, conjunctivitis, and ear, nose and throat infections.

- Depending on the extent and intensity of the flooding, animals, rodents and snakes could be displaced from their natural habitats, causing other potential risks. Mosquito populations would increase.

- Flooding could result in health issues from toxic mold. Allergenic, pathogenic and toxic illnesses related to the respiratory, digestive tract and reproductive system have been found to be related to toxic mold exposure.

- Stress, anxiety and depression could result from the impacts of flooding that could also include displacement.

III. Risks from unearthing and spreading toxic elements in soils and the seafloor from construction through or near Superfund and other toxic sites were not adequately addressed by Williams/Transco.

Raritan Bay Loop:

Due to efforts like improved wastewater treatment facilities and naturally-occurring changes, the waters in the Raritan Bay and Lower New York Bay have remarkably improved since the 1970's from the years of pollutants that were deposited there during the age of unregulated industrialization. Fish and marine mammal populations have increased here, and this is especially apparent in the recent drastic increase of sightings of humpback whales in these waters.

Disturbing, spreading and re-suspending toxins like arsenic, lead, dioxin, PCBs, and other elements with dredging and other construction of the Raritan Bay Loop would, in effect, place these toxins back on the seabed surface. There, bottom-dwelling creatures would again be poisoned, and the endangered Atlantic sturgeon, which feeds on bottom-dwelling species (benthic invertebrates such as crustaceans, worms, and mollusks, marine worms, and bivalve shellfish), would also be impacted.

PCBs, in the seabed of these waters, are associated with toxic effects in marine mammals that can impair hormone-mediated processes, reproduction and development. The humpback whale population is increasing in these waters, and seals live in communities on an island by the Verrazano Bridge and by Sandy Hook. Yet, an analysis of the impact of PCBs was only provided for two species in the DEIS - the hard clam (*M. mercenaria*) and *Nereis virens*, a common polychaete worm species. (DEIS, page ES-11)

Threats to the dwindling horseshoe crab population's reproduction and survival are posed from such spreading of contaminants. Horseshoe crab eggs provide a food source to migratory birds including the threatened red knot.

Madison Loop:

The Madison Loop would cross or be very close to several toxic sites with contaminated groundwater or soil, and the application is missing soil and groundwater analyses in these areas. Without providing any investigative reports about the potential to find contaminated groundwater and/or soil during construction, Williams/Transco only wrote that they would follow their Unanticipated Discovery of Contamination Plan, Materials Management Plan & General Groundwater Remediation Clean-up permit (BGR).

The sites of concern are:

- Road Department Garage Area 3-1 near MP 9.5 where there is potential to encounter contaminated groundwater since this site flows southeast toward the HDD location;
- Global Sanitary Landfill that is less than 0.1-mile south of MP 10.13 to 10.38 of the Madison Loop which is an NJDEP Classification Exception Area (CEA) which also acts as a Well Restriction Area (WRA);
- E.I. Dupont Denemours & Co. site with groundwater known to contain VOCs and metals that is currently being remediated in areas of the Madison Loop; and
- Morgan Ordnance Depot north of MP 11.10 of the Madison Loop that may have contaminated soil and unexploded munitions.

CS206 Emissions - Health Impact Reference

Federal and New Jersey State Agency chemical references recognizing airborne chemical emissions as highly toxic to human health causing a variety immediate and chronic health conditions from CS206 emissions (see below).

AMMONIA
 	
CS206 emissions 29,580 lbs per year
	• **Suspected liver, gastrointestinal, reproductive, respiratory, skin, and neurotoxicant (EDF Goodguide)**
	• **Exposure from inhalation may cause bronchiolitis obliterans; symptoms include cough, wheezing, obstructive/restrictive defect, chronic shortness of breath and difficulty breathing from low activity, increased inflation of lungs (HAZMAP)**
	• **Exposure through inhalation may cause toxic pneumonitis (acute inflammation of lungs); symptoms include burning, chest tightness, conjunctivitis, cough, dark or bluish color of skin due to oxygen deficient blood, shortness of breath and difficulty breathing from low activity, crackling when listening to breathing with stethoscope, excessive tearing of eyes, sore throat, pulmonary edema (increased fluid in lung tissues), runny nose, wheezing (HAZMAP)**
	• **Exposure through inhalation may cause chronic bronchitis; symptoms include coughing up phlegm, wheezing (HAZMAP)**
	• **TOXIC; may be fatal if inhaled, ingested or absorbed through skin; vapors are extremely irritating and corrosive (NOAA)**
	• **High exposure can cause a build-up of fluid in the lungs (pulmonary edema) (NJ Fsheet)**
	• **Strong irritant to eyes, skin, respiratory tract (HSDB)**
	• **Exposure to high levels of ammonia in air may be irritating to skin, eyes, throat, and lungs and cause coughing and burns; lung damage and death may occur after exposure to very high concentrations of ammonia; some people with asthma may be more sensitive to breathing ammonia than others (ASTDR)**
	• Populations at increased risk include asthmatics, those hyper reactive to other respiratory irritants, and those with glaucoma, corneal disease, and chronic respiratory disease **(HSDB)**
	• Agency exposure limits:
	  ○ **CDC Acute Inhalation Risk Level** at **1.7 Parts Per Million (PPM)**
	  ○ **OSHA: 50ppm** over 8 hour work shift
	  ○ **NIOSH: 25ppm** over 10 hour work shift **(NJ Fsheet)**

FORMALDEHYDE
 	
CS206 emissions 668 lbs per year
	• **Known carcinogen (HAZMAP)**
	• **Suspected gastrointestinal/liver, immune system, neuro, reproductive, respiratory, and skin/sense organ toxicant (EDF Goodguide)**
	• **Adverse effects from exposure include asthma and toxic pneumonitis (inflammation of the lungs) (HAZMAP)**
	• **High exposure through inhalation can cause a buildup of fluids in the lungs (NJ Fsheet)**
	• **Repeated exposure may cause bronchitis and an asthma like allergy (NJ Fsheet)**
	• **Limited evidence that exposure may damage developing fetus and affect female fertility (NJ Fsheet)**
	• Eye, skin, and respiratory tract irritant **(HSDB)**
	• People with asthma may be particularly sensitive to exposure **(HSDB)**
	• Exposure through inhalation can cause burning sensation, cough, headache, nausea, and shortness of breath **(NIOSH)**
	• Agency exposure limits:
	  ○ **CDC Acute Inhalation Risk Level** at **.04 parts per million (PPM)**
	  ○ **OSHA: 0.75ppm** averaged over 8 hour work shift
	  ○ **NIOSH: 0.016ppm** averaged over 10 hour work shift **(NJ Fsheet)**

BENZENE
 	
CS206 emissions 26 lbs per year
	• **Listed as a known carcinogen (HAZMAP)**
	• **Listed as a recognized carcinogen and developmental and reproductive toxicants (EDF Goodguide)**
	• **Listed as a cause of anemia (decrease in number of red blood cells) (HAZMAP)**
	• **Listed as a neurotoxin (cause of central nervous system solvent syndrome) (HAZMAP)**
	• **Listed as a reproductive toxin (HAZMAP)**
	• **Listed as a suspected cardiovascular/blood, endocrine, gastrointestinal/liver, immune system, neuro-, respiratory, skin/sense organ toxicant (EDF Goodguide)**
	• **The major effect of benzene from long-term exposure is on the blood; causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia; can also cause excessive bleeding and can affect the immune system, increasing the chance for infection (ASTDR)**
	• **Occupational diseases associated with exposure include: leukemia and aplastic anemia (symptoms include fever, bleeding into the skin, mouth, nose, and gastrointestinal tract caused by the low platelet count of aplastic anemia and the damage to capillaries caused by viral hemorrhagic fevers, decreased white blood cell count, tiny circumscribed foci of extravagated blood in the skin); large areas of confluent petechiae are called purpura, ecchymoses, or bruises (HAZMAP)**
	• Acute exposure to high concentrations of benzene in air results in neurological toxicity (headache, dizziness, drowsiness, confusion, tremors, and loss of consciousness) **(HSDB)**
	• Agency exposure limits:
	  ○ **CDC Acute Inhalation Risk Level** at **.009 Parts Per Million (PPM)**
	  ○ **OSHA: 1ppm** averaged over 8 hour work shift
	  ○ **NIOSH: 0.1ppm** averaged over 10 hour work shift **(NJ Fsheet)**

ETHYLBENZENE
 	
CS206 emissions 70 lbs per year
	• **Possible human carcinogen (ASTDR)**
	• **Listed as a suspected blood/cardiovascular, developmental, endocrine, gastrointestinal/liver, kidney, neuro, reproductive, respiratory, and skin/sense organ toxicant (EDF Goodguide)**
	• **Limited evidence that ethylbenzene may damage the developing fetus (NJ Fsheet)**
	• **Exposure to relatively low concentrations of ethylbenzene in air for several months to years causes kidney damage in animals (ASTDR)**
	• High exposure can cause symptoms similar to chronic solvent encephalopathy, a syndrome with a variety of central nervous effects **(HAZMAP)**
	• Exposure may cause acute toxic effects such as difficulty concentrating, confusion, dizziness, fatigue, irritability, lethargy, impaired speech **(HAZMAP)**
	• Most severe irritant of benzene series **(HSDB)**
	• Exposure to high levels of ethylbenzene in air for short periods can cause eye and throat irritation; exposure to higher levels can result in dizziness **(ASTDR)**
	• Irreversible damage to the inner ear and hearing has been observed in animals exposed to relatively low concentrations of ethylbenzene for several days to weeks **(ASTDR)**
	• Inhalation may cause irritation of nose, dizziness, depression **(NOAA)**
	• Agency exposure limits
	  ○ **CDC Acute Inhalation Risk Level** at **5 Parts Per Million (PPM)**
	  ○ **OSHA: 100ppm** averaged over 8 hour work shift
	  ○ **NIOSH: 100ppm** averaged over 10 hour work shift **(NJ Fsheet)**

ACETALDEHYDE **CS206 emissions 88 lbs per year**	• **Listed as a possible human carcinogen (HSDB)** • **Suspected developmental, immune system, kidney, neuro, respiratory, skin/sense organ toxicant (EDF Goodguide)** • **Acetaldehyde may cause birth defects in humans since it causes them in animals (NJ Fsheet)** • **Exposure can cause toxic pneumonitis (inflammation of the lungs) (HAZMAP)** • Eye irritant at 50ppm for 15 min.; respiratory tract irritant at 134ppm for 30 min.; nose and throat irritant at 200ppm for 15 min. **(HSDB)** • Breathing vapors will be irritating and may cause nausea, vomiting, headache, and unconsciousness **(NOAA)** • Exposure to high concentrations can cause headache, dizziness, headache, light-headedness, and passing out **(NJ Fsheet)** • Higher exposures may cause a buildup of fluid in the lungs **(NJ Fsheet)** • Repeated exposure may bronchitis to develop with coughing, phlegm, and shortness of breath **(NJ Fsheet)** • Agency exposure limits: ○ **CDC Acute Inhalation Risk Level -** A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C. ○ **OSHA: 200ppm** over 8 hour work shift ○ **NIOSH: limit to lowest feasible concentration (NJ Fsheet)**
NAPHTHALENE **CS206 emission 2 lbs per year**	• **Listed as a possible carcinogen (HSDB)** • **Suspected cardiovascular/blood, developmental, gastrointestinal/liver, neuro, respiratory, skin/sense organ toxicant (EDF Goodguide)** • **Limited evidence that exposure may damage developing fetus (NJ Fsheet)** • **May damage red blood cells causing anemia (low blood count) (NJ Fsheet)** • **Exposure to large amounts may damage red blood cells or cause hemolytic anemiadestroy (destroys red blood cells resulting in too few red blood cells until body replaces them; symptoms include fatigue, lack of appetite, restlessness, and pale skin) (ASTDR)** • **Exposure may cause methemoglobinemia (blood disorder in which an abnormal amount of methemoglobin [form of hemoglobin--the molecule in red blood cells that distributes oxygen to the body] is produced, preventing oxygen from being effectively released to tissues in the body) (HAZMAP)** • **Naphthalene is an ocular irritant that has caused cataracts in exposed workers (HAZMAP)** • Acute toxic effects from exposure include abdominal pain, confusion, cough, fatigue, wheezing, weakness, buildup of fluid in the lungs, nausea, and more **(HAZMAP)** • Effects from exposure through inhalation include headache, weakness, nausea, vomiting, sweating, confusion, jaundice, and dark urine **(NIOSH)** • People with blood, kidney, or liver diseases may be at a heightened risk **(HSDB)** • Agency exposure limits: ○ **CDC Chronic Inhalation Risk Level** at **.0007 Parts Per Million (PPM)** ○ **OSHA: 10ppm** averaged over 8 hour work shift ○ **NIOSH: 10ppm** averaged over 10 hour work shift **(NJ Fsheet)**

TOLUENE
 	
CS206 emission 285 lbs per year
	• **Listed as a recognized developmental toxicant (EDF goodguide)**
	• **Listed as a suspected cardiovascular/blood, gastrointestinal/liver, immune system, kidney, neuro-, reproductive, respiratory, and skin/sense organ toxicant (EDF goodguide)**
	• **Inhaling high levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy; can also cause unconsciousness, and even death (ASTDR)**
	• **High levels of toluene may affect your kidneys (ASTDR)**
	• **Toluene may cause birth defects in humans as it has been shown to cause them in animals (NJ Fsheet)**
	• **Toluene may damage developing fetus (NJ Fsheet)**
	• High exposure can cause symptoms similar to chronic solvent encephalopathy (a syndrome with a variety of central nervous effects) **(HAZMAP)**
	• Exposure may cause acute toxic effects such as difficulty concentrating, confusion, dizziness, fatigue, irritability, lethargy, impaired speech **(HAZMAP)**
	• Toluene may affect the nervous system; low-to-moderate levels can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss; these symptoms usually disappear when exposure is stopped **(ASTDR)**
	• Vapors irritate eyes and upper respiratory tract; cause dizziness, headache, anesthesia, respiratory arrest **(NOAA)**
	• Inhaling can irritate the nose and throat causing coughing and wheezing **(NJ Fsheet)**
	• People with central nervous system or liver diseases may be especially sensitive **(HSDB)**
	• Agency exposure limits:
	  ○ **CDC Acute Inhalation Risk Level** at **4 Parts Per Million (PPM)**
	  ○ **OSHA: 200ppm** averaged over 8 hour work shift
	  ○ **NIOSH: 300ppm** averaged over 10 shift **(NJ Fsheet)**

XYLENE **CS206 emission 140 lbs per year**	• **Temporary memory loss, confusion, and laboratory evidence of liver injury have been reported in workers overexposed to xylene** (HAZMAP) • **Listed as a suspected cardiovascular, developmental, liver, immune system, kidney, respiratory, skin, reproductive, and immune system toxin (EDF Goodguide)** • Listed as a neurotoxin **(EDF Goodguide)** • People who breathe high levels may have dizziness, confusion, and a change in their sense of balance **(ASTDR)** • Exposure to high levels for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys **(ASTDR)** • Inhalation can irritate the nose and throat causing coughing and wheezing **(NJ Fsheet)** • Exposure can cause headache, nausea and vomiting, dizziness, light-headedness and passing out **(NJ Fsheet)** • Repeated exposure can affect concentration, memory, vision, and muscle coordination **(NJ Fsheet)** • **CDC Acute Inhalation Risk Level** at **4 Parts Per Million (PPM)**