Natural Gas Compressor Stations

Addressing Community Concerns, Assessing Emissions and Health Impacts

SWPA-EHP Presentation
Deerfield, MA
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Southwest PA Environmental Health Project

Our mission is to respond to individuals’ and communities’ need for access to accurate, timely and trusted public health information and health services associated with natural gas extraction.
SWPA-EHP Services

Health evaluation and support
- Nurse Practitioner
- Health exams
- Consultations
- Referrals for health services
- Health Provider education
- Clinical toxicity profiles

Public Health Outreach
- Identification of exposure pathways
- Measurement tools
- Interpretation of air/water lab results
- Assessment of air exposures
- Evaluation of health risks
- Information assessment
Health concerns in communities exposed to natural gas from fracked shale

David R. Brown Sc.D

SWPA-EHP
Discussion outline

Fracking ancient shale beds releases raw natural gas and other chemicals into neighborhoods.

Over 1.2 million people are living within 1/2 mile of a shale gas extraction, processing or transporting pipeline in Pennsylvania. The Environmental Health Project has been examining persons with health concerns.

This discussion will focus on
- the health effects observed in communities,
- the chemicals involved
- the pathways of exposure

Personal actions available to protect residents who are exposed will be included.
## Symptoms Reported to EHP Nurse Practitioner

<table>
<thead>
<tr>
<th></th>
<th>Individuals reporting</th>
<th>Percentage of total cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory</td>
<td>60</td>
<td>53%</td>
</tr>
<tr>
<td>Dermatologic</td>
<td>55</td>
<td>49%</td>
</tr>
<tr>
<td>Eye</td>
<td>44</td>
<td>39%</td>
</tr>
<tr>
<td>Nose &amp; throat</td>
<td>68</td>
<td>60%</td>
</tr>
<tr>
<td>Gastro-Intestinal</td>
<td>56</td>
<td>50%</td>
</tr>
<tr>
<td>Cardiac</td>
<td>33</td>
<td>29%</td>
</tr>
<tr>
<td>Neurological</td>
<td>65</td>
<td>58%</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>64</td>
<td>57%</td>
</tr>
<tr>
<td>Endocrine</td>
<td>21</td>
<td>19%</td>
</tr>
<tr>
<td>Ear/hearing</td>
<td>19</td>
<td>17%</td>
</tr>
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</table>
# Health Issues

<table>
<thead>
<tr>
<th>Category</th>
<th>Researcher/author</th>
</tr>
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<tbody>
<tr>
<td>High Blood pressure</td>
<td>Subra (2010)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Researcher/author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer risk</td>
<td>McKenzie (2012)</td>
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</table>
14 Emissions of Concern for Immediate Toxic Responses

1. Barium, Arsenic
2. Fluoride salts*
3. VOCs *
4. PAHS
5. BTX*
6. Methylene chloride, (halogenated alkanes)*
7. Acetaldehyde/Formaldehyde
8. Fine particulate matter*
9. Carbon monoxide
10. Glycols*
11. Silica dust*
12. Radium and radioactive decay products*
13. Nitrogen oxides
14. Hydrogen sulfide
Chemicals and Pathways of Exposure

• Chemicals come from both fracking fluids and the actual shale deposits.

• Exposure pathways are:
  – Air emissions from flaring, fugitive emissions and blow downs.
  – Water emissions are from waste ponds, disposal, spills and long term storage.
  – Soil and food exposures from fallout and other undetermined factors.
A one-week sample of Dylos results for a house monitored in March 2013

PM 2.5

Recorded Counts of Particles

Time of Day

2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM  2:00 PM  8:00 AM
4p
Summary of peak PM2.5 count values for each house, given in number of hours, % total hours, times of day, and maximum peak value.

(Median 50 Cts/0.01 ft³)

6 hour average: night, morning, afternoon, evening

<table>
<thead>
<tr>
<th>House</th>
<th>Number of hours with peaks</th>
<th>% of total hours with peaks</th>
<th>Times of day of peaks*</th>
<th>Maximum Peak Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>8.5</td>
<td>N</td>
<td>2711</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>5</td>
<td>M, N</td>
<td>756</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>2.5</td>
<td>M</td>
<td>171</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0.5</td>
<td>N</td>
<td>201</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>2.5</td>
<td>A, E</td>
<td>556</td>
</tr>
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<td>6</td>
<td>11</td>
<td>7.7</td>
<td>A, E, N</td>
<td>576</td>
</tr>
<tr>
<td>7</td>
<td>31</td>
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<td>1654</td>
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<td>8</td>
<td>29</td>
<td>15</td>
<td>M, A, E</td>
<td>991</td>
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<tr>
<td>9</td>
<td>9</td>
<td>12.6</td>
<td>M, E, N</td>
<td>1057</td>
</tr>
<tr>
<td>10</td>
<td>23</td>
<td>32</td>
<td>M, A, E, N</td>
<td>844</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
<td>16</td>
<td>M, E</td>
<td>3846</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>1.4</td>
<td>E</td>
<td>203</td>
</tr>
<tr>
<td>13</td>
<td>3</td>
<td>4.3</td>
<td>M</td>
<td>164</td>
</tr>
<tr>
<td>14</td>
<td>57</td>
<td>34.3</td>
<td>M, A, E, N</td>
<td>1761</td>
</tr>
</tbody>
</table>
Review of Reported Symptoms

Symptoms might be persistent, transient, or intermittent. These variations in symptom presentation are consistent with the changing and episodic nature of exposures.
DEP Summary of the Inventory Data
Reported Emissions

- VOC: 64%
- PM-10: 13%
- PM-2.5: 11%
- Formaldehyde: 6%
- n-Hexane: 1%
- SOx: 3%
- Toluene: 14%
- Benzene: 0%
- Ethyl Benzene: 0%
- 2,2,4-trimethyl pentane: 0%
Compressor Blowdowns

- Formaldehyde: 3%
- PM-10: 1%
- PM-2.5: 1%
- SOx: 1%
- 2,2,4-Trimethylpentane: 0%
- Ethyl Benzene: 21%
- Benzene: 22%
- Xylenes: 22%
- Toluene: 29%
PM 2.5 Peaks vs Number of Symptoms

PM Peaks vs Number of Symptoms
Health Findings and Air Monitoring Reports are in Conflict

Health Findings
Reports of acute onset sequale in humans:
- respiratory,
- neurologic,
- dermal,
- vascular bleeding,
- abdominal pain,
- nausea, and vomiting

Monitoring Reports
Assurances from air monitoring data that untoward exposures are not occurring.
- Barnett Shale Texas (Bunch et al- 2013)
- Marcellus Shale Ambient Air sampling (Pennsylvania DEP 2010)
- City of Fort Worth gas Air Quality Study (ERG 2011)
Central Questions

What are the health issues associated with UNGD of shale and implications for health care providers?

What is the evidence that would indicate a clinical problem for providers?

What characteristics define the health issues of immediate concern, and what is needed to mitigate the damage?
Summary of the Evaluation

- The analysis shows that protocols used for assessing compliance with ambient air standards do not adequately determine
  - the intensity, frequency or durations of the actual human exposures to the mixtures of toxic materials released at UNGD sites.
  - Typically used periodic 24-hour average measures underestimate actual acute exposures by an order of magnitude.
  - NAAQs and other available reference standards for ambient air are set in ‘forms’ that prevent determination of acute health risk.
  - Standards do not consider the most likely synergistic potential of the mixture-combinations of toxic air emissions.
  - Standards needed for acute toxics are not available for most compounds
  - Measures are incomplete (Only 6 of 11 primary chemicals identified by BSSI measured by TCEQ)

- Application of basic, air dispersion modeling shows that local weather conditions and time of release are strong determinants of the timing and intensity of individual exposures.
Westttown, New York
(Minisink)

Summary of air monitoring and health assessment at 8 residences
Minisink: Pilot Project

- Community coordinator
- Health assessments of 8 families
- PM2.5 monitoring with Speck monitors
- VOC sampling with summa canisters
Minisink:

The predominant health impacts reported were:

- Respiratory problems
- Neurological problems
- Dermatological problems

- Overall “quality of life” levels were below normal for half of the respondents when compared to a national standard (SF36).
Example of Speck Results (ug/m3)
Example of Speck Results
Episodic high levels of PM2.5 outside multiple homes occurred within similar time frames seven times over 59 days. These results are based on hourly averages of ug/m³ values.

<table>
<thead>
<tr>
<th>Date of Peak event</th>
<th># of monitors showing a peak out of # in use</th>
<th>Recorded peak levels</th>
<th>Daily AQI average</th>
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</thead>
<tbody>
<tr>
<td>10/30</td>
<td>3/4</td>
<td>31, 90, 426</td>
<td>5.0</td>
</tr>
<tr>
<td>11/5</td>
<td>2/5</td>
<td>33, 57</td>
<td>5.5</td>
</tr>
<tr>
<td>11/7</td>
<td>3/5</td>
<td>36.5, 114, 133</td>
<td>5.3</td>
</tr>
<tr>
<td>11/12</td>
<td>4/5</td>
<td>53.7, 131, 269, 325</td>
<td>9.0</td>
</tr>
<tr>
<td>12/3</td>
<td>3/5</td>
<td>40, 235, 399</td>
<td>5.0</td>
</tr>
<tr>
<td>12/6</td>
<td>2/5</td>
<td>76, 160</td>
<td>10.8</td>
</tr>
<tr>
<td>12/17</td>
<td>3/5</td>
<td>99, 162, 229</td>
<td>9.9</td>
</tr>
</tbody>
</table>
Health Assessment Project: Assessing Gas Compressor Station Health Impacts

SWPA-EHP
Madison County, NY DOH
IHE University at Albany
Assessment Goals & Objectives

- Assess health status of residents before the compressor station is built, during construction, and during operations and blow down events within 1 mile of the site.
- Monitor and measure environmental factors before the compressor station is built, during construction, and during operations and blow down events.
- Evaluate/analyze results to determine possible health effects.

* Madison County site - the most comprehensive assessment
Assessment Parameters * Madison County only

Environmental
- Air Quality
  - PM,
  - VOCs, Formaldehyde
  - Radon*
- Home Env. Assess.
- Water Quality*
  - Surface & Well*
    - *EPA Drinking Water Standards
- Noise*
- Traffic counts*

Health
- Residents
  - Health Questionnaires
  - Health Diary
  - Lung Function Test*
- Community Health* Assessment
  - Target health data
    (cancer, respiratory, cardio, birth)
  - School nurse reports
  - EMS/Police/ER logs
- DOH Complaint log*
Monitoring Events/Timeline

Residents within 1 mile of station participate in baseline monitoring and follow-up assessments for a period of 2 years.

4 main monitoring events
- Baseline – Pre-Construction* - MOST IMPORTANT
- Construction*
- Post Construction
  - 1 yr
  - 2 yrs
Monitoring Levels/Locations

- Individuals (surveys, diaries, Lung Function Test*)
- Residences within 1 mile (air, noise, water)
  - Indoor air
  - Outdoor air
- Select Community Sites (water, noise, air)
  Schools? Daycares?

Collaboration:
- EHP, Albany IHE, Madison County
- Cornell University/Oregon State Univ. Animal Study
- West Virginia University Consortium – environmental air study
Basic Community Monitoring and Health Assessment Model

Primary Community Contact person/organizer

PRE- and POST-CONSTRUCTION Monitoring

4 residences within about $\frac{1}{2}$ mile for placement of continuous air monitors - one inside, one outside

VOC and formaldehyde sampling at closest residences (1 or more 12-hour sample under appropriate weather conditions)

PRE- and POST-CONSTRUCTION Health assessments

Individual health assessment, SF36 and home environment assessment surveys on as many residents as possible within 1 mile

Medically trained personnel review health assessments with residents
PM Monitors
Continuous air monitoring
Noise Monitor
Casella cel264

- Indoor/outdoor
- 1 hour
Summa Canister

12-hour samples
calm conditions and overnight
EHP Air Model

1. Determine source terms - PM, VOCs, formaldehyde
   derived from monitoring studies and public data

2. Measure distance from source to residence
   Google Earth

3. Gather weather data from nearest airport or weather station
   wind direction, wind speed, cloud cover, day or night (6-hour time periods)

4. Consult EHP air model charts
   estimates of exposure at the residence based on source term, weather, distance
# Exposure Profile Based on Local Weather Pattern

<table>
<thead>
<tr>
<th>Wind speed</th>
<th>Day</th>
<th>Day</th>
<th>Day</th>
<th>Day</th>
<th>Night</th>
<th>Night</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clear or just a few clouds</td>
<td>Scattered cloud cover. Sky less than half filled with clouds</td>
<td>Broken cloud cover. Sky more than &gt;50% cloud cover</td>
<td>Overcast &gt;80% cloud cover</td>
<td>&gt; 50% cloud cover</td>
<td>&lt; 50% cloud cover</td>
</tr>
<tr>
<td>&lt;5 mph</td>
<td>low</td>
<td>low</td>
<td>low</td>
<td>extreme</td>
<td>extreme</td>
<td>extreme</td>
</tr>
<tr>
<td>5 to 7 mph</td>
<td>low</td>
<td>low</td>
<td>average</td>
<td>very high</td>
<td>extreme</td>
<td>extreme</td>
</tr>
<tr>
<td>7 to 11 mph</td>
<td>very low</td>
<td>low</td>
<td>low</td>
<td>average</td>
<td>average</td>
<td>high</td>
</tr>
<tr>
<td>11 to 13 mph</td>
<td>low</td>
<td>low</td>
<td>average</td>
<td>average</td>
<td>average</td>
<td>average</td>
</tr>
<tr>
<td>&gt;13 mph</td>
<td>very low</td>
<td>low</td>
<td>low</td>
<td>low</td>
<td>low</td>
<td>low</td>
</tr>
</tbody>
</table>
## Compressor Station

Estimated air exposure values of VOCs in µg/m³

(average hourly emission per day 300 grams/minute)

<table>
<thead>
<tr>
<th>Weather and Stability Class</th>
<th>100 yds 0.1 km</th>
<th>360 yds 0.5 km</th>
<th>½ mile 1 km</th>
<th>1.2 miles 2 km</th>
<th>1.8 miles 3 km</th>
<th>3.1 miles 5 km</th>
<th>6.2 miles 10 km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sky: clear day, Wind: &lt;5 mph</td>
<td>A1</td>
<td>525</td>
<td>17</td>
<td>4</td>
<td>1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: clear day, Wind: 5-7 mph</td>
<td>A-B3</td>
<td>400</td>
<td>26</td>
<td>7</td>
<td>1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: clear day, Wind: 7-11 mph</td>
<td>B3</td>
<td>275</td>
<td>25</td>
<td>8</td>
<td>1</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: clear day, Wind: 11-13 mph</td>
<td>C4</td>
<td>400</td>
<td>67</td>
<td>23</td>
<td>6</td>
<td>3</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: clear day, Wind: &gt;13 mph</td>
<td>C5</td>
<td>350</td>
<td>58</td>
<td>20</td>
<td>5</td>
<td>2</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: scattered clouds, day, Wind: &lt;5 mph</td>
<td>A8</td>
<td>575</td>
<td>37</td>
<td>11</td>
<td>2</td>
<td>1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: scattered clouds, day, Wind: 5-7 mph</td>
<td>B7</td>
<td>450</td>
<td>40</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>&lt;1</td>
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<tr>
<td>Sky: scattered clouds, day, Wind: 7-11 mph</td>
<td>B-C8</td>
<td>375</td>
<td>52</td>
<td>18</td>
<td>4</td>
<td>2</td>
<td>&lt;1</td>
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<td>Sky: scattered clouds, day, Wind: 11-13 mph</td>
<td>C-D9</td>
<td>550</td>
<td>84</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Sky: scattered clouds, day, Wind: &gt;13 mph</td>
<td>D-10</td>
<td>625</td>
<td>87</td>
<td>32</td>
<td>12</td>
<td>6</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Sky: broken clouds, &gt;50%, day, Wind: &lt;5 mph</td>
<td>B11</td>
<td>630</td>
<td>56</td>
<td>18</td>
<td>3</td>
<td>1</td>
<td>&lt;1</td>
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<tr>
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<td>C12</td>
<td>750</td>
<td>125</td>
<td>44</td>
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<td>C13</td>
<td>475</td>
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<td>725</td>
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<td>14</td>
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<td>2</td>
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<tr>
<td>Sky: broken clouds, &gt;50%, day, Wind: &gt;13 mph</td>
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<td>630</td>
<td>87</td>
<td>32</td>
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<td>6</td>
<td>&lt;1</td>
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<td>Sky: overcast &gt; 80%, day</td>
<td>Wind: &lt;5 mph</td>
<td>D16</td>
<td>1850</td>
<td>250</td>
<td>96</td>
<td>37</td>
<td>18</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>------</td>
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<td>----</td>
</tr>
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<td>Sky: overcast &gt; 80%, day</td>
<td>Wind: 5-7 mph</td>
<td>D17</td>
<td>1350</td>
<td>175</td>
<td>69</td>
<td>26</td>
<td>13</td>
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<tr>
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<td>Wind: 7-11 mph</td>
<td>D18</td>
<td>850</td>
<td>100</td>
<td>44</td>
<td>17</td>
<td>8</td>
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<tr>
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<td>Wind: 11-13 mph</td>
<td>D19</td>
<td>725</td>
<td>100</td>
<td>37</td>
<td>14</td>
<td>7</td>
</tr>
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<td>Sky: overcast &gt; 80%, day</td>
<td>Wind: &gt;13 mph</td>
<td>D20</td>
<td>625</td>
<td>87</td>
<td>32</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Sky: clouds &gt; 50%, night</td>
<td>Wind: &lt;5 mph</td>
<td>E21</td>
<td>2600</td>
<td>500</td>
<td>200</td>
<td>100</td>
<td>65</td>
</tr>
<tr>
<td>Sky: clouds &gt; 50%, night</td>
<td>day 5-7 mph</td>
<td>E22</td>
<td>1850</td>
<td>350</td>
<td>150</td>
<td>75</td>
<td>46</td>
</tr>
<tr>
<td>Sky: clouds &gt; 50%, night</td>
<td>Wind: 7-11 mph</td>
<td>D23</td>
<td>850</td>
<td>100</td>
<td>44</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Sky: clouds &gt; 50%, night</td>
<td>Wind: 11-13 mph</td>
<td>D24</td>
<td>725</td>
<td>100</td>
<td>37</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Sky: clouds &gt; 50%, night</td>
<td>Wind: &gt;13 mph</td>
<td>D25</td>
<td>625</td>
<td>87</td>
<td>32</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Sky: clouds &lt; 50%, night</td>
<td>Wind: &lt;5 mph</td>
<td>F26</td>
<td>4200</td>
<td>725</td>
<td>350</td>
<td>150</td>
<td>99</td>
</tr>
<tr>
<td>Sky: clouds &lt; 50%, night</td>
<td>day 5-7 mph</td>
<td>F27</td>
<td>3000</td>
<td>500</td>
<td>250</td>
<td>100</td>
<td>71</td>
</tr>
<tr>
<td>Sky: clouds &lt; 50%, night</td>
<td>Wind: 7-11 mph</td>
<td>E28</td>
<td>1100</td>
<td>225</td>
<td>99</td>
<td>48</td>
<td>29</td>
</tr>
<tr>
<td>Sky: clouds &lt; 50%, night</td>
<td>Wind: 11-13 mph</td>
<td>D29</td>
<td>725</td>
<td>100</td>
<td>37</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Sky: clouds &lt; 50%, night</td>
<td>Wind: &gt;13 mph</td>
<td>D30</td>
<td>625</td>
<td>87</td>
<td>32</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>
Guide to Air Quality Near Shale Gas Sites

- Sunny Day: any wind or no wind
- Cloudy Day: no wind or light wind
- Cloudy Day: windy
- Calm Night: scattered to no clouds
- Night: scattered to no clouds, windy
- Cloudy Night: no wind
- Cloudy Night: light wind to windy

Healthy:
- No associated health risks/concerns.

Moderate to Healthy:
- Unusually sensitive people, older adults, and children should avoid exertion and outdoor work.

Unhealthy:
- Avoid extended or heavy exertion, close windows, go somewhere else, turn on air filter.

Very Unhealthy:
- Avoid extended or heavy exertion, close windows, go somewhere else, turn on air filter.

Southwest Pennsylvania Environmental Health Project
WWW.ENVIRONMENTALHEALTHPROJECT.ORG
For detailed information, contact 724-260-5504
How to protect against health impacts from unconventional natural gas development (UNGD)

Cut off contamination from air

Clean your house often, especially areas where your children play. Use a vacuum that can fit a HEPA filter. Don’t sweep with a broom.

Vent the air in places where you use water. Open windows or run an exhaust fan in the bathroom, kitchen and laundry room. If you have a stove fan, always use it while cooking.

Let fresh air in your home when it is breezy outside, usually in the middle of the day. Unhealthy air can collect closer to ground level when the air is still, usually in the morning and evening.

Take off your shoes and wipe off pets’ paws and fur before going inside. This will help to keep contamination from soil out of your home.

Cut off contamination from water

Don’t rely on one-time water tests to tell you if your water is safe to drink and use. Accidents and contamination can happen at any time.

Consider using bottled water for drinking, cooking and making drinks like baby formula, coffee, juice.

If you must drink or cook with your tap water, leave it uncovered in a pitcher or bottle in the refrigerator overnight before using it.

Stop drinking your water if you or someone in your family has stomach pain or discomfort, confusion, nosebleeds, muscle pains or other unusual symptoms.

If your water burns your skin or causes a rash, take showers and baths somewhere else. Go see your doctor and call our office to see our nurse practitioner.

Monitor changes in your health and environment

Keep a health diary. Write down changes in your health and changes you notice in your water or air. Share this information with your health care provider.

Remember that children, senior citizens or people with chronic health conditions are more sensitive. Pay special attention to changes in their health.

Check the conductivity of your water. This can tell you if your water changes and if there may be a problem with your water. EHP offers the CATTFish, to monitor conductivity, to individuals on well or spring water.*

Monitor particulate matter (PM) in the air. EHP offers the Speck air monitor to help individuals identify times when particulate matter concentrations are high within their home, and other times when exposures may not be occurring.*

Find ways to cope with the changes in your environment. EHP offers a free program, Take Steps to Health, to help individuals improve their health and manage some of life’s stressors.

*The Speck and CATTFish cannot identify specific chemicals in your air or water. They warn you that changes that may warrant extra testing are occurring.

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SOUTHWEST PENNSYLVANIA ENVIRONMENTAL HEALTH PROJECT
Conclusions

• People are exposed to toxics through air, water and soil.
• The exposures are periodic and intense for several hours.
• Regulatory air and water screening will not detect the hazard.

• Most likely acute physical symptoms headache, wheezing, ear/nose/throat (including nosebleeds), skin rash and fatigue.
• Biomonitoring methods need to be developed.

• Interventions and support at the patient level help coping.
• Individuals must monitor their health and exposure status.
• Sense of community trust and social capital is destroyed.
• Federal, State and Local public health and environmental agencies are not able to effectively respond. The Public Health Process has become rule bound, restricted to standard environmental tests of air and water and research health protocols.
• Regulatory agencies do not have the flexibility to monitor health and environment appropriately.
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