beyond expectations

Fracking Noise and Lights: Impacts on Local Residents

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- We continue to have little *published* information on the NOISE effects of non-traditional forms of gas.
- However, we have many *anecdotal reports* from people living near well sites, compressor stations, or processing plants.

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Long-term exposure?

- We don't know much about the long-term effects of industrial noise on *animals* (wildlife or domestic) or *people* in the general vicinity of non-traditional well sites, compressor stations, or processing plants.

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What has been reported?

- Department of Environmental Conservation
  - **(GEIS)** Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program (1992 and 2011)

"Site preparation, drilling, and hydraulic fracturing activities could result in temporary noise impacts, depending on the distance from the site to the nearest noise-sensitive receptors."

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- **The majority of the noise associated with hydraulic fracturing comes in the first 50-100 days.**
  - **Once the well has been completed and the equipment has been demobilized, the remaining wellhead production does not generate a significant level of noise.**
- **Current regulations require all wells on a multi-well pad be drilled within 3 years of starting the first well.**
  - **Thus it is possible that a person living in close proximity to the pad would experience adverse noise impacts intermittently for up to 3 yrs.**

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Noise Sources Associated with "Fracking"

- Trucks and other large vehicles to supply the well site with materials and water during all phases.
- Excavators, graders, bulldozers, compactors, and loaders at first two phases of production.
- Air compressors at well site (# varies) – this equipment generates the highest level of noise during operations.

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- Drill Rigs – powered by diesel engines (noise will fluctuate depending on the engine speed and load)
- Tubular Preparation and Cleaning- conducted as drill pipe is placed into the wellbore
- Elevator Operation – used to move drill pipe (dB level is not high)
- Drill Pipe Connections – as depth of well increases, additional pipe is connected (the release of air pressure during process creates noise)

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What do we know, in general, about noise?

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- **Distance** of homes from the well site (should be > 500 ft) will decrease the intensity level of the noise.
- **Atmospheric conditions** (humidity levels, barometric pressure, wind speed, precipitation) can decrease intensity of the noise.
- **Terrain** (hills/valleys/water sources) can decrease/deflect the noise.
- **Vegetation** can decrease the intensity of the noise. (This will be seasonal as the plants lose their leaves.)

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What has been reported…

- According to the GEIS report (2011), the noise produced around hydraulic fracturing sites is not sufficiently intense to cause hearing loss.
  - 79 dBA (50') to 44 dBA (2000') from rotary and horizontal drilling

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However, it doesn't take LOUD noise in a person's environment to cause health problems.

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- Noise pollution is a major cause of sleep disturbances.
- Disturbances in sleep cause:
  - increased blood pressure
  - increased heart rate
  - increased pulse amplitude
  - vasoconstriction
  - cardiac arrhythmias
  - increased body movement (fidgeting).
    - These effects do not decrease over time.
- Secondary effects include fatigue, depressed mood and well-being, and decreased performance.

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Health Effects of Noise Pollution

Psychological/emotional impact of noise:
- Fear of the noise source
- Psychosis
- Anxiety and annoyance

Physical impact of noise:
- Sleep deprivation (mentioned previously)
- Birth defects
- Stress-related cardiovascular disorders (e.g., hypertension)
- Rashes, diarrhea, and headaches

Social behaviors affected by noise:
- Introverted behaviors
- Depressed mood and well-being
- Misinterpretation of social cues

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- In both industrial and community studies, noise exposure is related to raised catecholamine secretion.
  - Catecholamine –a group of chemically related neurotransmitters that have similar effects on the sympathetic nervous system.
  - Catecholamine secretions cause general physiological changes that prepare the body for the "fight-or-flight" response.
    - Some typical effects are increases in heart rate, blood pressure, blood glucose levels, and a general reaction of the sympathetic nervous system.

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What about fracking noise?

- Fracking well sites and compressors are said to produce noise that we feel
  - subsonic frequencies below about 20 Hz
- Long-term exposure to low frequency and subsonic noise can cause major health effects including cardiac infarcts, brain aneurysms, stroke, cancer, epilepsy, rage reactions and suicide.

-Center for Human Performance and CITIDEP (Portugal)
-School of Biomedical Engineering, Sciences and Health Systems at Drexel University

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Survey Description

- Demographic questions
  - Age, sex
  - Distance from site, length of time living there
- Three sections of questions in different formats:
  - Likert scale (1 [not at all] to 5 [a great deal])
  - Yes/No questions
  - Put an X by statements that apply

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What we have learned…

- It is EXTREMELY difficult to get sound level readings during the actual drilling phases!
- It is difficult to find sites in which other contaminating factors aren't at play
  - Railroad and train whistle noise
  - Firing range
  - Major interstate
  - Wind and precipitation effects

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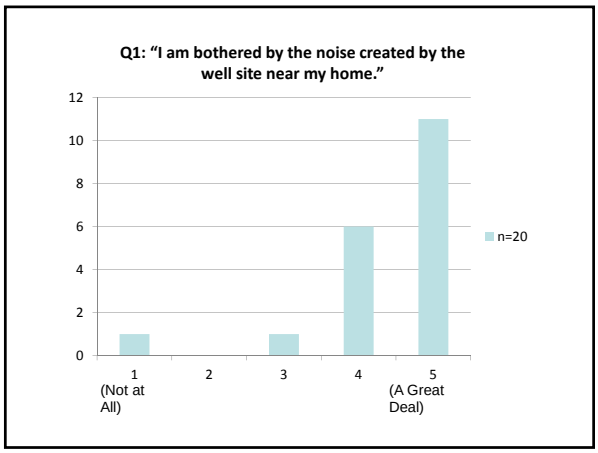
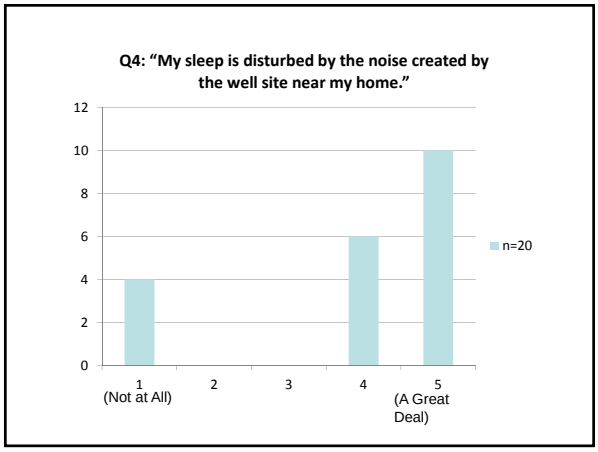
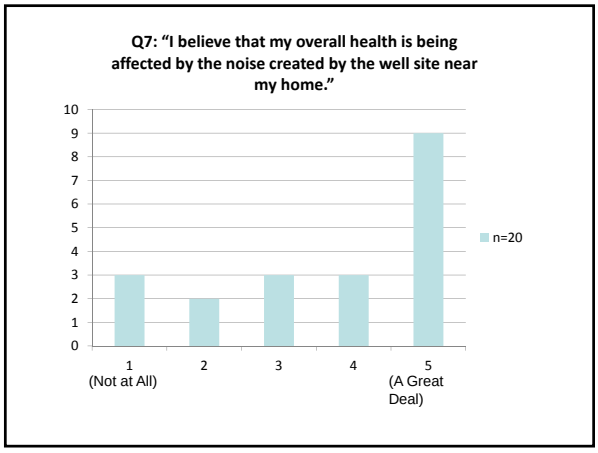
NOISE


Q1: "I am bothered by the noise created by the well site near my home."
12
10
8
6
4
2
0
1 (Not at All)
2
3
4
5 (A Great Deal)
n=20


Q4: "My sleep is disturbed by the noise created by the well site near my home."
12
10
8
6
4
2
0
1 (Not at All)
2
3
4
5 (A Great Deal)
n=20


Q7: "I believe that my overall health is being affected by the noise created by the well site near my home."
10
9
8
7
6
5
4
3
2
1
0
1 (Not at All)
2
3
4
5 (A Great Deal)
n=20

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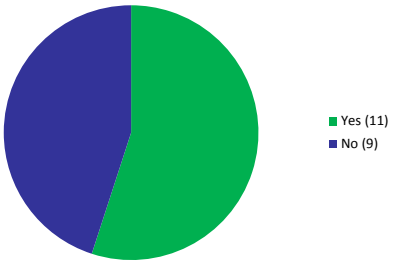
I consider the noise created by the well site near my home as:

-Not very bothersome- 10%
-The loudest noise I have ever experienced- **15%**
-Not very loud- 10%
-Damaging to my hearing- 15%
-Pleasant to listen to- 0%
-Disturbing to my sleep- **75%**
-Not too loud- 15%
-Dangerous to my family's health- **60%**
-Damaging to my health- **65%**
-Not a problem- 10%
-Not as bothersome as the lights- **5%**
-Extremely bothersome- **65%**

Since people have begun preparing and working on the well site near my home…

Q12: "I have been diagnosed with health problems."



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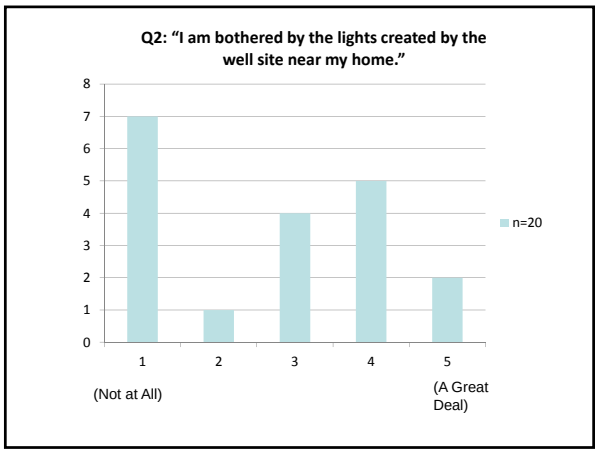
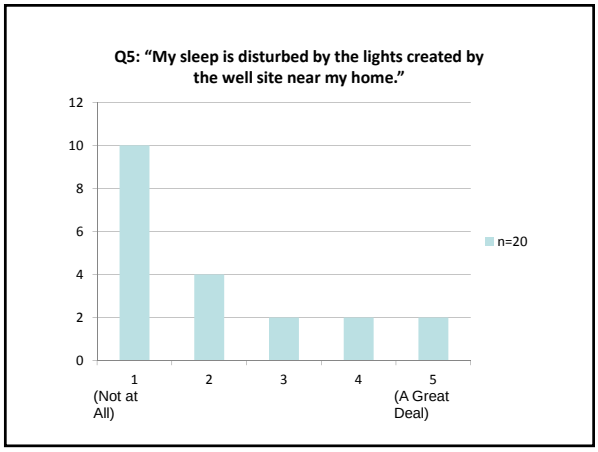
LIGHTS





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Conclusions

1. The sound level readings that were taken from each location did not have enough intensity to cause hearing loss for residents of surrounding neighborhoods.

2. Sound level and dosimeter readings indicate continuous low-level noise with intermittent changes in intensity, which are reportedly causing annoyance, anxiety, and stress concerns over a long period of time.

3. Noise is more disturbing to local residents than the lights or workers around the well sites.

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Comments provided on surveys

- "My greatest concern is the continuous, repetitive noise that they cause. Even at a lower frequency they are very disturbing. This kind of noise from the industry of pumps running for hours, back up alarms, pressure release sounds, among others, has had a great deal of effect on us. Not to mention this goes on all hours of the night and disturbs our sleep… if you do fall asleep, you are awakened with a pounding headache at any hour of night, due to the repetitious sounds pounding through your head. We experienced a lot of fatigue due to the lack of sleep…"

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Comments provided on surveys

- "I am bothered by the presence of people/workers around the well site near my home."
- "Moved into this rural area and expected to hear noises connected with farming, but not the drone of drilling at all hours of the day and night."

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