

Site Evaluation Committee  
Pamela Monroe, Administration  
21 Fruit St., Suite 10  
Concord, NH 03301

February 29, 2016

Re: Response to Request for Advance Public Comment on Rules Related to Certificates of Site and Facility, Site 300.

Dear Ms. Monroe,

Thank you for the opportunity to provide comments on the Site 300 Rulemaking as it pertains to siting high pressure gas pipelines and their mandatory infrastructure technology (compressor stations, valve stations, pigging stations *et cetera*).

We have reviewed the current Site 300 rules and the provisions specified in the Request for Comment and found them unable to contemplate typical and characteristic methodologies employed in the industry (as required for the current science and technology to operate properly), coupled with expected tradeoffs. Good engineering is always about balancing tradeoffs; the siting of gas infrastructure is inherently technology-based and thus is engineering-centric when married to the socio-economic siting contingencies, hitherto.

The goal with these below, proposed, updates to the Site 300 rules are to educate and protect assets of consequence for any applicant, stakeholder, or affected land owner about the unique siting design inputs and requirements in the geography required for this, the Great State of New Hampshire and other given siting contingencies. Seemingly, many "minimum requirements" Federal Regulations are ill-equipped to contemplate what is needed for safe implementation, in this the Granite State, and other concerns that could have catastrophic scenarios if not planned for and sited properly. Additionally, as such, we have the New Hampshire Joint Board of Professional Engineers, with licensed engineers per law for matters of public safety; seemingly remiss in current proposals witnessed otherwise.

Despite the 25 January 2016 date of the request for public comment, we regret that our group, and many others, of engineering professionals and scientists were made aware of this only on 22 February 2016, the typical New Hampshire school vacation week. As it seems that the NHSEC is the best kept secret within our purview as stakeholders and residents (knowing the members of the NHSEC being New Hampshire residents as well), we respectfully request that the deadline for submission be extended beyond 29 February 2016 to give the municipalities and New Hampshire residential members of the public a reasonable opportunity to contribute to this process in efforts to aid the New Hampshire Site Evaluation Committee (NHSEC) and applicants for the same.

Respectfully, we request that the following updated contemplations and provisions be considered for Site 300 implementation:

1. Public and Private Drinking Water Wells for site concerns of gas infrastructure, accompanying machinery and technology:
  - a. Require impacts of blasting studies
    - i. It is well known that aquifers do not adhere to political, construction or property owner's boundaries for contamination kinetics concern
    - ii. A less impactful technology of cutting and drilling is less intrusive to aquifer infrastructure seemingly created millennia ago.
  - b. Require for siting concerns the mitigations and avoidance of aquifers, shallow wells, natural springs, and surface waters near compressor stations, that are used for public reservoirs and private drinking wells
  - c. Require testing and monitoring of public and private wells prior to construction (baseline) and periodically post construction; test for flow as well as contaminants (*exempli gratia*, arsenic, radon, benzene, VOCs, etc.)



Figure 1: Typical blow down or “blow off” purposeful (or emergency) release of product, as reasonable facsimile containing fracked gas laden with additional remnants of chemicals typically present (not shown is lit cigarette of driver in the hand of the arm hanging out of the window)

- d. Require analysis of pollution (air, soil or water) on the above water concerns, given surface facilities such as compressor engines or turbines, compressor blow downs, condensate tanks, storage tanks, truck loading racks, glycol dehydration units, amine units, separators, fugitive emission sources, *et cetera*
  - i. It is known that TEG type dehydration processes increase BTEX (benzene, toluene, *et cetera*) as known and lethal carcinogens sometimes used in Marcellus shale or other gas plays.
  - ii. Radon is also known to be sometimes at least 70 times greater in the Marcellus shale gas plays.
    - 1. Radon is a noble gas
    - 2. Any radon (or other chemicals) remaining could be transported quickly to end customer use in post transmission distribution systems
    - 3. Radon does not burn at the gas burner or stove-top
    - 4. Radon is "supposed" to be cleaned out of gas
    - 5. Require discussion and report of Radon decompositional kinetics, decompositional chains, coupled with half lives, and their health impacts
    - 6. Require discussion and report for recent (within a prior year's worth of gas harvesting) of radon (and other chemical) contents as measured in gas products expected or will be present to travel through applicant(s) pipelines.
      - a. Units of radioactivity must also be provided to accepted scientific units of counts per minute, and not gas industry normative or relative units.
      - b. Keeping in mind that blow downs or "blow offs" release massive amounts of product (possibly containing radon amongst other chemicals of concern) directly to the atmosphere
      - c. Require monitoring to sample hazardous substances that may be traveling through this, the Great Granite State of New Hampshire, as such, many chemicals used in fracking may be illegal in many other states or in New Hampshire
      - d. The use of trade secret is not grounds for summary dismissal of this topic in alignment with current RSA nor Health Code.
    - 7. Require applicant(s) to include blow down frequency proposed

- a. Require applicant to list other compressor stations with blow off frequencies that were less than forecasted and why, noting any significant design features like wet seals versus dry seals
- b. Require applicant to list other compressor stations with blow off frequencies that were more than forecasted and why, noting any significant design features like wet seals versus dry seals



Figure 2: Typical blow down or “blow off” of smaller pipeline

- 8. Require that applicant(s) capture all blow downs, blow offs or other fugitive emissions

- a. Applicant(s) may concede that methane is lighter than air, and goes “straight up” and dissipates
  - b. This sentiment does not include frequent weather inversions that can keep gas and particulates at the ground level, given the bowl-like valley terrain in some areas of New Hampshire
- 9. Require that the same be true for pneumatic valve and other actuation systems that also vent product or gas.
- iii. Require air quality testing before construction and regularly after operation begins, to be done by uninterested third party independent contractors of choosing by stakeholders and residents as funded by high-pressure pipeline applicant(s).
- iv. Under the federal Clean Air Act, NH is permitted to establish standards that are better than the EPA. See also RSA 125 for spirit and intent of the law.
- v. Anecdotally, it has been known that applicants in the gas transmission industry, may “legally” run dump trucks or other heavy machinery with particulate exhaust, incessantly and unnecessarily (without purpose other than...) with significantly increased frequency in an area to perturb pre-construction baseline measurements near sensors or canisters for both air quality or noise baseline measurements. As such it is proposed that such measurements be witnessed with security and uninterested third party verification paradigms. Results should be correlated to video or other sensors, like traffic study survey equipment.
- e. Required for siting of infrastructure; must include entire cradle to grave construction and operation modes analysis inclusive of
  - i. hydrostatic testing of pipelines and the typical large amounts of water required
    - 1. typical amounts of water may be in the millions of gallons range
    - 2. Require study and report for water gathering and disposal.
      - a. Keeping in mind that the 4th largest maple producer in New Hampshire, located in the Monadnock region has tree filtered water that is run through reverse-osmosis filtration
      - b. with resulting 100,000 gallons of water required to be disposed of in a commercial-grade septic system despite being pure natural water from trees and filtered.
  - ii. Decommissioning of infrastructure

- iii. Maintenance, or emergency situations inclusive of blow downs (blow-offs) discharge of gas product to the atmosphere and nearby communities, schools, religious congregations, agriculture *et cetera*
- iv. Foreign soil fill contingencies with invasive species of molds, fungi, plants *et cetera*
- v. By way of example for applicant(s) like Kinder Morgan / Tennessee Gas Pipeline Company: Vegetation management including herbicides (from research conducted by the Citizens of Fitzwilliam, NH):

Kinder Morgan employs many types of herbicides to control vegetation including aminopyralid, chlorsulfuron, dicamba, diuron, flumioxazin, glyphosate, imazapyr, metsulfuron-methyl, triclopyr, and 2,4-D amine. All are used to control invasive plants and weeds. They state that the “residual activity” of these chemicals ranges from low to high. Low generally refers to residual soil activity of up to 40 days, moderate for up to one year, and high for residual activity over one year. They have set guidelines as to where each type of herbicide can be used. Of these herbicides, Kinder Morgan indicates that glyphosate and 2,4-D are non-residual. (Kinder Morgan Canada: Integrated Vegetation Management Plan, 2011-2016)

The use of pesticides and herbicides on a continuing and ongoing basis for controlling growth around pipelines and equipment used by Kinder Morgan do not limit themselves to the growth they are intended to curtail or kill. Since much of the pipeline’s right-of-way will be on private property, runoff can move to ground wells and vegetation.

Aminopyralid is used for the control of noxious weeds and invasive plant species including woody plants, and annual and perennial broadleaf weeds. It is effective only on actively growing weeds. This chemical is of concern to vegetable growers as it can enter the food chain via manure to result in deformed plants or poor to non-existent yields. It is in the same family as clopyralid and picloram. These chemicals can move with rainfall, irrigation and dew and remain active in soil contaminated by leeching and runoff.

Washington State University Extension: Herbicide Contamination of Organic Matter (<http://whatcom.wsu.edu/ag/aminopyralid>), Virginia Coop Extension: “Pyridine Herbicide Carryover: Causes and Precautions” ([http://pubs.ext.vt.edu/VTTP/VTTP-6/VTTP-6\\_pdf.pdf](http://pubs.ext.vt.edu/VTTP/VTTP-6/VTTP-6_pdf.pdf))

Chlorsulfuron is used to control the hard to manage annual and perennial broadleaf vegetation by both foliar and root uptake. This chemical is a highly acute toxin and known as a probable carcinogenic, a known groundwater pollutant due to its leachability and its long persistence in the soil, and a known reproductive or developmental toxicant. It is toxic to some aquatic plants and can affect some non-target plant and food production resulting in diseases and reproduction effects.

ALSASE Inhibitors: sulfonyleureas (<http://agron-www.agron.iastate.edu/~weeds/Ag317/manage/herbicide/su/html>),

Federal Register – The Daily Journal of the US Government – Chlorsulfuron; Community Right-to-Know Toxic Chemical Release Reporting ([www.federaregister.gov/articles/2013/12/09/2013](http://www.federaregister.gov/articles/2013/12/09/2013))

Dicamba is used to treat actively growing broadleaf vegetation and brush. It kills broadleaf weeds before and after they sprout. It is toxic to conifer species and is mobile in most soils. Significant leaching is possible. It dissipates slowly in hardwood forests and wetlands, and it is slightly toxic to birds, fish and aquatic vertebrates. Dicamba is highly soluble in water and may contaminate groundwater as it is highly mobile. Desirable broadleaf plants such as fruit trees and tomatoes may be harmed during their growth and development stages. Research indicates that it can be a DNA damaging agent and could be potentially dangerous to humans.

Extonet – Extension Toxicology Network Dicamba Pesticide Info Profile ([pmp.cce.cornell.edu/profiles/extonet/carbaryl-dicroto](http://pmp.cce.cornell.edu/profiles/extonet/carbaryl-dicroto)), Technical Fact Sheet – National Pesticide Information Center Chemical Watch Fact Sheet: A Beyond Pesticides /NCAMP Fact Sheet – Dicamba ([http://www.npic.orst.edu/factsheets/dicamba\\_tech.pdf](http://www.npic.orst.edu/factsheets/dicamba_tech.pdf)), Washington State DOT – Dicamba Roadside Vegetation Management Herbicide Fact Sheet (<http://www.wsdot.wa.gov/NR/rdonlyres/C9917703-1FA8-41D0-BFA7-B5EC86BBC0D9/0/dicamba.pdf>)

Diuron is used to control many annual and perennial grasses and herbaceous vegetation that inhibits photosynthesis. It is a pre-emergent herbicide and can be released into water from runoff. If released into soil, it can remain in the upper 5-10 cm of the soil with a half-life of about 330 days. It emits noxious fumes during fire conditions, and fire fighters must use self-contained breathing equipment and prevent the runoff of the fire water. It is slightly toxic to birds and mammals.

Spectrum Chemical Fact Sheet ([www.speclab.com/compound/c330541.htm](http://www.speclab.com/compound/c330541.htm)), Extonet Extension Toxicology network Pesticide Information Profile Diuron 1996 (<http://extonet.orst.edu/pips/diuron.htm>), Material Safety Data Sheet Agrilance LLC ([www.dcms.net/LDat/mp510015.pdf](http://www.dcms.net/LDat/mp510015.pdf))

Flumioxazin is used as a pre-emergent to control selected grasses and broadleaf weeds on bare ground. This chemical is slightly toxic to fish and moderately highly toxic to aquatic invertebrates. Data indicates that it may be an endocrine disrupter in mammals. This compound has the potential to contaminate surface water by dissolution in runoff water. It is considered to be moderately to slightly toxic to freshwater fish, and it may cause long term adverse effects in the aquatic environment.

Flumioxazin Factsheet Wisconsin Department of Natural Resources (<http://dnr.wi.gov/lakes/plants/factsheets/FlumioxazinFactsheet.pdf>), Flumioxazin: Environmental Fate and Ecological risk Assessment: US EPA – Pesticides:

Flumioxazin- EPA ([http://www.epa.gov/opp00001/chem\\_search/cleared\\_reviews/csr\\_PC-129034\\_14-Aug-03\\_a.pdf](http://www.epa.gov/opp00001/chem_search/cleared_reviews/csr_PC-129034_14-Aug-03_a.pdf)),

California Department of pesticide Regulation Published Report 2003-6 Flumioxazin Tracking ID No.191861N

([www.cdprca.gov/docs/registration/ais/publdreports/5802.pdf](http://www.cdprca.gov/docs/registration/ais/publdreports/5802.pdf)), Flumioxazin Herbicide Technical Brochure – Valent

([www.engageapro.com/uploads/brochures/flumi\\_brochure\\_english%20Apr%2030.09.pdf](http://www.engageapro.com/uploads/brochures/flumi_brochure_english%20Apr%2030.09.pdf)), CLH Report Proposal for

Harmonised Classification and Labeling – Based on Regulation (EC) No.1272/2008 CCCP Regulation ([http://echa.europa.eu/documents/10162/13626/clh\\_report\\_flumioxazin\\_dh012867-43\\_en.pdf](http://echa.europa.eu/documents/10162/13626/clh_report_flumioxazin_dh012867-43_en.pdf)), Safety Data Sheet According to

Regulation (EC)No. 1907/2006 of 18 December 2006 (REACH)

[www.interfarm.co.uk/DownloadFile.ashx?Field=85](http://www.interfarm.co.uk/DownloadFile.ashx?Field=85))

Glyphosate (used in Roundup) is only effective on growing plants. This chemical can disrupt the functions of enzymes in animals. In the US, it has been suggested that it can reduce winter hardiness of trees and resistance to fungal diseases. It can remain active and may be released from the soil and absorbed by plants. It has caused the destruction of habitats and food sources for some birds and amphibians and reduced populations. This was found to be toxic to a range of bacteria, fungus and yeast. Scientists have linked exposure to Roundup to ADHD, Alzheimers disease, anencephaly, autism, birth defects in humans and animals, cancers, celiac disease, gluten intolerance, kidney disease, colitis, depression, pregnancy problems, obesity, reproductive problems and respiratory illnesses.

Glyphosate- Pesticide Action Network UK – Glyphosate Fact Sheet (<http://www.pan-uk.org/pestnews/Actives/glyphosa.htm>), roundup-found-in-animals-with-birth-defects.html),

EPA – Pesticide website

(<http://www.epa.gov/oppsrrd1/reregistration/REDs/factsheets/0178fact.pdf>), National Pesticide information Center Glyphosate General Fact Sheet:

(<http://npic.orst.edu/factsheets/glyphogen.html>)

Imazapyr controls broadleaf vegetation, annual and perennial grass species and woody vegetation by preventing seed germination. It is highly mobile and can travel with soil to enter ground and surface water. It is highly persistent in the environment, very water soluble and does not absorb well in most soils. It does not distinguish the plants it kills, so rare and endangered plants are at risk. The EPA has stated that “jeopardy” will occur to terrestrial and aquatic plant species from the use of Arsenal which is made with this chemical.

Oregon State University – Agricultural Chemical Research & Extension – Pesticide Fact Sheet: Forestry Use – Imazapyr

(<http://www.oregon.gov/odf/privateforests/docs/imazapyr.pdf>), Imazapyr Fact Sheet

(<http://environmentalcommons.org/cetos/criticalhabitat/imazapyr.pdf>), From the expert declaration of Dr. Susan Kegley on behalf of Californians

for Alternatives to Toxics for the Humboldt County Superior Court:

(<http://www.alternatives2toxics.org/pdfs/>)

kegley\_summary\_declaration.pdf

Metsulfuron-Methyl is used for the control of noxious weeds and invasive plants. It can exist in the soil for more than fourteen months and migrate. It is extremely potent and effective on native plants and the aquatic environment, and it can cause death to trees. It is highly mobile and can travel through soil with water and enter groundwater.

ATP Environmental: Metsulfuron-Methyl What the Hell is It?

([http://www.atpenvironmental.com.au/metsulfuronmethyl-](http://www.atpenvironmental.com.au/metsulfuronmethyl-what-the-hell-is-it/)

[what-the-hell-is-it/](http://www.atpenvironmental.com.au/metsulfuronmethyl-what-the-hell-is-it/)), EXTENSION SERVICE: Oregon State University, Agricultural Chemical Research &

Extension FactSheet- Forestry Use

MetsulfuronMethyl(<http://www.oregon.gov/odf/privateforests/docs/metsulfuronmethyl.pdf>,

Metsulfuron-Methyl- Human Health & Ecological Risk Assessment Final Report, Prepared for the USDA

Forestry Service ([http://www.fs.fed.us/foresthealth/pesticide/pdfs/120904\\_Metsulfuron.pdf](http://www.fs.fed.us/foresthealth/pesticide/pdfs/120904_Metsulfuron.pdf))

Triclopyr is used to control established perennial vegetation and brush and selectively to control encroaching trees. It is moderately to highly toxic to freshwater plants and fish and some marine vertebrates and invertebrates. Spray drifts can cause destruction of non-target plants, microorganisms, fungi, mosses and algae. Some of its compounds (EDTA, triethylamine and kerosene) have been proven to cause birth defects in test animals as well as reactions to eyes, skin, respiratory, nervous and gastrointestinal systems of humans and animals. It can move through soil and has the potential to pollute groundwater.

Californians for Alternatives to Toxics: Toxological Profile for Triclopyr

([http://www.alternatives2toxics.org/tox\\_profile-triclopyr.htm](http://www.alternatives2toxics.org/tox_profile-triclopyr.htm))National Pesticide Information –

General Fact Sheet on Triclopyr (<http://npic.orst.edu/factsheets/triclogen.pdf>), Triclopyr: Weed Control Methods Handbook for the Nature Conservancy M. Tu, C. Hurd, R. Robison

& J.M. Randall (<http://www.invasive.org/gist/products/handbook/20.triclopyr.pdf>)

2,4-D Amine is an herbicide that interferes with growth in invasive plant species. It is an element of Agent Orange that was used during the Vietnam War. Studies have shown that it can cause lymphatic cancer in exposed humans, and it has had negative effects on the human endocrine and immune systems. It can be a central nervous system depressant causing stiffness of joints at certain formulations. It is slightly toxic to wildfowl and some formulations are highly toxic to fish and honeybees.

2,4-D Technical Fact Sheet. National Pesticide Information Center

(<http://npic.orst.edu/factsheets/2,4-DEtech.pdf>),

Beyond Pesticides: 2,4-D

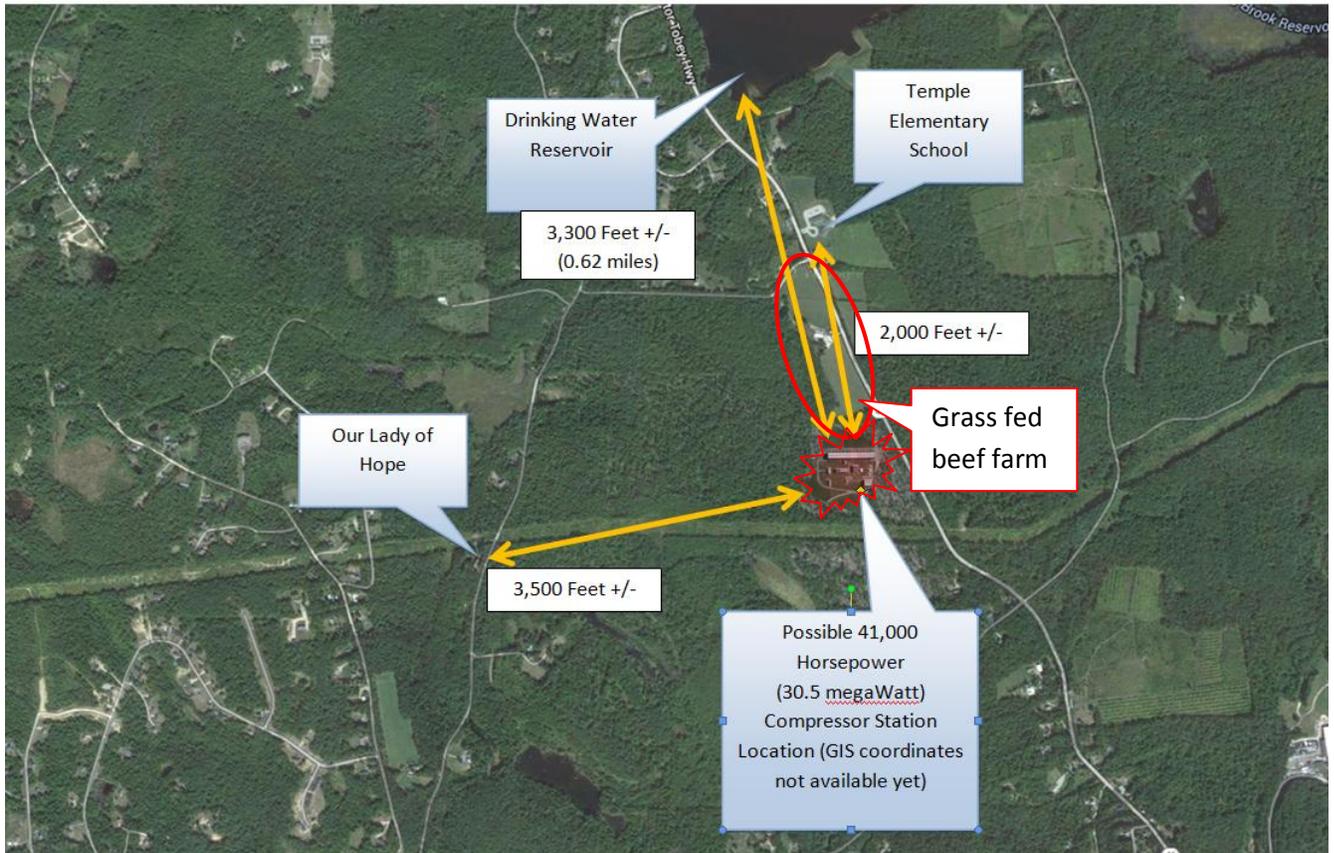
(<http://www.beyondpesticides.org/info/services/pesticidefactsheets/toxic/2,4-D.php>),

TOXIPEDIA:

2,4-D (<http://www.toxipedia.org/display/toxipedia/2,4-D>)

Note: This information has been compiled by local citizens as a service to our community and is not meant to take the place of personal research or legal advice.

2. Appropriate setbacks to mitigate potential health and safety impacts:



**Figure 3: Possible New Ipswich Compressor Station location, abutting or adjacent to Greenville and Temple, NH town boundaries.**

**a. Require a Comprehensive Health Impact Assessment (CHIA)**

- i. Environmental chemists agree that documented health hazards and toxic chemicals exist for 3 mile radii from 12,000 horsepower compressor stations.
  - ii. By way of example, the proposed compressor station for Kinder Morgan/Tennessee Gas NED project in Figure 3, is 41,000 horsepower (30.5 megaWatts)
- b. For example, for the proposed NED project, there is another compressor station possible for Winchester, NH (also in the Monadnock Region)
- i. Multiply by a factor of 2 as appropriate (to include these two compressor stations in close proximity) when considering the Monadnock Region on the whole

- ii. Future expansion for the NED project above may include going back to the originally proposed 80,000 horsepower (each) rendering two possible 59.6 megaWatt gas-fired power generation compressor stations in the Monadnock Region (119.3 megaWatts)
- iii. Original calculations using linear unit analysis methods for a 36" 2.2 bcf pipeline capacity included, *prima facie*, an answer of 38.1 Hiroshima atomic bombs worth of energy yield over a 24-hour period.
  - 1. This is not surprising for an interstate gas transmission pipeline
  - 2. To be fair, this 38.1 Hiroshima atomic bombs worth of energy yield is not the explosive consequence of the same, rather is the energy integrated over a 24-hour period flowing through the originally proposed NED pipeline project as is typical with calculus-based integral analysis.
  - 3. However, the above leads to the discussion of pipe volume (under pressure) and valve stations allowed to be spaced far apart for fuel contingencies in the event of a gas release (or plasmatic ignition event thereof)
  - 4. The good news is that a pipeline rupture, gas leak and ignition (explosion) would probably be less than 38.1 Hiroshima atomic bombs
- c. Require discussion and report that blanket dimensional setbacks cannot contemplate or mitigate health impacts.
  - i. Significant and ever-changing EPA simulation models (whether finite element analysis, geocentroid methods of moments, or equivalent) are employed by FERC and others to study this phenomena for impact statements given model inputs such as weather inversions, terrain, assets of consequence etc.
  - ii. Ultimately concentrations derived from emission statistics are also important given the terrain and weather with other design inputs.
  - iii. By way of example, the NHDES declares "bad air" days in the Monadnock Region due to weather inversion. However, low hanging wood smoke is empirically observed in the entirety of the Monadnock Region with more vivid frequency due to atmospheric inversion than is actually declared by NHDES.
  - iv. By way of example: 41,000 horsepower IS 30.5 megaWatts of power (identical)
    - 1. 1 horsepower is identical to 745.6999.....Watts of power (approximately 746 Watts for every 1 horsepower)

2. Gas-fired turbines in gas compressor stations and electric generation stations use identical fuel contingencies and have like-kind, if not identical exhaust contingencies (scrubbing versus non-scrubbing)
  - a. Currently proposed gas-fired power generation compressor stations for NED are only 30% efficient
  - b. Basic high school proficiency knows that full combustion of methane is water (vapor) and CO<sub>2</sub>.
  - c. 30% efficiency is not full combustion, usually resulting in toxic, lethal carcinogenic aldehydes and other toxic byproducts (NO<sub>x</sub> *et cetera*).
3. Gas-fired power generation (electrical) stations like Granite Ridge are around 50% efficient (combined cycle), and are sited appropriately as any (gas-fired) power generation plant should.
  - v. Require power generation stations (for any purpose including, but not limited to compressor stations or electrical stations) to be sited as proper power generations as enjoyed by facilities such as Granite Ridge or other smaller "peakers" typical with gas-fired turbine technology or other engine technology.
- d. Require agreement of acceptable cancer rate increases for surrounding radii of consequence for all stakeholders and applicant(s)
  - i. It is well known that the chemical emissions from gas infrastructure (fracked or natural) includes carcinogens (not only known in the State of California, but known everywhere for humans and by the EPA)
- e. Require agreement of acceptable increases in respiratory disease rates, inclusive of epistaxis nasal episodes (bloody noses) and asthma.

### 3. Noise, Vibration and Light Pollution



Figure 4: Characteristic gas-fired turbine power generation equipment of large magnitude compressor station internals

- a. Require a Comprehensive Noise Study such that acoustic energies in all scales (*exempli gratia*, dBA, dBC, dBG) shall be simultaneously presented as non-stochastically, unweighted and account for direct conduction, acoustic coupling, with secondary acoustic reradiation and acoustically coupled sources, inclusive of air (with varying densities inclusive of weather, like fog, other chemistry or gasses), water, stone or other media. All of the above in alignment with similar intent of testing, modeling, simulation of large scale wind farms with permanently mounted machinery.
  - i. keeping in mind that single number measurements with statistical weighting paradigms and simplistic equipment with single readouts are "blind" instruments and measurements.
  - ii. Measurements should also be calibrated side-by-side audio recordings at significant resolution and sample rate for post processing correlation and monitoring (*exempli gratia*, 24-bit, 96kHz sample rate)
- b. Require all studies to include all multiple seasons within New England, such that trees with leaves as deciduous seasonal variance conditions, be measured over a typical 12 month period not to exceed 3 years of study, since, as Samuel Clemens notes, that the New England weather is consistently changing.
- c. Require that infrasound shall be additionally modeled and studied using the G-weighted scale and not be skewed by masking effects from the dBA (or dBC) region of STATISTICAL emphasis. As such masking effects are reduced for folks with hearing deficiencies in the dBA region of emphasis. No masking effects shall be considered due to animal or human population situations, as they are always present otherwise.
- d. Studies for acoustic transfer functions (both terra-conduction and atmospherically emissive) and acoustic reradiation must include residential and especially other structures with natural resonances measured and modeled.
  - i. Existing structures must be physically visited and studied additionally with infrasound generation perturbation inclusive of situations where structures are compromised by snowpack or snow load of four feet versus non snow load scenarios over all seasonal variations.
  - ii. Include effects of nuisance or acoustic energy on schools, religious centers, elderly housing, residents and other sensitive areas of use
- e. Typical methodologies for acoustic or conducted acoustic analysis may include dropping a weight on the forest floor and recording transfer functions with geophones with known distances from the perturbation. These are typical system impulse response measurement techniques:

- i. Transfer functions shall be derived using appropriate means; however, it is noted with extremely guarded caution that conventional geophones have particular resonances and reduced dynamic range "suckouts" within their spectral responses outside of seismic regions, yet within the G-weighted scale that are within areas of interest.
- ii. Non conventional technologies for geophones and equivalent technology exist with extended functionality and are required for side-by-side analysis by Applicant or study purveyors for studies.
- iii. It is conceivable, that a simple weight drop on the forest floor does not comprise enough dynamic range, as measured in decibels, to provide enough dynamic range for multiple turbines interacting and spinning at an example 41,000 horsepower (or even 80,000 horsepower)
  - 1. Harmonic intermodulation is expected, outside of typical geophone resonant structure frequency responses.
  - 2. Measurement dynamic range is most likely compromised in this scenario. Require discussion, and resolution of query with expert testimony under oath.
- f. Please be advised that it has been disclosed during "open houses" by a current or future Applicant or their engineers for the NED project, that they have never built any of these compressor stations this large (41,000 horsepower; 30.5 megaWatts) as is proposed. Thus no prior experience or practicality (notionally of 49 CFR 192) exists, coupled with no prior precedent of any kind, expressed or implied.
- g. Require studies that must include intermodulation from the Passive Intermodulation (PIM) constructs in the area and distortion-based modulation "sum and difference" products included ESPECIALLY from operations of multiple parallel compressors/engines in systems. Monte Carlo analysis or other stochastic, non deterministic (*exempli gratia*, genetic algorithms) modeling shall additionally be peak searching. This, especially coupled with tonality analysis.
- h. Require analysis of pure tones and other peak phenomena that shall be disclosed and studied for all weather conditions including snowpack and ice with and without sublimation and fog, trees with and without leaves; all seasonal variability and weather conditions over aforementioned annual bases (basis plural) of time due to variations from year-to-year of land water content, seasonal frost line, *et cetera*. Average noise shall only be used for baseline motifs where peak phenomena are required for study due to preexisting quiet conditions in the area, with typical 5 dB penalties as needed.

- i. Please have applicant(s) and uninterested third party study purveyors indicate all stochastic or deterministic methodologies used, especially when coupled with finite element analysis, genetic algorithms, Newtonian method of moments or other paradigms.
- j. Reports shall include effects to school children education, adrenaline based responses to meat in the woods (hunting as is used for quality of life, socio-economic, cultural, spiritual, religious and historical human paradigms) and in the example of NED, the abutting Temple Grass Fed Beef Farm for this and any compressor station, and of course, residents and critters -- endangered or otherwise.
- k. Studies must be conducted over all seasons, especially for trees with and without leaves, with and without snowpack, rime, or other phenomena not to exceed 3 years of average study.
- l. For example, in Temple, New Ipswich and Greenville: Please be advised that many folks ride horses and we have multiple pony/horse farms (some with endangered species) nearby the proposed Compressor Station in New Ipswich, NH. How do these animals and the riders respond to being "spooked" by a blow down (or blow off) in an affected region? Of interest, equestrians have the right-of-way as automobiles do not have such liberty.
- m. We are reminded of the three developmentally disabled adult communities in Temple, NH coupled with Low Frequency Noise (and all other sound or noise) situations regardless if Applicant(s) for NED summarily dismiss such issues:
- n. The above is practical experience and empirical evidence of direct impact.
- o. We are further reminded of intrigues and concerns within FERC public record and comment regarding low frequency sound for the Newtown, CT school tragedy shooting and individuals with sensitivities, for example Mr. Lanza. It has been claimed that Mr. Lanza told his psychiatrist that he was "bedeviled" by vibrations prior to the shooting tragedy. Pipelines by Lanza's home are only 1500 feet away; the Temple Elementary School, Beef Farm, Religious Institutions are in similar proximity, perhaps even closer. Noting that pipelines are like tuned organ pipes, with appropriate resonances and transfer function transmission paradigms. Please, see also the following FERC accession numbers:
  - i. 20101129-0017        Comments of Stephen Kohlhase re investigation and study of the Low Frequency noise and vibrations to continue to be expose from Iroquois Gas Transmission System, LP's Brookfield Compressor units under CP07-457 et al.
  - ii. 20101130-0004        Comments of Stephen Kohlhase re investigation and study of the Low Frequency noise and vibrations that continue to be

exposed re Iroquois Gas Transmission System, LP's Brookfield Compressor units under CP07-457 et al.

- iii. 20101210-4001 Letter to Stephen Kohlhase re the 11/24/10 letter documenting concerns about the noise and vibration potentially originating from Iroquois Gas Transmission Company's (Iroquois) Brookfield Compressor Station under CP07-457 et al.
  - iv. 20110216-5007 Comments of Bruno Ricci under CP07-457, Low frequency noise & vibrations still need to be mitigated
  - v. 20120726-5039 Iroquois Gas Transmission System, L.P. Report on Noise Mitigation Efforts at Brookfield Compressor Station under Docket No. CP07-457.
  - vi. 20121009-5127 Comment of Stephen D Kohlhase under CP02-31, et al.
  - vii. 20121120-5018 Formal Complaint of Stephen D. Kohlhase under PF12-9, et al.
  - viii. 20121123-5048 Comments of Stephen D. Kohlhase re the Millennium Compressor Project under CP11-515, et al.
  - ix. 20130611-5004 Comment of Stephen D Kohlhase under CP02-31, et al
- p. Require that applicant(s) must include all source code, compiled executables and methodologies employed for modeling contingencies
  - q. Require for disclosure, all parameters used to run study simulations with methods used especially inclusive of model calibration methodologies.
  - r. Design, fabrication and installation of quiet compressor stations through ASME has been known since 1991

#### 4. Require alternatives analysis

- a. Include FERC style alternative analysis specific to the siting requirements, inclusive of a no-build alternative utilizing precatory practices within OEP confines.
- b. Require electric compressor stations in siting processes
  - i. Motors up to 100,000 horsepower are readily available from companies like General Electric
  - ii. Alternatively, come to agreement on the price of human life and health, given pollution and chemical decompositional kinetics for area(s) of consequence if electric motor driven compressor stations are not chosen due to desired economy of applicant(s)
  - iii. By Way of example, now that Eversource has increased tower height for the 345,000 volt transmission line, as part of the recent winter reliability program, mostly in co-location or adjacent to the example Kinder Morgan NED pipeline project proposal, an electric compressor station could have

additional conductors (maintaining phase relationship to existing conductors) also strung on the same or similar insulators on same utility towers to the site(s) of compressor station(s) in the Monadnock Region.

#### 5. Electromagnetic Spectrum Study

- a. Require a study and impacts of the effects of compressor stations infrastructure, blow downs and pipelines with the electromagnetic spectrum infrastructure in the areas of proposed construction and operation.
- b. JUSTIFICATION: For the same basic physics well known in aerospace and the commercial industry that cause radio silence, it is well known phenomena where electromagnetic spectrum is affected by dissimilar densities of air caused by heat, exhaust plumes, or methane (and other chemicals) which is also an identical situation for compressor stations and pipeline operations if not exacerbated further due to the possible massive size of compressor stations.
- c. Perform link budget analysis for all antennas, systems and services, transmitters and receivers, encumbered in the area of operation with characteristic worst case design inputs of exhaust, heat plumes, or blow offs, especially during emergency situations regardless if *force majeure*.
- d. Further the issue can and usually is aggravated for plasmatic incidents or “fire balls”, during nontraditional events or incidents (*exempli gratia*, during a gas pipeline rupture, gas release or fire scenario; regardless if *force majeure*).
  - i. This, coupled with the ability of emergency responder radio networks being severed, or other 911-based communication equipment.
  - ii. Emergency receive communication for situational awareness, given the "all or nothing" digital modulation age.
- e. By way of example (but not limited to), during our last ice storm in the Monadnock Region, with 14 days of no electricity service, We relied on television (and a backup generator, including for well pumping of water) as our means of emergency situational awareness and communication. During this time we received a class B NTSC signal due to adverse propagation effects in the affected area; the area surrounding a proposed New Ipswich Compressor Station.
- f. Of course, NTSC has been recently supplanted with vestigial sideband of an 8-pattern constellation, i.e., digital TV VSB-8. VSB-8 is extremely sensitive to multipath phenomena, in Our personal and professional experience, as is additionally found empirically with weather (and especially causes listed above) in our practical experience.
- g. Mitigations of installing cable TV service for the entire town(s) is deprecated as such, the entire cable TV physical plant (and Ma Bell copper phone plant) on

utility poles was relegated to the forest floor and inoperable during the recent ice storms, in some areas for 30 days (of no cable TV, telephone or cellular telephone service -- cell towers lost their battery backups after 2 days).

- h. Applicant must include all source code, and methodologies employed for modeling contingencies
  - i. Studies must be conducted over all seasons, especially for trees with and without leaves, with and without snowpack, rime, or other phenomena not to exceed 3 years of average study.
6. Corrosion Protection (CP) Systems
- a. Require study and report of how any applicant(s) arrives at their design for cathodic protection (amongst other TBDs typically embodied) before this project can be considered convenient or satisfy any alleged need, given:
    - i. soil measurements and their methodologies,
    - ii. other measurement methodologies,
    - iii. fall of potentials, impedance measurements,
    - iv. system proposals including rectifier amperages (inclusive of electrical noise signals), rectifier power paradigms
    - v. spacing for test coupons,
    - vi. source code, compiled executables regardless of licensure, simulations,
    - vii. all design and simulation / modeling inputs,
    - viii. inductive and capacitive coupling
    - ix. MSDS of conductive coke, anode beds, dimensions thereof and the like
    - x. maintenance plans with measurement methodologies,
    - xi. outputs, models,
  - b. The entire project directly encumbers the safety, socio-economic, and viability of the project for investors, residents and stakeholders. It is key for applicant(s) to desire to care for their own assets properly
  - c. Denial of survey is not an enabler for any exclusion or summary dismissal.
  - d. Require report and study of how the electric field of nearby "co-located" power lines accelerates the rate of pipeline corrosion.
    - i. Large grounding arrays are required to combat corrosion.
    - ii. However, in much of New Hampshire where the power lines pass across shallow-to-bedrock soils, the ground does not offer much grounding.
  - e. Require report and study with mitigations for lightning protection systems and their maintenance.
    - i. In Mason, for instance, there are known lack or failure of utility corridor groundings that increase voltage potentials.

- ii. Require plans and discussion for the proverbial "glass popsicle" scenario maintenance after lightning strikes and the appropriate measurements of pipeline fall-of-potentials for any grounding, sacrificial anode test coupons or lightning protection systems (LPS). The "glass popsicle" is the sand turned into glass around soil-based electrodes for lightning or cathodic protection systems; it only takes one lightning hit to diminish integrity (we are required in some industries to measure LPS or CP efficacy after every lightning storm; while usually a requirement for nuclear weapons depots, it is interesting that scale of energy yields could approach 38.1 Hiroshima atomic bombs worth of non-explosive energy yield over 24 hours).

## 7. Frost line concerns

- a. Require applicant(s) to bury pipelines below frost line grade
  - i. Current Federal guidelines may not contemplate the frost line adequately for New Hampshire or are egregiously vague in interpretation
  - ii. The New Hampshire Joint Board of Professional Engineers exist for many of these purposes to aid applicant(s)
  - iii. Current applicant(s) like Kinder Morgan / Tennessee Gas Pipeline Company have used out of state professional engineers that have made project maps for purposes of public communication, in error including town boundaries and roads being misplaced by upwards of 800 feet or more.
  - iv. Pipeline purveyors denote that their pipelines will run "hot" due to natural physics of gas transmission. This is true....
  - v. Gas transmission may not be happening at all times and is not guaranteed
  - vi. Differential frost heaving destroys structures like pipelines, that pipeline applicant(s) may want to protect by using appropriate design practices, that may not be in alignment with minimums afforded by Federal Regulation
  - vii. Pipeline purveyors may propose the use of frost free soils to mitigate the above (*exempli gratia*, gravel or equivalent -- fines like sand retain water and frost)
    - 1. This gravel (so-called frost free soil) has the propensity of sharp edges that cut through protective pipeline coatings exposing corrosion pinhole points of contention, only exacerbated by electromagnetic fields of co-located power lines

- 2. Keeping in mind that pipelines vibrate as tuned organ pipes from compressor station harmonics, intermodulation and acoustic spectral content, coupled with contingent gas flow
    - b. Water will pool in low lying areas that have no place for water to be mitigated
      - i. New Hampshire landscape is rife with topology to this effect
      - ii. The only way is to pump water upwards; in plethora.
8. High Consequence Areas
- a. Require that applicant use more robust pipe schedule thickness than is allowed in so-called "low consequence" areas, when co-locating next to assets of consequence, like (but not limited to) power lines that supply electricity to more than 11,723 residents of the public.
  - b. This must be specified regardless of population density, due to synergistic and catastrophic contingencies, given that newer pipelines seem to have more problems than older pipelines
  - c. Require mitigation to Emergency Responders and discussion thereof, being isolated and severed from the service area due to road closures during gas release events.
9. Need for this siting
- a. Require reports and documentation of need for project resulting in the siting thereof, that uses analysis not solely relying upon or funded by the industry nor applicant(s)
  - b. Require analysis funded by applicant(s) for uninterested third party of affected stakeholders should correlate directly with applicant(s) findings and analysis to show need, and siting resonance with the terrain, weather, and other physical parameters required herein.
  - c. Require consideration that infrastructure is a regional concern beyond New Hampshire borders.
  - d. Require consideration for need of project from uninterested third party analysis not funded by applicant(s)
  - e. By way of example, current Kinder Morgan NED motifs include extra length of pipeline seemingly detouring through New Hampshire due to ostensible resistance in Massachusetts. Regardless if said pipeline proposal "detours" through New Hampshire or not, Liberty Utilities in precatory precedent agreement (now in appellate situations) would still "get their gas" from the Dracut, MA hub – the terminus of the NED pipeline as proposed.

## 10. Socioeconomic

- a. For example, in light of the current NED proposed project which affects the below towns directly or indirectly (as abutting), the Federal Small Business Administration (SBA) has recently declared the towns of Sharon, Temple and New Ipswich, all within New Hampshire as an already economically disadvantaged HUB Zone.
  - i. This HUB Zone is listed under the town of "Davis" New Hampshire.
- b. Regardless, required for study by applicant(s), are the socio-economic impacts (and safety) of a Pipeline and Compressor Station within any already economically depressed and impacted HUB Zones leading to siting of energy generation infrastructure related to high pressure gas pipelines.
  - i. New Hampshire is UNIQUE in that does not have an income tax, nor a sales tax when compared to many other states. This provides different socio-economic analysis paradigms for State revenue with expected and decreased real estate values with pipeline ramifications.
  - ii. Pipeline purveyors may kvetch that they have never seen any decrease in real estate value.
  - iii. However, there is precedence being contemplated coupled with case law in other regions of this truth
  - iv. Many eminent domain takings or condemnations include non-disclosure agreement (NDA) statements that prevent previously affected land owners from disclosing financial details for sale or purchase prices of real estate, assumed or otherwise.
  - v. Pipeline purveyors would be well advised that in New Hampshire, the Tax Stamp system, fully disclosed in public purview for real estate taxes and transfers provides a simple means (a single division or multiplication operation to arrive at a sale or purchase price) to determine prices of depressed real estate due to pipeline activity if so devised, regardless of NDA. The purchase or sale price cannot be occluded from the public regardless of nondisclosure agreement.
  - vi. Correspondingly, New Hampshire's revenue is significantly concerned with real estate tax based upon the value of the home or building, which is sometimes seemingly disproportionately high -- to wit, the tiny town of Greenville, NH (used to be "downtown" Mason, NH) next to New Ipswich and Temple, NH, up until a few years ago, had THE HIGHEST REAL ESTATE TAX RATE IN THE ENTIRE UNITED STATES OF AMERICA!
  - vii. When a real property decreases in value for New Hampshire, it DIRECTLY means less revenue to the town, and ultimately to the county and to, this

the Great State of New Hampshire. While the purveyors of pipelines tout that they have not seen decrease in real estate values, there is now precedent in New York of this very scenario in plethora.

- viii. The Ripple Effect: When there is less revenue in a town for the "few" affected properties abutting pipelines, the tax rate should (or will) go up inclusive of assessment differentials betwixt proximity bound real property to compensate for loss of revenue (schools and towns need their budgets satisfied), especially for other properties not directly encumbered by a location in proximity to a pipeline or compressor station. The pipeline or compressor station could make prices go up! This is common sense yet is profoundly contrarian to current marketing (yes, marketing and sales material) mantra perhaps embodied by some applicant(s).
- c. Require analysis for current application(s) that may have massive economic impacts for revenue to the State also by way of example for the proposed NED project: in the two Southwestern New Hampshire Counties where more than 1/3 of the population lives (Cheshire and Hillsborough Counties).
  - i. Perhaps an overly simplistic model can be shown below (yet allowances for accuracy increase are demonstrated and available):
    1. For example only: from The New Hampshire Public Utilities presenting before Docket DG 14-380: because the NED pipeline is directly and explicitly encumbered by Liberty Utilities' Settlement Agreement before the PUC: another way to approach a calculation of how the Liberty Request affects NH...

Kinder Morgan / Tennessee Gas Pipeline (KM/TGP) references US Census data in their recent resource report.

The US Census data median household price for Hillsborough and Cheshire county in New Hampshire (the Counties), where 1/3 of NH's population lives is: \$249,900 and \$195,400 respectively, averaging out to be \$ 222,650.00 per household across the Counties.

The KM/TGP NED pipeline project has 235 property owners, in July (Source: FERC), using denial of survey (despite there may be some 820+ properties needed by eminent domain and proposed agreement). Denial of survey is used by New Hampshire (and

Massachusetts) property owners to prevent KM/TGP from collecting property survey data including trespassing (which has been anecdotally violated numerous times to date; hence the seemingly erroneous responses of so-called eco-terrorism in the region). This typically renders the property as a candidate for eminent domain condemnation for new ROWs (there is no "co-location" as conflated by KM/TGP) if the property owner is unwilling to negotiate with TGP/KM; as is self-evident for denial of survey.

This does not account for all properties indirectly affected. However, for sake of argument:

235 properties x \$ 222,650.00 (median household price) = \$ 52,322,750.00 of encumbered real estate median value, instantaneously.

Over a 24-year period, as used by Liberty for their analysis purposes:

\$ 52,322,750.00 x 24 years = \$ 1,255,746,000.00 of perpetual encumbered real estate median value (about \$ 1.3 Billion; neglecting time-value of money)

There is new precedent that will most likely parallel case law, where real estate can lose up to 50% value due to compressor stations or pipelines. KM/TGP will argue that there is no loss in real estate value due to their infrastructure, yet the precedent has already been set as described.

Let us assume a 40% real estate value loss (instead of the 50% above), to be conservative and to the benefit of Liberty and NED pipeline project:

\$ 1,255,746,000.00 x 40% = \$627,873,000.00 ...

...in lost median real estate value for the directly encumbered New Hampshire properties due to pipeline or compressor station

implementation in this model. This does not include peripheral and collateral real estate losses in towns or properties not directly encumbered, but are in abutting or adjacent proximity to, the pipeline or compressor station within the so-called incineration zone. Incineration zones, pollution, noise, or areas of consequence do not adhere to political boundaries.

Also, using the same model above, but with median family income from US Census data for the Counties renders \$ 955,375,747.20 of encumbered median family income over 24 years. These encumbered families' homes will typically be "under water" (if they are not already). Residents have expressed exact sentiment to walk away from their mortgages and property, if the NED pipeline is approved.

This could remove \$955,375,747.20 from the local economy (or even if a significant percentage thereof) for abandoned property in the so-called incineration zone adjacent to the pipelines (as may be typically underestimated by pipeline purveyors) and further; with a makeup of increased taxes for other non-encumbered properties, elsewhere in the towns due to minimum tax base requirements to support the schools, bonds, town services *et cetera*. This resident exodus sentiment has been beleaguered on WMUR and NH1 news media outlets.

Let us also consider this model: a company like Kinder Morgan / Tennessee Gas Pipeline Company could typically offer about \$1 per inch diameter per linear foot of pipeline imposed upon a landowner's property. So, about \$30 per linear foot... as run over, say, 50 feet of property, the burdened landowner would receive a one-time payment of \$1,500 in this example. This is considered income, that the landowner must pay taxes upon, coupled with the burden of still paying property tax for precluded property in their ownership while the proposed Pipeline Company reaps profit and benefits; in perpetuity for this model.

Additionally, it is in every business' best interest to lower their costs and reduce tax payments, especially when beholden to their

investors. As such, it may be typical that pipeline companies file for, and typically win, a tax abatement for the first year of appreciation or thereto as is typically the most expensive operational year. Also, infrastructure assets depreciate, reducing the amount of tax revenue for a town (and county, and state), every year.

The loss in local economy and tax revenue to the towns due to real estate and pipeline abatement losses, then the remaining tax portion contributions to the Counties, and ultimately the State could be immediate for the first year and perpetually diminished thereafter.

Because the State of New Hampshire is sometimes characterized as being “broke” or “frugal” this could potentially trigger the immediate need for a broad-based income and sales tax to account for the shortfall; and political suicide.

The above, while simplistically calculated, likely outweighs the so-called “[unneeded] NED [export pipeline] is cheaper by \$537M than any other [forceful taking of massive amounts of land] competing project” motif denoted by Liberty following similar methodologies from the seemingly incomplete Liberty SENDOUT analysis compiled over the 24 years....

Even if numbers presented herein are factored by large percentages to sway results in either direction (to simulate a more precise modeling contingency), the socio-economic trend is still alarming!

Coupling this, with the knowledge about the other pipeline expansions and projects available today or soon for the REGION, significantly renders the NED pipeline as superfluous and unneeded but still at rate payers’ risk (whether through electrical bill tariff, export global market competition, or over-provisioning / surplus gas with infrastructure reservation fees and stranded costs, and so-on).

2. For example, please note that the Temple Elementary School is part of 9 towns that are not directly encumbered by the proposed NED Project (except that the ENTIRE State is likely encumbered by proxy). However, whatever financial situations happen for nearby Temple tax or revenue concerns likely will severely impact these 9 other towns and the school system; inclusive of socio-economic situations for study. As such, the purview any study must be expanded to include this scenario. Please be advised that the Conval school district spends about \$17,000 (more or less) per student, even though we may be so-called rural, perhaps it could be considered that we are affluent as well (and the Temple Elementary School has obtained some of the highest NECAP test score in recent times). We require further study including financial ramifications for the 9 towns of Conval (far away from the pipeline). It is interesting to note that \$17,000 per student (every year in Conval) is almost half of the average student debt for a 4-year college degree in New Hampshire.
- ii. The Northeast, especially New Hampshire is already economically disadvantaged due socio-economic issues NOT related to energy. Younger generations are seemingly leaving New Hampshire in droves, due to the expensive real estate costs, and energy transmission costs disproportionate, unfair and unjust (per FERC adjudicative outlook). Businesses are closing typically because they cannot find qualified workers and the average commute may be an hour or more also due in part to lack of affordable workforce housing (an issue that may be problematic for pipeline construction housing for workers). This is data compiled by statisticians for our State and is known.
- iii. Please be advised that pipeline construction typically does not create many local jobs. We are supposed to be "rural" after all (as purported by many applicant(s)), which means very few people, live here nor are skilled pipeline workers otherwise... We do not seemingly have skilled pipeline workers in droves especially given our sparse population density.



Figure 5: New Hampshire's businesses are sometimes leaving due to other pressures not related to the cost of electricity generation using fossil fuels. While wholesale electricity costs have gone down, electric bills have skyrocketed with failed infrastructure project costs and other financial wrangling being foisted onto customers, like high, unjust and disproportionate (per FERC) transmission fees imposed by ISO-NE.

11. Horsepower revisited and efficiency:

- a. Please note that 1 horsepower is identical to 745.6999 Watts (approximately 746 Watts) of power.
  - i. By way of example, if one has a 746 Watt solar panel on their roof, it is a 1 horsepower solar panel.
  - ii. A 746 Watt toaster oven is a 1 horsepower toaster oven.
  - iii. The concept of horsepower and Watts is similar to saying "I have a dozen doughnuts" or "I have 12 doughnuts".
- b. 41,000 Horsepower is identical 30.5 Megawatts; given that currently proposed gas-fired power generation systems for compressor stations proposed by

applicant(s) for New Ipswich and Winchester, NH (Both in the Monadnock Region) totals 61 Megawatts.

- c. These compressor stations would be only 30% efficient each. By comparison, another gas fired turbine power generation system is Granite Ridge, a combined cycle power generation system that is 50% efficient.
- d. Regardless, it is well known with basic high school proficiency, that full combustion of methane usually renders only water (vapor) and CO<sub>2</sub>.
- e. However, it is clear that at only 30% efficiency, and other chemicals laden in the "natural" (fracked) gas, that this is not a case of full combustion, rather it is only partial combustion with other toxic chemicals, some measured in tens of tons per year (possibly double this for the entire Monadnock region given the two compressor stations' contingency). These are the subject and concern of the EPA, and a CHIA

## 12. The Maple Industry and other Agricultural Concerns

- a. Require the applicant(s) to inventory all maple trees slated for demise along the adjacency of pipeline and compressor station(s) construction path(s).
  - i. Maple trees are food source for local folks and a business enterprise for maple producers; inclusive of so-called "back yarders".
  - ii. By way of example, we notice the maple "sugaring house" set back from the road abutting the power lines and proposed Compressor Station site in New Ipswich, NH.
  - iii. Maple producers do not confine themselves within their own property bounds, yet they borrow the use of trees from other folk's properties, perhaps in exchange for maple product consideration.
  - iv. This is because it takes 40 gallons of maple sap to produce 1 gallon of syrup.
  - v. It is by dint of severe effort and sheer number of trees to collect this sap (some by sled, or tapping system), over uneven and treacherous snowpack multiple feet deep.
  - vi. The season lasts a scant couple months or so around March or February, and then that's it for the maple producing season of the Northern hemisphere for the year.
  - vii. It is not just a simple matter tapping some trees; there are other concerns to prevent girdling of trees and so on.
  - viii. Maple products are now known to contain anti-oxidants and several health related compounds unique to maple and maple alone. It is a far more robust choice of sweetener with nutritional value for this region, historically, culturally, and in modern consideration.

- ix. Maple sugar was originally found historically and culturally with our Indigenous Tribal Stewards of this Great Land (*exempli gratia*, Indigenous, or vernacular-referred Native Americans) before any political boundaries of our current system. Sweetness and nutrition from the maple sugar bush along power lines are known.
- b. Require applicant to list current, or other natural enemies of the maple tree noted in the inventory of the above:
  - i. disease
  - ii. invasive insects (*exempli gratia*, the sugar maple borer)
- c. The above is practical experience and empirical evidence of direct impact that.
- d. By way of example, applicant(s) like Kinder Morgan / Tennessee Gas Pipeline Company should be required to analyze how the above, can affect the 4th largest award winning renowned maple producer in the entire State of New Hampshire living and operating here in "Davis", NH? Haven't heard of Davis, NH? The Small Business Administration has declared the towns Temple, Sharon, and New Ipswich New Hampshire as an economically depressed HUB zone and has called this collective of towns, "Davis" New Hampshire.

13. Alternatives

- a. For example, from the ISO-NE website real-time data:

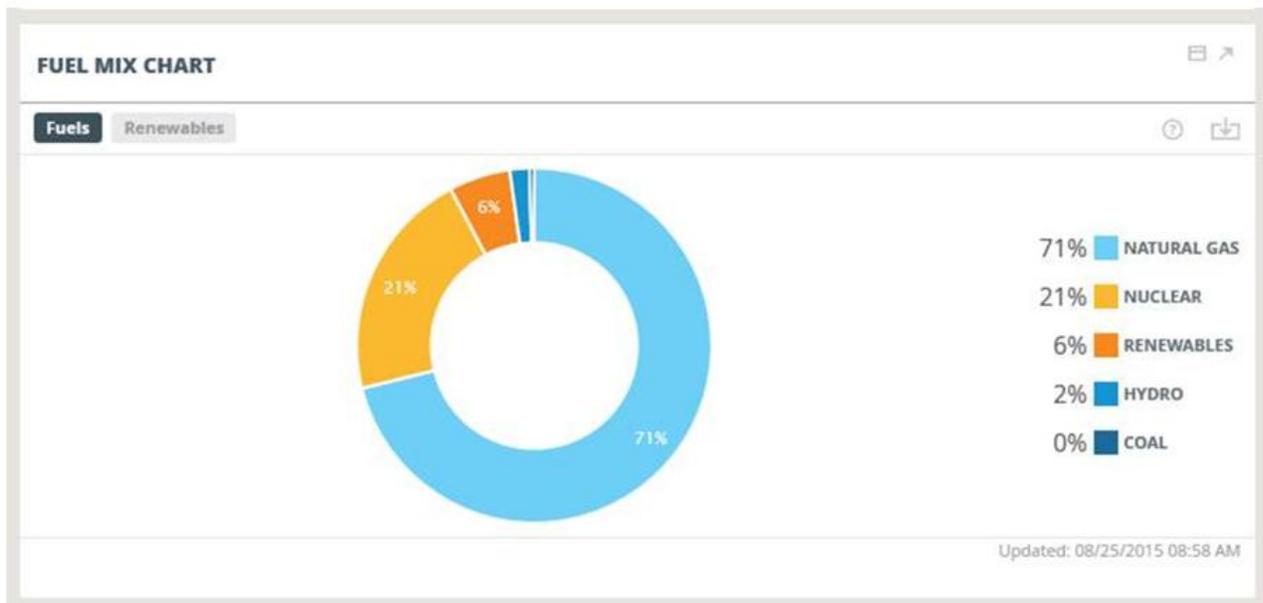


Figure 6: Fuel Mix Chart for New England (from ISO-NE) 08/25/2015 with 71% "natural" (or fracked) gas generation displacing other generation fuel types

- i. The price for electricity in Figure 6 around this time was still \$0.033/kWh despite 71% generation by natural gas (Southern states are typically less expensive; why?). However, we sometimes see the price of electricity here, go negative (meaning we are paying market users to use our electricity).
- ii. New Hampshire has 63 electrical generation power plants
- iii. New Hampshire at times exports around 50% of its power generation out-of-state
- iv. Currently New Hampshire has excess generation capacity before any new pipeline capacity increase
- v. How much more gas can this pie chart withstand?
- vi. Reliance on only one particular fuel type leaves discord; the market too volatile despite price equalization.
  - 1. ISO-NE has stated that fuel diversity is needed to stem the above issues
  - 2. ISO-NE has stated in conflict above, that more natural gas is needed
- vii. Heed the current New Hampshire Governor's administration's guidelines:
  - 1. The Office of Energy Planning in their ten year report under this current administration has noted several benefits to energy efficiency being the least expensive option to rate payers.
  - 2. The Governor of New Hampshire, the Honorable Margaret Hassan, has said herself that the least expensive kilowatt is the one that is never used.
- b. Require study and report on how applicant(s) will aid this generation capacity beyond 71% within the realities of the above.

14. Chicanery Prevention for the benefit of all stakeholders, residents and applicant(s)

- a. Require disclosure that any facts or figures from any applicant be expounded upon as to who funded such studies that render facts or figures, including sources, raw calculations, calculation inputs and sources, *et cetera*. This is not material proposed for redaction in the public purview.
- b. Require that applicant(s) facts and figures be corroborated by uninterested independent third party study chosen by affected stakeholders also funded by applicant(s)
  - i. There should be correlation for projects that can be sited properly between uninterested independent third party analysis and applicant(s) funded analysis of the same.

- ii. This is part of the tradeoffs for good engineering of any project. As such if a project is well conceived, there should be little tradeoff, or
- c. By way of example (from FERC additional data requests to Kinder Morgan / Tennessee Gas Pipeline Company for the currently proposed NED project in New England and the Northeast):
  - i. Section 9.1.1.2 (tables 9.1.5 to 9.1.10) – [...] If the closest monitor with similar land use and terrain to the compressor station [in New Ipswich] was not selected as being representative, provide a rationale for why the more distant monitor was selected as representative.
  - ii. For example, Market Path Mid-Station 4 is located in [New Ipswich, adjacent to the Temple Elementary School, Greenville Reservoir located in Temple, a grass fed beef farm, a nunnery, hawk migration route, aquifers, etc.] a rural area of Hillsborough County, New Hampshire. Monitor ID 33-011-0018 is also in a rural area of Hillsborough County, and is located about 6 miles from this compressor station.
  - iii. Explain why Tennessee Gas selected Monitor ID 33-015-0018, located in an urban area 24 miles away from the compressor station, as more representative of the compressor station area for carbon monoxide, PM2.5, ozone, and sulfur dioxide than Monitor ID 33-011-0018.
  - iv. In addition, provide electronic copies of, or complete citations for, the State Annual Monitoring Reports referenced in the tables and identify which values are from these reports rather than the EPA database.
  - v. It is unclear if the above is due to ineptitude, willful deceit, or some other rationale.
- d. By way of example, to the resource report submitted by Tennessee Gas Pipeline Company to FERC for NED, Volume 11, entitled "Safety".
  - i. Tennessee Gas Pipeline Company states that Kinder Morgan's safety record is 0.25 incidents per 1000 miles.
  - ii. Kinder Morgan's Safety Record is irrelevant here.
  - iii. The Tennessee Gas Pipeline Company is submitting this resource report, will be installing the pipeline, and doing "all the work"; Not Kinder Morgan.
  - iv. And the above statement still comes out to 7 incidents per year on average (almost once every other month) for Kinder Morgan. This is unacceptable at airports when landing planes and using these statistics; is this acceptable for the transportation of fracked gas?
  - v. Tennessee Gas Pipeline's safety record is different despite Kinder Morgan's known fatalities and convicted felonies in the public record.
- e. Kinder Morgan has purported operating gas pipelines and compressor stations in New Hampshire for over 60 years, despite their incorporation only in 1997.

15. The rest is left out for brevity at this time, but some concepts and requirements are mentioned in other comments from other folks.

As can be seen, siting of modern gas infrastructure may not be as simple as contemplated in 1968. There are many concepts and topics prevalent for mitigation, and design improvement over normative proposals, required to protect applicant(s) own best interests and those of stakeholder and residents to which applied-for projects should serve, based upon actual need, regionally and locally under the same ISO purview. Please feel free to inquire of us further for more comment.

Our Best Thanks,

David Mackensen

Electrical Engineer, Senior Systems Engineer, Scientist

Monadnock Region of this, the Great Granite State of New Hampshire