Acknowledgements

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Source of map on cover: Pennsylvania Department of Conservation and Natural Resources.
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Introduction

This report provides a summary of the results obtained from a 2012 survey of Pennsylvania residents living in the Marcellus Shale region of the state.

The purpose of this document is to provide insights into residents’ perceptions of natural gas development in Pennsylvania. The report includes information on their reported knowledge, attitudes and behaviors related to natural gas development, including their views about hydraulic fracturing and possible uses of treated wastewater from these operations. No conclusions or inferences are made. Individuals interested in additional statistical analyses and more detailed information should contact Dr. Gene L. Theodori at:

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Methodology

Between June 2012 and October 2012, a random sample of individuals living in counties in the Pennsylvania Marcellus Shale region were contacted by mail or telephone and asked to participate in a survey of resident opinions concerning natural gas extraction in the region. The sample was chosen to reflect the views of individuals living in counties with “high” well densities (20 or more wells per 100 square miles) and those with “low” well densities (fewer than 20 wells per 100 square miles). A total of 3,505 persons were contacted, with 800 providing data for this analysis (a 23% response rate). Half of the sample members were interviewed by telephone; half responded to mailed questionnaires.

Counts included in the “low” well density category were: Bedford, Blair, Cambria, Cameron, Centre, Clearfield, Clinton, Indiana, Lackawanna, Somerset, Sullivan, and Wayne. The “high” well density counties included: Bradford, Fayette, Greene, Lycoming, Susquehanna, Tioga, Washington, Westmoreland, and Wyoming.
Self-rated Knowledge of Selected Issues Related to Natural Gas Drilling

Figures 1a through 1e illustrate respondents' self-rated knowledge of the economic, social, environmental, and water quality and quantity effects of natural gas drilling in the Marcellus Shale.
Figure 1a

Knowledge about natural gas drilling in the Marcellus Shale with respect to:
Economic impacts of the natural gas industry
(n = 800)

A great deal: 17.9%
A good bit: 28.8%
Some but not much: 29.9%
Very little: 14.0%
None or almost none: 9.4%
Figure 1b

Knowledge about natural gas drilling in the Marcellus Shale with respect to:
Social impacts of natural gas well development on communities
(n = 795)

- A great deal: 15.2%
- A good bit: 27.7%
- Some but not much: 28.8%
- Very little: 15.8%
- None or almost none: 12.5%
Figure 1c

Knowledge about natural gas drilling in the Marcellus Shale with respect to:
Effects of gas drilling on the natural environment
(n = 797)

- A great deal: 18.3%
- A good bit: 30.5%
- Some but not much: 27.2%
- Very little: 13.5%
- None or almost none: 10.5%
Figure 1d

Knowledge about natural gas drilling in the Marcellus Shale with respect to:

Implications of natural gas drilling for water quality

(n = 795)

- A great deal: 17.9%
- A good bit: 28.4%
- Some but not much: 28.4%
- Very little: 14.2%
- None or almost none: 11.1%
Figure 1e

Knowledge about natural gas drilling in the Marcellus Shale with respect to:
Implications of natural gas drilling for water quantity
(n = 792)

- A great deal: 13.0%
- A good bit: 23.9%
- Some but not much: 29.2%
- Very little: 18.9%
- None or almost none: 15.0%
Trust in Selected Groups and Organizations Related to Natural Gas Development

Figures 2a through 2e illustrate respondents’ overall trust in the industry, state and local officials/organizations, environmental groups, and scientists.
Figure 2a

Trust with respect to natural gas development:
Natural gas industry
(n = 797)

- Great deal of trust: 20.6%
- Some trust: 36.7%
- Very little trust: 25.6%
- No trust: 14.2%
- Don't know: 2.9%
Figure 2b

Trust with respect to natural gas development:
State officials and organizations
(n = 800)

<table>
<thead>
<tr>
<th>Trust Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great deal of trust</td>
<td>7.1%</td>
</tr>
<tr>
<td>Some trust</td>
<td>31.0%</td>
</tr>
<tr>
<td>Very little trust</td>
<td>36.6%</td>
</tr>
<tr>
<td>No trust</td>
<td>23.4%</td>
</tr>
<tr>
<td>Don't know</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

0% 5% 10% 15% 20% 25% 30% 35% 40%
Figure 2c

Trust with respect to natural gas development:
Local officials and organizations
(n = 800)

- Great deal of trust: 11.0%
- Some trust: 38.9%
- Very little trust: 29.6%
- No trust: 18.4%
- Don't know: 2.1%
Figure 2d

Trust with respect to natural gas development: Environmental groups/organizations
(n = 800)

- Great deal of trust: 23.6%
- Some trust: 37.3%
- Very little trust: 22.1%
- No trust: 14.0%
- Don't know: 3.0%
Figure 2e

Trust with respect to natural gas development: Scientists/researchers
(n = 800)

- Great deal of trust: 40.0%
- Some trust: 39.9%
- Very little trust: 10.0%
- No trust: 4.1%
- Don't know: 6.0%
Possible Positive and Negative Impacts of Natural Gas Development

Figures 3a through 3e illustrate respondents’ opinions on several items concerning the potentially positive aspects and negative consequences of natural gas development.
We already know enough about the potential impacts of natural gas extraction to move forward with development in the Marcellus Shale.

(n = 799)
Figure 3b

All in all, the benefits of natural gas extraction from the Marcellus Shale to this region will outweigh the costs.

(n = 796)

- Strongly disagree: 12.1%
- Disagree: 20.2%
- Neutral: 26.5%
- Agree: 29.0%
- Strongly agree: 12.2%
Figure 3c

I worry that there will be some sort of catastrophic accident involving natural gas extraction in the Marcellus Shale.

(n = 799)
Any negative impacts of natural gas extraction in the Marcellus Shale can be fixed. (n = 799)

- Strongly disagree: 13.8%
- Disagree: 31.8%
- Neutral: 22.5%
- Agree: 25.8%
- Strongly agree: 6.1%
Figure 3e

Development of natural gas in the Marcellus Shale will create long lasting environmental problems.

(n = 799)
Participation in Natural Gas Development Activities

Figures 4a and 4b illustrate respondents’ leasing of land for natural gas development and whether or not drilling or pipeline development has occurred on their land. Table 1 summarizes four actions that respondents may or may not have taken in response to the exploration and production of natural gas.
Figure 4a

Leased land for natural gas development
(n = 799)

82.9%

17.1%
Figure 4b
[includes only respondents who answered “Yes” in Figure 4a]

Drilling or pipeline development on leased land
(n = 136)

- Yes: 21.3%
- No: 78.7%
# Table 1

Four actions possibly taken in the past twelve months in response to the exploration and production of natural gas

<table>
<thead>
<tr>
<th>Actions</th>
<th>Have You?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Attended a public meeting to get information and learn more about the</td>
<td>17.8%</td>
</tr>
<tr>
<td>drilling and production of natural gas. ( n = 798 )</td>
<td></td>
</tr>
<tr>
<td>Contacted a local elected official or governmental agency to complain</td>
<td>6.0%</td>
</tr>
<tr>
<td>about a natural gas drilling and/or production issue. ( n = 799 )</td>
<td></td>
</tr>
<tr>
<td>Voted FOR a political candidate because of his/her favorable position</td>
<td>13.3%</td>
</tr>
<tr>
<td>on the drilling and/or production of natural gas. ( n = 795 )</td>
<td></td>
</tr>
<tr>
<td>Voted AGAINST a political candidate because of his/her favorable</td>
<td>11.9%</td>
</tr>
<tr>
<td>position on the drilling and/or production of natural gas. ( n = 795 )</td>
<td></td>
</tr>
</tbody>
</table>
Community-level Changes Related to Natural Gas Development

Figures 5a through 8b illustrate respondents’ perceptions of changes in their community that may be associated with natural gas development. First, respondents were asked to indicate whether or not their community was experiencing a particular change. Second, respondents were asked to rate the importance of each change to their community.
Figure 5a

Community is or is not experiencing:
Increased job opportunities for local residents
(n = 736)

- Experiencing: 46.7%
- Not experiencing: 53.3%
Figure 5b

*Importance to community:*
Increased job opportunities for local residents

(n = 767)
Figure 6a

Community is or is not experiencing: Increased opportunities for small business development
(n = 730)

Experiencing: 43.3%
Not experiencing: 56.7%
Figure 6b

*Importance of:*
Increased opportunities for small business development

(n = 768)

- Very important: 42.8%
- Important: 34.7%
- Neither important nor unimportant: 10.0%
- Unimportant: 5.6%
- Very unimportant: 6.9%
Figure 7a

Community is or is not experiencing: Water quality impacts from drilling-related activity
(n = 725)

- 21.5% Experiencing
- 78.5% Not experiencing
Figure 7b

Importance of:
Water quality impacts from drilling-related activity
(n = 766)

- Very important: 62.7%
- Important: 21.4%
- Neither important nor unimportant: 6.5%
- Unimportant: 2.7%
- Very unimportant: 6.7%
Figure 8a

*Community is or is not experiencing: Water quantity impacts from drilling-related water withdrawals*

(n = 727)

- Experiencing: 19.0%
- Not experiencing: 81.0%
Figure 8b

*Importance of:*
Water quantity impacts from drilling-related water withdrawals

(n = 769)

- Very important: 57.1%
- Important: 23.8%
- Neither important nor unimportant: 9.3%
- Unimportant: 3.3%
- Very unimportant: 6.5%
Hydraulic Fracturing

Figures 9 through 11h pertain to the issue of hydraulic fracturing. Figure 9 summarizes respondents’ level of familiarity with the process of hydraulic fracturing. Figures 10a through 10h illustrate the contribution made to respondents’ knowledge about hydraulic fracturing from eight different sources. And, Figures 11a through 11h represent respondents’ overall trust in each of eight sources to deliver unbiased, factual knowledge on hydraulic fracturing.
Figure 9

Level of familiarity with the process of hydraulic fracturing
(n = 796)

- Extremely familiar:
  - 8.7%
  - 9.8%
  - 17.5%
  - 12.9%
  - 10.4%
  - 20.7%

- Extremely unfamiliar:
  - 20.0%
Figure 10a

Contributed to knowledge about the process of hydraulic fracturing:
Newspapers
(n = 795)
Figure 10b

Contributed to knowledge about the process of hydraulic fracturing:
Gasland (the film by Josh Fox)

(n = 786)
Figure 10c

Contributed to knowledge about the process of hydraulic fracturing:
Natural gas industry (n = 794)

- A great deal: 12.1%
- Some: 35.0%
- Very little: 23.8%
- None: 29.1%
Figure 10d

Contributed to knowledge about the process of hydraulic fracturing:
Regulatory agencies
(n = 791)

- A great deal: 6.6%
- Some: 25.3%
- Very little: 27.3%
- None: 40.8%
Figure 10e

* Contributed to knowledge about the process of hydraulic fracturing: Conservation/environmental groups (n = 793) 

- A great deal: 10.3%
- Some: 33.1%
- Very little: 23.7%
- None: 32.9%
Figure 10f

Contributed to knowledge about the process of hydraulic fracturing:
Cooperative Extension
(n = 789)

- A great deal: 4.1%
- Some: 16.7%
- Very little: 21.2%
- None: 58.0%
Figure 10g

Contributed to knowledge about the process of hydraulic fracturing:
University professors
(n = 791)

- A great deal: 4.8%
- Some: 15.0%
- Very little: 20.9%
- None: 59.3%
Figure 10h

Contributed to knowledge about the process of hydraulic fracturing:
Landowner groups/coalitions
(n = 794)

- A great deal: 9.6%
- Some: 27.1%
- Very little: 18.5%
- None: 44.8%
Figure 11a

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
Newspapers
(n = 797)

Great deal of trust: 7.8%
Some trust: 52.9%
Very little trust: 27.1%
No trust: 12.2%
Figure 11b

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
Gasland (the film by Josh Fox)
(n = 753)

Great deal of trust: 4.1%
Some trust: 22.5%
Very little trust: 22.7%
No trust: 50.7%
Figure 11c

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
Natural gas industry
(n = 798)
Figure 11d

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
Regulatory agencies
(n = 795)

- Great deal of trust: 9.3%
- Some trust: 43.4%
- Very little trust: 29.4%
- No trust: 17.9%
Figure 11e

*Trust to deliver unbiased, factual knowledge on hydraulic fracturing:*
Conservation/environmental groups

(n = 792)

- Great deal of trust: 15.2%
- Some trust: 43.7%
- Very little trust: 24.1%
- No trust: 17.0%
Figure 11f

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
Cooperative Extension
(n = 780)

- Great deal of trust: 11.4%
- Some trust: 43.3%
- Very little trust: 22.2%
- No trust: 23.1%
Figure 11g

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
University professors
(n = 794)

- Great deal of trust: 14.9%
- Some trust: 45.1%
- Very little trust: 22.0%
- No trust: 18.0%
Figure 11h

Trust to deliver unbiased, factual knowledge on hydraulic fracturing:
Landowner groups/coalitions
(n = 796)

- Great deal of trust: 12.7%
- Some trust: 44.2%
- Very little trust: 26.3%
- No trust: 16.8%
Frac Flowback Water

Figures 12 and 13 and Table 2 involve “frac flowback water” (i.e., the water that returns to the surface after a gas well is hydraulically fractured). Figure 12 summarize respondents’ level of familiarity with the management and disposal of frac flowback water in the Marcellus Shale. Figure 13 demonstrates respondents’ level of familiarity with frac flowback wastewater treatment technology. And, Table 2 summarizes respondents’ views on the possible safe uses of treated frac flowback waters.
Figure 12

Level of familiarity with the management and disposal of frac flowback water in the Marcellus Shale
(n = 797)

| Extremely familiar | 6.8% | 6.4% | 12.3% | 14.3% | 14.1% | 12.9% | Extremely unfamiliar | 33.2% |
Figure 13

Level of familiarity with frac flowback wastewater treatment technology

(n = 798)

Extremely familiar

- 31%
- 5.5%
- 10.9%
- 11.8%
- 13.9%
- 16.3%

Extremely unfamiliar

- 38.5%

0% 5% 10% 15% 20% 25% 30% 35% 40%
### Table 2

Ranking of ways treated wastewater from hydraulic fracturing operations might be used safely

<table>
<thead>
<tr>
<th>Ways desalinated water could be safely used:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-use by gas and oil industry operators (n = 787)</td>
<td>80.8%</td>
<td>19.2%</td>
</tr>
<tr>
<td>Industrial use (e.g., manufacturing, etc.) (n = 787)</td>
<td>76.7%</td>
<td>23.3%</td>
</tr>
<tr>
<td>Municipal uses (e.g., watering of golf courses and city parks, etc.) (n = 788)</td>
<td>51.9%</td>
<td>48.1%</td>
</tr>
<tr>
<td>Irrigation of farmland (n = 788)</td>
<td>31.3%</td>
<td>68.7%</td>
</tr>
<tr>
<td>Watering of livestock (n = 789)</td>
<td>19.3%</td>
<td>80.7%</td>
</tr>
<tr>
<td>People’s drinking water (n = 785)</td>
<td>11.2%</td>
<td>88.8%</td>
</tr>
</tbody>
</table>
Overall Opposition or Support for Natural Gas Extraction

Figure 14 exhibits respondents’ overall level of opposition or support for natural gas extraction from the Marcellus Shale region.
Figure 14

Overall feeling about natural gas extraction in the Marcellus Shale
(n = 797)

- Strongly support: 28.7%
- Somewhat support: 30.0%
- Neither oppose nor support: 16.8%
- Somewhat oppose: 15.1%
- Strongly oppose: 9.4%
Figures 15 through 21 summarize select individual-level traits of the survey respondents. Included here are characteristics such as:

- gender (Figure 15);
- age (Figure 16);
- level of education (Figure 17);
- current work situation (Figure 18);
- household income (Figure 19);
- individuals living in household (Figure 20); and,
- individuals under age 18 living in household (Figure 21).
Figure 15

Gender
(n = 799)

55.8% Female
44.2% Male
Figure 16

Age
(n = 777)

- 65+ years: 37.5%
- 45 to 64 years: 48.1%
- 25 to 44 years: 13.4%
- 18 to 24 years: 1.0%
Figure 17
Level of education
(n = 798)

- Did not graduate from high school: 4.3%
- High school graduate/GED: 18.8%
- Some college or other post-high school education: 23.4%
- Completed a 4-year college degree: 36.1%
- Graduate work or professional training beyond a college degree: 17.4%
Figure 19

Household income
(n = 650)

- $100,000 or more: 19.7%
- $75,000 to $99,999: 11.1%
- $50,000 to $74,999: 21.4%
- $35,000 to $49,999: 15.1%
- $25,000 to $34,999: 14.9%
- $15,000 to $24,999: 11.8%
- Less than $15,000: 6.0%
Figure 20

Individuals living in household
(n = 776)

- 1 individual: 17.9%
- 2 individuals: 17.4%
- 3 individuals: 11.9%
- 4 individuals: 4.1%
- 5 individuals: 4.1%
- 6 or more individuals: 2.2%
- 1 individual: 11.9%
Figure 21

Individuals under age 18 living in household
(n = 776)

- No one under age 18: 78.0%
- 1 individual under age 18: 10.2%
- 2 individuals under age 18: 8.5%
- 3 individuals under age 18: 1.8%
- 4 or more individuals under age 18: 1.5%
Note

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