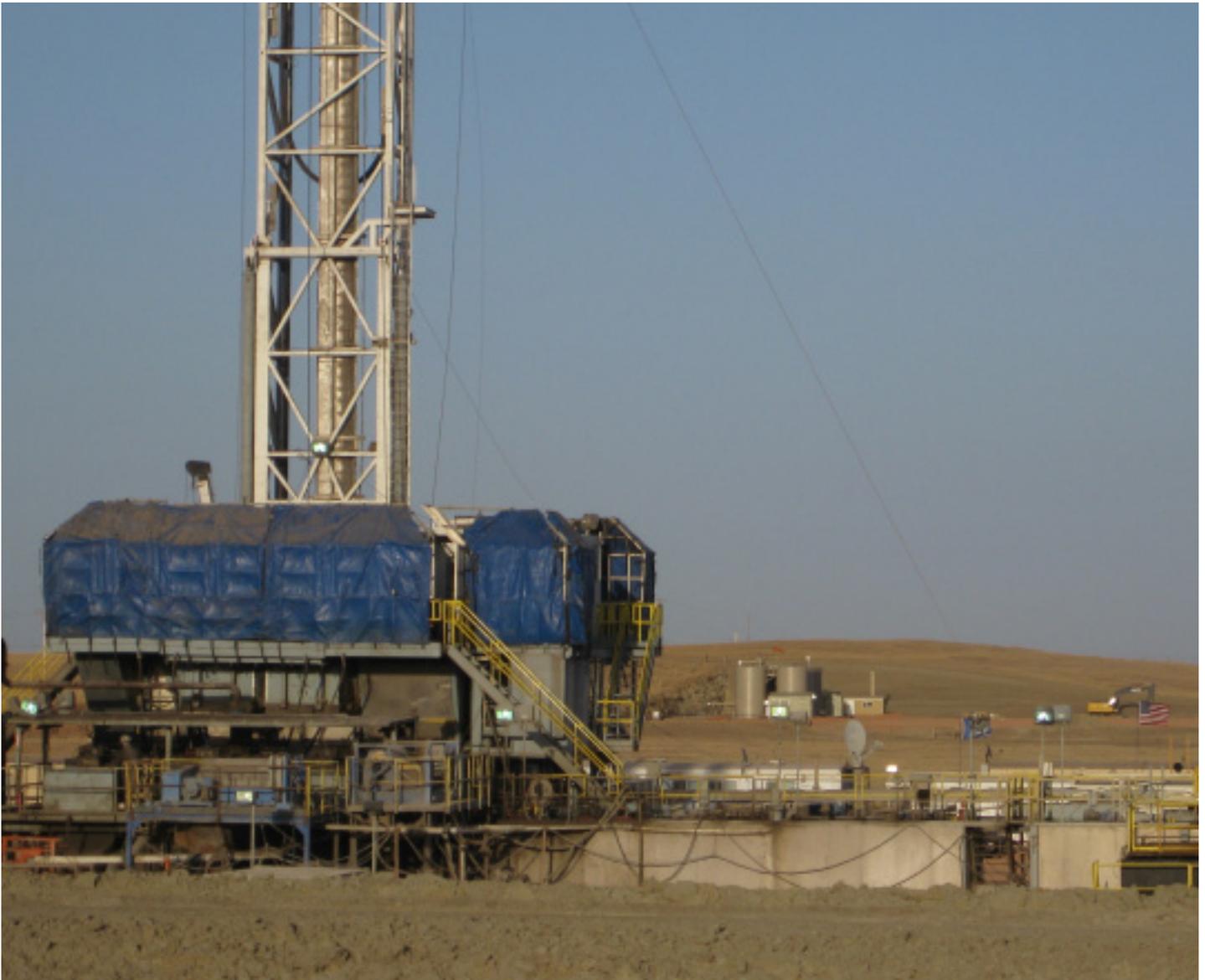


# RESPONDING TO LANDOWNER COMPLAINTS OF WATER CONTAMINATION FROM OIL AND GAS ACTIVITY: BEST PRACTICES



**HARVARD LAW SCHOOL**

Environmental Law Program  
Emmett Environmental Law & Policy Clinic

PREPARED BY

William Cranch, *Clinical Student*

Margaret Holden, *Clinical Student*

Shaun Goho, *Senior Clinical Instructor*

Kate Konschnik, *Policy Director*

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**The Emmett Environmental Law and Policy Clinic** at Harvard Law School is directed by Wendy B. Jacobs and is dedicated to addressing major environmental issues in the United States and abroad and to providing its students an opportunity to do meaningful, hands-on environmental legal and policy work. Students and clinic staff work on issues such as climate change, pollution reduction, water protection, and smart growth.

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Cover Image: A drill rig in the Bakken oil field in Stark County, western North Dakota. Source: U.S. Geological Survey/ Photo by Stephanie Gaswirth (2012), available at <http://energy.usgs.gov/GeneralInfo/HelpfulResources/MultimediaGallery/HydraulicFracturingGallery.aspx>.

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## EXECUTIVE SUMMARY

State agencies are receiving an increasing number of complaints that shale oil or shale gas extraction has contaminated private water supplies. However, across the United States, only a few statutes, regulations, and procedures focus on responding to and investigating these complaints. Those that exist are often insufficient to respond adequately to landowner concerns. This report provides specific recommendations that state lawmakers and agencies can consider implementing to develop robust, comprehensive policies for responding to landowner complaints. If adopted, these practices can help ensure that agencies conduct a thorough investigation of potentially contaminated water sources, landowners obtain an accurate understanding of the finding, and transparency of the investigatory process is enhanced.

### Recommendations

The recommendations contained in this report focus on four major categories: baseline water testing and statutory presumptions of liability; administrative processes for handling water supply complaints; information distribution; and review of agency determinations.

**(1) Require baseline water testing and adopt statutory presumptions of liability.** Baseline water testing conducted prior to shale oil or shale gas extraction is crucial to help agencies establish whether oil and gas activity has influenced water quality and/or quantity. In addition, a statutory presumption that the operator is liable for nearby water contamination or diminution is crucial to encouraging responsible drilling practices. Therefore, we recommend that:

- States require mandatory baseline water testing.
  - Baseline water testing should be required within a certain radius of oil and gas wells and impoundments.
  - Mandatory follow-up testing should occur at established intervals after completion of drilling.
  - Baseline water sampling should test for a standard set of parameters.
  - An independent third party should conduct the sampling and testing.
- States adopt statutory presumptions of liability.
  - Operators should be presumed liable for contamination and diminution of all water supplies within the mandatory baseline sampling radius.

- Time limits on periods of presumed liability should be of sufficient length to allow any contamination or diminution to manifest in surrounding water supplies.
  - Operators should be able to rebut the presumption of liability by affirmatively proving certain pre-established defenses, such as the absence of a “tracer” chemical that fingerprints a chemical release as belonging to that operator.
- States consider requiring tracers to establish or disprove causation.

**(2) Establish robust administrative processes for handling water supply complaints.** A robust procedure for handling complaints helps ensure that investigations are comprehensive, timely, and accurate. We recommend that:

- States establish a statutory framework that governs agency responses to landowner complaints of contamination or diminution of water supplies from oil and gas activity.
- States handle investigations of landowner complaints of contamination or diminution of water supplies in a timely fashion.
- Agencies issue impact determinations in a timely fashion.
  - Time frames for issuance of determinations should balance promptness with the requirements for a thorough investigation.
  - The agency should be permitted to extend the investigation period if necessary to ensure thoroughness, as long as it provides an explanation of the reason for delay and an estimated updated timeline.
- State agencies develop a mandatory, comprehensive internal process for responding to complaints.
  - Investigators should have adequate training in water sampling, sample analysis, and identifying oil and gas contamination.
  - Investigators should consult information about an area’s geology and hydrology.
  - State agencies should establish a standard set of required sampling parameters.

**(3) Facilitate information distribution.** Agencies should respond to landowner complaints in a clear, understandable manner. They should also make information about investigations available to the general public, to help keep landowners informed and enhance transparency between the public and state agencies. Specifically, we recommend that:

- Determination letters include information sufficient for a landowner to fully understand the investigation and the basis for the determination.
- State agencies make determination letters available to the general public.
- Agency websites be designed to facilitate the access to and use of information by the general public.

**(4) Allow for review of agency determinations.** Review of agency determinations is a necessary component of a functional investigation and determination system. Therefore, agency determinations should be appealable to the agency's administrative review board. Once all administrative appeals have been exhausted, the determination should be considered final agency action subject to judicial review.

## PART I: INTRODUCTION

In recent years, advances in hydraulic fracturing and horizontal drilling have made it economically feasible to recover oil and natural gas from shale formations in the United States. Hydraulic fracturing involves injecting “fracking fluids” containing water, chemicals, and proppants at high pressures into oil- and gas-producing formations, creating fractures and allowing fossil fuels to flow to production wells.<sup>1</sup> Horizontal drilling allows the direction of a well to change by 90 degrees, thereby allowing it to reach otherwise inaccessible areas and maximizing the proportion of the reservoir tapped by a given well.<sup>2</sup> These technological advances have resulted in dramatic increases in oil and gas production. For example, the share of U.S. natural gas that comes from shale production has increased from eleven percent in 2008 to thirty-five percent in 2012, and that percentage is growing.<sup>3</sup>

These technologies, in addition to increasing production, have also raised concerns about environmental impacts. One such concern is the risk of groundwater and surface water contamination or diminution.<sup>4</sup> Contamination and diminution can occur at any stage throughout the oil and gas extraction process. First, at the water acquisition stage, water withdrawal for use in fracking fluid can impact water quantity and quality.<sup>5</sup> Second, during the chemical mixing stage, chemicals can be released to surface and groundwater from spills, leaks, or chemical transportation accidents.<sup>6</sup> Third, during well injection, fracking fluid may migrate into drinking water aquifers, or a well malfunction could lead to accidental release of natural gas to ground or surface water.<sup>7</sup> Fourth, at the flowback and produced water stage, chemicals returned to the surface could be released due

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1 GROUNDWATER PROTECTION COUNCIL, STATE OIL AND GAS AGENCY GROUNDWATER INVESTIGATIONS AND THEIR ROLE IN ADVANCING REGULATORY REFORMS 21 (2011), available at [http://fracfocus.org/sites/default/files/publications/state\\_oil\\_gas\\_agency\\_groundwater\\_investigations\\_optimized.pdf](http://fracfocus.org/sites/default/files/publications/state_oil_gas_agency_groundwater_investigations_optimized.pdf).

2 Mark Fischetti, *The Drillers are Coming*, SCIENTIFIC AMERICAN, July 2010, at 82, 83-84.

3 ENERGY INFORMATION ADMINISTRATION, NATURAL GAS ANNUAL 2012, at 1 (2013), available at <http://www.eia.gov/naturalgas/annual/pdf/nga12.pdf>.

4 See, e.g., Sally Entekin et al., *Rapid Expansion of Natural Gas Development Poses a Threat to Surface Waters*, 9 FRONTIERS IN ECOLOGY & THE ENV'T 503 (2011) (scientific perspective); Erica Brown et al., Center for Local, State, and Urban Policy, *Public Opinion on Fracking: Perspectives from Michigan and Pennsylvania* (2013) (public perspective), available at <http://closup.umich.edu/files/nsee-fracking-fall-2012.pdf>; EPA, STUDY OF THE POTENTIAL IMPACTS OF HYDRAULIC FRACTURING ON DRINKING WATER RESOURCES (2012), available at <http://www2.epa.gov/sites/production/files/documents/hf-report20121214.pdf>. Other concerns include impacts to air quality and sociological changes. EPA, *supra*, at 5.

5 EPA, *supra* note 4, at 9.

6 *Id.*

7 *Id.*

to leakage from onsite storage or improper pit construction, maintenance, or closure.<sup>8</sup> Finally, at the waste disposal stage, incomplete treatment of wastewater and solid residuals or wastewater transportation accidents can result in contamination.<sup>9</sup>

Indeed, there is evidence that water contamination from hydraulic fracturing is occurring.<sup>10</sup> For example, a Scranton Times-Tribune analysis of water contamination determinations made by the Pennsylvania Department of Environmental Protection (“PADEP”) revealed that oil and gas development contaminated water supplies for at least 161 Pennsylvania homes, farms, churches, and businesses between 2008 and October 2012.<sup>11</sup> Other studies have found that methane contamination has risen sharply near hydraulic fracturing sites in Pennsylvania and New York.<sup>12</sup>

Of course, industrial impacts on private water supplies are not new to the law. At the most basic level, common law rights in tort or property law exist to resolve disputes. However, in the context of the prolific spread of oil and gas drilling activities, particularly shale gas extraction, landowner complaints of contamination and diminution may be addressed more efficiently by state administrative processes.

We begin our analysis with Pennsylvania, because its law governing responses to landowner complaints is one of the more robust in the United States and because this state has seen extensive development of its shale gas resources. Under Pennsylvania law, a landowner who believes she is suffering pollution or diminution of a water supply as a result of the drilling, alteration, or operation of an oil or gas well may notify PADEP and request that the agency conduct an investigation.<sup>13</sup> PADEP must investigate the claim within ten days of notification and must make a determination within forty-five days.<sup>14</sup>

To evaluate the content and quality of these determinations, we obtained and evaluated over 450 determination letters from PADEP. In evaluating these letters, we found that some of them

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8 *Id.*

9 *Id.*

10 Kevin Begos, *Some States Confirm Water Pollution from Drilling*, AP (Jan. 5, 2014).

11 Laura Legere, *Sunday Times Review of DEP Drilling Records Reveals Water Damage, Murky Testing Methods*, SCRANTON TIMES-TRIBUNE (May 19, 2013), <http://thetimes-tribune.com/news/sunday-times-review-of-dep-drilling-records-reveals-water-damage-murky-testing-methods-1.1491547>.

12 Stephen G. Osborn et al., *Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing*, 108 PROC. NAT’L ACAD. SCI. USA 8172 (2011); R. B. Jackson et al., *Increased Stray Gas Abundance in a Subset of Drinking Water Wells Near Marcellus Shale Gas Extraction*, 110 PROC. NAT’L ACAD. SCI. USA 11,250 (2013); *see also* Brown, *supra* note 4, at 9.

13 58 Pa. Cons. Stat. § 3218.

14 *Id.*

contain enough information to enable a landowner to understand whether her water resources have been impacted. These letters enclose water sample analysis results and a fact sheet, compare the results to pre-drill water test results, and explain any differences that might be present.<sup>15</sup> However, in many other letters, some or all of this information is absent. As a result, many letters do not contain sufficient information for landowners to determine whether or how water resources have been impacted. The most common shortcomings are that (1) PADEP does not explain the water sample analysis; (2) PADEP does not explain how it reached its conclusion; (3) PADEP indicates that it does not have adequate information to make a determination; and (4) the letters are confusing and/or inconsistent with others in the same geographic area.

Although some states have frameworks similar to Pennsylvania's, across the United States there are very few statutes, regulations, and internal procedures that focus on how to respond to landowner complaints about water contamination.<sup>16</sup> For example, many states do not have a separate administrative process for handling complaints about oil and gas drilling impacts on water quality or quantity; rather, residents must submit complaints through general environmental complaint procedures. In addition, many states do not require timely investigations, timely determinations, or a comprehensive investigative process. Finally, even states (such as Pennsylvania) that have established a separate administrative process may not provide comprehensive determination letters to landowners, and either do not make such letters publicly accessible, or make them difficult to locate and access. In addition to these procedural shortcomings, many states do not require mandatory baseline testing, which is crucial for an agency to determine whether nearby oil or gas activity has impacted a water supply.

This report provides detailed guidance for states regarding how to respond to landowner complaints about water contamination or diminution that may be caused by shale oil or shale gas extraction. Our recommendations focus on four categories: Part II discusses baseline water testing and statutory presumptions of liability; Part III concerns the administrative process for handling water supply complaints and making determinations; Part IV discusses dissemination of determinations and other information; and Part V discusses administrative and judicial review of determinations. These guidelines are designed to stimulate discussions and assist state development of robust, comprehensive policies for responding to landowner complaints in a way that ensures that landowners obtain an accurate understanding of the source of their water contamination and enhances transparency of agency investigations.

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15 *E.g.*, Letter from S. Craig Lobins, Northwest Regional Office, to Margaret Glatch, CID No. 276991 (Mar. 10, 2011) (on file with the Emmett Environmental Law and Policy Clinic (“ELPC”).

16 For a list of relevant provisions, see the Appendix.

## PART II: BASELINE WATER TESTING & PRESUMPTIONS OF LIABILITY

Although most of this report focuses on the procedures that agencies use to review and respond to complaints, this Part suggests three program components states could adopt that would facilitate investigations and shift the burden of proof in limited circumstances. The first is a requirement that all operators conduct baseline tests of water quality and quantity in all nearby water wells before drilling. Baseline testing identifies the chemical characteristics and quantity of a water resource, which can then be monitored to evaluate whether nearby drilling has impacted it. Indeed, in the absence of such testing, it is extremely difficult to definitively link oil and gas activity to declining water quantity and/or quality.

Second, we recommend that, in reviewing water contamination complaints, states adopt a presumption that an operator is liable for contamination occurring within a certain distance of an oil or gas well unless the operator can demonstrate that the contamination can be traced to another cause. Because operators know they will be held liable for post-drilling contamination unless they show test results indicating that a water supply was already contaminated, presumptions may make rational operators more likely to operate with caution and follow responsible drilling practices. Presumptions of liability also shift the burden of proving causation from the landowner to the operator, the party with greater expertise and access to relevant information, serving to level the playing field.

Third, states should investigate the use of “tracer” molecules to fingerprint drilling fluids from individual well sites. These molecules are still a relatively new technology, but offer the promise of definitively identifying the source of water contamination.

### **Recommendation II.A: Adopt mandatory baseline water testing that adheres to a specific set of standards.**

Currently, North Carolina, Ohio, Colorado, Illinois, and Wyoming require baseline water testing, or testing prior to the commencement of drilling (see table II.A). Other states, including Pennsylvania and West Virginia, do not require baseline testing, but encourage it by providing that results may be used to rebut a presumption of liability. However, in order to fully understand the impact of oil and gas activity on water quality, baseline water testing prior to commencement of drilling should be mandatory in all states where drilling occurs. This required baseline water testing should follow a specific set of standards, which are outlined below.

***II.A.1. – Baseline water testing should be required within a certain radius of oil and gas wells and impoundments.***

Geologists, engineers, and other relevant experts should be consulted to determine the appropriate sampling radii for water testing. Currently, the radius for required baseline testing ranges from 1,500 feet from oil and gas wells in Ohio and Illinois to 5,000 feet in North Carolina (see table II.A). There does not appear to be a scientifically-based rationale for these radii. One group of researchers suggest that 3,000 feet from wells may be an appropriate distance over which to sample groundwater,<sup>17</sup> based on a study analyzing water samples from 60 private water wells in Pennsylvania and New York.<sup>18</sup> It is unclear whether this distance should differ based on the unique geology of a state or shale basin, or any additional site-specific conditions. Thus each state agency should consult with experts to determine the possible range of impact of any oil and gas contamination. This should serve as the basis for determining the proper sampling radius.

In addition, the testing radius should be centered around each component of the well operation that may contain sources of contamination at any time during shale gas extraction, including impoundments, cutting pits, and chemical storage units. Limiting the radius to one centered around wellheads, as many states' presumptions currently do, fails to account for other potential sources of water contamination and the reality that contamination vectors may be located far from the wellhead itself.<sup>19</sup>

Note that some landowners may not wish to grant operators access to their water supply due to privacy or other concerns. In that case, the state should allow an operator to be exempt from baseline testing requirements if the operator provides proof that it has requested access from the landowner and the landowner has refused.

***II.A.2 – Mandatory follow-up testing should occur at established intervals after well completion.***

Currently, many states do not require follow-up tests, and those that do only require them within a short window of time after well completion. For example, Ohio does not require any follow-up tests<sup>20</sup> and North Carolina requires only two within a twenty-four-month period after

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17 ROBERT B. JACKSON ET AL., CENTER ON GLOBAL CHANGE, DUKE UNIVERSITY, RESEARCH AND POLICY RECOMMENDATIONS FOR HYDRAULIC FRACTURING AND SHALE-GAS EXTRACTION 7 (2011), *available at* <http://files.nicholas.gethifi.com/publications/climate/policydesign/researchandpolicyrecommendationsforhydraulic-fracturingandshale-2010gasextraction-paper.pdf>.

18 Osborn, et al., *supra* note 12.

19 EPA, *supra* note 4, at 9.

20 Ohio Rev. Code § 1509.06(A)(8)(b)-(c).

production has commenced.<sup>21</sup> However, contamination may take months or years to surface. A best practice for follow-up sampling can be found in Colorado, where one groundwater sampling must be conducted between six and twelve months following the completion of a well, and a second sampling be conducted between sixty and seventy-two months.<sup>22</sup> In addition, testing data should be made available such that the landowner can easily access and trust them. For instance, Colorado requires the state agency to post the sampling results on its website.<sup>23</sup> In North Carolina, a landowner may ask the State to do the follow-up sampling instead of the operator.<sup>24</sup>

### *II.A.3. – Baseline water sampling should test for a standard set of parameters.*

Testing for all possible parameters in a water sample is costly and impractical. Instead, States can identify a number of required parameters for water quality testing, based on constituents likely to be present in oil and gas production fluids. The parameters should be the same as the parameters used to investigate water quality after a complaint has been made. After some years of experience, stakeholders are beginning to converge on a set of parameters, which provides a sense of scope. States wishing to establish the most comprehensive testing regime should consider all parameters tested by each stakeholder as potential candidates. These parameters can be found in Table III.D. In addition to chemical parameters, baseline water level testing would be helpful when assessing water diminution claims.

### *II.A.4 – An independent third party should conduct the sampling.*

Illinois requires an “independent third party, under the supervision of a professional engineer or professional geologist” to collect the samples and an “independent testing laboratory” to analyze them.<sup>25</sup> Pennsylvania rules also require that baseline testing be conducted by an independent certified laboratory.<sup>26</sup> These requirements help ensure the objectivity of the assessment. They also ensure that a properly-trained technician conducts the analysis.

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21 N.C. Gen. Stat. § 113-423(f).

22 2 Colo. Code Regs. §§ 404-1:317B(d)-(e); 404-1:609(b).

23 2 Colo. Code Regs. § 404-1:317B(f)(1).

24 N.C. Gen. Stat. § 113-423(f).

25 225 Ill. Comp. Stat. 732/1-80.

26 25 Pa. Code § 78.52 (2011).

**Table II.A: Mandatory Baseline Water Testing: Existing Models<sup>27</sup>**

State	Provision	Sampling Radius & Timing	Follow Up Tests	Identity of Tester	Parameters	Other Procedures
CO	2 Colo. Code Regs. § 404-1: 317B(d)-(e) (surface water); 609(b) (groundwater)	<p><b>Surface Water:</b> operations in the intermediate and external buffer zones require a “pre-drilling water sample collected immediately down gradient of the oil and gas location.”</p> <p><b>Groundwater:</b> “Initial baseline samples and subsequent monitoring samples shall be collected from all Available Water Sources, up to a maximum of four (4), within one-half (1/2) mile radius of a proposed Oil and Gas Well, Multi-Well Site, or Dedicated Injection Well.” - Initial sampling should occur “within 12 months prior to setting conductor pipe in a Well or the first Well on a Multi-Well Site, or commencement of drilling a Dedicated Injection Well.”</p>	<p><b>Surface Water:</b> a follow-up sample must be collected three months “after the conclusion of any drilling activities and operations or completion.”</p> <p><b>Groundwater:</b> “One subsequent sampling event shall be conducted at the initial sample locations between six (6) and twelve (12) months, and a second subsequent sampling event shall be conducted between sixty (60) and seventy-two (72) months following completion of the Well or Dedicated Injection Well, or the last Well on a Multi-Well Site.”</p>	<b>Surface Water:</b> “analyses must be performed by laboratories that maintain state or nationally accredited programs.”	<b>Surface Water:</b> pH, alkalinity, specific conductance, major cations/anions, total dissolved solids, BTEX/GRO/DRO, TPH, PAH’s, and metals (arsenic, barium, calcium, chromium, iron, magnesium, and selenium). In addition, “[c]urrent applicable EPA-approved analytical methods for drinking water must be used.”	<b>Surface Water:</b> “[c]urrent applicable EPA-approved analytical methods for drinking water must be used.”
IL	225 Ill. Comp. Stat. 732	“all water sources within 1,500 feet of the well site”	All applicable water sources must be “sampled and tested in the same manner 6 months, 18 months, and 30 months after the high volume horizontal hydraulic fracturing operations have been completed.”	An “independent third party, under the supervision of a professional engineer or professional geologist” must collect samples. An “independent testing laboratory” must analyze them.	“pH; total dissolved solids, dissolved methane, dissolved propane, dissolved ethane, alkalinity, and specific conductance; chloride, sulfate, arsenic, barium, calcium, chromium, iron, magnesium, selenium, cadmium, lead, manganese, mercury, and silver; BTEX; and gross alpha and beta particles to determine the presence of any naturally occurring radioactive materials.”	Sampling must, at minimum, “be consistent with the work plan and allow for a determination of whether any hydraulic fracturing additive or other contaminant has caused pollution or diminution...”

<sup>27</sup> For further information on these provisions, see the Appendix. In Colorado, the intermediate buffer zone is 301-500 feet from a classified water supply segment (a classified water supply segment is a perennial or intermittent stream classified as being suitable or intended to become suitable for potable water supplies by the Colorado Water Quality Commission). The external buffer zone is 501-2,640 feet from a classified water supply segment.

State	Provision	Sampling Radius & Timing	Follow Up Tests	Identity of Tester	Parameters	Other Procedures
NC	N.C. Gen. Stat. § 113-423(f)	5,000 feet from a well-head, at least 30 days prior to initial drilling	"at least two follow-up tests within a 24-month period after production has commenced"			
OH	Ohio Rev. Code 1509.06 (A) (8)(b)-(c)	1500 feet for all horizontal wells and (b) 300 feet for all non-horizontal wells in urban areas			Must be "conducted in accordance with guidelines established in 'Best Management Practices For Pre-drilling Water Sampling.'"	Must be "conducted in accordance with guidelines established in 'Best Management Practices For Pre-drilling Water Sampling.'"
WY	Wyo. Admin. Code Oil & Gas Cons. Comm'n ch. 3, § 46(h)	<p><b>Radius:</b> If four or fewer water sources are within a half-mile radius of the location for a proposed gas well, a baseline sample is required from each water source. For more than four sources, the operator must submit a plan to the Supervisor for approval for selecting sources to sample based on factors including proximity, source/aquifer and groundwater flow direction.</p> <p><b>Timing:</b> "initial sampling and testing shall be conducted within the twelve (12) month period prior to spudding the well or the first well on a multi-well pad."</p>	There must be a second sampling between 12 and 24 months after setting the production casing, and a third sampling between 36 and 48 months after casing.		"temperature, pH, oxidation-reduction potential, specific conductance, turbidity, dissolved oxygen, total dissolved solids (TDS), dissolved gases (methane, ethane, propane), alkalinity (total bicarbonate and carbonate as CaCO <sub>3</sub> ), major anions (bromide, chloride, fluoride, sulfate, nitrate and nitrite as N, phosphorus), major cations (calcium, iron, magnesium, manganese, potassium, sodium), other elements (barium, boron, selenium and strontium), presence of bacteria (iron related, sulfate reducing, slime forming), total petroleum hydrocarbons (TPH), BTEX compounds (benzene, toluene, ethylbenzene and xylenes), and naphthalene. Field observations such as odor, water color, sediment, bubbles, and effervescence shall also be documented."	The proposed regulations contain an appendix detailing sampling and analysis procedures for groundwater baseline sampling, analysis, and monitoring. The appendix describes the minimum requirements and protocols that must be followed by oil or gas operators.

## **Recommendation II.B: Adopt statutory presumptions of liability to encourage responsible drilling practices.**

Like mandatory baseline water testing, statutory presumptions of liability play an essential role in the operation of an effective investigation and determination regime. In groundwater contamination cases, causation is often both the key issue and the most difficult element to prove. Presumptions of liability simplify the causation analysis by holding an operator liable unless it is able to affirmatively rebut the presumption. In jurisdictions where baseline water testing is mandatory, the radius for the testing would also constitute the “zone of presumption.” In jurisdictions where baseline testing is not mandatory, presumptions may incentivize baseline testing, as a method for rebutting the presumption. Similarly, homeowners may be more willing to cooperate with baseline testing in order to establish that their water supply was not contaminated before extraction. As between a landowner and an operator, a presumption of liability also places the evidentiary burden on the party that is more likely to have the expertise and the resources to determine the cause of the contamination.

Illinois, North Carolina, Pennsylvania, and West Virginia have presumptions of liability in place. Table II.B describes some of the differences between these existing statutory programs.

**Table II.B.: Presumptions of Liability: Existing Models<sup>28</sup>**

State	Provision	Presumption	Rebuttal	Burden and Standard for Rebuttal	Remedies
IL	225 Ill. Comp. Stat. 732/1-83; 85	Presumed that any person conducting or has conducted high volume horizontal hydraulic fracturing operations is liable for pollution or diminution of a water supply if: 1. Water source is within 1,500 feet of the well site; 2. Water quality data showed no prior pollution or diminution; and 3. Pollution or diminution occurred no more than 30 months after completion of operations.	1. Water source not within 1,500 feet; 2. Pollution or diminution occurred prior to operations or more than 30 months after completion; 3. Pollution or diminution occurred as the result of an identifiable cause other than operations.	On operator to affirmatively prove by clear and convincing evidence.	Restore or replace affected supply with an alternative source adequate in quantity and quality for purposes served. Quality must meet or exceed the quality of the original water source based on baseline testing.
NC	N.C. Gen. Stat. § 113-421	Presumed that an oil or gas developer or operator is responsible for contamination of all water supplies that are within 5,000 feet of a wellhead.	1. Contamination existed before commencement of drilling activities as evidenced by a predrill test; 2. Landowner refused to allow pre-drill test; 3. Water supply not within 5,000 feet; or 4. Contamination occurred as result of a cause other than activities of the operator.	On operator to prove by a preponderance of the evidence.	1. Provide replacement water supply to the surface owner and others using supply at time of commencement of activities that is adequate in quality and quantity; 2. Compensation for any damage to water supplies in use prior to commencement; 3. Cost of repair of damaged personal property; and 4. Market value of damage to livestock, crops or timber
PA	58 Pa. Cons. Stat. § 3218	Presumed that a well operator is responsible for pollution of a water supply if: 1. Conventional well: within 1,000 feet of a wellhead and pollution occurred within 6 months after completion of drilling or alteration; 2. Unconventional well: within 2,500 feet of vertical bore and pollution occurred within 12 months after completion of drilling, stimulation or alteration.	1. Pollution existed prior to the drilling as determined by a predrill survey; 2. Landowner refused to allow operator access to conduct predrill survey; 3. Water supply not within presumptive distance; 4. Pollution occurred after presumptive timeline; or 5. Pollution resulted from a cause other than the drilling activity.	On operator to affirmatively prove.	1. Provide temporary water supply if water user is without a readily available alternative source of water that is adequate in quantity and quality for the purposes served by the supply.
WV	W. Va. Code § 22-6A-18	Presumed that the drilling and the oil or gas well was the proximate cause of contamination or deprivation of fresh water source or supply if within 1,500 feet of the center of the well pad for a horizontal well.	1. Pollution existed prior to the drilling as determined by a predrill test; 2. Landowner refused to allow operator access to conduct predrill test; 3. Water supply not within 1,500 feet; 4. Pollution occurred more than 6 months after completion of drilling; 5. Pollution occurred as the result of some cause other than the drilling.	On operator to prove by a preponderance of the evidence.	1. Replace the water supply with a comparable water supply. In addition, Secretary may order: 2. Provide an emergency drinking water supply within 24 hours; 3. Provide a temporary water supply within 72 hours; 4. Begin to establish a permanent water supply within 30 days, with completion of permanent replacement within 2 years; and 5. Pay all reasonable costs incurred by the landowner in securing a water supply.

<sup>28</sup> For further information on these provisions, see the Appendix.

*II.B.1 – Operators should be presumed liable for contamination and diminution of all water supplies within the mandatory baseline sampling radius.*

Operators should be presumed liable for all contamination and diminution of water supplies within the radius in which baseline testing was conducted, unless baseline sampling reveals that the contamination existed prior to drilling. As mentioned below, the presumption does not apply if the landowner has refused to allow pre-drill testing on her land. Thus, the presumption of liability incentivizes landowners to allow testing of their water, so that they can take advantage of the presumption in the event that contamination occurs.<sup>29</sup>

*II.B.2 – Time constraints on periods of presumed liability should be of sufficient length to allow any contamination or diminution to manifest itself in surrounding water supplies.*

Water contamination may occur soon after completion of an improperly drilled or cemented well. The longer the period of time that has passed since the completion of a well, the less likely it becomes that water contamination has been caused by one of these acute incidents. For this reason, states with statutory presumptions of contamination have set time limits for the presumption. West Virginia, Pennsylvania, and Illinois limit the presumption to six months, twelve months, and thirty months, respectively, after well completion while North Carolina has no time constraint on the presumption.

Less is known about the probability of contamination over the long term from poorly maintained wells. Underground contamination can take years or even decades to migrate from a source to a domestic well.<sup>30</sup> Therefore, removing all time constraints would be the most favorable approach for landowners. However, holding an operator liable for contamination long after shale gas development is complete arguably puts an undue burden on the operator. A time limit reflects a balancing act between these two interests. States seeking to implement a time limit on the presumption of liability should consult with hydrologists and hydro-geologists to determine the amount of time necessary for contamination to migrate from drill sites or impoundments to nearby properties.

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29 Note that if baseline testing is not mandatory (contrary to the recommendations made in Part II.A of this report), presumptions of liability encourage both landowners *and* operators to conduct baseline testing, as operators must present baseline testing results with pre-drilling contamination in order to rebut the presumption of liability.

30 Thomas Harter, University of California, *Farm Water Quality Planning Reference Sheet: Groundwater Quality and Groundwater Pollution* (2003), available at <http://groundwater.ucdavis.edu/files/136273.pdf>.

*II.B.3 – Operators should be able to rebut the presumption of liability by affirmatively proving any of the statutorily defined defenses.*

While a presumption of liability simplifies the causation analysis, it is essential that operators have the opportunity to rebut this presumption or argue that it does not apply. This will allow operators to escape liability when their activities are not the cause of contamination. Even if the water well is within the zone in which the presumption applies, an operator may be able to prove that the contamination originates from another source, for example by showing that the specific substances found in the water are not present at the well site or that they can be traced to another source. Five affirmative defenses should be available to operators:

1. The homeowner's water supply is outside the statutory radius.
2. Contamination occurred after the statute of limitations for the presumption.
3. Contamination existed before the commencement of drilling activities.<sup>31</sup>
4. The landowners refused to allow pre-drill testing of their water supply.
5. Contamination of a landowner's water supply occurred as a result of something other than the operator's activity.<sup>32</sup>

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31 This rebuttal should only be allowed if post-drill data shows that the scope and character of contamination is the same as that found in pre-drill results. Homeowners whose pre-drill results reflect contamination in certain amounts or parameters should not automatically forfeit the presumption if post-drill results reveal contamination of different parameters or in markedly different amounts.

32 This exception might include the presence of another operator or polluter within the "zone of presumption," as well as past or present sources of pollution on the landowner's property, caused by unrelated third parties, prior landowners, or the current landowner herself.

## Recommendation II.C: Use of tracers may help establish causation.

A relatively new regulatory approach to identifying the source of water contamination is the use of “tracer” molecules, such as synthetic DNA<sup>33</sup> or “nano-rust,”<sup>34</sup> to fingerprint drilling fluids from well sites.<sup>35</sup> These tracers, which are safe and similar to naturally occurring substances, could be added in minute quantities to drilling fluids by operators. Landowners complaining of contamination could then test their water supply for the presence of these tracers. These particular molecules can be crafted with signatures specific to individual well sites, creating the potential for proof of contamination from a specific wellhead or impoundment pit. To be most effective, tracers should be added to both fracking fluid before it is injected and to any return fluid stored in impoundments, tanks, or pits, to ensure that fluid is traced throughout its lifecycle.

The City of Dallas, Texas, recently became the first jurisdiction to require the use of tracer chemicals in fracking fluid.<sup>36</sup> State agencies should investigate the technical feasibility of implementing a similar mandate. Interested jurisdictions could implement its use in one of two ways. First, agencies could require the use of tracers in all fracking fluid. Second, operators who elect to use tracers in their fluids could receive reduced bonding or fee requirements, or a rebuttable presumption of no fault if the tracer is not detected in a landowner’s water supply.

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33 Base Trace, *About Our Technology*, <http://www.basetrace.com/technology> (last visited Apr. 22, 2014).

34 Laura Legere, *Finding New Tools for Tracing Fracking Impacts*, SCRANTON TIMES-TRIBUNE (May 20, 2013), available at <http://thetimes-tribune.com/news/gas-drilling/scientists-find-new-tools-for-tracing-fracking-impacts-1.1492016>.

35 Dave Fehling, *Tracing the Culprit if Fracking Pollutes Water Supplies*, NAT’L PUB. RADIO (Jan. 22, 2013), <http://stateimpact.npr.org/texas/2013/01/22/scientists-close-to-testing-tracers-for-drilling-fluid/>.

36 Susanne Pagano, *Dallas Approves Gas Drilling Ordinance, Offering Protections for Homes, Schools*, BLOOMBERG BNA DAILY ENV’T REPORT (Dec. 16, 2013).

## PART III: ADMINISTRATIVE PROCESS FOR HANDLING WATER SUPPLY COMPLAINTS

The preceding recommendations are designed to produce the data necessary for states to make informed decisions when responding to water contamination or diminution complaints. This Part outlines the elements of a comprehensive administrative process for handling water supply complaints. A robust procedure for responding to and investigating complaints helps ensure that the investigations are predictable, fair, and thorough.

### **Recommendation III.A: Establish a statutory framework that governs agency responses to landowner complaints of contamination or diminution of water supplies as a result of oil and gas activity.**

A predictable, fair, and thorough system for investigation of complaints benefits landowners and operators by resolving disputes without expensive and protracted litigation. Some states, such as Oklahoma, provide a general administrative process for all environmental impact complaints. Other states have developed complaint resolution regimes that specifically address impact on water supplies by oil and gas activities. The latter approach appears to be preferable for a number of reasons. First, the investigation of water supply impacts from oil and gas activity is a highly specialized science, requiring knowledge in water chemistry, geology, hydrogeology, topography, and engineering. Devoting a discrete part of an agency to these specific types of complaints allows the agency to focus its expertise. Second, as shale oil and shale gas extraction continue to expand, a devoted statutory framework will allow agencies to efficiently and effectively deal with future complaints. Third, a targeted statutory framework implemented by dedicated personnel inspires confidence that state environmental protection agencies are focused on the problem, and that property owners' complaints are heard, investigated, and addressed. Finally, a dedicated process for complaints provides an additional mechanism for informing the state, its residents, and operators about potential problems at well sites and impoundments.

### **Recommendation III.B: Investigate landowner complaints of contamination or diminution of water supplies in a timely fashion.**

The prompt investigation of landowner complaints is an important component of an effective complaint resolution regime. Timely responses reassure property owners concerned about contaminated water supplies that they are receiving adequate attention. Some cases of contamination may also require immediate attention to ease public health and safety concerns (for example, if residents' drinking water is no longer appropriate for consumption, or if natural gas contamination

poses an explosive hazard). Timely investigations ensure these public health hazards are quickly identified and remedied. Finally, promptness serves an important evidentiary function, ensuring that conditions at the water supply and any potentially implicated oil and gas platforms, pits, or impoundments are investigated and recorded as closely as possible to the time of the complaint.

The first component of a scheme that ensures that investigations are carried out promptly is a provision dictating the maximum allowable time for the relevant agency to initiate the investigation itself. This time frame should be measured from the date the agency is notified of the complaint. The following chart provides examples of timing requirements in several states:

**Table III.B: Existing Timing Requirements/Policies for Responses to Complaints**

State	Provision/Policy	Initial Response Time	Initiation of Investigation	Determination Issued
Colorado	“It is COGCC policy to respond to all complaints within 48 hours and the COGCC strives to do so within 24 hours.” STATE REVIEW OF OIL & NATURAL GAS ENVIRONMENTAL REGULATIONS (“STRONGER”), COLORADO HYDRAULIC FRAC-TURING STATE REVIEW 26 (2011).	24-48 hours		
Illinois	225 Ill. Comp. Stat. 732/1-83		30 days	“reasonable effort” to issue within 180 days
North Dakota	N.D. Admin. Code 43-02-03-54	“within a reasonable time”		
Oklahoma	Okla. Admin. Code § 165:5-1-26 and 165:5-1-29	2 business days		180 days
Pennsylvania	58 Pa. Cons. Stat. § 3218		10 days	45 days

**Recommendation III.C: Issue final impact determinations in a timely fashion.**

*III.C.1 – Time frames for issuance of determinations should balance promptness with the requirements for a thorough investigation.*

In addition to commencing investigations in a timely manner, the agency should also complete investigations and issue determinations promptly. Timely determinations allow property owners and operators to quickly arrange remedies, move on if satisfied with the outcome, or prepare for appellate review. Statutory frameworks should indicate the amount of time the agency has to issue a determination, starting from the date of receipt of the complaint or the date of initiation of the investigation. Mandated timelines create an incentive for agencies to investigate efficiently, and provide a framework on which agencies can arrange a set process for comprehensive investigations. However, the timeline should not be so ambitious that it frustrates agency personnel or encourages

shortcuts in the investigation. Any deadline for issuing determinations should be established by balancing the amount of time the agency needs to conduct a thorough investigation with the parties' interest in obtaining a prompt decision.

*III.C.2 – The agency should be permitted to extend the investigation period if necessary to ensure thoroughness, provided it gives an explanation for the delay and an estimated timeline.*

Although deadlines are important, states should also establish a process to allow investigations to be extended for legitimate reasons. These extensions can be handled in different ways. Under the approach adopted by Illinois, the statute can specify that the agency is to make a “reasonable effort” to meet the deadline.<sup>37</sup> The “reasonable effort” approach does not require the agency to explain its reasons for delay. Under another approach, used by Oklahoma, an agency could be required by statute to notify the parties within the statutory period that it requires more time to complete a thorough investigation.<sup>38</sup> The latter approach may be preferable, particularly if it follows Oklahoma law, which requires an explanation for the delay and an estimated updated timeline.

**Recommendation III.D: Develop a comprehensive, uniform internal process for responding to complaints.**

Agencies should develop standard procedures for investigating complaints. A mandatory procedure for investigations can help ensure that all of the essential factors are taken into account in each investigation, and can help make certain the accuracy of the agency's determination.<sup>39</sup> In addition, developing a mandatory procedure for responding to complaints—and making landowners aware of this procedure—will help to build trust between landowners and agencies. If property owners know that the state agency is conducting a thorough analysis and is following a number of mandatory steps, they are more likely to trust the state agency's final determination.

There are three important steps that should be included in the process. First, investigators should gather comprehensive information about the location surrounding a water well and consult with experts about the geology and hydrology of the area. Second, investigators should test water for a pre-determined, specified set of parameters. Finally, investigators should be directed to provide a reasoned analysis to support their conclusion whether the water contamination was caused by the gas

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37 225 Ill. Comp. Stat. 732/1-83.

38 Okla. Admin. Code § 165:5-1-29.

39 Although a thorough investigation should be the norm, agency procedures should include an escape clause that allows an abbreviated process for complaints that clearly do not warrant a full investigation. In such cases, however, the agency should be required to explain why it is foregoing the standard analysis.

drilling operations.

***III.D.1 – Investigators must receive training in water sampling and identifying oil and gas contamination.***

Agencies should ensure that investigators are properly trained to identify oil and gas contamination. In particular, investigators should have a basic understanding of how oil and gas contamination might occur and what such contamination would look like in their state. Although investigators need not be experts in chemistry, geology, engineering, or hydrology, they should have a basic scientific background and possess post-high school training in environmental water quality issues.

***III.D.2 – Before making a determination, investigators should gather comprehensive information about the geology and hydrology of an area and consult with geologists, hydro-geologists, and hydrologists.***

The geology, hydrogeology, and hydrology of an area determine what types of constituents are found in oil and gas contamination and whether a particular oil and gas well can be linked to water contamination or diminution. Without gathering the necessary data about the geology and hydrology of an area, a water quality investigator may not know the proper constituents to test for in the water, or know whether it is possible for oil and gas contamination to travel from an oil or gas well to a water source. Therefore, state agencies must develop a procedure for responding to investigations that includes consultations with geologists and hydrologists prior to and after testing. Agencies might consider building the extra cost associated with these consultations, and the initial reviews by state geologists and hydrologists, into well permit fees. Research need not be undertaken on a well by well basis. The Utah state geological survey, for instance, has undertaken state-wide freshwater assessments.<sup>40</sup> This information can then be relied upon by agencies in contamination and diminution investigations.

***III.D.3 – State agencies should test water samples for a standard set of parameters.***

To ensure that investigations of complaints are consistent and thorough, state agencies should require that all water samples be tested for a standard set of parameters. Each state should develop its own list of parameters, based on local geology. Examples of the lists of parameters developed by several jurisdictions are listed below in Table III.D.

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<sup>40</sup> See JANAE WALLACE, *BASILINE WATER QUALITY AND ESTIMATED QUANTITY FOR SELECTED SITES IN THE SOUTHEASTERN UINTA BASIN, UTAH* (2012), available at <http://www.geology.utah.gov/online/ofr/ofr-595/ofr-595.pdf>.

Table III.D: Current Water Sampling Parameters

Parameter	Illinois (statute) <sup>a</sup>	Colorado (statute) <sup>b</sup>	City of Southlake, Texas (municipal code) <sup>c</sup>	Wyoming (regulation) <sup>d</sup>	Pennsylvania (informal recommendations) <sup>e</sup>	Ohio (informal recommendations) <sup>f</sup>
<b>Acidity</b>						
Alkalinity	X	X		X	X	X
pH	X	X		X	X	X
<b>Metals</b>						
Barium	X	X	X	X	X	X
Cadmium	X					
Calcium	X	X		X	X	X
Chromium	X	X				
Iron	X	X		X	X	X
Lead	X					X
Magnesium	X	X		X	X	
Manganese	X			X	X	X
Mercury	X					
Selenium	X	X		X		
Silver	X					
Sodium			X	X	X	X
Strontium			X	X	X	X
Potassium				X	X	X
<b>Nonmetals, volatiles and other compounds</b>						
Arsenic	X	X				
Bicarbonates						
Boron				X		
BTEX	X	X*		X		X
Carbonates					X	
Chloride	X			X		X
Dissolved oxygen				X		
Fluoride				X		
Gross alpha						
Gross alpha and beta particles	X					
Hardness					X	X
Hydrogen sulfide						
Major cations/anions		X		X		
Naphthalene				X		
Nitrate				X		
Nitrite				X		

\* Colorado includes in its “BTEX” compounds (Benzene, Toluene, Ethylene, and Xylene) both Gasoline Range Organics (“GRO”) and Diesel Range Organics (“DRO”). 2 Colo. Code Regs. § 404-1:317B(d)(4)(F). This is broader than some other states. In addition, under the federal Safe Drinking Water Act, fracking fluids are exempt from the statute unless they include diesel-based compounds. 42 U.S.C. § 300h(d). Gasoline-based compounds are exempted from coverage.

Parameter	Illinois (statute)	Colorado (statute)	City of Southlake, Texas (municipal code)	Wyoming (regulation)	Pennsylvania (informal recommendations)	Ohio (informal recommendations_)
<b>Nonmetals, volatiles and other compounds (cont.)</b>						
Sulfate	X			X	X	X
Surfactants						
VOCs			X			
Bromide				X		
<b>Petroleum Products</b>						
Dissolved ethane	X		X	X		
Ethane			X		X	
Dissolved methane	X			X		X
Methane			X		X	
Dissolved propane	X			X		
PAH's		X				
TPH		X	X	X		
Oil and Grease					X	
<b>Solids</b>						
Specific conductance	X	X		X	X	X
Total dissolved solids (TDS)	X	X	X	X	X	X
Total Suspended Solids (TSS)			X		X	X
Turbidity			X	X		
Residue - Filterable					X	
Residue - Non Filterable					X	
<b>Other Parameters</b>						
Coliform bacteria				X**	X	
Static water level						
Temperature				X		
Oxidation-reduction potential				X		

\*\* Wyoming requires testing only for “iron related, sulfate reducing, [or] slime forming” bacteria. Wyo. Admin. Code Oil & Gas Cons. Comm’n ch. 3, § 46(h).

**Sources for Table III.D:**

<sup>a</sup> 225 Ill. Comp. Stat. 732/1-80.

<sup>b</sup> 2 Colo. Code Regs. § 404-1:317B(d)-(e).

<sup>c</sup> City of Southlake, Texas, Ordinance No. 880-B, available at <http://weblink.cityofsouthlake.com/WebLink8/DocView.aspx?id=452815&&&dbid=0>.

<sup>d</sup> Wyo. Admin. Code Oil & Gas Cons. Comm’n ch. 3, § 46(h). Wyoming also requires that odor, water color, sediment, bubbles, and effervescence be documented. *Id.*

<sup>e</sup> PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, PA-DEP RECOMMENDED BASIC OIL & GAS PRE-DRILL PARAMETERS (Nov. 2012), available at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-91717/8000-FS-DEP4300.pdf>.

<sup>f</sup> OHIO DEPARTMENT OF NATURAL RESOURCES, DEPARTMENT OF HEALTH, & ENVIRONMENTAL PROTECTION AGENCY, RECOMMENDATIONS FOR DRINKING WATER WELL SAMPLING BEFORE OIL AND GAS DRILLING (Nov. 2012), available at <http://www.epa.ohio.gov/portals/0/general%20pdfs/waterwellsampling.pdf>.

## PART IV: INFORMATION DISTRIBUTION

In addition to developing comprehensive procedures for investigating water quality complaints, states should develop guidelines and policies for how to distribute information about complaints and determinations.

### **Recommendation IV.A: Include in determination letters information sufficient for landowners to fully understand the investigation and the basis for the determination.**

Once an investigation is complete, the agency should send a determination letter that explains the results of the investigation to the landowner who submitted the complaint. To give landowners an accurate understanding of their water contamination and whether it can be linked to nearby oil and gas activity, these letters must include enough information for the landowner to understand what the state did and how it reached its conclusion. To achieve this goal, determination letters should include several components.

First, all determinations should contain complete water sample analysis results and a fact sheet to help the landowner interpret the results. The determinations should explain what specific tests were conducted, and where applicable, identify any levels of chemicals elevated from pre-drill levels or outside the parameters of EPA's safe drinking water standards.

Second, all letters should explain how the agency used the data to reach its conclusions. If elevated levels of chemical substances are found but the agency does not attribute these elevated levels to oil and gas activity, the agency should explain why and how it has reached this conclusion. For example, the agency could explain that elevated levels of chemical substances in the water supply could not be attributed to a certain gas well in a certain area due to the topography and hydrology of the area. Alternatively, the agency could explain that it cannot attribute the elevated levels of chemical substances to oil and gas activity because there was no baseline water testing conducted and some of the substances may be naturally-occurring.<sup>41</sup>

Third, agencies should be extremely clear in explaining their reasoning when concluding that oil and gas activity has not caused water contamination. They should specify whether the agency can definitively say that oil and gas activity has not caused contamination, and if so, explain how. If there is simply not enough information to link oil and gas activity to water contamination, that should be

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41 If a state adopts a presumption that operators are liable for contamination within a certain distance of a well site, then letters to landowners within this area indicating that the operator is presumed liable for the contamination can contain an abbreviated version of this analysis.

clearly stated. The agency should also include information about how landowners can monitor or gather more information to more clearly identify the source of the contamination, and what they can do to remediate their water supply in the meantime.

Finally, letters should follow a checklist or set of guidelines to ensure consistency within and across offices. The wording of conclusory phrases (such as “contamination cannot be attributed to drilling”) should be consistent within and across offices. This will allow landowners to more clearly understand the letters, and enable them to compare determinations from year-to-year or site-to-site.

#### **Recommendation IV.B: Determination letters should be available to the general public.**

While it is particularly important that agencies provide clear explanations for their conclusions to affected landowners, determination letters should also be made available to the general public. Public disclosure of determinations serves a number of purposes. First, it helps neighboring landowners learn about degradation or diminution of water supplies which may be hydrologically connected to their own. Second, disclosure informs landowners whether this degradation or diminution has been investigated and whether it can be linked to oil or gas extraction. Third, public access to water quality determinations helps people make informed decisions about risk. For example, a landowner who has access to water quality determinations and observes a link between contamination and oil or gas extraction in nearby areas may decide to not allow drilling on her property. Conversely, landowners who can review an operator’s record in their state and find that it has not been subject to complaints may be more likely to allow that operator to drill on their property. Finally, disclosure enhances transparency and helps build trust among the public, state agencies, and operators.

Because some landowners may have privacy concerns about making such information public, landowners should be able to opt out of this requirement, or request redactions of names or addresses. However, the default should be for the sharing of information.

Two states, Illinois and Colorado, regularly share such information with the general public. In Illinois, the Department of Natural Resources must publish on its website “lists of confirmed cases of pollution or diminution that result from high volume horizontal hydraulic fracturing operations.”<sup>42</sup> And in Colorado, throughout a water quality investigation, the Colorado Oil and Gas Conservation Commission (“COGCC”) makes a database of the investigation available to the public.<sup>43</sup> However,

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42 225 Ill. Comp. Stat. § 732/1-83(h).

43 STATE REVIEW OF OIL & NATURAL GAS ENVIRONMENTAL REGULATIONS (“STRONGER”), COLORADO HYDRAULIC FRACTURING STATE REVIEW 23 (2011). However, this information is not easy to locate.

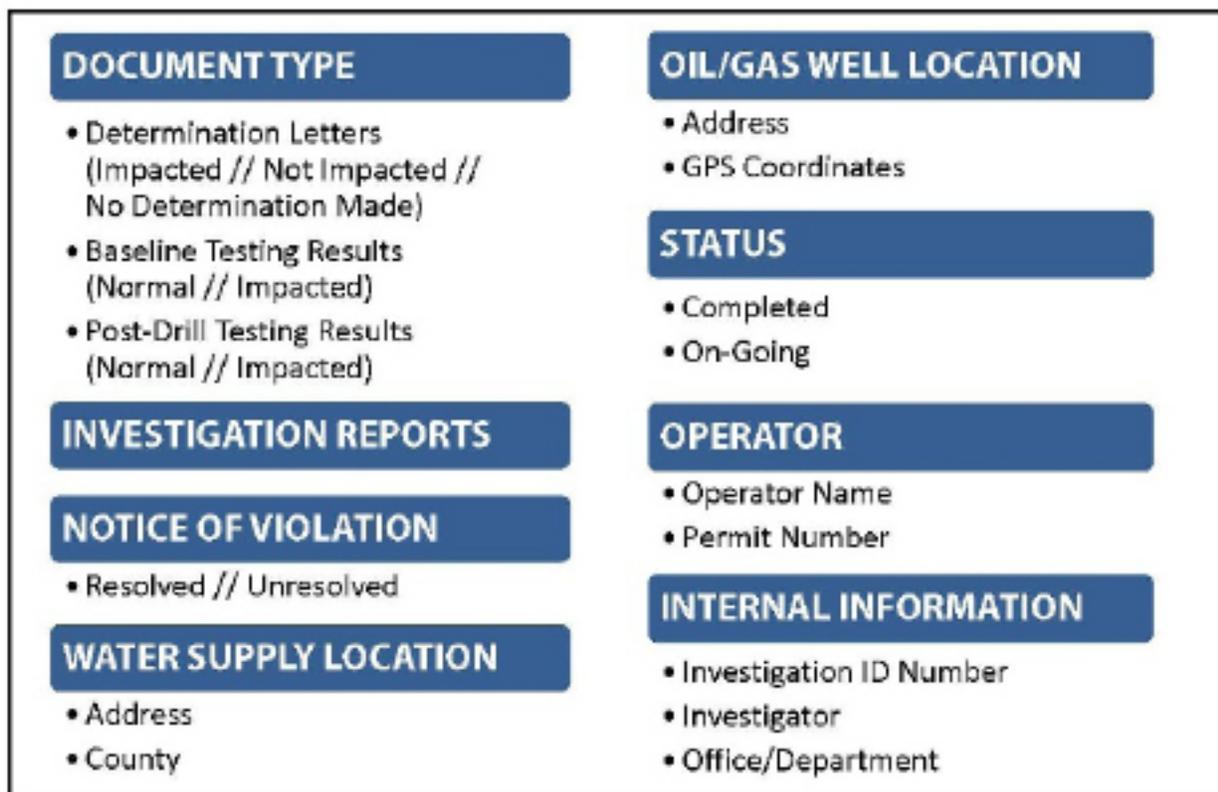
we recommend that states go a step further than the information-sharing policies in Illinois and Colorado by mandating that the state agency publish comprehensive determination letters (including the water sample results attached to the letters) on its website unless a landowner has opted out.

**Recommendation IV.C: Use agency websites to disseminate information to the general public.**

Given the importance of making information about determinations publicly available, agencies should ensure that such information—including determinations, baseline testing results, investigation reports, and notices of violation (“NOVs”) issued to operators—is accessible and usable. Interested persons should not have to rely on making requests to the agency to obtain such information. Rather, it should be posted on agency websites in an understandable, usable format.

Websites should be easy to navigate, allowing persons to quickly locate information. Determinations, baseline testing results, investigation reports, and NOVs should be fully searchable by as many of the parameters listed in Figure IV.C as possible. In addition, users should be able to search for all relevant information available on the website without needing to limit the search to specific kinds of documents, operators, or other results.

**Figure IV.C: Website Search Parameters**



## PART V: REVIEW OF AGENCY DETERMINATIONS

### **Recommendation V: Enable landowners and operators to appeal impact determinations to an administrative appellate review board, which will carry out de novo review of the investigator's initial determination.**

States might consider establishing a process by which landowners and operators can appeal an agency's determination. A determination that oil and gas activities have impacted a landowner's water supply typically requires, at minimum, the operator to restore or replace the water source.<sup>44</sup> A determination that oil and gas activities did not impact the water supply, on the other hand, is the agency's final decision that the landowner is not entitled to a replacement supply and/or restoration or replacement of the water source. Thus, property owners should be entitled to review of the agency's determination as a matter of due process. In addition, appeals present parties with their first opportunity to raise issues and concerns with a determination, which the agency typically makes without input from the landowner or operator.

Although review of impact determinations could initially occur either in a court of law or before an administrative appellate review board, we believe the latter option is preferable. Appellate review boards keep the first stage of appellate review "in-house," taking advantage of agency expertise. Furthermore, an administrative review process, which can be less formal than judicial review, should be less expensive for the parties.

This approach may also reduce the burden on the judicial system. It is likely that in many cases, the parties will be satisfied with the review board's decision and the dispute will therefore never reach the courts. Even when one of the parties does appeal the review board's decision, judicial review will occur based on a complete evidentiary record, including submissions by the parties to the review board. Judicial review could then occur under the "abuse of discretion" standard that usually applies to an agency's factual decisions.

We recommend that the administrative appeal board review the agency's initial determination de novo. Ideally, the initial determination process is sufficiently comprehensive and transparent to satisfy property owners and operators that any additional investigation they may put in themselves would result in a similar conclusion. However, in reality, some parties may desire to dispute the agency's finding by presenting evidence of their own. As the parties did not have the opportunity to

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44 See, e.g., 225 Ill. Comp. Stat. § 732/1-83(d); 25 Pa. Cons. Stat. § 3218(a). This paper does not take a position on the nature of the appropriate remedy if an operator is found liable for contaminating or diminishing a water source.

present this evidence in the initial investigation, they must be allowed to offer it on appeal. Likewise, evidence produced by the party should be given the same weight as evidence in the agency's record, and no deference should be given to the initial determination on appeal. In this way, review of the determination serves as a check on the investigators' actions, ensuring that, at a minimum, interested parties can rely on their own investigations in an adversarial setting to supplement the basis for the determination below.

Even though review of agency determinations by an administrative board should be more efficient than judicial review, it remains expensive and time-consuming for all parties. States should therefore consider building in an optional alternative dispute resolution process, such as mediation. Especially in circumstances where providing an alternate source of water may be significantly less costly than going through the expense of an appeal, mediation can serve to inform parties of the relative strength of their positions in potential litigation, allowing them to make educated judgments based on the likelihood of success. Mediation, if successful, can be faster, less costly, and more emotionally satisfying than an adversarial process.<sup>45</sup>

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45 In an analogous context, the Texas Railroad Commission requires both a mandatory period for settlement negotiations and the use of a mediator before informal complaints to the Commission involving interested parties in the gathering, shipping, and selling of oil and gas move to the formal process. Railroad Comm'n of Texas, *Procedure for Filing and Responding to Informal Complaints About Natural Gas Purchasing, Selling, Shipping, Transportation, or Gathering Practices*, <http://www.rrc.state.tx.us/compliance/complaints/informalcomplaintinfo.php> (last visited Apr. 22, 2014).

## PART VI: CONCLUSION

The recommendations contained in this report are intended to guide states in developing an effective regime for responding to landowner complaints about water contamination due to shale gas extraction. Each state will need to adapt these recommendations to its specific context. If these recommendations are adopted, they can help ensure that agencies conduct a thorough review of potentially contaminated water sources, and that landowners obtain an accurate understanding of the source of their water contamination. These practices could go a long way toward promoting greater transparency among landowners, state agencies, and operators, and toward enhancing understanding about potential impacts of shale oil and shale gas extraction.

## APPENDIX: SELECTED PROVISIONS OF STATE AND LOCAL LAWS

This appendix provides an overview of statutes and regulations in fifteen states that deal with investigation of landowner complaints about environmental contamination and water sampling procedures and guidelines.

### CALIFORNIA

#### *Investigation of Landowner Complaints*

California Public Resources Code Section 3235, in its chapter on Oil and Gas Conservation, states:

The supervisor may upon his own initiative or shall upon receipt of a written complaint from a person owning land or operating wells within a radius of one mile of any well or group of wells complained against make an investigation of the well or wells involved. The supervisor shall make a written report and order, stating the work required to repair the damage complained of,<sup>1</sup> or stating that no work is required.

A copy of the order shall be delivered to the complainant, or if more than one, to each complainant, and, if the supervisor orders the damage repaired, a copy of the order shall be delivered to each of the owners, operators, or agents having in charge the well or wells upon which the work is to be done.

The order shall contain a statement of the conditions sought to be remedied or repaired and a statement of the work required by the supervisor to repair the condition. Service shall be made by mailing copies to such persons at the post office address given.<sup>2</sup>

This statute does not apply solely to complaints of water contamination. Instead, it requires investigation of all complaints within a mile of a gas well, and it places the burden of investigation on the State Oil and Gas supervisor (in contrast to, for example, the Pennsylvania model, which *requires* that the Department investigate the complaint and make a determination).

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1 Problematically, it is unclear if the “damage” referred to in the provision applies to landowner property, or only to damage at the oil well site, as the investigation required is specifically of the oil well involved. If this were the case, landowners might have difficulty obtaining standing in an appeal of the supervisor’s determination that no repairs are required.

2 Cal. Pub. Res. Code § 3235.

## COLORADO

### *Investigation of Landowner Complaints*

The Colorado Oil and Gas Conservation Commission (COGCC) provides a specific form that landowners can use to submit a complaint about oil and gas operations.<sup>3</sup> In response, the COGCC “shall investigate any complaint and determine what, if any, action shall be taken in accordance with Rule 522.”<sup>4</sup>

Rule 522 establishes the specific procedure to be followed regarding alleged violations.<sup>5</sup> Rule 501(c) provides that any “final order of the Commission . . . shall be subject to judicial review in accordance with the provisions of the Administrative Procedure Act, §24-4-101 to -108, C.R.S., and any other applicable provisions of law.”<sup>6</sup>

COGCC’s response to the STRONGER Hydraulic Fracturing Questionnaire<sup>7</sup> provides more details on the process it follows. COGCC responds to landowner complaints by sampling water wells. According to the questionnaire, “COGCC responds to all complaints within 48 hours, and strives to do so within 24 hours. Each complaint is analyzed and assigned to a member of the COGCC’s environmental, engineering, or inspection staff.”<sup>8</sup> Complaints are investigated through site inspections, data

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3 See 2 Colo. Code Regs. § 404-1:336.

4 *Id.*

5 The procedure is as follows. If the Director has “reasonable cause to believe that a violation of the Act, or of any rule, regulation, or order of the Commission, or of any permit issued by the Director, has occurred, the Director shall cause the operator to voluntarily remedy the violation, or shall issue a [Notice of Alleged Violation (NOAV)] to the operator.” 2 Colo. Code Regs. § 404-1:522 (a)(3). This NOAV does *not* constitute a final agency action. Rule 552(a)(5)(B). The NOAV can be resolved through negotiation, resulting in a written Administrative Order by Consent (AOC), which is considered a final order. *Id.* § 404-1:522(b)(3). If the operator contests the NOAV, the Director will apply to the Commission for an Order Finding Violation (OFV). *Id.* § 404-1:522(c)(1). Similarly, if the Director does not issue an NOAV, the complainant may file an application to the commission requesting an OFV, or the Commission may do so on its own initiative “if it believes the Director has failed to enforce a provision of statute, rule, regulation, order, permit or permit condition.” *Id.* § 404-1:522(c)(2). Finally, if an operator fails to take the correction action required by the AOC or OFC, the Commission may issue a cease and desist order. *Id.* §404-1:552(d)(1). They may also issue these orders in emergency situations. *Id.* § 404-1:552(d)(2).

6 2 Colo. Code Regs. § 404-1:501. However, as noted below, NOAVs do not constitute final orders. And although a complainant may appeal the Director’s failure to issue an NOAV to the Commission, and it is unclear whether the Commission’s failure to issue an OFV following a hearing is a final order. Thus it may be the case that many determinations may not be appealed.

7 STATE REVIEW OF OIL & NATURAL GAS ENVIRONMENTAL REGULATIONS (“STRONGER”), COLORADO HYDRAULIC FRACTURING STATE REVIEW 26 (2011).

8 It is unclear how COGCC determines which complaints are assigned to which type of staff member.

collection, field review and sampling and analysis. After the initial inspection and any data collection, an assessment is completed to determine if additional work is required. Photographs, maps and other documents are entered into the database and indexed to the complaint. When the complaint is resolved or closed, a report is generated.”

### *Water Sampling*

COGCC’s Rule 317B(d)-(e) requires a pre-drill sample for all drilling operations in the intermediate and external buffer zones of a public water system surface water supply area. It also stipulates parameters for water samples, and requires that EPA analytical methods for drinking water be used and tests conducted in nationally or state accredited laboratories. Specifically, the Rule states that a “pre-drilling surface water sample collected immediately downgradient of the oil and gas location”<sup>9</sup> is “required for all Drilling, Completion, Production, & Storage (DCPS) operations<sup>10</sup> in the intermediate and external buffer zones.”<sup>11</sup> A follow-up sample must be collected three months “after the conclusion of any drilling activities and operations or completion.”<sup>12</sup> Sample parameters must include pH, alkalinity, specific conductance, major cations/anions, total dissolved solids, BTEX/GRO/DRO, TPH, PAH’s, and metals (arsenic, barium, calcium, chromium, iron, magnesium, and selenium).<sup>13</sup>

Current applicable EPA-approved analytical methods for drinking water must be used and analyses must be performed by laboratories that maintain state or nationally accredited programs. . . . Copies of all test results . . . shall be provided to the Commission and the potentially impacted Public Water System(s) within three (3) months of collecting the samples . . . [t]he analytical results and surveyed sample locations shall be submitted to the Commission in an electronic data deliverable format.<sup>14</sup>

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9 Note that the rule does not define the term “immediately downgradient.”

10 “Drilling, Completion, Production and Storage (DCPS) operations” refers to “operations at (i) well sites for the drilling, completion, recompletion, workover, or stimulation of wells or chemical and production fluid storage, and (ii) any other oil and gas location at which production facilities are operated. DCPS Operations shall exclude roads, gathering lines, pipelines, and routine operations and maintenance.” 2 Colo. Code Regs. § 404-1:317B(a)(1).

11 *Id.* § 404-1:317B(d). The intermediate buffer zone is 301-500 feet from a classified water supply segment (a classified water supply segment is a perennial or intermittent stream classified as being suitable or intended to become suitable for potable water supplies by the Colorado Water Quality Commission). The external buffer zone is 501-2,640 feet from a classified water supply segment.

12 *Id.*

13 *Id.*

14 *Id.*

COGCC's Rule 609(b) states:

Initial baseline samples and subsequent monitoring samples shall be collected from all Available Water Sources, up to a maximum of four (4), within one-half (½) mile radius of a proposed Oil and Gas Well, Multi-Well Site, or Dedicated Injection Well.<sup>15</sup>

This rule requires statewide groundwater baseline sampling and monitoring (in contrast to the previous provision, which addresses surface water sampling) and pre-drill testing of up to four water sources within one half mile of proposed oil and gas wells, which is significantly further than many other states require. If more than four Available Water Sources are present, the operator must select four sampling locations based on proximity, type of water source, orientation of sampling locations, multiple identified aquifers available, and condition of water source.

This rule also requires that at least two additional samples be taken after well completion. The first sample must be taken between six and twelve months after completion and the second between sixty and seventy-two months after completion.<sup>16</sup>

#### *Process for sharing information about water quality tests*

Although the statute does not provide a process for sharing information about water quality tests, COGCC's response to the STRONGER Hydraulic Fracturing Questionnaire notes that throughout a water quality investigation, the database referenced above is available to the staff and public. Database queries have been developed to facilitate information retrieval.

## IDAHO

#### *Investigation of Landowner Complaints*

No relevant provisions.

#### *Water Sampling*

Section 20.07.02.055(m) of the Idaho Administrative Code (IDAPA) requires the owner or operator of a well to notify home owners and water well owners within one-quarter mile of the oil or gas well of proposed well treatments. The provision explains that "the notification will . . . offer an opportunity

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<sup>15</sup> *Id.* § 404-1:609(b).

<sup>16</sup> *Id.* § 404-1:609(d)(2).

to have the owner or operator sample and test the water, at the owner or operator's cost, prior to and after the oil or gas well being treated.”

This provision states that owners and operators of wells may sample and test water prior to and after treatment. However, sampling and testing is optional, and there is no presumption of liability in Idaho to encourage pre-drill testing. In addition, the state does not appear to offer guidance to landowners on what parameters to test for or whom to hire for the testing.

## ILLINOIS

### *Investigation of Landowner Complaints*

*Section 1-83 of the Illinois Hydraulic Fracturing Regulatory Act* states that “any person who has reason to believe they have incurred pollution or diminution of a water source as a result of a high volume horizontal hydraulic fracturing treatment of a well may notify the Department of Natural Resources and request that an investigation be conducted.”<sup>17</sup> The Department must “initiate an investigation of the claim” within 30 calendar days after notification and must make a “reasonable effort to reach a determination within 180 calendar days after notification.”<sup>18</sup> The Department may contact the Illinois Environmental Protection Agency “to seek the Agency’s assistance in water quality sampling.”<sup>19</sup>

If the water quality sampling results “or other information obtained as part of the investigation . . . indicate that concentrations exceed the standards or criteria referenced by pollution or diminution . . . the Department shall issue an order to the permittee as necessary to require permanent or temporary replacement of a water source.”<sup>20</sup> In addition, once the Department issues an order or finds pollution or diminution, “the Department shall contact the Agency and forward all information from the investigation to the Agency . . . [who] shall investigate the potential for violations as designated within Section 1-87 of this Act.”<sup>21</sup>

Section 1-83 is the first of two provisions in the Illinois statute for investigating landowner complaints

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17 225 Ill. Comp. Stat. 732/1-83(a).

18 *Id.* 732/1-83(b).

19 *Id.*

20 *Id.* 732/1-83(d). There is no proximity requirement at this stage. Facially, it seems as if anyone with polluted water could get a well operator to supply replacement water, regardless of distance from well. However, presumably, the department only issues an order to permittees that the investigation has indicated are responsible for the contamination.

21 *Id.* 732/1-83(f).

about water quality and/or diminution. This provision addresses the first step of this process, which is handled by the Illinois Department of Natural Resources. The word “determination” in this provision seems to refer to determinations about whether water samples have been affected by pollution or diminution. It is unclear whether these determinations also include a conclusion that the diminution/pollution has been caused by oil and gas activity (the fact that the permittee must replace the water source indicates that they do, but the wording in Section 1-87 suggests that the government can confirm that the cause of the pollution is attributable to fracturing either in the first or second phase).

Determinations under this section do not include conclusions about whether there has been a violation of the Illinois Environmental Protection Act or surface water or groundwater regulations adopted under the Illinois Environmental Protection Act. That conclusion is made by the Illinois Environmental Protection Agency, pursuant to Section 1-87 (below).

*Section 1-87 of the Illinois Hydraulic Fracturing Regulatory Act* states that once the Department of Natural Resources has issued an order under Section 1-83 or has found that there is pollution or diminution in a water supply, the Illinois Environmental Protection Agency must conduct an investigation to determine whether oil and gas activities:

have caused a violation of . . . the Illinois Environmental Protection Act or surface or groundwater rules adopted under the Illinois Environmental Protection Act . . . [and] whether pollution or diminution is continuing to occur at the location subject to the order, as well as locations identified by the Department or at any other water source within 1,500 feet of the well site. Any person conducting or who has conducted high volume horizontal hydraulic fracturing operations shall supply any information requested to assist the Agency in its investigation. The Agency shall give due consideration to any information submitted during the course of the investigation. . . .

If an Agency investigation under Section 1-83 or [Section 1-87(c)] confirms that the cause of the pollution, diminution, or water pollution is attributable to high volume horizontal hydraulic fracturing operations, in addition to any other relief available under law, the permittee shall be required to reimburse the costs and reasonable expenses incurred by the Agency for activities related to investigation and cleanup.<sup>22</sup>

Section 1-87 is the second provision in the Illinois Hydraulic Fracturing Regulatory Act that deals with investigating landowner water quality complaints. After the Department of Natural Resources

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22 *Id.* 732/1-87(b)-(c), (e).

has made its determination about whether a water supply has been affected by pollution or diminution (under 1-83), the Illinois Environmental Protection Agency must also conduct an investigation (under 1-87) to determine whether oil and gas activities have violated the Illinois Environmental Protection Act and corresponding regulations.

### *Water Sampling*

*Section 1-80 of the Illinois Hydraulic Fracturing Regulatory Act* requires that a permittee conduct baseline water quality sampling of all water sources within 1,500 feet of the well site, and outlines various requirements and parameters for the sampling. Specifically, this Section states that “[e]ach applicant for a high volume horizontal hydraulic fracturing permit shall provide the Department with a work plan to ensure accurate and complete sampling and testing.”<sup>23</sup> A work plan must include:

- (1) information identifying all water sources within the [required] range of testing . . .
- (2) a sampling plan and protocol. . . (3) the name and contact information of an independent third party under the supervision of a professional engineer or professional geologist . . . to conduct sampling to establish a baseline . . . (4) the name and contact information of an independent third party under the supervision of a professional engineer or professional geologist . . . to conduct sampling to establish compliance with monitoring . . . (5) the name and contact information of an independent testing laboratory, certified to perform the required laboratory method, to conduct the analysis required. . . (6) proof of access and the right to test within the area for testing . . . [and]
- (7) identification of . . . contingency measures, including provision for alternative drinking water supplies.<sup>24</sup>

In addition, “[p]rior to conducting high volume horizontal hydraulic fracturing operations on a well, a permittee shall retain an independent third party . . . and shall conduct baseline water quality sampling of all water sources within 1,500 feet of the well site.” If there are “no groundwater wells within 1,500 feet of a well site, or access to groundwater wells within 1,500 feet of the well site has been denied,” and the “proposed well site is located within 1,500 feet horizontally from any portion of an aquifer, the permittee shall conduct sampling of the aquifer at the closest groundwater well with access to the aquifer to which the permittee has not been denied access.”<sup>25</sup>

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23 *Id.* 732/1-80(a).

24 *Id.*

25 *Id.* 732/1-80(b).

Samples must be collected by an “independent third party, under the supervision of a professional engineer or professional geologist,”<sup>26</sup> and they must be analyzed by an “independent testing laboratory.”<sup>27</sup> Testing must be done “by collection of a minimum of 3 samples for each water source required to be tested under this Section. The permittee shall, within 7 calendar days after receipt of results, submit the results to the Department or to the owner of the water source under a non-disclosure agreement.” Further, the Department must “post the results on its website within 7 calendar days.” The results must include “a detailed description of the sampling and testing conducted under this subsection, the chain of custody of the samples, and quality control of the testing.”<sup>28</sup>

After baseline tests are conducted and a permit is issued, all applicable water sources must be “sampled and tested in the same manner 6 months, 18 months, and 30 months after the high volume horizontal hydraulic fracturing operations have been completed.”<sup>29</sup>

Sampling of private water wells or ponds within private property is not required if the owner of the private property declines “expressly and in writing, to provide access or permission for sampling.” If the owner will not provide proof, the operator must demonstrate that “good faith efforts . . . were made to secure the required documentation.” Owners “may condition access or permission for sampling of a private water well or pond . . . under a non-disclosure agreement,” which must include provisions that “(1) the permittee shall provide the results of the water quality testing to property owners; (2) the permittee shall retain the results of the water quality testing until at least one year after completion of all monitoring . . . ; (3) the permittee shall not file with the Department the results of the water quality testing . . . ; and (4) the permittee shall notify the Department” the results of the water quality testing where any testing indicates that concentrations exceed standards.<sup>30</sup>

Finally, each set of samples collected must include analyses for: “pH; total dissolved solids, dissolved methane, dissolved propane, dissolved ethane, alkalinity, and specific conductance; chloride, sulfate, arsenic, barium, calcium, chromium, iron, magnesium, selenium, cadmium, lead, manganese, mercury, and silver; BTEX; and gross alpha and beta particles to determine the presence of any naturally occurring radioactive materials.” In addition, sampling must, at minimum, “be consistent with the work plan and allow for a determination of whether any hydraulic fracturing additive or other contaminant

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26 *Id.* 732/1-80(a)(3).

27 *Id.* 732/1-80(a)(5).

28 *Id.* 732/1-80(b).

29 *Id.* 732/1-80(c).

30 *Id.* 732/1-80(d).

has caused pollution or diminution for purposes of Sections 1-83 and 1-85 of this Act.”<sup>31</sup>

*Section 1-85 of the Illinois Hydraulic Fracturing Regulatory Act* establishes a presumption of liability for pollution or diminution that occurs within 1,500 feet of a well site. The presumption can be rebutted by establishing that the pollution/diminution occurred prior to fracking or thirty months after operations, or that it occurred as the result of a different identifiable cause. Specifically, this Section: “establishes a rebuttable presumption for the purposes of evidence and liability under State law regarding claims of pollution or diminution” of water supply.<sup>32</sup> Unless rebutted, it is presumed that:

any person conducting or who has conducted high volume horizontal hydraulic fracturing shall be liable for pollution or diminution of water supply if: (1) the water source is within 1,500 feet of the well site; (2) water quality data showed no pollution or diminution prior to the start of high volume horizontal hydraulic fracturing operations; and (3) the pollution or diminution occurred during high volume horizontal hydraulic fracturing operations or no more than 30 months after the completion of the . . . operations.<sup>33</sup>

To rebut the presumption, a person must prove any of the following:

(1) the water source is not within 1,500 feet of the well site; (2) the pollution or diminution occurred prior to high volume horizontal hydraulic fracturing operations or more than 30 months after the completion of the . . . operations; or (3) the pollution or diminution occurred as the result of an identifiable cause other than [the drilling operations].<sup>34</sup>

#### *Process for sharing information about water quality tests*

*Section 1-83* establishes some guidelines about sharing information from water quality tests. First, within 15 calendar days after a determination has been made under Section 1-83 about whether there has been pollution or diminution of a water supply, the Department must “provide notice of its findings and the orders, if any, to all persons that use the water source<sup>35</sup> for domestic, agricultural,

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31 *Id.* 732/1-80(e).

32 *Id.* 732/1-85(a).

33 *Id.* 732/1-85(b).

34 *Id.* 732/1-85(c).

35 Under Section 1-5 of the Hydraulic Fracturing Regulatory Act, “water source” is defined as “(1) any existing water well or developed spring used for human or domestic animal consumption, or (2) any river, perennial stream, aquifer, natural or artificial lake, pond, wetland listed on the Register of Land and Water Reserves, or reservoir.” *Id.* 732/1-5. Thus an argument could be made that “all persons that use the water source” includes

industrial, or any other legitimate beneficial use.”<sup>36</sup> In addition, the Department must forward all information from the investigation to the Illinois Environmental Protection Agency.<sup>37</sup> Finally, “the Department shall publish, on its website, lists of confirmed cases of pollution or diminution that result from high volume horizontal hydraulic fracturing operations. This information shall be searchable by county.”<sup>38</sup>

## MICHIGAN

### *Investigation of Landowner Complaints*

Michigan Compiled Laws section 324.61507 allows interested parties to bring complaints to the supervisor regarding a broad variety of impacts from oil and gas activity under an exceptionally broad definition of “waste.” Specifically, the statute states that:

Upon the initiative of the supervisor or upon verified complaint of any person interested in the subject matter alleging that waste is taking place or is reasonably imminent, the supervisor shall call a hearing to determine whether or not waste is taking place or is reasonably imminent, and what action should be taken to prevent that waste. If the supervisor determines it appropriate, the supervisor shall hold a hearing and shall promptly make findings and recommendations. The supervisor shall consider those findings and recommendations and shall promulgate rules or issue orders as he or she considers necessary to prevent waste which he or she finds to exist or to be reasonably imminent.<sup>39</sup>

Waste in the statute is defined broadly to include underground waste and surface waste, encompassing unreasonable damage to underground fresh waters, unreasonable damage to the surface, and unnecessary endangerment of public health, safety or welfare.<sup>40</sup> Landowner water quality or quantity complaints would presumably fall under this definition, as either unreasonable damage to fresh water supplies, or unnecessary endangerment of public health or welfare.

The complaint must be “verified,” which might create a barrier to a thorough investigation. Under Michigan Compiled Laws section 324.1212, the decision of the supervisor at the completion of the

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persons who use an aquifer or stream that is hydrologically connected to a given well.

36 *Id.* 732/1-83(e).

37 *Id.* 732/1-83(f).

38 *Id.* 732/1-83(h).

39 Mich. Comp. Laws § 324.61507.

40 *Id.* § 324.61501(q).

hearing is appealable on the record to the director of the Department of Environmental Quality.<sup>41</sup>

### *Water Sampling*

*Supervisor of Wells Instruction 1-2011*<sup>42</sup> requires operators to keep records of water levels near freshwater sources when extracting large volumes of water to use in fracking operations. Specifically, all “high volume hydraulic fracturing well completions” (defined as those intending to use more than 100,000 gallons of hydraulic fracturing fluids) must include in their permit to drill a supplemental plat of the well site showing the location of all recorded or reasonably identifiable fresh water wells within 1,320 (1/4 mile) of water withdrawal locations. If one or more freshwater wells are present within 1,320 feet of a proposed “large volume water withdrawal site” (defined as those intending to produce a cumulative total of over 100,000 gallons of water per day when averaged over a consecutive 30-day period), the operator must “install a monitor well between the water withdrawal well(s) and the nearest freshwater well,” and “measure and record the water level daily during water withdrawal and weekly thereafter until water level stabilizes.” This information is reported weekly to the OGS District Supervisor.

This policy makes more information available to property owners to correlate diminutions in the quantity of water supplies to large-scale water withdrawal. This provision does not, however, apply where large-scale water withdrawal does not take place.

## **MISSISSIPPI**

### *Investigation of Landowner Complaints*

Mississippi does not have a specific legislative or administrative provision for investigating landowner complaints of water contamination by oil and gas activities. Instead, landowners must rely on an administrative hearing to resolve issues of contamination. *Section 53-1-29* of the Mississippi Code states that “any interested person shall have the right to have the board call a hearing for the purpose of taking action in respect to any matter within the jurisdiction of the board by making a request therefor in writing.”<sup>43</sup> Upon receipt, the board must promptly call a hearing, and within 30 days of the hearing “take such action with regard to the subject matter thereof as it may deem appropriate.”<sup>44</sup> In

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41 Martha L. Black & Ellen J. Kohler, *Diminishing Democracy: A Review of Public Participation in Michigan's Environmental Decisionmaking*, 50 WAYNE L. REV. 219, 248 (2004).

42 Michigan Dep't of Env'tl. Quality, *Supervisor of Wells Instruction 1-2011: High Volume Hydraulic Fracturing Well Completions*, available at [http://www.michigan.gov/documents/deq/SI\\_1-2011\\_353936\\_7.pdf](http://www.michigan.gov/documents/deq/SI_1-2011_353936_7.pdf).

43 Miss. Code Ann. § 53-1-29.

44 *Id.*

*Town of Bolton v. Chevron Oil Co.*, the Mississippi Court of Appeals held that landowners are required to exhaust administrative remedies by bringing contamination-based claims against operators before the state Oil and Gas Board in advance of bringing common law claims in state court.<sup>45</sup>

Under *Miss. Code Ann. § 53-1-43(b)*, private citizens who have notified the Board of an actual or threatened violation of a state oil and gas statute may bring suit if the Board fails to do so within 10 days. However, it is not clear which provision in Mississippi's Oil and Gas law would provide the appropriate remedy to landowner's whose water has been contaminated. The court in *Town of Bolton* notes that the Oil and Gas Board has jurisdiction over oil field exploration and production waste,<sup>46</sup> defined by under *Miss. Code Ann. § 53-1-3(t)* as “[a]ny liquid, gaseous, solid, naturally occurring radioactive, or other substance(s), including but not limited to, any chemical, produced water, sludge, oil-water emulsion, oil field brine, waste oil, sediment, scale or other waste substance(s).” Cases that deal with this waste provision deal with much larger land-based contamination resulting from the negligent disposal of larger amounts of production waste, not the kind of subtle water supply contamination with which specific provisions in other states are concerned.<sup>47</sup>

Mississippi's loose hearing framework, somewhat clarified in its judicial hearing, is a good example of the problems with failing to provide landowners with a specific complaint mechanism. Landowners in Mississippi are unable to file traditional common law claims before undergoing an administrative hearing, the results of which are unclear and untested.

Mississippi's surface coal mining laws provide much greater protection to landowner water supplies. Under *Miss. Code Ann. § 53-9-85*, “the operator of a surface coal mine shall replace the water supply of an owner of interest in real property who obtains all or part of that person's supply of water for domestic, agricultural, industrial or other legitimate use from an underground or surface source where the supply has been affected by contamination, diminution or interruption proximately resulting from the surface coal mining or reclamation operation.” In addition, surface mine permittees are required to assure that permanent water impoundments “will not result in the diminution of the quality or quantity of water utilized by adjacent or surrounding landowners.”<sup>48</sup> Although landowners would be required to undergo a similar hearing process, at least for surface mining they would have clear rights and remedies that specifically address water supply contamination.

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45 *Town of Bolton v. Chevron Oil Co.*, 919 So. 2d 1101, 1105-1106 (Miss. Ct. App. 2005).

46 *Id.* at 1106.

47 *See, e.g., Donald v. Amoco Prod. Co.*, 735 So. 2d 161 (Miss. 1999).

48 *Miss. Code Ann. § 53-7-35(1)(q)(v)*.

## NORTH CAROLINA

### *Water Sampling*

*North Carolina General Statute § 113-423(f)* requires pre-drill testing of water supplies within 5,000 feet from a wellhead before any drilling activity commences and two follow-up tests within two years from the commencement of drilling. Specifically, this provision states:

[a]ny lease of oil or gas rights or any other conveyance separating rights to oil or gas from the freehold estate of surface property shall include a clause that requires the oil or gas developer/operator to conduct a test of all water supplies within 5,000 feet from a wellhead . . . at least 30 days prior to initial drilling activities . . . and at least two follow-up tests within a 24-month period after production has commenced. The Department shall identify the location of all water supplies, including wells, on a property on which drilling operations are proposed to occur. A surface owner may elect to have the Department sample wells located on their property, in lieu of sampling conducted by the oil or gas developer or operator, in which case the developer or operator shall reimburse the Department for the costs involved in testing.<sup>49</sup>

A surface owner can elect to have the Department conduct the water sampling instead of the operator.<sup>50</sup> In that case, the operator must reimburse the department for the cost of testing. Interestingly, the Department—not the developer/operator—is responsible for identifying the location of water supplies on a property where drilling is proposed. One advantage of this approach—making the testing requirement part of the lease/deed—is that if the testing is not done, the property owner (in the case of the lease) or the surface owner (in the case of a severance deed) will have a private right of action against the operator.

*North Carolina General Statute § 113-421* establishes a rebuttable presumption. Specifically, the provision states that “it shall be presumed that an oil or gas developer or operator is responsible for contamination of all water supplies that are within 5,000 feet of a wellhead that is part of the oil or gas developer’s or operator’s activities unless the presumption is rebutted.”<sup>51</sup>

To rebut the presumption, an oil or gas developer or operator must prove by a preponderance of the evidence any of the following:

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49 N.C. Gen. Stat. § 113-423(f).

50 *Id.*

51 *Id.* § 113-421(a).

(1) the contamination existed prior to the commencement of the drilling activities as evidence by a pre-drilling test of the water supply . . . (2) the surface owner or owner of the water supply in question refused the oil or gas developer or operator access to conduct a pre-drilling test of the water supply . . . (3) the water supply . . . is not within 5,000 feet of the wellhead . . . [or] (4) the contamination occurred as the result of a cause other than activities of the developer or operator.<sup>52</sup>

## **NORTH DAKOTA**

### ***Investigation of Landowner Complaints***

Rule 43-02-03-54 of the North Dakota Administrative Code states:

[u]pon receipt of a written complaint from any surface owner or lessee, royalty owner, mineral owner, local, state, or federal official, alleging a violation of the oil and gas conservation statutes or any rule, regulation, or order of the commission,” the director [of oil and gas of the industrial commission] shall within a reasonable time reply in writing to the person who submitted the complaint stating that an investigation of such complaint will be made or the reason such investigation will not be made. The person who submitted the complaint may appeal the decision of the director to the commission. The director may also conduct such investigations on the director’s own initiative or at the direction of the commission. If, after such investigation, the director affirms that cause for complaint exists, the director shall report the results of the investigation to the person who submitted the complaint, if any, to the person who was the subject of the complaint and to the commission. The commission shall institute such legal proceedings as, in its discretion, it believes are necessary to enjoin further violations.

This rule does not require that an investigation follow any complaint, but it does require that the director give a reason that an investigation will not be made. The list of people who may file a written complaint excludes private individuals with no ownership (or leasing) right on the source property. The rules do not discuss whether the Commission will respond to complaints made by these individuals.

N.D. Cent. Code § 38-11.1-06 establishes that a landowner can bring a claim against a mineral developer to recover damages for disruption of water quality or diminution of water supply caused

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<sup>52</sup> *Id.* § 113-421(a1).

by oil or gas activity within one mile of the property owner. To bring a claim, however, the property owner must have had a water quantity and quality test performed prior to the commencement of drilling operations. Specifically, this provision states:

if the domestic, livestock, or irrigation water supply of any person who owns an interest in real property within one-half mile . . . of geophysical or seismograph activities . . . or within one mile . . . of an oil or gas well site has been disrupted, or diminished in quality or quantity by drilling operations and a certified water quality and quantity test has been performed by the person who owns an interest in real property within one year preceding the commencement of drilling operations, the person who owns an interest in real property is entitled to recover the cost of making such repairs, alterations, or construction that will ensure the delivery...of that quality and quantity of water available . . . prior to the commencement of drilling operations.

[a]ny person who owns an interest in real property who obtains all or part of that person's water supply domestic, agricultural, industrial, or other beneficial use from an underground source has a claim for relief against a mineral developer to recover damages for disruption or diminution in quality or quantity of that person's water supply proximately caused from drilling operations conducted by the mineral developer. Prima facie evidence of injury . . . may be established by a showing that the mineral developer's drilling operations penetrated or disrupted an aquifer in such a manner as to cause a diminution in water quality or quantity within the distance limits imposed by this section. An action brought under this section when not otherwise specifically provided by law must be brought within six years of the time the action has accrued. For purposes of this section, the claim for relief is deemed to have accrued at the time it is discovered or might have been discovered in the exercise of reasonable diligence.

### *Water Sampling*

No relevant provisions.

## OHIO

### *Investigation of Landowner Complaints*

Ohio does not have any specific provisions for the investigation of landowner complaints. However, landowners can file complaints of alleged violations of environmental laws and conduct to the Ohio

Environmental Protection Agency.<sup>53</sup>

### *Water Sampling*

*Section §1509.06(A)(8)(b)-(c) of the Ohio Revised Code* requires water sampling tests prior to commencement of drilling within (a) 1500 feet for all horizontal wells and (b) 300 feet for all non-horizontal wells in urban areas prior to commencement of drilling. Water sampling must be “conducted in accordance with guidelines established in ‘Best Management Practices For Pre-drilling Water Sampling.’”<sup>54</sup>

“Best Management Practices for Pre-Drilling Water Sampling” requires proper sampling and laboratory protocol, the design of a water-sampling plan, and the analysis of certain parameters (barium, calcium, iron, magnesium, potassium, sodium, chloride, conductivity, pH, sulfate, alkalinity, and total dissolved solids).

## **OKLAHOMA**

### *Investigation of Landowner Complaints*

*Oklahoma Administrative Code 165:5-1-25, et seq.* allow citizens to file “pollution complaints” with the Oklahoma Corporation Commission, the public utilities commission of the state. Any pollution complaint received is to be recorded immediately, with written acknowledgement of pollution receipt mailed to the complainant, the alleged violator, and other relevant parties within two business days of receipt, providing status of the complaint. The Commission must then immediately review each complaint and in writing refer it to the appropriate agency for resolution.

If the complaint is not required to be referred to another agency’s jurisdiction, it must be “reasonably and sufficiently investigated . . . to determine whether or not a response action” should be initiated. Complaints referred to other agencies, those not within the Commission’s jurisdiction, or those that involve issues for which an adequate remedy has already been implemented, shall be closed in writing. Notice of closure shall be sent within seven days of closure to the complainant, alleged violators and other relevant parties. Those complaints not closed under 165:5-1-28 are to be resolved within 180

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53 Ohio E.P.A, *Contact Us*, <http://www.epa.state.oh.us/Contact/tabid/5950/LiveAccId/134900/Default.aspx#complaint> (last visited Feb. 18, 2014).

54 OHIO DEP’T OF NATURAL RES., DIV. OF OIL & GAS, BEST MANAGEMENT PRACTICES FOR PRE-DRILLING WATER SAMPLING (2012), *available at* [http://www.dnr.state.oh.us/Portals/11/oil/pdf/BMP\\_PRE-DRILLING\\_WATER\\_SAMPLING.pdf](http://www.dnr.state.oh.us/Portals/11/oil/pdf/BMP_PRE-DRILLING_WATER_SAMPLING.pdf).

days of receipt of the pollution complaint.<sup>55</sup>

“Pollution complaint resolution” is achieved when a written determination is made that: (1) the facts and circumstances do not constitute a violation of law; (2) there is a violation, but an adequate remedy has already been implemented; (3) there is a violation, but an individual proceeding has been initiated before the Commission or appropriate judicial body; or (4) the initiated remediation is expected to take longer than 180 days.<sup>56</sup> A copy of this determination is also sent to the parties.<sup>57</sup> The provision also contains a reporting component, requiring that all pollution complaints be summarized monthly and reported to the Commission. All final judicial decisions regarding pollution complaints must also be conveyed to the relevant parties within seven days of the Commission’s knowledge. Finally, all remediation completed in accordance with an administrative or judicial order must be summarized in writing, and delivered to all relevant parties and the Commission.

The Oklahoma pollution complaint model is similar in function to the Pennsylvania method, but more extensive. The provisions provide numerous process protections for ensuring that investigations are carried out quickly and efficiently. The fact that the statute specifically codifies the four different types of determinations presumably helps the consistency of written communications from the agency.

However, there are key substantive differences as compared to Pennsylvania’s scheme. First, the provisions are not specifically addressed at fracking and water supply complaints. Second, the provisions are focused solely on remediation and do not provide for compensation during remediation, such as replacement water supplies or filtration. Third, and perhaps most importantly, the provisions do not provide a mechanism for appeal. Presumably Oklahoma’s general agency law would provide for a default appeal for final agency actions. However, it is unclear if landowners would have standing under the statute to challenge the agency’s determination that there was no violation, as the statute does not supply a specific remedy to the landowner. In Pennsylvania, if the agency determines that their water supply was impacted by oil and gas, they have the right to receive compensation in the form of an alternative water supply from the operator. The Oklahoma statute does not have the same affirmative remedy for the landowner, and litigants would have to rely on the lack of pollution abatement in an administrative appeal from the Commission’s determination.

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55 Okla. Admin. Code § 165:5-1-29(a).

56 *Id.* § 165:5-1-29(b).

57 *Id.* § 165:5-1-29(c).

## PENNSYLVANIA

### *Investigation of Landowner Complaints*

58 Pa. Cons. Stat. § 3218(b) states:

[a] landowner . . . suffering pollution or diminution of a water supply as a result of the drilling, alteration or operation of an oil or gas well may so notify the [Department of Environmental Protection] and request that an investigation be conducted. Within ten days of notification, the department shall investigate the claim and make a determination within 45 days following notification. If the department finds that the pollution or diminution was caused by drilling, alteration or operation activities or if it presumes the well operator responsible for pollution under subsection (c), the department shall issue orders to the well operator necessary to assure compliance with subsection (a), including orders requiring temporary replacement of a water supply where it is determined that pollution or diminution may be of limited duration.

Subsection (c) provides a presumption of liability for unconventional well operators for pollution within 2,500 feet of the vertical bore and within 12 months of the completion of drilling or alteration, which can be rebutted by affirmatively proving defenses in subsection (d). These defenses include proving that “pollution existed prior to the drilling or alteration activity as determined by a predrilling or prealteration survey,”<sup>58</sup> the “landowner or water purveyor refused to allow the operator access to conduct a predrilling or prealteration survey,”<sup>59</sup> or “the pollution occurred as the result of a cause other than the drilling or alteration activity.”<sup>60</sup> Under subsection (e.1), operators are required to notify landowners “that the presumption established under subsection (c) may be void if the landowner or water purveyor refused to allow the operator access to conduct” pre-drill sampling or surveys.

Pennsylvania’s investigation model served as the jumping-off point for this report, with its requirement that all complaints be investigated within a specified time period, and statutory remedy of replacement water supplies. The model is a good baseline, but requires additional provisions or agency guidelines to fill out procedures and practices.

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58 58 Pa. Cons. Stat. § 3218(d)(1)(i).

59 *Id.* § 3218(d)(1)(ii).

60 *Id.* § 3218(d)(1)(v).

### *Water Sampling*

Pennsylvania does not require pre-drill sampling. Instead, it incentivizes operators to conduct testing to rebut the statutory presumption of liability and encourages landowners to allow access to preserve the presumption. In addition, DEP has released an informal fact sheet recommending basic oil and gas pre-drill parameters “for homeowners who wish to have their private well tested.”<sup>61</sup> The Department notes that landowners may wish to have their water tested for a more extensive list of parameters. The fact sheet provides a shorter list of minimum parameters to test for, although it also recommends sampling for the full set.

Operators who wish to take advantage of the rebuttal defense in subsection (d) will clearly attempt to perform predrill testing, but a mandatory regime captures those operators who would otherwise choose to forego baseline sampling.

## **SOUTH DAKOTA**

### *Investigation of Landowner Complaints*

South Dakota’s Department of Environment & Natural Resources (“DENR”) provides a form pursuant to *S.D.C.L. 34A-2-111* to file water quality complaints of violations of the state’s Water Pollution Control laws. In particular, 24A-2-21 provides that no person may cause pollution of any waters of the state, public or private. However, we cannot locate any guidelines about the structure and function of this complaint process.

### *Water Sampling*

On January 17, 2013, during a meeting of the South Dakota Board of Minerals and Environment,<sup>62</sup> Bob Townsend, the Administrator of DENR’s Minerals and Mining Program, responded to a suggestion by Kathy Guiles, the Harding County Auditor that “hydraulic fracturing reporting requirements should . . . contain a section addressing baseline and follow-up water quality sampling of aquifers in the vicinity of oil and gas wells subject to hydraulic fracturing.”<sup>63</sup> Mr. Townsend responded that

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61 Penn. Dep’t of Env’tl. Prot., *PA DEP Recommended Basic Oil & Gas Pre-Drill Parameters* (2012), available at <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-91717/>.

62 Minutes of the Board of Minerals and Environment Telephone Conference Call Meeting, Jan. 17, 2013, available at <http://denr.sd.gov/boards/2013/bme0113mins.pdf>.

63 *Id.* at 4.

rather than include it in rule, the department developed a new policy on sampling of domestic wells in the vicinity of oil and gas wells subject to high volume hydraulic fracturing. The policy was developed to address Harding County’s concern regarding ground water quality near oil or gas fields where high volume hydraulic fracturing is utilized. The staff will take a sample at the request of the landowner before fracturing takes place and take another sample after fracturing takes place. The results will be provided to the landowner. Mr. Townsend noted that Colorado has a similar policy.<sup>64</sup>

We were not able to find a statement of this policy on DENR’s webpage.

This voluntary sampling policy, while a step in the right direction, lacks the teeth of a codified regulation or a mandatory sampling rule with attached presumptions of liability. Requiring reporting results to the landowner is also helpful, but public disclosure with permission of the landowner would be even more effective.

## TEXAS

### *Investigation of Landowner Complaints*

Texas’s policies regarding drinking water complaints due to oil and gas are complex because of the interplay between the state’s Commission on Environmental Quality (“TCEQ”) and the Railroad Commission (“RRC”), the state regulator of oil and gas. Through a statutory memorandum of understanding between TCEQ and RRC, suspected contamination of private drinking water supplies from oil and gas activities is reported to RRC.<sup>65</sup> TCEQ directs complainants to RRC’s informal complaint web-form.<sup>66</sup> The informal complaint process involves a mandatory period for settlement, followed by mediation to resolve the complaint. If mediation is not successful, more formal processes may be initiated.<sup>67</sup> However, the statutory authority for RRC’s informal complaint process seems directed at disputes between sellers, shippers and gatherers of oil and gas, as opposed to impacted landowners. It is unclear whether this process is intended to apply to environmental complaints. If it is, the RRC may provide an interesting model for ADR with regard to drinking water complaints.

More generally, this administrative division of labor, carving drinking water contamination

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64 *Id.*

65 *See* 16 Tex. Admin. Code § 3.30.

66 Railroad Comm’n of Texas, *Procedure for Filing and Responding to Informal Complaints About Natural Gas Purchasing, Selling, Shipping, Transportation, or Gathering Practices*, <http://www.rrc.state.tx.us/compliance/complaints/informalcomplaintinfo.php> (last visited Feb. 18, 2014).

67 *Id.*

complaints out of TCEQ's jurisdiction when it is related to oil and gas activities, raises some questions of efficiency and agency expertise.

### *Water Sampling*

Texas municipal codes and ordinances may provide additional models. For example, the City of Southlake, in the Dallas-Fort Worth area, has an extensive gas ordinance, 880-B.<sup>68</sup> Section 9.5-242(gg) requires that operators provide the municipal gas inspector with pre-drill and post-drill water analyses of all existing water wells and surface features within 2,000 feet of the gas well and identify all property owners and surface water features in this area. Pre-drill samples establish baseline water quality data and continuous quarterly testing is required from construction to abandonment. Individual water well sampling may take place after a complaint by a landowner and after investigation by city staff concerning water well impairment, using the baseline testing data. Baseline testing is mandatory unless the landowner objects to having their water well tested.

Section 9.5-242(gg) further provides that testing parameters will be determined by the City as outlined in a continuous quarterly water testing plan, but the statute includes an extensive list of minimum parameters, including VOCs, TPHs, TDS&TSSs, methane, ethane, sodium, barium, strontium and turbidity. Additional compounds may be added based on provided MSDS information.

The 880-B model is extensive. The robust pre-drill testing requirement and the specific directive to base determinations on pre- and post-drill sampling is a useful standard. In addition, codifying specific minimum testing parameters makes the process more transparent for landowners.

Chapter 3.1 of the Land Development Code of Colleyville, Texas provides an additional model for baseline testing. Section 3.1-145-C-1-h provides:

Any wells drilled as part of a gas well and testing of adjacent wells shall meet the following requirements:

- i. No oil or gas well permit will be issued for any well where the center of the well at the surface of the ground is located within 1,000 feet of an existing fresh water well intended for domestic use.
- ii. The operator shall, within 120 days of its completion date, equip each well with a cathodic protection system to protect the production casing from external corrosion, unless the inspector approves an alternative method of

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68 City of Southlake, Texas, Ordinance 880-B, *available at* <http://www.nctcog.org/trans/air/SouthLake.pdf>.

protecting the production casing from external corrosion. The operator of a well shall provide the inspector with a “pre-drilling” and “post-drilling” water analysis and flow rate from any existing fresh water well within 2,000 feet of the well. For the purposes of this section, “post-drilling” shall mean the period immediately after the completion of a well. The analysis shall be performed by an independent inspector approved by the City before and after each phase of drilling and fracturing. Such water tests shall conform to the following testing requirements:

- (1) Water samples must be collected and analyzed utilizing proper sampling and laboratory protocol from a U.S. Environmental Protection Agency or Texas Commission on Environmental Quality approved laboratory;
- (2) Well samples shall be analyzed prior to any drilling activity to document baseline water quality data of the well. A post-drilling sample shall be analyzed within three months after the drilling begins; and
- (3) Parameters to be tested for, including but not limited to methane, chloride, sodium, barium and strontium.

If it is found that the fresh water well is no longer in use and without possibility of future use or if the fresh water well owner objects to having the water well tested, the owner of the fresh water well may waive the right to have the operator test the water. In the event of evidence of fresh water well contamination of any wells within 2,000 feet of the gas well(s), the administrative officer is authorized to retest and/or perform an analysis of all wells in order to determine the potential cause of the contamination at the expense of the operator.<sup>69</sup>

Colleyville’s municipal regulation is notable for mandating pre- and post-drill water flow rate sampling for wells water wells within 2,000 feet, in addition to comprehensive quality sampling. The three-month post-drill sampling window is, however, quite short. In addition, the provision that allows the administrative officer to resample *all* water wells within 2,000 feet in the event of evidence of contamination in any one well is an interesting example of using available testing information to implement more robust inspections.

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69 Colleyville, Texas, Land Development Code, Chapter 3.1, *available at* [http://www.colleyville.com/images/content/files/communitydevelopment/ch.\\_03.1\\_gas\\_and\\_oil\\_well\\_drilling\\_and\\_production\\_fifth\\_revision.pdf](http://www.colleyville.com/images/content/files/communitydevelopment/ch._03.1_gas_and_oil_well_drilling_and_production_fifth_revision.pdf).

## WEST VIRGINIA

### *Investigation of Landowner Complaints*

There are no provisions for investigation of landowner complaints specifically in the oil and gas context. However, West Virginians can file a general environmental complaint through the Department of Environmental Protection.<sup>70</sup>

### *Water Sampling*

Section 22-6A-18(b) of the Natural Gas Horizontal Well Control Act states that

in any action for contamination or deprivation of a fresh water source or supply within one thousand five hundred feet of the center of the well pad for [the] horizontal well, there is a rebuttable presumption that the drilling and the oil or gas well or either was the proximate cause of the contamination or deprivation of the fresh water source or supply.

Operators may conduct pre-drill water testing to rebut the presumption of liability. An “independent certified laboratory” must conduct the predrilling or prealteration water well test, and a copy of the results must be “submitted to the department and the surface owner or water purveyor.”<sup>71</sup> An operator can also rebut the presumption of liability by proving that the landowner “refused to allow the operator access to the property to conduct . . . predrilling,”<sup>72</sup> that the “pollution occurred more than six months after completion of drilling or alteration activities,”<sup>73</sup> or that it “occurred as the result of some cause other than the drilling or alteration activity.”<sup>74</sup>

This provision is similar to Pennsylvania’s provision in that an oil or gas developer can rebut the presumption of liability for oil and gas activity by completing pre-drill water testing for water sources within 1,500 feet of the well pad (although the distances from the well pads are different in Pennsylvania).

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70 W. Va. Surface Owners’ Rights Org., *WV State agency for enforcing oil and gas drilling laws*, <http://www.wvsoro.org/resources/dep.html> (last visited Feb. 18, 2014).

71 W. Va. Code § 22-6A-18(d).

72 *Id.* § 22-6A-18(c)(2).

73 *Id.* § 22-6A-18(c)(4).

74 *Id.* § 22-6A-18(c)(5).

## WYOMING

### *Water Sampling*

Wyoming has no statutory authority to inspect private water wells unless there is a question of contamination of the aquifer that supplies those wells. The Department of Environmental Quality recommends landowners test their water pre-drill and supplies guidelines on testing parameters. According to DEQ's fact sheet on the issue, "If the DEQ determines that the contamination is due to natural causes, it will take no further action. However, if it appears that the contamination may be man induced, DEQ will do further investigation into the possible cause."<sup>75</sup>

In late 2013, Wyoming finalized the most comprehensive baseline testing scheme that reflects in the country. The program requires post-drilling samples, mandated isotopic analysis to determine methane provenance,<sup>76</sup> and mandated sharing of the testing results with the well owner as well as public disclosure of non-confidential information.

Under the rules, operators must submit a groundwater baseline sampling, analysis, and monitoring plan with their permit application.<sup>77</sup> A baseline sample is required from each water source if there are four or fewer water sources are within a half-mile radius of the location of a proposed gas well. If there are more than four sources, the operator must submit a plan to the Supervisor for approval for selecting sources based on factors including proximity, source/aquifer and groundwater flow direction.

Baseline testing plans under the proposed regulation must include one initial sampling within 12 months prior to drilling a new well, a second sampling between 12 and 24 months after setting the production casing, and a third sampling between 36 and 48 months after casing.<sup>78</sup> All sampling must be performed pursuant to the requirements and protocols found in proposed Appendix K.<sup>79</sup> Appendix K is a comprehensive document that includes minimum required testing parameters and methods, sample collection, handling and quality control procedures, field documentation

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75 Wyo. Dep't of Env'tl. Quality, Water Quality Div., *Niobrara Shale Development: Water Quality Questions and Answers* (2012), available at <http://deq.state.wy.us/wqd/groundwater/downloads/Niobrara%20Shale%20QA%20%2012-09A.pdf>.

76 Wyo. Admin. Code Oil & Gas Cons. Comm'n ch. 3, § 46(i).

77 *Id.* § 46(a).

78 *Id.* § 46(e).

79 Wyoming Oil and Gas Conservation Commission, *Sampling and Analysis Procedures for Groundwater Baseline Sampling, Analysis, and Monitoring Program*, available at [http://wogcc.state.wy.us/downloads/08162013\\_WOGCC\\_APPENDIX\\_K.pdf](http://wogcc.state.wy.us/downloads/08162013_WOGCC_APPENDIX_K.pdf).

requirements, and reporting requirements.

Copies of all final laboratory results and coordinates of the water sources must be provided to the Commission and the owner of the water source within three months of sample collection. These results are then made available to the public, unless the data is considered confidential under state law.<sup>80</sup>

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<sup>80</sup> Wyo. Admin. Code Oil & Gas Cons. Comm'n ch. 3, § 46(g).

The background of the page features a large, light green watermark of the Harvard University crest. At the top of the crest, the word "VERITAS" is written across three open books. Below this, there are three stylized trees, each with a bird perched on its branches. The crest is enclosed in a shield shape.

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**The Emmett Environmental Law & Policy Clinic** at Harvard Law School is directed by Wendy B. Jacobs and is dedicated to addressing major environmental issues in the United States and abroad and to providing its students an opportunity to do meaningful, hands-on environmental legal and policy work. Students and clinic staff work on issues such as climate change, pollution reduction, water protection and smart growth.

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