Comment and Request Public Hearing for Central New York Oil & Gas Plan Approval No.: 57-00004A

Health Impacts near Compressor Stations and that will be present if Davidson Township Compressor Station is built as specified

Please see below for comments we would like taken into account on health impacts that this compressor station will create if built as specified. THere are too many existing examples of poorly designed and inadequately maintained facilities like this in PA to add another without taking into account the health effects created and without allowing a public hearing.

I am concerned about the cumulative environmental and human health impacts that could result from approving one compressor station after another in North-central Pennsylvania. The Central New York Oil & Gas Compressor station application is just the most recent in a long line of applications that have recently been approved or are currently under consideration.

I am very concerned about the health impacts of air pollutants such as nitrogen oxides, sulfur oxides, Volatile Organic Compounds (VOCs), particulate matter, carbon monoxide and hazardous air pollutants that are emitted by compressor stations. These pollutants have been linked with a variety of health issues including respiratory conditions, cancers and even death.

I was happy to see that the DEP acknowledged its responsibility under the Greenhouse Gas Tailoring Rule by performing an analysis of GHG emissions. I was also pleased to see some emissions limitations set on each source. What criteria did the DEP use to determine if the equipment in this application qualifies as the Best Available Technology? I urge the DEP to develop more stringent emission thresholds (ie: lower emissions standards) for determining what constitutes a Best Available Technology. I urge the DEP to require annual stack tests on priority pollutants.

I urge the DEP to perform a proper aggregation analysis to determine the cumulative effects of all Central New York Oil & Gas facilities and to ensure that individual facility emissions are truly kept under the thresholds set for major sources. This will help protect the air and health for communities close to this compressor station, those living down-wind, and other Pennsylvania residents.

I also request that the DEP host a public hearing for this permit application. I am concerned about the cumulative effects of multiple natural gas facilities operating in North-central Pennsylvania – often under the same ownership or as part of an interrelated system. A public hearing would provide more opportunity for comments, as more people in the community would likely be able to attend a hearing than submit written comments. A public hearing is likely the DEP's most efficient way to respond to public comments as people can have their concerns answered directly and instantly.

Thank you for this opportunity to comment, and please keep me updated on any actions related to Plan Approval No. 41-00078C

Following are additional comments and concerns.

Sincerely,
B. Arrindell
Director
Damascus Citizens for Sustainability
P. O. Box 147
Milanville, PA 18443

There are negative health impacts which have been described near compressor stations and pipelines - this is why there needs to be a puplic hearing and re-consideration of this compressor station and its functioning parameters to reduce or eliminate these negative health impacts.

NOISE

Noise can cause Vibro-Acoustic Disease which can lead to heart disease, neurological and gastrointestinal problems, as well as psychological issues. It can interfere with the ability to learn in children.

Noise and its Effects on Human Health adapted from http://www.earthworksaction.org/noiseresources.cfm#GENERALNOISE There are adverse physical and mental effects from noise. For example, prolonged periods of exposure to 65 dBA can cause mental and bodily fatigue. Noise can affect the quantity and quality of sleep; it can cause permanent hearing damage; and it can contribute to the development or aggravation of heart and circulatory diseases; and it can transform a person's initial annoyance into more extreme emotional responses and behavior.[7] According to the World Health Organization: [8] Noise annoyance is a global phenomenon. A definition of annoyance is "a feeling of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them." . . .apart from 'annoyance', people may feel a variety of negative emotions when exposed to community noise, and may report anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion. . . . Social and behavioural effects include changes in overt everyday behaviour patterns (e.g. closing windows, not using balconies, turning TV and radio to louder levels, writing petitions, complaining to authorities); adverse changes in social behaviour (e.g., aggression, unfriendliness, disengagement, non-participation); adverse changes in social indicators (e.g. residential mobility, hospital admissions, drug consumption, accident rates); and changes in mood (e.g. less happy, more depressed).

The World Health Organization also reports that "a large proportion of low-frequency components in noise may increase considerably the adverse effects on health." [9]

- Health effects of low frequency noise Unfortunately, many of the health effects of noise due to oil and gas operations have not been scientifically documented. The lack of scientific study does not mean, however, that noise issues related to oil and gas are insignificant. The loud short-term noises from flaring and the loud or low frequency noise from compressors are common complaints. Numerous citizens have reported disruption of sleep and increased anxiety caused by noise from oil and gas developments.[10] LFN is commonly defined as noise that has a frequency between 20 and 100 - 150 Hz. Compressor stations create low frequency noise.

references on noise:

http://www.elkcapital.net/screamingsilence/ and http://www.elkcapital.net/screamingsilence/voices/Sound010.wav and http://www.citidep.pt/papers/articles/alvesper.htm and http://teeic.anl.gov/er/oilgas/impact/ drilldev/index.cfm and http://shaleshock.org/2009/01/noise-and-health/ and http://www.fastcompany.com/1744151/air-pollution-causes-europeans-to-lose-16-million-years-of- healthy-living-annually-study and http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf and http://un-naturalgas.org/resources_and_documents.htm http://www.earthworksaction.org/pubs//COGCCNoiseSubmission.pdf

NOISE RESOURCES from http://www.earthworksaction.org/noiseresources.cfm#GENERALNOISE

● General information on sound and noise ● Noise from oil and gas operations ● Rationale for a 45 dBA residential noise standard ● Noise mitigation options ● Noise and its effects on human health ● Noise and its effects on wildlife ● Background information on Colorado noise rule

General Information on how humans perceive noise There are some key concepts and facts that will help readers better understand noise:

● what is sound ● how do humans perceive sound ● how is sound quantified ● how sound travels ● all noise is not equally annoying

What is sound? Noise is often defined as unwanted sound. Sound is defined as any pressure variation heard by the human ear. The sound pressure level (SPL) is a measure of the air vibrations that make up sound.Because the human ear is sensitive to a wide range of pressure levels, the SPL is measured on a logarithmic scale with units of decibels (dB).

How do humans perceive sound? Healthy human ears perceive pressure variations over a wide range of frequencies -- from low frequencies of 20 Hz to frequencies as high as 20,000 Hz. In terms of sound pressure levels, the human ear's range starts at the threshold of hearing (0 dB) and ends at the threshold of pain (around 140 dB). The human ear is less sensitive to sounds in the low frequencies compared to the higher frequencies. For example, a 50 Hz (low frequency) tone must be at a level of 85 dB in order to be perceived by the listener as being the same loudness as the higher frequency 1000-Hz tone at a level of 70 dB.

How is sound quantified? As mentioned above, sound levels are usually measured and expressed in decibels (dB). Most environmental noise does not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The intensities of each frequency add to generate sound. The method commonly used to quantify environmental sounds involves evaluating all of the frequencies of a sound according to a weighting system which reflects that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (dBA). As a rule of thumb, a doubling in the loudness of the sound occurs with every increase of 10 dB in sound pressure. In other words, for most individuals a 60 dBA noise would sound twice as loud as a 50 dBA noise.

How Sound Travels Sound is caused by changes in air pressure. For example, when a mallet strikes a drum the drumhead begins to move back and forth (vibrate). As the drumhead moves down, air is pulled toward it, and as the head bounces back up it pushes air away. This creates changes in air pressure that move (or propagate) away from the drum, eventually striking our eardrum. These changes in pressure are known as sound waves.

There are a number of factors that affect the propagation of sound. The most important include: distance from source; obstacles such as barriers and buildings; atmospheric absorption; wind direction and speed; temperature and temperature gradient; humidity; precipitation;reflections; and ground absorption.[1]

It is important to understand that noise does not always decrease as one moves away from a noise source. The above factors can work to increase or decrease noise levels. For example, at short distances (up to 160 feet) the wind has a minor influence on the measured sound level.

At distances greater than 1,000 feet from a noise source, noise can become louder on the downwind side by as much as 20 dB, while on the upwind side levels can drop by 20 dB (depending on wind speed and distance).[2]

Other things to consider include the fact that while barriers may act to reduce high frequency sounds, low frequency sounds are difficult to reduce using obstacles or barriers. Additionally, while soft ground surfaces and the atmosphere are effective at absorbing mid-frequency and high frequency noise, these factors do not tend to reduce low frequency noise to the same degree. This means that as one moves away from the source, low frequencies often become much more prominent.[3]

All noise is not equally annoying Not all noise has the same effect on humans, nor do all humans react in the same way to noise stimuli. Certain noise characteristics can greatly increase the annoyance factor and the potential health impacts associated with noise. In addition to the sound pressure level, these factors include: 1) difference between the new noise and the prior ambient noise environment; 2) the presence tonal noise; 3) low frequency noise; 4) fluctuating, intermittent or periodic sounds; and 5) impulsive sounds.

Noise from oil and gas operations Noise from oil and gas development comes from a number of sources: truck traffic, drilling and completion activities, well pumps and compressors. For some landowners, noise from oil and gas operations is so loud or of such a different sound quality that it makes them feel as if they are living in an industrial zone.

For people who live in rural areas, the arrival of a new, industrial noise source can greatly disturb the natural environmental soundscape. Gail and Al Van Staveran were so greatly affected by the noise of nearby wells and compressors that they were driven away from their home. Landowners often complain about noise levels associated with natural gas compressors. The noise level varies with the size of the compressor and distance from the compressor; and it changes with shifts in wind direction and intensity. According to the Powder River Basin Resource Council, "Depending on the wind direction, the roar of a field compressor can be heard three to four miles from the site. Near the compressor stations, people need to shout to make themselves heard over the sound of the engines."

One Wyoming landowner has described compressor noise in this way: Now comes the second phase. The dreadful noise generated by a nearby large compressor station. Noise that was so loud that our dog was too frightened to go outside to do his business without a lot of coaxing. Noise that sounds like a jet plane circling over your house for 24 hours a day. Noise that is constant. Noise that drives people to the breaking point. My neighbor called the sheriff, state officials and even the governor and was told nothing could be done about the noise. Like I said, the noise drives people to the breaking point, and my neighbor ... " --Excerpted from CBM Destroys Retirement Dream.

How loud is oil and gas noise? A study in La Plata County, Colorado, reported noise levels for a number of oil and gas activities:[4]

The Bureau of Land Management (BLM) published different numbers. At 50 feet from the source, the measured noise levels were: well drilling - 83dBA; pump jack operations - 82 dBA; produced water injection facilities - 71 dBA; and gas compressor facilities - 89 dBA.[5]

Typical compressor station

50 dBA (375 feet from property boundary)

Pumping units

50 dBA (325 feet from well pad)

Fuel and water trucks

68 dBA (500 feet from source)

Crane for hoisting rigs

68 dBA (500 feet from source)

Concrete pump used during drilling

62 dBA (500 feet from source)

Average well construction site

65 dBA (500 feet from source)

In the same study, BLM also reported typical noise levels from construction equipment and oil and gas activity. These are presented in the chart below. Again, the sound levels were taken at a distance of 50 feet (15 meters). Estimates of noise attenuation at distances greater than 50 feet can be made by reducing noise levels by a factor of 6 dBA (A-weighted sound levels) for each doubling of distance. The actual noise levels experienced by a receptor, however, will depend on the distance between the receptor and the equipment, the topography, vegetation, and meteorological conditions (e.g., wind speed and direction, temperature, humidity).

Noise levels reported by the Bureau of Land Management. See endnote [5]

Rationale for a 45 dBA (or lower) residential noise standard In many residential neighborhoods, especially low density and rural areas, the nighttime noise level is very quiet. According to a Colorado-Based noise consultant, ambient noise levels in residential areas are frequently as low as 35 dBA during the nighttime, and are occasionally lower [6]. In these situations, if oil and gas facilities are allowed to emit noise at 45 dBA, the noise will be perceived by many as being twice as loud as the ambient noise in the area. In Alberta, Canada, it has been estimated that the ambient rural noise level is 35 dBA at night.

Noise standards of 45 dBA LEQ (nighttime) or lower are used in many jurisdictions that have oil and gas operations. There are several jurisdictions that require oil and gas operators to meet a 45 decibel level during the night- time, in residential areas.

Typically, noise measurements are taken outside, at a certain distance from or
at the property line of the receiver (e.g., a house, hospital, etc.). These are called "receptor-based" noise standards. In some cases, noise measurements are taken a certain distance from the noise source ("source- based" standards). In 2005, Colorado amended its noise rule from a "receptor-based" to a "source-based" standard, requiring noise measurements to be taken 350 feet from the oil and gas noise source.

Alberta, Canada: Alberta is a major oil and natural gas producing province in Canada. In Alberta, the Energy and Utilities Board has the responsibility for regulating noise from oil and gas operations. The EUB has produced what may be the most comprehensive noise regulations for the oil and gas industry across North America. The EUB essentially has a sliding scale noise standard whereby acceptable noise levels vary with the ambient noise. For example, if a citizen lives in an area where ambient noise is low (e.g., where housing density and traffic noise are low), then the oil and gas operator must ensure that noise reaching the receptor is no louder than 40 dBA. In some instances, if the ambient noise is very low (e.g., 30 dBA), companies may be required to mitigate noise to even lower levels (e.g., 35 dBA).

As ambient noise conditions increase, the allowable noise level increases. The highest allowable level in a residential neighborhood is 56 dBA at night. This noise level applies when there are more than 160 dwellings in a quarter-mile radius, and there is a major traffic source (road, rail, air) within 30 m (90 feet) of any of the dwellings.

World Bank: For onshore well sites, the recommended maximum noise level is 55 dB(A) and 45 dB(A) for day and night, respectively (measured at receptors or the edges of a property boundary, on an average hourly basis). These levels apply to residential, educational and institutional areas. Noise abatement measures should achieve either the levels state above or a maximum increase in background levels of 3 decibels (measured on the A scale) [i.e., dBA].

Sacramento County, CA: Sacramento County is a significant producer of dry natural gas in California. In the county, the allowable noise level is 50 dBA L50 (daytime) and 45 dBA L50 (nighttime), measured at residential properties. This is according to the Noise Element Of The1993 County Of Sacramento General Plan.

City of Longbeach, CA: The allowable exterior noise level in many parts of the city is 45 dBA (nighttime), according to the Longbeach city ordinances. Oil and gas operations must meet this standard, except during drilling and well servicing.

Examples of residential noise requirements of 45 dBA for oil and gas operations

Measurement LocationNighttime level (dBA)

World Bank - new oil and gas projects in residential areas

At receptors or edge of property boundary

45

Alberta, Canada - low traffic noise, low density housing med. traffic, med. density high traffic, high density

15 metres from a dwelling/receptor

40 45 56

Sacramento County, CA

At residential property line

45

City of Longbeach, CA
At residential property line
45
New Colorado Noise Rule
350 feet from noise source
45
45 dBA is achievable, even as close as 350 feet from the noise source
There are numerous examples that show that 40 - 45 dBA is achievable at 350 feet from the source.The City of Farmington, New Mexico uses "1 dBA over ambient" as a standard for all wells constructed in the city. In January of 2005, OGAP staff conducted sound measurements at well sites in the City of Farmington. Noise levels measured at 300 feet from the noise source varied from 39 to 49 dBA. It is estimated that if measurements had been taken at 350, these sound levels would have been in the range of 37 to 47 dBA. For more information, please download the OGAP/SJCA submission to the COGCC.
It is not cost prohibitive to achieve 45 dBA at 350 from the noise source
As part of its submission to the Colorado Oil and Gas Conservation Commission noise rule hearing, OGAP prepared a chart of noise mitigation cost estimates for oil and gas facilities that have achieved the 40-45 dBA noise level.
Noise Mitigation Options There are many proven ways of mitigating noise from oil and gas operations. One only has to look to regions that have fairly stringent noise regulations (e.g., Farmington, New Mexico, Alberta, Canad) to find excellent examples of noise mitigation. There are numerous acoustical or noise abatement companies that provide services to the oil and gas industry.
Vehicle Noise Noise created by operators constantly driving in and out from the well pad to monitor well production can be mitigated using an automated monitoring system, which allows wells to be monitored remotely, e.g., from the company's office. Vehicle noise may also be controlled to some extent by limiting the hours that industry employees use residential roads for accessing wells (e.g., limiting vehicles to the hours of 7:00 a.m. to 9:00 p.m., except in emergency situations).
Engine noise To mitigate noise impacts from engines, sound barriers made out steel and sound-absorbing insulation (i.e., NOT styrofoam) may be used. Sound barriers may be placed in an L-shape above the engine, and they extend past the sides of the engine. To reduce noise in sensitive areas, pumpjacks, engines, or well-site or field compressors may be entirely enclosed in a sound-insulated building. Some engines can operate at a constant number of revolutions per minute (RPM), which reduces the often annoying fluctuating noise caused by engines that speed up and slow down. Mufflers, like those used for automobile engines, can be used to minimize engine noise. In noise sensitive situations, hospital-grade mufflers used in series can be more effective at reducing noise from engines. In some situations, natural gas or diesel engines can be replaced with electric motors. These motors, if properly installed, tend to be much less noisy than their engine counterparts. The use of electrical motors depends on the availability of electricity, and whether or not a company is willing to run an electrical line to the site.
Compressor noise Noise from compressors can be mitigated most effectively by treating each significant noise source: gas turbines or engines, compressors, exhaust outlets and air inlets, and cooling and ventilation fans. Abatement may involve changing the blades on fans, which can change the frequency of sound emitted, thereby removing the annoying tones. Engine noise can be muffled using automotive-type mufflers, or by housing the engines in acoustically insulated structures. Also, the entire compressor can be housed in an acoustically insulated building.
Cost of Mitigation Some oil and gas opearators refuse to apply noise mitigation to their sites, using the excuse that mitigation is too expensive. If noise mitigation measures are installed when the site is constructed, rather than attempting to abate the noise after the equipment is installed, the costs are much more affordable. OGAP has compiled some examples of the costs of mitigation.
Examples of companies providing noise mitigation services to oil and gas industry
• • •
ATCO Noise Management Acoustical Control, Inc. Enviro Noise Control.

● Noise Solutions, Inc.

Noise and its Effects on Wildlife

Noise effects wildlife in a variety of different ways. It can cause the temporary or permanent displacement of animals and birds from particular areas. It can also have physiological effects that are detrimental to wildlife health. The Draft Resource Management Plan for leasing federal lands in southern New Mexico states that in some cases, federally threatened and endangered wildlife species may be affected by elevated noise levels. For example:

● High noise levels potentially can mask communications by wildlife that are used to attract mates and defend territories. [11]

● Increased noise and activity levels during construction and development could result in [bird] nest abandonment and decreased reproductive success if such activity occurs during the breeding season.[12]

In the final Environmental Impact Statement for the Jonah natural gas field, the BLM stated that:

It is likely that noise already has contributed to the apparent decrease in wildlife use on and adjacent to the Jonah Infill Drilling Project Area (JIDPA), with observed decreases in raptor nesting activity and productivity, male greater sage-grouse lek attendance and sage-grouse nesting within the JIDPA having been reported over the past several years. Data also suggest that noise may contribute to disturbance and/or departure of greater sage-grouse from area leks. [13]

ENDNOTES

[1] Breul and Kjaer. 2000. Environmental Noise Handbook, pp. 16-22. [2] McGregor, H. (Engineering Dynamics). 1998. Compression Facility Noise Guidelines for Colorado Oil and Gas
Commission. p. 10; and Breul and Kjaer. 2000. p. 20. See endnote [1].

[3] Casella Stanger. 2001. Low Frequency Noise. (Technical research support for U.K.Department for Environment, Food and Rural Affairs Noise Programme). p. 4; and Breul and Kjaer. 2000. pp. 18 and 19. See endnote [1]. [4] La Plata County (Colorado). 2002. La Plata County Impact Report. pp. 3-98. [5] Bureau of Land Management. Oct.2000. Draft RMPA/EIS for Federal Fluid Minerals Leasing and Development in Sierra and Otero Counties. Page 4-29.

[6] McGregor, H.N. (Engineering Dynamics, Inc., Englewood, CO). Propagation of Noise from Gas Compression Facilities Located in Mountainous Terrain. (COGCC Noise Stakeholder Meeting Handout.) [7] Marsh, A. 1999. University of Western Australia, School of Architecture and Fine Arts. Cited in East of Huajatolla Citizens Alliance. Noise.

[8] Berglund, B., Lindvall, T. and Schwela, D. 1999. Guidelines for Community Noise. World Health Organization. p. 50. [9] See endnote [8]. [10] Clarren, Rebecca. "Status quo reigns in New Mexico," High Country News. Sept. 25, 2000. p. 10.

[11] See endnote [5]. p. 2-9. [12] See endnote [5]. p. 4-42. [13] BLM. Jan. 2006. Final Environmental Impact Statement, Jonah Infill Drilling Project. Sublette County, WY. Chapter. 4. p. 4-48. the above article is from http://www.earthworksaction.org/noiseresources.cfm#GENERALNOISE

ACCIDENTS

Accidents can occur at any point of gas production, from transport of gear and chemicals to the site, to construction and operation of the well, to the processing of the gas and to the delivery of it via pipelines, and at any of those points, explosions are possible with serious threat to life. http://www.ktbs.com/news/24753381/detail.html http://www.mcclatchydc.com/2010/06/10/95701/oil-gas-worker-safety-record-weak.html http://www.osha.gov/pls/oshaweb/searchresults.relevance? p_text=gas%20workers%20safety&p_status=CURRENT&p_title= numerous references on worker safety http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=NEWS_RELEASES&p_id=19776 http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=NEWS_RELEASES&p_id=19575 Louisiana Compressor Station Fire http://www.ktbs.com/news/24753381/detail.html

Wyoming Compressor Station Fire

http://trib.com/news/state-and-regional/article_9de82058-2e6b-5e3d-8e19-2744fafd49b4.html? mode=story Texas Compressor station venting incident http://www.star-telegram.com/2011/05/14/3075603/delayed-response-to-gas-release.html http://en.wikipedia.org/wiki/List_of_pipeline_accidents

AIR POLLUTION

What do compressor stations emit? (from presentation by Sarah Buckley, RN) • Nitrogen Oxides (NOx) • Carbon Monoxide (CO) • Volatile Organic Compounds (VOC)

• Formaldehyde (H2CO) • Particulate Matter <10 (PM<10) • PM2.5 • Sulfur Dioxide (SO2)

NOx -- a group of highly reactive gasses known as "oxides of nitrogen." Alone it is associated with respiratory disease and increased visits to the ED. Ozone is formed when NOx and volatile organic compounds react in the presence of heat and sunlight. (Ozone itself for this situation is not monitored so it can only be inferred by NOx and VOCs.)

VOCs --"It is well known that all of the chemicals in this group are neurotoxins. They impact the central and peripheral nervous system. They have significant cognitive and behavioral effects... They are known hepatotoxins. Most have been identified as reproductive toxins both in males and females. They are recognized as fetotoxins, and have been associated with teratogenesis and fetal wastage following large or critically timed occupational or accidental exposures. All are dermatotoxins."

There is "little meaningful information on chronic, low level, exposure in the general environment has been developed"- (Witter et al, 2008 white paper)

SO2 -- associated with respiratory illness, increased visits to the ED and hospitalizations. It is toxic.

"Even small increases in exposure to these pollutants, human risks increase for the following: • Respiratory disease: Including respiratory disease-related hospital admission, mortality due to respiratory disease, worsening of illness in people with lung disorders (e.g. asthma, chronic obstructive pulmonary disease), asthma, bronchiolitis and respiratory infections, reduced lung function (especially in asthmatic children), allergic nasal and airways inflammation, allergies, symptoms (e.g. cough, wheeze, shortness of breath, eye irritation, headache).

• Childhood Asthma: Some of the most compelling evidence, reinforced by publications in the past five years, relates to ozone's impact on children with asthma. While there is evidence for some 'adaptation' to the effects of ozone as people age, and heterogeneity in peoples' responses to ozone (that may be related to genetics), the overall impact of ozone related to childhood asthma is noteworthy. It includes increases in pediatric emergency room visits and pediatric hospital admissions, asthma exacerbations of symptoms and use of rescue inhalers, impaired lung development, and airways inflammation in addition to asthma, including bronchiolitis.

• Cardiovascular disease: Including cardiovascular hospital admission, mortality due to cardiovascular disease, arrhythmias (heart rhythm disturbances, heart rate variability), blood pressure elevation.

• Genotoxicity: Damage to chromosomes and DNA. • Fetal and neonatal health: Preterm birth, low birth weight, hospitalization of newborns, and respiratory illness in infants born to asthmatic mothers who were exposed to ozone during pregnancy. (Witter et al,2008 white paper)

Particulate matter -- "Recent data demonstrates that while particles with diameters </= 10 microns (PM10) pose health risks, particles with diameters </= 2.5 microns (PM2.5) and particles with diameters </= 1 micron (ultrafine particles) contribute disproportionately to human health risks. Due to their small size and large surface area, these smaller particles are carried deeper

into the lungs when inhaled, and are capable of carrying toxic pollutants to the lung and elsewhere in the body as they enter the bloodstream."

"Even small increases in airborne particulate matter exposure, human risks increase for the following:

• Cardiovascular disease: Including cardiovascular hospital admission, mortality due to cardiovascular disease, premature death from heart disease, cardiac ischemia (reduce blood flow to the heart), arrhythmias (heart rhythm disturbances, heart rate variability), hypercoagulability, atherosclerosis, myocardial infarction (heart attack), blood pressure. • Respiratory disease: Including respiratory disease-related hospital admission, mortality due to respiratory disease, premature death from respiratory disease including lung cancer, worsening of illness in people with lung disorders (e.g. asthma, chronic obstructive pulmonary disease), asthma, bronchiolitis and respiratory infections, reduced lung function (especially in asthmatic children), allergic lung inflammation, allergies, symptoms (e.g. cough). • Fetal and neonatal health: Preterm birth, restricted fetal growth, lower infant term birth weight, and increased neonatal death especially when it is associated with respiratory illness. • Childhood illnesses: Pediatric allergies, ear/nose/throat and respiratory infections early in life, pediatric emergency room visits and pediatric hospital admissions, impaired lung development in children that affects lung function in adulthood, asthma, bronchiolitis, exacerbation of existing asthma and exacerbation of cystic fibrosis. • Geriatric illnesses: Including exacerbation of chronic obstructive pulmonary disease, congestive heart failure, heart conduction disorders, myocardial infarction and coronary artery disease, and diabetes in the elderly.

The above is from Witter's White Paper 2008 http://docs.nrdc.org/health/files/hea_08091702A.pdf, and adapted by S Buckley, RN.

In the following study there were methane plumes and VOCs identified downwind of the compressor station complex in Dish. Monitoring is not done cumulatively and routinely for all the compressors in an area. That must be done. http://www.earthworksaction.org/pubs/DISH_CanisterResults.pdf Excerpt: The Methane plumes identified and plotted by Picarro were located downwind of the Compressor Station Complex in DISH. The Complex consist of 11 compressor stations operated by five companies, Crosstex, Chesapeake, Atmos, Energy Transfer, and Enbridge. In conjunction with the Methane Mapping performed by Picarro in DISH, on March 2, 2010, at 1:54 PM, an air sample was collected in the Methane Plume identified by Picarro, downwind of the Compressor Station Complex. A certified evacuated stainless steel Summa canister was used by Alisa Rich of Wolf Eagle Environmental, Flower Mound, TX., to collect a grab sample of air from south east of the Guthrie home, in the Methane Plume. The canister was analyzed by GD Air Testing, Inc., Richardson, TX., for Volatile Organic Compounds (TO-14), Tentatively Identified Compounds (GC/MS Scan) and Light Hydrocarbons including Methane (ASTM 1945)

Resu ltsofAnalysisofAirSam ples(seearticlefordetails) Chemical Concentration ppbv TCEQ Short-Term Effects Screening Levels ppbv TCEQ Long-Term Effects Screening Levels ppbv

Volatile Organic Com pounds Benzene Chloromethane Dichlorodifluoromethane Dichlorodifluoromethane Toluene m&p-Xylene o-Xylene Tentatively Identified C om pounds Isobutane

C5 Hydrocarbon Carbon Disulfide Dimethyl Disulfide Methylethyl Disulfide

Dimethyl Trisulfide Unid. Sulfur Group C11 Hydrocarbons C12 Hydrocarbons Light H ydrocarbons Methane

*Exceeded Short and Long-Term Health Effects Screening Levels **Exceeded Short and Long-Term Odor Effects Screening Levels ***Exceeded Long-Term Odor Effects Screening Level

Methane The methane concentration in the canister, 4.0 ppmv at 1:54 PM (13:54) on March 2, 2010, corresponded to the highest methane concentration, 3.8 ppm, detected in the plume by Picarro on March 2, 2010 between 13:00 and 15:00.

Volatile Organ ic Ch emicals an d Ten tatively Iden tified Ch emical s Fifteen volatile organic chemicals were detected in the air in association with the methane plume, downwind of the Compressor Station Complex in DISH on March 2, 2010. Three of the chemicals exceeded TCEQ Effects Screening Levels. Carbon Disulfide exceeded the TCEQ

Short-Term and Long-Term Health Effects Screening Levels. Dimethyl Disulfide exceeded the TCEQ Short and Long-Term Odor Effects Screening Levels. Methylethyl Disulfide exceeded the TCEQ Long-Term Odor Effects Screening Level. Of the 15 Volatile Organic Chemicals detected in the air of DISH downwind of the Compressor Station Complex on March 2, 2010, 14 were previously detected in the air in DISH in association with air sampling performed by Wolf Eagle Environmental on August 17 and 18, 2009 and December 13, 2009. Five of the 15 Volatile Organic Chemicals were detected in excess of the TCEQ Effects Screening Levels in the previous DISH air sampling events conducted by Wolf Eagle Environmental: Benzene, m&p-Xylene, Carbon Disulfide, Dimethyl Disulfide and Methylethyl Disulfide. Three of these five Volatile Organic Chemicals previously detected in excess of the TCEQ Effects Screening Levels exceeded the TCEQ Effects Screening Levels in the sampling event of March 2, 2010: Carbon Disulfide, Dimethyl Disulfide and Methylethyl Disulfide

Conclusion

The Volatile Organic Chemicals detected in the methane plume downwind of the Compressor Station Complex in DISH on March 2, 2010 corresponded to the Volatile Organic Chemicals detected in previous air sampling events performed in DISH.

What are the chemicals of concern and what should be monitored?

-Volatile Organic Chemicals -Hazardous Air Pollutants -NOX -Methane

-Formaldehyde What are the chemicals of concern that have been detected in the Dish study?

Carbon Disulfide Benzene Methyl Pyridine Ethyl-methylethyl disulfide Carbonyl Sulfide

Trimethyl Benzene Methyl-Methylethyl Benzene Diethyl Benzene 1,2,4-Trimethyl Benzene from http://www.earthworksaction.org/pubs/WilmaSubra_DISHSafety_20091106.pdf We also know that formaldehyde can be released.

On the basis of this study (by Wilma Subra in Dish, TX), Subra answers the question: What are the Human Health Effects Associated with Chemicals Detected in the air in excess of TCEQ Short and Long -Term Effects Screening Levels : Acute Health Effects

Irritates Skin, Eyes, Nose, Throat and Lungs Headaches Dizziness, Light Headed Nausea, Vomiting

Skin Rashes Fatigue Tense and Nervous Personality Changes Depression, Anxiety, Irritability Confusion

Drowsiness Weakness Muscle Cramps Irregular Heartbeat (arrhythmia

Chronic Health Effects Damage to Liver and Kidneys Damage to Lungs Damage to Developing Fetus Causes Reproductive Damage Damages Nerves Causing Weakness and Poor Coordination Affects Nervous System Affects the Brain

Leukemia Aplastic Anemia Changes in Blood Cells Affects Blood Clotting Ability Carcinogen Mutagen Teratogen -Developmental Malformations

Health Effects Reported By DISH Community

Nasal Irritation* Throat Irritation* Eyes Burning* Frequent Nausea* Allergies

Sinus Problems* Bronchitis* Persistent Cough Chronic Eye Irritation* Shortness of Breathe Severe Headaches* Frequent Nose Bleeds Sleep Disturbances Joint Pain

Difficulty in Concentrating Nervous System Impacts Irregular/Rapid Heart Beat* Strokes

Enlarged Spleen Pre-Cancerous Lesions* Abnormal Mammogram

Increased Fatigue*

Dizziness* Forgetfulness

Easy Bruising Muscle Aches & Pains*

Weakness* & Tired* Ringing in Ears

Sores & Ulcers Mouth Urinary Infections Depression* Decreased Motor Skills* Falling, Staggering*

Frequent Irritation* Amnesia

Severe Anxiety* Excessive Sweating

Abnormal EEG* Lump in Breast

Thyroid Problems Endometriosis

Brain disorders*

*Health Impacts Associated with Chemicals present in Excess of Short and Long Term Effects Screening Levels from http://www.earthworksaction.org/pubs/WilmaSubra_DISHSafety_20091106.pdf

Additional references on air pollution: http://www.youtube.com/user/balckbart0930#p/u/2/sEoN-3A-zQ4 example from Dimock, PA http://www.edf.org/documents/9235_Barnett_Shale_Report.pdf and http:// www.damascuscitizens.org/ HEALTH-EPA_Comments_Eric_London_MD.pdf and http://www.eeb.cornell.edu/ howarth/ GHG%20update%20for%20web%20--%20Jan%202011%20(2).pdf and http://www.propublica.org/ documents/item/epa-greenhouse-gas-emissions-reporting-from-the-petroleum- and-natural-gas-i and http:// s3.documentcloud.org/documents/29077/new-epa-data-subpart-w-tsdf.pdf and http:// www.earthworksaction.org/ pubs/Lana's%20paper%20for%20web.pdf and http://www.star-telegram.com/ 2010/10/03/2516374/formaldehyde-from-gas-compressor.html and http://www.pnas.org/content/108/20/8172 and http://michigantoday.umich.edu/ 2011/05/story.php?id=7993&tr=y&auid=8325907 and http://www.star-telegram.com/2010/10/03/2516374/ formaldehyde-from-gas-compressor.html and http://www.dentonrc.com/sharedcontent/dws/drc/localnews/stories/ DRC_Dish_tests_0413.240e63b73.html and http://www.star-telegram.com/2011/03/02/2891340/dish-sues-gas-firms-over-compressor.html and http://www.fortworthgov.org/uploadedFiles/Gas_Wells/Emissions%20report %20for%20barnett- shale%2010-14-08.pdf

Children are especially vulnerable because their lungs continue to grow and enlarge until about age 18. Plus they breathe faster and are closer to the ground. As they mature in the presence of ozone, alveolar production is reduced, and the result of chronic ozone exposure can be brittle lungs like those of an elderly adult.

Air pollution has also been shown to be associated with neurodevelopmental disorders, lower IQ in babies born to mothers with PAH (polycyclic aromatic hydrocarbon) exposure during pregnancy and learning disorders in exposed children.

The Pediatric Environmental Health Specialties Units http://www.aoec.org/pehsu.htm , federally funded, and whose mission is to provide care and advocacy on behalf of children’s environment, just issued these guidelines for parents http://www.aoec.org/pehsu/documents/ hydraulic_fracturing_2011_parents_comm.pdf and health practitioners http://www.aoec.org/ pehsu/documents/hydraulic_fracturing_and_children_2011_health_prof.pdf :

PEHSU Information on Natural Gas Extraction and Hydraulic Fracturing for Health Professionals The Pediatric Environmental Health Specialty Units (PEHSU) Network encourage families, pediatricians, and communities to work together to ensure that children are protected from exposure to environmental hazards. Background Natural gas extraction from shale is a complex process which includes: 1) building access roads, centralized water and flowback holding ponds and of the site itself ; 2) construction of pipe lines and compressor stations; 3) drilling; 4) hydraulic fracturing; 5) capturing the natural gas; 6) and disposal (or recycling) of, flowback water and drill cuttings. Hydraulic fracturing, also known as hydrofracking or fracking, uses a combination of water, sand, and chemicals injected into the ground under high pressure to release natural gas. The HF process is also used in some parts of the country for extracting oil. This process has become much more common in the US over the last decade. It was first used for natural gas in Colorado, Wyoming, and Texas. The practice has recently spread into other states, including West Virginia, Pennsylvania, and New York.

Health Issues Questions regarding the possible health effects of Natural gas extraction/Hydraulic fracturing (NGE/HF) have been raised about water and air quality. To ensure that children's health is part of the ongoing evaluation of possible human health effects of NGE/HF, the Pediatric Environmental Health Specialty Unit (PEHSU) network, which consists of experts throughout the country dedicated to preventing adverse pediatric health outcomes from environmental causes, developed this fact sheet. A distinct challenge in discussing these possible health effects is the lack of research regarding the human health effects of NGE/HF. Most of the research to date focuses on ecosystem health. Because many questions remain unanswered, the PEHSU network recommends a precautionary approach to toxicants in general and to the NGE/HF process specifically.

Water Contamination One of the potential routes of exposure to toxics from the NGE/HF process is the contamination of drinking water, including public water supplies and private wells. This can occur when geologic fractures extend into groundwater or from leaks from the natural gas well if it passes through the water table. In addition, drilling fluid, chemical spills, and disposal pit leaks may contaminate surface water supplies. A study conducted in New York and Pennsylvania found that methane contamination of private drinking water wells was associated with proximity to active natural gas drilling. (Osborne SG, et al., 2011). While many of the chemicals used in the drilling and fracking process are proprietary, the list includes benzene, toluene, ethyl benzene, xylene, ethylene glycol, glutaraldehyde and other biocides, hydrochloric acid, and hydrogen treated light petroleum distillates. These substances have a wide spectrum of potential toxic effects on humans ranging from cancer to adverse effects on the reproductive, neurological, and endocrine systems (ATSDR, Colborn T, et al, U.S. EPA 2009). Air Pollution Sources of air pollution around a drilling facility include diesel exhaust from the use of machinery and heavy trucks, and fugitive emissions from the drilling and NGE/HF processes. These air pollutants are associated with a spectrum

of adverse health outcomes in humans. Increases in particulate matter air pollution, for example, have been linked to respiratory illnesses, wheezing in infants, cardiovascular events, and premature death (Laden F, et al, Lewtas J, Ryan PH, et al, Sacks JD, et al). Since each fracturing event at each well requires up to 2,400 industrial truck trips, residents near the site and along the truck routes may be exposed to increased levels of these air pollutants (New York State DECDMR, 2009). Volatile organic compounds can escape capture from the wells and combine with nitrogen oxides to produce ground- level ozone (CDPHE 2008, CDPHE 2010). Due to its inflammatory

effects on the respiratory tract, ground-level ozone has been linked to asthma exacerbations and respiratory deaths. Elevated ozone levels have been found in rural areas of Wyoming, partially attributed to natural gas drilling in these locations. (Wyoming Department of Environmental Quality, 2010). In an air sampling study from 2005 to 2007 conducted in Colorado, researchers found that air benzene concentrations approached or exceeded health-based standards at sites associated with oil or gas drilling (Garfield County PHD, 2007). Benzene exposure during pregnancy has been associated with neural tube defects (Lupo PJ, et al), decreased birth parameters (Slama R, et al., 2009), and childhood leukemia (Whitworth KW, et al., 2008). Noise Pollution Noise pollution from the drilling process and resulting truck traffic has not been optimally evaluated, but since drilling sites have been located in close proximity to housing in many locations, noise from these industrial sources might impact sleep, and that has been associated with negative effects on learning and other aspects of daily living (Stansfeld SA, et al., 2003, WHO 2011). Special Susceptibility of Children Children are more vulnerable to environmental hazards. They eat, drink, and breathe more than adults on a pound for pound basis. Research has also shown that children are not able to metabolize some toxicants as well as adults due to immature detoxification processes. Moreover, the fetus and young child are in a critical period of development when toxic exposures can have profound negative effects. Recommendations: In light of the lack of research investigating the potential adverse human health effects from gas and oil well operations located in close proximity to human habitation, as well as considering the unique vulnerability of children, the PEHSU network recommends the following:

● Continuing the surveillance of water quality, noise levels, and air pollution in areas where NGE/HF sites are located near communities.

● Monitoring the health impacts of persons living in the area, preferably with cohort studies. ● Increasing the awareness of community healthcare providers about the possible health
consequences of exposures from the NGE/HF processes, including occupational exposures to workers
and the issue of take-home toxics (e.g., clothing and boots contaminated with drilling muds). ● Disclosure of all chemicals used in the drilling and NGE/HF and product dewatering to ensure that
acute exposures are handled appropriately and to ensure that surveillance programs are optimized.

● Given the short half-lives of volatile organic compounds and the fact that many of the NGE/HF chemicals have not been disclosed, biologic testing should not be pursued unless there has been a known, direct exposure.

● In addition to the annual testing for coliforms and nitrates recommended by the U.S. EPA and the American Academy of Pediatrics (AAP), the AAP guidance recommends that families with private drinking water wells in NGE/HF areas should consider testing the wells before drilling begins and on a regular basis thereafter for chloride, sodium, barium, strontium, and VOCs in consultation with their local or state health department.

● As invaluable resources for their local, state, and regional communities, health professionals should advocate for human health effects to be a part of the discussion regarding NGE/HF.

For further information, please contact your regional Pediatric Environmental Health Specialty Unit, available at www.pehsu.net .

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This material was developed by the Association of Occupational and Environmental Clinics (AOEC) and funded under the cooperative agreement award number 1U61TS000118-02 from the Agency for Toxic Substances and Disease Registry (ATSDR). Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing funds to ATSDR under Inter-Agency Agreement number DW-75-92301301-0. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications.

In addition to the above statement from the PEHSU, a letter of concern about gas drilling was sent to the NYSDOH Commissioner in February 2011 to which thousands of physicians were signatories.

Why is there concern among doctors?

Doctors are concerned that there has been too little research to establish the safety of natural gas exploration, production and delivery, including pipelines and compressor stations.

There is a tool which can be used in any land use decision to determine how human health will be impacted by the specific land use and that is called a HEALTH IMPACT ASSESSMENT (HIA).

An HIA aims to identify how development induces unintended changes in health determinants and resulting changes in health outcomes. HIA provides a basis to proactively address any risks associated with health hazards. HIA also addresses health improvement opportunities in development.

Adapted from the WHO, Gothenburg Consensus Paper 1999

The HEALTH IMPACT ASSESSMENT may be defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population. The HIA addresses the potential human health impacts of a proposed plan, such as this compressor station, and very importantly addresses how the most vulnerable, including children, the elderly and medically underserved will be affected by the land use (in this case, the compressor station). The HIA identifies appropriate actions to manage those effects.

The practice of a Health Impact Assessment (HIA) elevates the role of health in decision-making. Health Impact Assessment is a practical tool that can provide a structured process to determine a policy or project's impact on health; bring both immediate and long term health benefits; and ensure project dollars are used efficiently to provide the highest benefit to communities. They help create healthier communities by addressing the root causes of many prominent health problems. HIAs have demonstrated success in a variety of issue areas, ranging from land use and transportation to housing policies, labor standards, natural resource extraction, education and economic policies. It must be done wherever permitting is sought in order to determine whether the people and the government wish to take the risks to human health which will ensue if this development proceeds. http:// www.hiaguide.org/hia/national-petroleum-reserve-alaska-oil-development-plan and http:// www.garfield-county.com/public-health/battlement-mesa-health-impact-assessment-ehms.aspx and http:/ / www.hiaconnect.edu.au/files/HIA_International_Best_Practice_Principles.pdf and http://www.iaia.org/ iaiawiki/ hia.ashx and http://www.healthimpactproject.org/hia/process and

Quigley, R., L. den Broeder, P. Furu, A. Bond, B. Cave and R. Bos 2006 Health Impact Assessment International Best Practice Principles. Special Publication Series No. 5. Fargo, USA: International Association for Impact Assessment.

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Governments and their agencies should aim to maximize positive health impacts and minimize negative ones. Human health impacts should be considered at least as significant as the permitting of pipelines, or other considerations which are under FERC's authority.

The Agency for Toxic Substances and Disease Registry or an independent school of public health should do a health impact assessment on the safety of a compressor station here, advise as to mitigation measures, and monitor all incidents involving spills or releases.

In science and medicine we follow the Precautionary Principle, which states that "When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."

When evidence gives us good reason to believe that an activity, technology, or substance may be harmful, we should act to prevent harm, not cause more harm. If we always wait for scientific certainty, people may suffer and die and the natural world may suffer irreversible damage. http:// www.worldinbalance.net/intagreements/1992-rio-environmentanddevelopment.php http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm http://www.sehn.org/wing.html