

Oil and Natural Gas Production (ONGP) Health Concerns

ONGP in Pennsylvania

ONGP is a significant industry in Pennsylvania. The latest wave of ONGP activity in the state began in 2005 with the start of unconventional oil and natural gas development (UONGD). Unconventional wells are distinct from conventional wells by the geologic formation being tapped. They use horizontal and vertical drilling and hydraulic fracturing (“fracking”) to access traditionally unavailable reservoirs of oil and natural gas.

As of Mar. 31, 2020, the Pennsylvania Department of Environmental Protection (DEP) reported there were 10,965 active unconventional wells in the state. Thirty-four of Pennsylvania’s 67 counties had active unconventional wells, with Washington (1,805), Susquehanna (1,633) and Greene (1,387) counties having the greatest numbers of active unconventional wells.*

ONGP Health Registry

In response to growing concerns about UONGD, the Pennsylvania Department of Health (DOH) developed a confidential health registry to better track and respond to public health complaints related to ONGP.

As of Mar. 31, 2020, DOH received 166 ONGP-related health complaints, with Washington (41), Susquehanna (32) and Bradford (23) counties having the most health complaints.

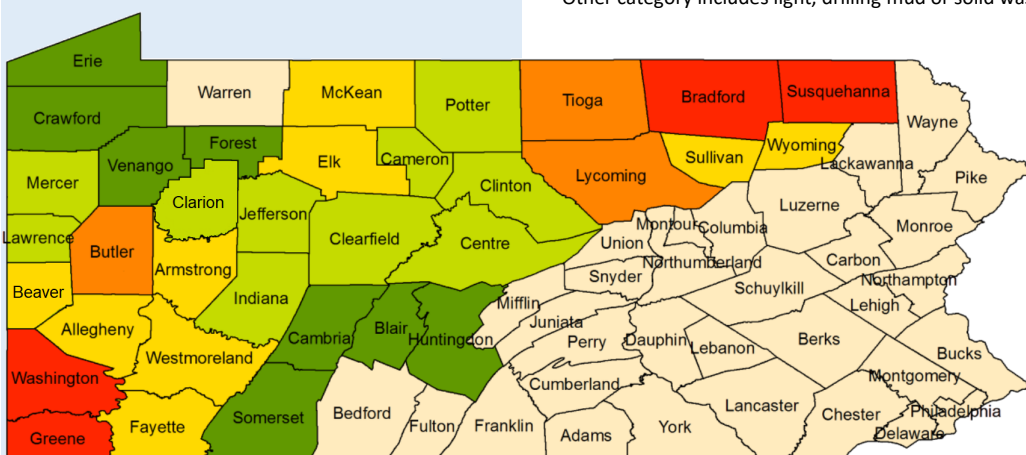


Figure 2. Active Unconventional Oil and Natural Gas Wells in Pennsylvania, as of Mar. 31, 2020*

*Based on the number of active wells from DEP Spud Data Report, Wells Drilled by County

Figure 1. Total Health Complaints Logged by DOH Division of Environmental Health Epidemiology Since 2011 (N=166)

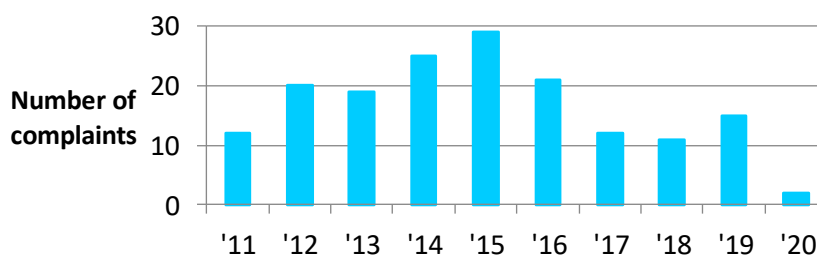


Table 1. Reason for Contact (N=166)

| Reason | Q1 2020 | 2020 YTD | Total since 2011 | % of Total since 2011 |
|--------------------------------------|---------|----------|------------------|-----------------------|
| General inquiry | 0 | 0 | 24 | 14.5% |
| News update/alert | 0 | 0 | 3 | 1.8% |
| Information sharing | 0 | 0 | 12 | 7.2% |
| Formal health complaint ^a | 2 | 2 | 127 | 76.5% |

^aGeneral inquiries, news updates/alerts and information sharing cases were no longer logged in the health complaints registry effective March 2017.

Table 2. Environmental Source of Concern^a (N=166)

| Source | Q1 2020 | 2020 YTD | Total since 2011 | % of Total since 2011 |
|--------------------|---------|----------|------------------|-----------------------|
| Water | 2 | 2 | 117 | 70.5% |
| Air | 0 | 0 | 96 | 57.8% |
| Soil | 0 | 0 | 31 | 18.7% |
| Noise | 0 | 0 | 54 | 32.5% |
| Truck traffic | 0 | 0 | 50 | 30.1% |
| Other ^b | 0 | 0 | 48 | 28.9% |
| Missing | 0 | 0 | 9 | 5.4% |

^aMore than one environmental source of concern may be selected per complaint.

^bOther category includes light, drilling mud or solid waste, vibrations or seismic testing, etc.

Referrals

One hundred % of Q1 2020 health complaints were referred by DEP.

Number of wells



Table 3. Demographic Information of Individuals in ONGP Registry With a Formal Health Complaint (N=127 formal health complaints, 265 individuals*)

| Characteristic | Q1 2020 | 2020 YTD | Total since 2011 | % of Total since 2011 |
|-----------------------|---------|----------|------------------|-----------------------|
| Female | 2 | 2 | 138 | 52.1% |
| Male | 0 | 0 | 123 | 46.4% |
| Missing | 0 | 0 | 4 | 1.5% |
| Non-Hispanic white | 2 | 2 | 111 | 41.9% |
| Non-Hispanic black | 0 | 0 | 0 | 0.0% |
| Hispanic | 0 | 0 | 0 | 0.0% |
| Other | 0 | 0 | 3 | 1.1% |
| Missing | 0 | 0 | 151 | 57.0% |
| 0-17 years old | 0 | 0 | 43 | 16.2% |
| 18-64 years old | 2 | 2 | 132 | 49.8% |
| 65+ years old | 0 | 0 | 41 | 15.5% |
| Missing | 0 | 0 | 49 | 18.5% |
| Any private insurance | 1 | 1 | 80 | 30.2% |
| Public only insurance | 1 | 1 | 29 | 10.9% |
| Uninsured | 0 | 0 | 6 | 2.3% |
| Missing | 0 | 0 | 150 | 56.6% |

Demographic Summary

This table summarizes the demographic and health insurance information of individuals included in the formal health complaints received for Q1 2020, YTD 2020 and total since 2011. This does not necessarily reflect the demographic characteristics of the entire community.

*Table excludes general inquiries, news updates and information sharing complaints. Each health complaint may pertain to more than one individual. Race/ethnicity, age and health insurance were not systematically collected until March 2017. Percentages within each group may not sum to 100% due to rounding.

Table 4. Health Information of Individuals in ONGP Registry With a Formal Health Complaint (N=127 formal health complaints, 265 individuals*)

| Symptom Group | Q1 2020 | 2020 YTD | Total since 2011 | % of Total since 2011 |
|-------------------------------|---------|----------|-----------------------|-----------------------|
| Cardiovascular | 0 | 0 | 42 (11) [†] | 15.8% |
| Dermatological | 2 | 2 | 102 | 38.5% |
| Ear | 1 | 1 | 33 | 12.5% |
| Eye | 0 | 0 | 54 | 20.4% |
| Gastrointestinal | 2 | 2 | 95 | 35.8% |
| General systemic ^a | 1 | 1 | 96 | 36.2% |
| Neurological | 0 | 0 | 115 (6) [†] | 43.4% |
| Psychological | 2 | 2 | 62 (8) [†] | 23.4% |
| Respiratory | 1 | 1 | 141 (22) [†] | 53.2% |
| Urogenital | 1 | 1 | 27 (6) [†] | 10.2% |
| Missing | 0 | 0 | 36 | 13.6% |

Symptom Summary

This table summarizes the symptoms reported by individuals for Q1 2020, YTD 2020 and total since 2011.

*Table excludes general inquiries, news updates and information sharing complaints. Each health complaint may pertain to more than one individual.

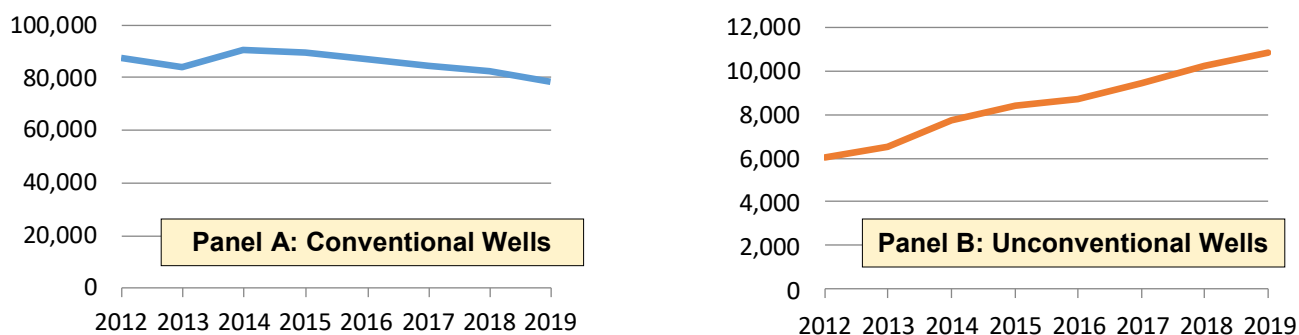
^aIncludes sleep disturbance, fatigue, fever, chills, night sweats, shaking, weight loss/gain, decreased appetite, muscle aches/cramps, joint pain, fainting and swelling

[†]Numbers in parentheses correspond to newly diagnosed conditions relevant to that symptom group: heart disease and/or hypertension (cardiovascular group), neurological disease (neurological), psychological disease (psychological), asthma or COPD (respiratory), kidney disease or failure (urogenital). They do not represent pre-existing conditions. Therefore, someone could report that UONGD exacerbated their asthma (noted in the respiratory count) but was diagnosed before UONGD activity started in their area (not reflected in number of parentheses).

Health Overview 2020 Year-to-Date Based on Formal Health Complaints (N=2 complaints, 2 individuals)

- 100% of individuals reported being in poor or fair health.
- 50% of individuals reported being disabled.
- 50% of individuals reported being diagnosed with cancer since the beginning of 2020.
- 100% of individuals visited the doctor for their health concerns.
- Two (50%) of 2020 YTD complaint cases had concerns about animal health (livestock or pets).

Figure 3. Total Number of Active Oil and Natural Gas Wells in Pennsylvania, 2012 to 2019



The tables below show data for counties with more than 500 active unconventional oil and natural gas wells as of Mar. 31, 2020.

Washington (1,805) Susquehanna (1,633) Greene (1,387)
Bradford (1,345) Lycoming (924) Tioga (773) Butler (576)

Table 5. Environmental Source of Concern by County (All Complaints Since 2011)

| Source | Washington | Susquehanna | Greene | Bradford | Lycoming | Tioga | Butler |
|--------------------|------------|-------------|--------|----------|----------|-------|--------|
| Water | 24 | 27 | 7 | 21 | 2 | 4 | 3 |
| Air | 32 | 17 | 4 | 6 | 4 | 2 | 2 |
| Soil | 9 | 5 | 2 | 4 | 0 | 1 | 0 |
| Noise | 21 | 10 | 4 | 4 | 0 | 1 | 1 |
| Truck traffic | 21 | 9 | 3 | 4 | 1 | 2 | 1 |
| Other ^a | 21 | 10 | 2 | 5 | 0 | 0 | 1 |
| Missing | 3 | 0 | 0 | 0 | 1 | 0 | 0 |

County-specific numbers of complaint cases are as follows: 41 (Washington), 32 (Susquehanna), 8 (Greene), 23 (Bradford), 6 (Lycoming), 4 (Tioga) and 3 (Butler). More than one environmental source of concern may be selected per complaint.

^aOther category includes light, drilling mud or solid waste, vibrations or seismic testing, etc.

Table 6. Health Symptoms by County (Individuals With a Formal Health Complaint Since 2011)

| Symptom Group | Washington | Susquehanna | Greene | Bradford | Lycoming | Tioga | Butler |
|-------------------------------|------------|-------------|--------|----------|----------|-------|--------|
| Cardiovascular | 6 | 8 | 3 | 12 | 0 | 1 | 0 |
| Dermatological | 23 | 27 | 10 | 12 | 6 | 1 | 0 |
| Ear | 7 | 6 | 0 | 3 | 2 | 1 | 0 |
| Eye | 15 | 11 | 2 | 5 | 3 | 2 | 0 |
| Gastrointestinal | 22 | 24 | 6 | 15 | 0 | 3 | 2 |
| General systemic ^a | 24 | 19 | 9 | 11 | 0 | 3 | 2 |
| Neurological | 29 | 19 | 6 | 15 | 1 | 5 | 3 |
| Psychological | 22 | 14 | 2 | 5 | 3 | 0 | 2 |
| Respiratory | 37 | 29 | 12 | 16 | 4 | 6 | 2 |
| Urogenital | 6 | 7 | 2 | 4 | 3 | 0 | 1 |
| Missing | 16 | 2 | 3 | 8 | 0 | 0 | 1 |

County-specific numbers of individuals are as follows: 66 (Washington), 60 (Susquehanna), 20 (Greene), 35 (Bradford), 8 (Lycoming), 8 (Tioga) and 5 (Butler).

^aIncludes sleep disturbance, fatigue, fever, chills, night sweats, shaking, weight loss/gain, decreased appetite, muscle aches/cramps, joint pain, fainting and swelling

By far, most oil and natural gas-related complaints received by DOH have been related to UONGD. We have received four complaints related to conventional oil and natural gas development since 2011.

Figures in this report may slightly differ from previous reports due to the potential for ongoing data collection. Please contact the Division of Environmental Health Epidemiology for more details at 717-787-3350 or env.health.concern@pa.gov.