SIGNIFICANT HIGHLIGHTS OF COAL DUST CAMPAIGN

SUMMARY

The Sierra Club's Coal Dust Blues Campaign began in April of 2014 with a community meeting at ODU, after a door-to-door canvas of neighborhoods near the NS Lamberts Point (LP) Terminal. Since then, there have been two other community meetings, one in West Ghent and one in Lambert's Point. Over 200 people have attended all three meetings. At all of these folks expressed genuine concern about the dust's impact on their health, the environment and the constant nuisance of it covering their houses and items on their property. To further spread the word about the danger of coal dust, the Campaign has distributed fliers (1500 each time) door-door-door announcing the three meetings and another canvas leaving fridge magnets with info on filing complaints with DEQ and NS; set up a Facebook page and hosted a web page; distributed over 100 yard signs and bumper stickers.

Also, representatives have met with DEQ staff from the regional office in VB (Reg. Director Maria Nold), and state Director David Paylor in Richmond to request enforcement action for mitigation of fugitive coal dust that DEQ estimates being released at the rate of 90,000 lbs/year, a low number in our opinion. DEQ has refused to act on our request citing the "grandfather clause" exempting NS from the Clean Air Act of 1970 and the monitoring by NS, which shows the levels of concentration below 150 µg/c3 (see commentary under DEQ below). Also, there was a meeting with NS officials in 2014, where the CEO at the time Wick Moorman denied that coal dust was a public or environmental health threat and claimed '[t]here are no facts to suggest this is a meaningful problem of any kind.'"[1]. Also, we have met with the local director of the Norfolk office of the VA Department of Health to request a community health impact assessment of the toxic effect of the dust on human health. They agreed to explore the idea, but to date no final results reported to that end (see commentary below).

Councilman Tommy Smigiel has written a letter to Mayor Fraim and the Norfolk City Council requesting that the city go on record as requesting that NS implement reasonable mitigation measures (enclose the dumpers and conveyances at the LPT and cover the coal cars) but too date, the Mayor has blocked any action on the resolution. I have even appealed and met one-on-one with the Mayor asking for his support of the resolution, but he refused by stating that I nor anyone could show that coal dust had caused any health problems in the community. My response was that toxic coal dust containing arsenic (a known carcinogen), plus mercury, lead and other heavy metals has been scientifically linked to respiratory diseases, including asthma, childhood bronchitis, pneumonia, emphysema and decreased lung capacity, plus heart disease, increased infant mortality, developmental disorders and premature death. As such, I suggested to Mayor Fraim that the burden of proof was on NS to prove that coal dust was not a contributing factor in the cases of people in the nearby neighborhoods who have contracted or suffered from these diseases or disorders.

Furthermore, we have met with Senator Lynwood Lewis about this matter and setup a Facebook information/action page at https://www.facebook.com/CoalDustBlues/?ref=bookmarks. Additionally to disprove the erroneous claim by NS CEO Fowler about the content of the black dust, we gathered samples from houses in the LP and W. Ghent neighborhoods, had them analyzed at an independent lab (Chemoptix Microanalysis) and each tested positive for coal dust as compared to a reference sample found near the railroad tracks.[2] Chemoptix estimated the quantitative percentage of coal dust in each sample, which ranged from 20 to 70% (see attached press release).[3] These results confirm the only previous Virginia DEQ analysis on record dating back to 1996 of particles collected at a home near Lambert's Point.[4]

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[1] The Virginian-Pilot, 6/27/14, pg. 11

[2] Chemoptix Microanalysis (4/10/15), West Linn, OR, (see test results at www.CoalDustNorfolk.com/Chemoptix_coal-drift_041015.pdf)

[3] Chemoptix (4/18/15), (see at www.CoalDustNorfolk.com/Chemoptix_AGI_041815.pdf)

[4] The Virginian-Pilot, 06.27.14, pg. 11

Also, there have been discussions and email correspondence with Councilwoman Whibley and other members of the council and a petition with 600 signatures (http://petitions.moveon.org/sign/norfolk-city-council-1) [see attached petition delivered to Council and comments from signers] calling on the Council to pass the Smigiel Resolution has been delivered to each Council member and formally presented at a Council meeting. Councilwoman Whibley told me that there was no science to show that coal dust was harmful to public and environmental health. I sent her the scientific evidence cited in this document, but she still refused to come out publicly in favor of the resolution saying she wanted to wait for more data from the air monitors. I asked Councilman Protogyrou directly to support the resolution, but he advised that he had a conflict of interest due to owning a large block of NS stock.

Also, we created a petition (http://petitions.moveon.org/sign/norfolk-southern-ceo.fb48?source=c.fb&r_by=530901) to the new NS CEO James Squires as of June 1, 2015, asking him and the NS Board of Directors to mitigate the coal dust was initiated and sent to Squires with nearly 400 signatures. In an email exchange with Squires after he became CEO in 2015, I appealed once again for NS to be a good neighbor and act in a moral and socially responsible manner. His response: *"...Norfolk Southern has determined that enclosing the trans-loading equipment and covering the coal cars is neither practical nor affordable, and we have no plans to do so."* And this is a company with revenue of $11.6 billion that paid the former CEO Moorman $13.5 million ($6,500/hour or $260,000/week) last year. It would take less than 1% of its annual gross revenue to do the mitigation measures that we have requested, although a former NS paid consultant had recommended enclosing the dumpers in the 1970's. NS refused to act on the recommendation then as it does now.

More detailed information on the outcomes of the meetings with state regulatory agencies and NS are noted herein, plus other relevant items bearing on our ongoing campaign for coal dust mitigation.

1. **Power Point Presentation on Scope of the Problem** (see attachment to this email):
   a. ODU Researchers Documented Toxic Coal Dust Contamination in Norfolk
      - *Black grit commonly coats cars, windowsills, and plants in neighboring communities*
      - *Soil samples from throughout city contained up to 20% coal by weight at a site less than 2.2 miles from the docks, 3% coal 11 miles away and 1% coal as far as 26 miles away*
      - High coal levels in soil samples taken along railroad tracks suggest that trains are another pathway for contamination.
      - *Arsenic (carcinogen & neurotoxin) measured at levels in Norfolk at five times higher than background soil concentrations nearby*
   b. More Coal Dust Facts
      - DEQ exempts LP from CAA; assumes no pollution problem at <55m tons/yr; no monitoring
      - DEQ inspects facility once every five years (2011, 14)
      - DEQ analysis of particles at a home near Lamberts Point in 1996 showed large amounts of coal dust
      - Each coal car (200,000/yr) est. to release coal dust at one lb/mile from mine to port [≤400 lbs/car]
      - DEQ est 88,000[5] lbs dust released in '13 from terminal operations less coal cars
   c. Health Effects
      - Coal dust contains arsenic, lead, mercury, other heavy metals
      - Linked to low birth rate, premature birth, neuro-developmental delays in children; lung cancer, pneumonia, emphysema, bronchitis; asthma attacks; heart disease & strokes; premature death

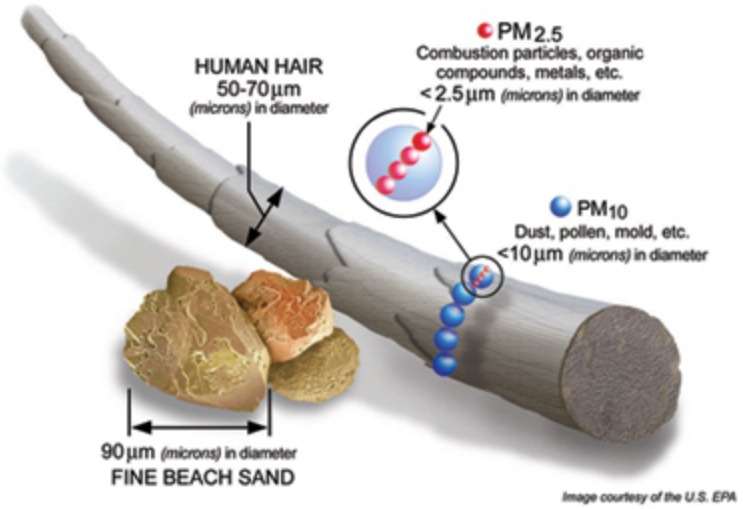
[5] Ray Gregory, one of the community activists who lived in W. Ghent at the time of his meeting with DEQ, asked Maria Nold, local DEQ regional director, directly how they came up with this figure, which we believe is far below the actual amount, when figuring in the dust blowing off of the uncovered coal cars coming into the LPT and the thousands waiting in the yard to be dumped. All she could say was that The DEQ does "estimate" how much airborne pollutants come off the coal terminal. The agency uses a formula tied to the amount of coal Norfolk Southern processes in a year.

- NS and DEQ claim that most of the fugitive coal dust is PM10/coarse particles, less harmful than fine particles/PM2.5 that can penetrate deep into the alveoli of the lungs and end up in the blood stream. DEQ nor NS, however, do any analysis of the air samplers captured particles to determine the content or toxicity, so their claim lacks credibility. We have asked for this procedure to be implemented, along with continuous monitoring on at least an hourly basis, but they have refused our request and claim that the current monitoring regime of just two monitors for PM10 at the perimeter of the NS property line that takes readings, as I recollect, for 24 hours every 6 days. Also, we have asked for air samplers to be strategically placed throughout the affected neighborhoods, based on a site study to determine the locations; however, DEQ has refused our request in that they rely on NS to install the monitors, which they likewise refuse to do. (see attachment of 7/15/15/Sen. Lewis cover ltr & exchange between Nold and Cook based on questions from Cook to DEQ) of 5/29/14

d. Lab Test Results 2015 on Swipe Samples Taken from Nearby Homes (see attached press release)

VA Sierra Club ID	*Chemoptix ID*	*Result (AGI visual estimation % v/v):*
Lab treated sample	G-MIC-11341	~60%
1415 W 27th and 1430 W 26th Lambert's Point	G-MIC-11342	~40%
Skylight 1342 Westover, West Ghent	G-MIC-11343	~70%
913 Weyandoke Rd. West Ghent	G-MIC-11344	~30%
1342 Westover Ave., West Ghent	G-MIC-11345	~20%
1405 W. 27th, Lambert's Point	G-MIC-11346	~30%

2. DEQ Regulatory Authority and Lax Enforcement
   a. Regulatory authority and enforcement of particulate matter releases from emitting sources, like the LP NS Terminal, lies with the VA DEQ as established by a state implementation plan (SIP) as delegated by the US EPA to the states. The EPA establishes the National Ambient Air Quality Standards (NAAQS) guidelines for what is supposedly safe exposure for humans to particulate matter (PM), PM-10 (less than 10µm) and PM-2.5 (less than 2.5 µm). The size of particles is directly linked to their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into your lungs, and some may even get into your bloodstream. More information about health. See the EPA's Fast Facts page for a quick summary of particle pollution basics.



b. Current air quality monitoring at the LP Terminal done by NS, not DEQ. NS contracts with a private company to install and monitor the air quality using two monitoring stations on the perimeter of their property line at HRSD and Redgate Avenue at Jeff Robertson Park. NS contends that they are routinely in compliance with EPA guidelines, thus no threat to public and environmental health. However, that claim is in question due to the fact that scientific data has led Wisconsin and the EPA to propose and W.H.O. to recommend much lower values for PM10 and PM2.5 per the following table. The results from the NS samplers will likely show readings below the EPA guidelines of 150 µg/m^3, which will give NS, the DEQ and the city the cover to continue business as usual, while the cited scientific evidence herein clearly shows the dangers of exposure to arsenic, lead and mercury and other heavy metals. Remember NS has found that there is no safe level for exposure for coal dust.

			EPA (a)	WHO(b)	WI ©	
$PM_{2.5}$	primary	Annual	12 µg/m^3	10 ug/m^3		annual mean, avg over 3 years
	secondary	Annual	15 µg/m^3			annual mean, avg over 3 years
	primary & secondary	24-hour	35 µg/m^3	20 µg/m^3	20 µg/m^3	98th percentile, averaged over 3 years
PM_{10}	primary & secondary	24-hour	150 µg/m^3	50 µg/m^3	50 µg/m^3	Not to be exceeded more than once per year on avg over 3 years

a. EPA suggested lower EPA guidelines for 24-h PM10 standard in the range of 65-85 µg/m3 for 24-h concentrations (U.S. EPA, 2010); however, lower guidelines never adopted with the existing 150 ug/m3 left in place]
b. WHO's current, recommended guidelines to better protect human and environmental health.[6]
c. WI agrees with WHO suggestions but not sure if they were ever adopted at the state level.

The two air monitors currently operated by NS at the perimeter of their property that take a 24 sample of PM10 only every six days for a 24-hr time period are extreme deficient for determining the actual exposure of residents on a daily 24/7 basis. We have asked DEQ for "air monitors that capture PM10 and PM2.5 at appropriate locations in the affected communities... and perform analysis on the captured dust to determine the presence of toxic compounds that harm human and environmental health." But, DEQ ignored the request to monitor for PM2.5 (fine particulate matter 2.5 micrometers in diameter), more harmful to human health in that such particles can penetrate the alveoli in the lungs and enter the bloodstream causing an

[6] http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf, pg9

increase in illness and premature death.[7] Therefore, the Club calls for reconsideration of our original request for monitors to be located in the most affected communities (Lambert's Point, West Ghent and Larchot) with the capability to continuously capture PM2.5 and PM10 particles via hourly data readings. Likewise, we still want quarterly analysis performed on the captured dust to determine the presence of toxic compounds that harm human and environmental health. Also, Nold/DEQ was non-responsive on the request to perform analysis on the captured dust to determine the presence of toxic compounds that harm human and environmental health.
Furthermore, the NAAQS limit of 150mgm(-3) for all particulate matter in general is 2-3x higher that it should be for coal dust that contains highly toxic, poisonous heavy metals with links to severe health effects and premature death. That standard needs to be reevaluated and drastically lowered under the state's SIP as it relates to coal dust.

> Elevated levels of particulate matter have been associated with significant negative effects on human health. Significant and measurable reductions in life expectancy in the United States have been correlated to exposure to fine particulate matter (Pope et al., 2009). Exposure to PM10 has significantly correlated with all-cause, cardiovascular, and respiratory mortality (Zanobetti and Schwartz, 2009). In recognition of these health risks, the U.S. EPA has established health-based standards that provide maximum ambient concentrations for particulate matter, including a standard of 150 µg/m3 for 24-h concentrations for PM10. EPA's recent draft policy assessment for particulate matter standards for PM10 in 2010 was 65-85 µg/m3, however it was never adopted. At the same time WHO recommends a maximum of 50 ug/m3 for PM10 or 1/3 the current EPA level.
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> Exposure to particulate matter that includes coal dust is particularly hazardous (Hendryx et al., 2008). The risks associated with coal dust exposure among mine workers are well studied. Recognizing the risk to the general public from exposure to particulate matter containing coal dust, the Wisconsin Department of Health and Family Services has proposed a risk based ambient air concentration of 20 µg/m3 for coal dust (WDHFS Letter, 2003) .
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> WHO also reports that the low end range of concentrations at which adverse health effects have been demonstrated is only slightly above the background concentration of 3–5 µg/m3 for PM2.5 particulates, and 8-10 µg/m3 for PM10. These guidelines specify that the length of exposure time changes the mortality risks. WHO estimates for daily exposure there is a 1% increase in mortality for each 10µg/m3 increase in PM10 particulates.[8]
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> Schwartz et al. studied hospital emergency room visits for asthma in Seattle, Washington, over a 13-month period from September 1989 to September 1990 (117). The 24-hour average PM10 concentrations ranged from 6 to 103 µg/m3 . Asthma visits by subjects under 65 were significantly associated with the PM10 concentration measured on the previous day, after adjustment for weather variables and a number of other potential confounders. A graphical and tabular analysis suggested that an increase in asthma visits could be observed at levels below 24 µg/m3 .

NOTE: In 2009, the Southern Appalachia Mountain Stewards and the Sierra Club petitioned the State Air Pollution Control Board to amend the fugitive dust emissions standards for existing and new and modified stationary sources. The SAPCB however voted in 2010 to deny the petition for rulemaking and requested instead a guidance document regarding fugitive dust generated by coal mining, processing, handling or transportation activities that incorporates the following concepts:

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[7] The IARC and WHO designate particulates a Group 1 carcinogen. Particulates are the deadliest form of air pollution due to its ability to penetrate deep into the lungs and blood streams unfiltered, causing permanent DNA mutations, heart attacks and premature death.[5] In 2013, a Danish study involving 312,944 people in nine European countries revealed that there was no safe level of particulates and that for every increase of 10 µg/m3 in PM10, the lung cancer rate rose 22%. The smaller PM2.5 were particularly deadly, with a 36% increase in lung cancer per 10 µg/m3 as it can penetrate deeper into the lungs.[6]

[8] http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf, pg 9

1. If in the opinion of the Department of Environmental Quality reasonable precautions were not being taken and the resulting conditions cause or contribute to the endangerment of human health and the Department of Mines, Minerals and Energy does not take enforcement action, the Department of Environmental Quality would consider doing so pursuant to the existing regulations. [Based on public records that we have looked at and in direct questions to DEQ, this regulation and authority has never been invoked]

2. When determining appropriate reasonable precautions, the Department of Environmental Quality will consider the potential impact on human health, i.e., proximity of the fugitive dust release to human habitation and activities. [Based on public records that we have looked at and in direct questions to DEQ, this regulation and authority appears to have never been invoked]

CONCLUSION: The current EPA/DEQ NAAQS for PM-2.5 (primary and secondary for 24 hr at 35 µg/m3) and for PM-10 (primary and secondary for 24 hr at 150 µg/m3) are set in excess of what would protect human health according to WHO, WI and the EPA's 2010 proposed daily exposure guidelines.[9]

In fact, WHO states that small particulate pollution have health impacts even at very low concentrations – indeed no threshold has been identified below which no damage to health is observed. Therefore, the WHO 2005 guideline limits aimed to achieve the lowest concentrations of PM possible.[10]

Despite overwhelming evidence, as cited herein, of adverse impact to the health of exposed residents, the environment and as a constantly visible nuisance factor, DEQ refuses to use its existing authority[11] to mitigate the release of 90,000 lbs of fugitive coal dust from the LP Terminal operation, while hiding behind the "grandfather clause" exempting NS and their LPT from the Clean Air Act and the EPA's NAAQS to the detriment of human and environmental health, especially for those living nearby. It appears that DEQ places the profits of NS before the health of the people and the welfare of the corporation before the needs of the community.

We have appealed to NS officials on a number of occasions to act in a moral, socially responsible and ethical manner as a good neighbor, aside from any exemptions, by enclosing the dumpers and the conveyances to the ships/barges and to put covers on the coal cars; however, to date, they have refused. Also, Norfolk Mayor Fraim and a majority of the Council have declined to act on a resolution asking for the same measures in the interest of public and environmental health of the City's residents. Instead, they have chosen to ignore or discount the scientific evidence linking coal dust to a number of diseases, conditions and premature death as noted elsewhere herein.

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[9] https://www.meas.ncsu.edu/airquality/pubs/pdfs/146.pdf; Contents lists available at SciVerse ScienceDirect Atmospheric Environment journal homepage: www.elsevier.com/locate/atmosenv [pg. 499]

[10] http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf, pg 9

[11] How can DEQ claim that "reasonable precautions" are being taken by NS to prevent the release of fugitive coal dust into the surrounding neighborhoods and the Elizabeth River, when DEQ estimates that NS on average releases 90,000 lbs of coal dust annually from its LPT operations? Since DEQ has chosen to exempt Norfolk Southern's terminal operations from the Clean Air Act, the appropriate "reasonable precautions" standard presents a very high hurdle to get over because it requires a finding by DEQ that "reasonable precautions" were not being taken and the resulting conditions "caused or contributed to the endangerment of human health." Over the years since that standard has been in effect, DEQ has never to our knowledge used it with Norfolk Southern because they must first advise DMME of a violation and if they fail to take enforcement action, the DEQ would consider doing so pursuant to existing regulations, which apparently DEQ chooses not to apply to the Lambert's Point Terminal, a classic catch 22 situation

Linking coal dust as the only causal factor for a specific disease or condition that may occur with residents in the surrounding community presents a challenging, if not impossible task, because a number of other PM sources of exposure can contribute to diseases like asthma attacks, emphysema, pneumonia, bronchitis low birth rate, premature birth, neuro-developmental delays in children; lung cancer, heart disease & strokes and premature death. Nevertheless, peer-reviewed scientific research shows that coal dust is a contributing factor linked to these diseases and conditions. Since we know there is no safe level of exposure, the EPA and DEQ should use its authority and all available resources to minimize exposure to coal dust.

Remember, just because the EPA sets a maximum exposure or contaminant level that does not mean exposure below that level is safe or that the EPA actually monitors or enforces its regulations. In most cases it depends on the polluting source/company to self monitor as DEQ does with NS. And even when the EPA knows of a violation of its own regulations, as in the case of lead in the Flint, MI and Washington, DC[12] drinking water, it may ignore the danger to public and environmental health and do nothing or too little too late.

The EPA has on numerous occasions deemed a substance safe to use, based in large part on biased scientific data provided by the manufacturer or industry associations. That occurs because to ban or restrict use of a chemical based substance, the EPA must prove that a substance is unsafe and usually bases its decision on test data provided by the company making the product [instead of making the company prove that its safe before getting approval to use]. Then, many years later after immeasurable harm to public and environmental health, the EPA may determine that a prior approved substance is toxic and harmful as in the case of DDT.

For example, as early as the 1940s, scientists in the U.S. had begun expressing concern over possible hazards associated with DDT, but the EPA did not act to restrict its use until legal proceedings and public outcry forced it to finally enact regulations in 1973 to restrict its use. Prior to that in 1971, the "U.S. District Court of Appeals in 1971 ordered the EPA to begin the de-registration procedure for DDT. After an initial six-month review process, William Ruckelshaus, the Agency's first Administrator rejected an immediate suspension of DDT's registration, citing studies from the EPA's internal staff stating that DDT was not an imminent danger to human health and wildlife. However, the findings of these staff members were criticized, as they were performed mostly by economic entomologists inherited from the United States Department of Agriculture, who many environmentalists felt were biased towards agribusiness and tended to minimize concerns about human health and wildlife."[13]

The system is rigged in favor of business and industry that gives campaign contributions to elected officials, who in turn enact laws that provide the framework for regulations favorable to polluters that agencies like the EPA must adhere to. For example, if you want to market a new chemical for use in a product — even one that will come into contact with children or pregnant women — it's up to the EPA to prove that it's unsafe, using whatever data are provided by the chemical company, with little power to ask for more. And if it's one of the 62,000 chemicals that were already in use when the TSCA went into effect in 1976 — a category that includes BPA, for instance, — chances are it was never really tested by the government at all. "Chemicals are deemed safe until the EPA can prove that they are dangerous," says Richard Wiles, executive director of the nonprofit Environmental Working Group. "It's completely backward."

In closing, I leave you with the example of coal mine dust, which was originally dismissed as a mere nuisance, not a potentially serious threat to extractive workers who inhaled it. In the 1930s, the US Public Health Service played a major role in conceptualizing coal mine dust as virtually harmless. Dissent from this position by some federal officials failed to dislodge either that view or the recommendation of minimal limitations on workplace exposure that flowed from it. Privatization of regulatory authority after 1940 ensured that miners would lack protection against respiratory disease. The reform effort that

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[12]https://en.wikipedia.org/wiki/Lead_contamination_in_Washington,_D.C._drinking_water
https://en.wikipedia.org/wiki/DDT [13]

overturned the established misunderstanding in the late 1960s critically depended upon both the production of scientific findings and the emergence of a subaltern movement in the coalfields. This episode illuminates the steep challenges often facing advocates of stronger workplace health standards.[14] The language used by NS to describe their release of fugitive coal dust into the air and lungs of nearby residents as a mere "nuisance" to discredit the health issues raised and the science cited by those calling for measures to protect public and environmental health.

NS joins a long list of those who use the "Merchants of Doubt" model like the tobacco and coal industries to promote doubt about the cited peer reviewed scientific data that shows harm to public health and discredit anyone who calls on them to stop using the air, land and water as a public sewer to dump their toxic, poisonous waste to bolster their bottom line. Such a position is immoral, unethical and socially responsible and should be illegal. NS has gotten away with it for over a 100 years by using legalized bribery to buy politicians and buy off many in the communities where they operate with their measly charitable contributions of $6.95 million, which amounts to only 1/16th of 1% of its annual revenues. Norfolk Southern's charitable giving is comparable to an individual making $50,000 a year donating all of $30.90 to charity, or about 1/16th of 1% of income.

But perhaps the sins of the politicians are even worse. After all, our elected political leaders have a sworn duty to protect us, yet these so-called leaders, save for Tommy Smigiel, seem perfectly content to behave as if it were more important not to ruffle the feathers of "our leading corporate citizen" as characterized by Mayor Fraim, by asking them to diminish their gross revenue of $12 billion by 1% for just one year. Who knows if that might cause them to reduce their measly charitable contributions.

The Sierra Club and outspoken residents who want NS to clean up its act cannot be bought off, and we will continue our two year campaign for cleaner air, water and soil in the interest of improving our city's public and environmental health.

The effects of PM on health occur at levels of exposure currently being experienced by many people both in urban and rural areas and in developed and developing countries – although exposures in many fast-developing cities today are often far higher than in developed cities of comparable size. "WHO Air Quality Guidelines" estimate that reducing annual average particulate matter (PM_{10}) concentrations from levels of 70 $\mu g/m^3$, common in many developing cities, to the WHO guideline level of 20 $\mu g/m^3$, could reduce air pollution-related deaths by around 15%. However, even in the European Union, where PM concentrations in many cities do comply with Guideline levels, it is estimated that average life expectancy is 8.6 months lower than it would otherwise be, due to PM exposures from human sources.

[14] http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3558784/