

# SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450

601 WEST ROSEMARY STREET, SUITE 220  
CHAPEL HILL, NC 27516-2356

Facsimile 919-929-9421

April 30, 2013

VIA ON-LINE SUBMISSION TO:

<http://www.regulations.gov>

Docket ID No. EPA-HQ-ORD-2010-0674

Re: EPA's Request for Information to Inform Hydraulic Fracturing Research Related to Drinking Water Resources, Docket ID No. EPA-HQ-ORD-2010-0674

We appreciate the opportunity to submit comments on behalf of the North Carolina Environmental Justice Network ("NCEJN") regarding the above referenced Request for Information to Inform Hydraulic Fracturing Research Related to Drinking Water Resources. NCEJN is a coalition of community organizations and its supporters who work with low-income communities and people of color to promote health and environmental equity, clean industry, safe work places and fair access to all human and natural resources through organizing, advocacy, research and education based on principles of economic and political equity. The NCEJN works to empower impacted communities through organized forums, conferences and support of member advocates on environmental issues that negatively impact their health and quality of life.

The Southern Environmental Law Center ("SELC") is a non-profit legal advocacy group dedicated to protecting the environment of the Southeast. SELC works with more than 100 partner groups in six southeastern states. SELC has been actively involved in a variety of efforts to protect and improve water quality in the Southeast and strives to incorporate principles of environmental justice in its program work.

Currently, the North Carolina Mining and Energy Commission is engaged in developing a regulatory program for the management of oil and gas exploration and development activities in North Carolina, including the use of horizontal drilling and hydraulic fracturing. At this point, no comprehensive study has been completed analyzing the potential impacts of hydraulic fracturing, including, but not limited to drinking water impacts on low-income communities and communities of color in North Carolina.<sup>1</sup>

We urge the EPA to: 1) consider fully the impacts of hydraulic fracturing on communities of color and low-income communities in North Carolina, in accordance with Environmental Justice Executive Order 12898; and 2) respond to future requests for comments from the state of North Carolina regarding hydraulic fracturing, reminding them of their responsibility to do the same. In response to your request for Information to Inform Hydraulic Fracturing Research

---

<sup>1</sup>NC Dept. of Env't and Natural Res., North Carolina Oil and Gas Study under Session Law 2011-276 p. 478-479 (April 30, 2012).

Related to Drinking Water Resources, we have included an expert analysis of demographic data at Attachment E to this letter, showing the potential disparate impact, including but not limited to drinking water impacts, of hydraulic fracturing on low-income communities and communities of color, in North Carolina.

Title VI of the Civil Rights Act of 1964, Environmental Justice Executive Order 12898 and North Carolina policy guidance on Environmental Equity all require consideration of the impacts of environmental decision-making on low-income communities, communities of color, or both.

This letter outlines: the background associated with hydraulic fracturing in North Carolina, including unique vulnerabilities of our landscape and the limitations of our state's regulatory process, the necessity of consideration of impacts on communities of color and low-income communities, the demographic data that supports potential disparate impact, a description of potential impacts, including impacts on drinking water resources, and recommendations.

## **I. North Carolina Background**

### **A. Unique Vulnerabilities with regard to North Carolina Shale Gas Reserves, Geography and Drinking Water Resources**

#### North Carolina's Shale Gas Reserves

Shale gas refers to natural gas found within shale formations.<sup>2</sup> Shale forms where sediments accumulate in naturally low-lying regions of the earth's crust. These are known as basins. North Carolina contains four geologic or Triassic basins that outcrop at the Earth's surface. These were formed during the Triassic Period between 235 million and 200 million years ago.<sup>3</sup> The Dan River Basin extends through Stokes and Rockingham Counties into Virginia.<sup>4</sup> The Davie Basin straddles Yadkin and Davie Counties. The Deep River Basin runs from Granville County southwest into South Carolina and includes parts of Durham, Orange, Wake, Chatham, Lee, Moore, Montgomery, Richmond, Anson and Union counties.<sup>5</sup> It is subdivided into three sub-basins, Durham, Sanford and Wadesboro.<sup>6</sup> Finally, the Ellerbe Basin, an "erosional remnant" of the Deep River Basin, is contained in Richmond County.<sup>7</sup>

Information concerning these shale formations and the gas within them is limited.<sup>8</sup> All preliminary estimates on the amount of technically recoverable<sup>9</sup> gas in the April 2012 North

---

<sup>2</sup>[http://www.eia.gov/energy\\_in\\_brief/article/about\\_shale\\_gas.cfm](http://www.eia.gov/energy_in_brief/article/about_shale_gas.cfm).

<sup>3</sup>North Carolina Oil and Gas Study pp. 17-18.

<sup>4</sup>Id.

<sup>5</sup>Id.

<sup>6</sup>Id.

<sup>7</sup>Id.

<sup>8</sup>North Carolina Oil and Gas Study at 29.

<sup>9</sup>Technically recoverable gas is a measure of the volume of natural gas which could be obtained using currently available technology but without regard to economic feasibility. Id. at 30.

Carolina Oil and Gas Study are based on data from just two wells within the 59,000 acre Sanford sub-basin.<sup>10</sup> The Sanford sub-basin crosses Lee, Chatham and Moore counties.<sup>11</sup>

Currently, it is estimated that 4.2 billion cubic feet of technically recoverable gas per well is available.<sup>12</sup> Past experience indicates that only about 20% of this total will be economically feasible, i.e. recoverable at a cost which is less than its selling price.<sup>13</sup> United States Geological Survey (USGS) assessments predict that based on 2010 average daily consumption of natural gas in North Carolina, Deep River Basin natural gas could meet the state's natural gas demands for just 5.6 years.<sup>14</sup> Dan River-Danville Basin resources could meet the state demand for only 60 days.<sup>15</sup> To put these numbers in greater perspective, even with adding potentially recoverable gas from all North Carolina shale gas plays,<sup>16</sup> the total reserves here are anywhere from 0.2% to 0.4% of the total estimated national reserves.<sup>17</sup> Finally, prognoses of economic viability in North Carolina indicate that current gas prices are too low to justify active drilling.<sup>18</sup>

We urge that the EPA strongly consider the potential risks to North Carolina's natural resources and public health from hydraulic fracturing, especially in light of the questionable amount of recoverable natural gas supply in this state, the state's unique natural characteristics and the location of the state's particularly vulnerable communities.

#### North Carolina Natural Resources at Risk

The geographic area under consideration for hydraulic fracturing is in the North Carolina piedmont. This region, also called the Piedmont Plateau, is located between the Appalachian Mountains and the coastal lowlands of North Carolina, and is characterized by rolling hills and fertile soil.<sup>19</sup> It is historically the agricultural heartland of the state<sup>20</sup> and is the region that includes eight of the top ten largest cities in the state.<sup>21</sup>

The region is home to a number of rare and unusual ecosystems. The grasslands known as piedmont prairies, once widespread, are now rare and isolated.<sup>22</sup> Old-growth hardwood forests, now mostly displaced by pines, remain only in a few bottomland areas. The piedmont

---

<sup>10</sup>North Carolina Oil and Gas Study at 30.

<sup>11</sup>*Id.* at 63.

<sup>12</sup>*Id.* at 30.

<sup>13</sup>*Id.*

<sup>14</sup>USGS report: <http://pubs.usgs.gov/fs/2012/3075/fs2012-3075.pdf>.

<sup>15</sup>*Id.*

<sup>16</sup> Shale gas is found in shale "plays," which are shale formations containing significant accumulations of natural gas and which share similar geologic and geographic properties.

[http://www.eia.gov/energy\\_in\\_brief/article/about\\_shale\\_gas.cfm](http://www.eia.gov/energy_in_brief/article/about_shale_gas.cfm).

<sup>17</sup>Elkan, Alexander. "North Carolina Shale Gas Rights and Access" p. 5, UNC School of Law 2013 Festival of Legal Learning materials.

<sup>18</sup>*Id.* citing Theodor A. Feitshans, "Shale Gas in North Carolina: Issues in Law, Economics and Policy", NC State Economist (May/June 2012).

<sup>19</sup><http://placesofvalue.com/north-carolina-map-and-climate/north-carolina-the-piedmont-area/>.

<sup>20</sup>*Id.*

<sup>21</sup>*Id.*

<sup>22</sup>James Douglas Benson, Characterization of Piedmont Prairie Sites in North and South Carolina (2011), <http://udini.proquest.com/view/characterization-of-piedmont-pqid:2371399551/>.

sandhills region, which marks the remains of an ancient seashore, is home to the vanishing longleaf pine and the endangered red-cockaded woodpecker which lives in longleaf pine forests.<sup>23</sup> Almost the entire extant range of the Cape Fear Shiner (*Notropismekistocholas*) is located in the Sanford sub-basin counties of Lee, Moore and Chatham, and the Deep River along the border of Lee and Chatham Counties is one of only two locations in North Carolina home to the endangered shrub harperella (*Ptilimniumviviparum*).<sup>24</sup>

In addition to endangered species and dwindling piedmont prairie and long-leaf pine populations, the current North Carolina hydraulic fracturing geographic study area includes drinking water resources that are remarkable in their vulnerability to the hydraulic fracturing process.

### Potential Drinking Water Impacts

Although well-water is common in Lee, Moore and Chatham Counties, which are largely rural, the region does not actually contain any aquifers as typically defined.<sup>25</sup> The mostly sedimentary rock in the region contains long, thin intrusions of igneous rock which are highly fractured.<sup>26</sup> The fractured nature of these igneous rock intrusions allows the rock to soak up water sufficient to support a water supply well.<sup>27</sup> Subsurface water can flow for great distances following the edges of these intrusions.<sup>28</sup> Water from North Carolina wells is generally safe to drink without processing, and groundwater is the most common source of water for irrigation and livestock.<sup>29</sup>

Groundwater reliance, population growth, background water quality monitoring, relatively shallow shale deposits in relation to deep wells and surface water concerns should all be considered in evaluating potential drinking water impacts.

First, there are large numbers of residents who rely on groundwater supply for drinking water. In the counties of the Sanford sub-basin, Chatham, Moore and Lee, the total population percentage relying on groundwater per county are 58%, 76% and 19%, respectively.<sup>30</sup> A total of 30% of residents in the greater Dan and Deep River basin twelve county region rely on groundwater, of which 23% is self-supplied, i.e. private wells vs. municipal wells.<sup>31</sup>

The population of that region is expected to grow, increasing the drinking water supply demand. In the five years from 2005 to 2010, the population in the three most impacted counties

---

<sup>23</sup>Cecil C. Frost, Four Centuries of Changing Landscape Patterns in the Longleaf Pine Ecosystem, in Proceedings 18th Tall Timbers Fire Ecology Conference: the longleaf pine ecosystem: ecology, restoration and management 17-43 (Hermann, S. M., 1993). <http://americaslongleaf.org/media/2554/historic-landscape-scale-change-in-llp-ecosystems-nc.pdf>.

<sup>24</sup> US Fish and Wildlife Service, Lee County Endangered Species, <http://www.fws.gov/raleigh/species/cntylist/lee.html>.

<sup>25</sup>North Carolina Oil and Gas Study at 113.

<sup>26</sup>Id.

<sup>27</sup>Id.

<sup>28</sup>Id.

<sup>29</sup>North Carolina Oil and Gas Study at 113.

<sup>30</sup>Id. at 118.

<sup>31</sup>Id.

increased from 195,391 to 210,523.<sup>32</sup> Between 2010 and 2030, the population in these counties is expected to further rise to 278,451.<sup>33</sup> This represents a population increase of 33% over 20 years and 43% over 25 years.<sup>34</sup> Even including predicted increases in water treatment capacity, the demand for well water in these same counties is expected to increase 45% to 10 million gallons per day by 2030.<sup>35</sup>

Next, there is little data on the overall background quality of groundwater in the Triassic basins<sup>36</sup> and no groundwater monitoring stations have been constructed there.<sup>37</sup> This creates an untenable circumstance whereby culpability for contamination would be difficult to prove.

Significantly, there is a relatively short distance between recoverable gas and groundwater that may be used as drinking water supply.<sup>38</sup> Compared to Pennsylvania, where shale gas lies at depths of 10,000 feet and drinking water wells are generally no more than 600 feet deep, in North Carolina's Triassic basin, some shale gas resources lie at depths of only 3,000 feet while drinking water supply wells of up to 1,000 feet have been found.<sup>39</sup> NCDENR has stated that based on their estimates in the Triassic basin, "the [shale gas] producing zones and hydraulically fractured intervals of any gas wells *will be* located in potential future water supplies."<sup>40</sup> Thus, the overall risk of well contamination from hydraulic fracturing is significantly higher in North Carolina due to geological factors.<sup>41</sup>

Potential drinking water impacts are not limited to groundwater contamination. There are several important rivers in the region, including the Deep and the Haw, which join to form the Cape Fear River near the Lee-Chatham County border.<sup>42</sup> These rivers both feed drinking water supply in two watersheds that are heavily leased for potential hydraulic fracturing.<sup>43</sup> Stormwater run-off from construction sites, spills and releases during transportation of wastewater as well as on-site spills all threaten drinking water supplies fed by rivers in the heavily leased watersheds.<sup>44</sup>

## B. Limitations of North Carolina's Regulatory Process

North Carolina has only recently begun its attempts to study and regulate hydraulic fracturing. The North Carolina Geologic Survey announced the existence of shale gas underlying the Deep and Dan River basins in twelve North Carolina counties in 2009.<sup>45</sup>

---

<sup>32</sup>North Carolina Oil and Gas Study pp. 51-52.

<sup>33</sup>*Id.* at 52.

<sup>34</sup>*Id.*

<sup>35</sup>*Id.*

<sup>36</sup>*Id.*

<sup>37</sup>*Id.*

<sup>38</sup>North Carolina Oil and Gas Study at 115.

<sup>39</sup>*Id.*

<sup>40</sup>*Id.*

<sup>41</sup>North Carolina Oil and Gas Study at pp. 115-118.

<sup>42</sup>*Id.*, pp. 48 – 50.

<sup>43</sup>SELC Map of Public Water Supplies and Gas Exploration Leases in Lee County. Attachment A.

<sup>44</sup>North Carolina Oil and Gas Study pp. 139-145.

<sup>45</sup>Reid, J. C., & Taylor, K. B. (2009). Shale gas potential in the Triassic strata of the Deep River Basin, Lee and Chatham counties, N.C. with pipeline and infrastructure data.  
[http://www.geology.enr.state.nc.us/pubs/PDF/NCGS\\_OFR\\_2009-01\\_20090709.pdf](http://www.geology.enr.state.nc.us/pubs/PDF/NCGS_OFR_2009-01_20090709.pdf).

Following the Geologic Survey's initial announcement, several small companies began leasing mineral rights from landowners in Lee County, and the state legislature began to consider the policy changes that would be necessary to develop the shale gas resource.

On June 23, 2011, then Governor Beverly Perdue signed into law House Bill 242 as Session Law 2011-276, directing the Department of Environment and Natural Resources (DENR) to conduct a study and hold public hearings on the issues of horizontal drilling and hydraulic fracturing for gas extraction.<sup>46</sup> As one piece of the state's shale gas study, DENR requested that the State Review of Oil & Natural Gas Environmental Regulations (STRONGER) organization, a nonprofit, perform a review of North Carolina's oil and gas regulatory programs. The STRONGER review process brought together representatives from the state, the oil and gas industry, and public interest stakeholders to evaluate the state's regulatory programs against STRONGER's set of national guidelines. STRONGER's review panel met in late October 2011 to gather information about the state's processes and issued a report in late February 2012.<sup>47</sup>

The legislature released its draft study of hydraulic fracturing in March of 2012. Southern Environmental Law Center, on our own behalf, and on behalf of North Carolina Sierra Club and Environment North Carolina commented on the draft, noting that state regulators still did not know whether hydraulic fracturing could be done safely, or what should be contained in the regulatory structure that would manage the industry.<sup>48</sup> North Carolina's final study, released just one month later, made little progress in addressing the same concerns. Now, one year later, the state has just as many unanswered questions, but recently introduced legislation that proposes lifting the moratorium on horizontal drilling and setting a date certain for permitting.<sup>49</sup> In addition to the numerous information gaps, the study did not consider adequately the potential impact of hydraulic fracturing on low-income communities and communities of color in North Carolina.

## **II. North Carolina DENR and the Environmental Protection Agency are required to consider impacts of hydraulic fracturing on low-income communities and communities of color**

Federal law, federal policy, and state policy require the Mining and Energy Commission and the EPA to consider impacts of hydraulic fracturing on communities of color and/or low-income communities.

### **A. Title VI of the Civil Rights Act of 1964**

Title VI of the Civil Rights Act of 1964 states that “[n]o person in the United States shall, on the ground of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.” In 2011, the General Assembly directed the North Carolina Department of

<sup>46</sup><http://www.ncleg.net/gascripts/BillLookUp/BillLookUp.pl?Session=2011&BillID=h242&submitButton=Go>.

<sup>47</sup>[http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=a76955dc-78d0-4b73-ad9f-336353173f45&groupId=14](http://portal.ncdenr.org/c/document_library/get_file?uuid=a76955dc-78d0-4b73-ad9f-336353173f45&groupId=14).

<sup>48</sup>April 2, 2012 SELC comments on Draft North Carolina study, p. 8. Attachment B.

<sup>49</sup>NC Senate Bill 76, Domestic Energy Jobs Act,

<http://www.ncleg.net/gascripts/BillLookUp/BillLookUp.pl?Session=2013&BillID=s+76&submitButton=Go>.

Environment and Natural Resources (“NCDENR”), in coordination with the Department of Justice, and the Rural Advancement Foundation (“RAFI-USA”) to study the issue of oil and gas exploration in North Carolina. The General Assembly also passed the Clean Energy and Economic Security Act, reconstituting the state’s Mining Commission as the North Carolina Mining and Energy Commission. The Commission, in conjunction with other commissions and states agencies, has been charged with, among other duties, establishing an oil and gas regulatory program that is “designed to protect public health and safety; protect public and private property; protect and conserve the State’s air, water and other natural resources.”<sup>50</sup> As a sub-division of NCDENR, a state agency receiving federal funds, the North Carolina Mining and Energy Commission must comply with Title VI and its regulations.

If regulations are promulgated without full consideration of implications of hydraulic fracturing on communities of color, the regulations as applied may have an adverse and disproportionate impact on the local community on the basis of race, in violation of Title VI.

#### B. Environmental Justice Executive Order 12898

The Environmental Protection Agency (EPA) defines environmental justice, as:

[F]air treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, or commercial operations, or the execution of federal, state, local, and tribal programs and policies. Meaningful involvement means that potentially affected community residents have an appropriate opportunity to participate in decision-making about a proposed activity that will affect their environment and/or health, the public’s contribution can influence the regulatory agency’s decisions, their concerns will be considered in the decision making process; and the decision makers seek out and facilitate the involvement of those potentially affected.<sup>51</sup>

The Executive Order requires that each federal agency shall identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations.<sup>52</sup> In evaluating the impacts of hydraulic fracturing on drinking water, the EPA should also consider the impacts on low-income communities and communities of color.

#### C. North Carolina’s Environmental Equity Initiative

Failure to consider the potential impacts of hydraulic fracturing on low-income communities is inconsistent with the principles of environmental equity as reflected in

---

<sup>50</sup><http://portal.ncdenr.org/web/mining-and-energy-commission/>.

<sup>51</sup><http://www.epa.gov/environmentaljustice/basics/index.html>.

<sup>52</sup>Exec. Order No. 12898, § 101.1-101, 59 C.F.R. 7629 (1994), amended in 60 FR 6381 (1995).

NCDENR's October 19, 2000 "Environmental Equity Initiative" Policy. In order to meet the goals of the Initiative, the policy provides that NCDENR will, among other actions:

- Address environmental equity issues in permitting decisions for projects potentially having a disparate impact on communities protected by Title VI of the Civil Rights Act of 1964;
- Use demographic information to determine whether there is: 1) a need for greater outreach to community in order to encourage more meaningful participation, or 2) special health risks based on the nature of the population;
- Resolve environmental equity complaints, consistent with the protection afforded by Title VI of the Civil Rights Act of 1964; and
- Provide opportunities for interested parties to raise concerns on Environmental Equity in NCDENR's decisions.

North Carolina's study nor the deliberations of the current commission have met the goals of the Initiative.

### **III. Environmental Justice Analysis: EJ Communities and Disparate Adverse Impacts**

#### **A. Environmental Justice and Shale Gas Extraction in Lee County**

At least fourteen North Carolina counties could be affected by the hydraulic fracturing extraction process: Stokes, Rockingham, Granville, Orange, Durham, Chatham, Wake, Lee, Moore, Richmond, Montgomery, Anson, Davie and Yadkin.<sup>53</sup> At present, Lee County is the focus for the greatest amount of extraction activity because existing exploratory wells in the Sanford sub-basin, which includes Lee County, indicate the presence of natural gas.<sup>54</sup> Four companies have leased more than 9,000 acres for shale gas exploration in the county.<sup>55</sup>

Lee County has higher population percentages of people of color and low-income people than the other counties in the Sanford sub-basin as well as the state on average.<sup>56</sup> Lee County also has higher unemployment rates than the state on average as well as more unemployment, on average, than the other counties in the Sanford sub-basin. Further, there are higher than state average populations of people of color in several gas exploration lease areas.<sup>57</sup> These communities face greater potential for harm from negative impacts, including drinking water damage, from hydraulic fracturing.

Lee County has a higher percentage of minorities, at 41.3% of the county population, compared to the state of North Carolina as a whole, which is 36.4% minority. Lee County also

<sup>53</sup>North Carolina Oil and Gas Study p. 17. Figure 1-1 Exposed North Carolina Triassic Rift Basins.

<sup>54</sup>North Carolina Oil and Gas Study p. 50.

<sup>55</sup>State Oil and Gas Environmental Regulations (STRONGER) Report, North Carolina, p. 7 (February 2012).

<sup>56</sup>Table 1: Lee County Environmental Justice Indicators. Attachment C.

<sup>57</sup>SELC Map of Lee County Communities of Color and Gas Exploration Leases by Census Block. Attachment D.



has a greater percentage of low-income people than the state of North Carolina as a whole. 10.6% of all Lee County workers are unemployed, compared to 9.7% of North Carolina workers. 16.8% of Lee County residents live beneath the poverty level, as opposed to 16.1% of the rest of North Carolinians.

Significantly, in a statistical analysis of Lee County gas exploration leases and United States Census Bureau race data, researchers found that census blocks with a higher than state average proportion of people of color were twice as likely to have a gas exploration lease than census blocks with a lower than state average population of people of color.<sup>58</sup> Further, census blocks with higher proportions of people of color have twice the proportion of land leased for gas exploration.<sup>59</sup>

#### B. Environmental Justice and Underground Wastewater Injection in Coastal North Carolina

In addition to the potential Environmental Justice implications associated with the extraction process, there are also Environmental Justice considerations related to disposal of wastewater. Currently, the practice is illegal in North Carolina. Even the state's Department of Environment and Natural Resources recommends maintaining that prohibition because of North Carolina's unsuitable geology and seismic risks.<sup>60</sup>

Despite that recommendation, North Carolina's "Domestic Energy Jobs Act," Senate Bill 76, would allow disposal of hydraulic fracturing wastewater fluid through deep underground injection.<sup>61</sup> Rather than that injection occurring near the extraction site, it would most likely get disposed in coastal North Carolina.<sup>62</sup> An EPA assessment of industrial waste injection sites nationwide classified western North Carolina as unfavorable under all conditions and coastal North Carolina as unsuitable under most conditions.<sup>63</sup>

North Carolina has 17 coastal counties, of which eight have either low-income or minority populations that are larger than the state average.<sup>64</sup> Ten North Carolina coastal counties have higher unemployment rates than the state average.<sup>65</sup> In addition, it is of some concern that the sites at which the underground injection could occur may show even more stark numbers. The negative impacts of underground injection, including potential contamination of groundwater in coastal aquifers and seismic activity would then be disproportionately borne by low-income communities or communities of color in coastal North Carolina.

---

<sup>58</sup>Race, Poverty, and Hydraulic Fracturing in North Carolina by Emily Werder, MPH. Attachment E.

<sup>59</sup>*Id.*

<sup>60</sup>North Carolina Oil and Gas Study p. 319.

<sup>61</sup><http://www.ncleg.net/gascripts/BillLookUp/BillLookUp.pl?Session=2013&BillID=s+76&submitButton=Go>.

<sup>62</sup><http://www.newsobserver.com/2013/03/04/2725177/coastal-counties-could-get-fracking.html>.

<sup>63</sup> United States Environmental Protection Agency. (1990, June). *Assessing the geochemical fate of deep-well-injected hazardous waste: A reference guide*.

<sup>64</sup>Table 2: NC Coastal Counties Environmental Justice Indicators. Attachment F.

<sup>65</sup>*Id.*

### C. Defining Disparate Adverse Impacts of Hydraulic Fracturing on Communities of Color and Low-Income Communities in Lee County and Coastal North Carolina

Low-income communities and communities of color often face particular inequities from the outset that make environmental harm all the more devastating. Lesser access to quality healthcare, affordable housing and gainful employment all factor into these communities suffering disproportionately. In addition to the impacts on drinking water supply, there are several other negative impacts of hydraulic fracturing that may be borne disproportionately by communities of color and low income communities either because of proximity to the extraction area, proximity to the disposal area, or due to particular vulnerabilities of these communities. These include:

#### Noise

Noise pollution has been shown to have significant adverse health effects. Although little research has been done on the specific noise problems associated with hydraulic fracturing, the American Academy of Pediatrics (AAP) has expressed concern about the effects of noise on nearby children.<sup>66</sup> The AAP cited a study in the British Medical Bulletin, which found that chronic noise can affect children's reading comprehension and long-term memory.<sup>67</sup> Studies on primary-school children have shown that exposure to chronic noise impairs their ability to concentrate and makes it harder for them to understand what they read.<sup>68</sup> This effect is even measurable between different classrooms in the same school.<sup>69</sup>

In addition, Portuguese researchers have identified a condition known as vibroacoustic disease, characterized by thickened pericardia and cardiac valves, which is caused by chronic exposure to low-frequency sound, including frequencies too low to be perceived by the human ear.<sup>70</sup> Symptoms associated with the condition include epilepsy, balance problems and endocrine disorders.<sup>71</sup>

#### Traffic

Hydraulic fracturing is a transportation-heavy industry. For instance, a study conducted by the New York Department of Environmental Conservation estimated that for each well drilled, construction would require up to 3,958 round trips by truck to the well site.<sup>72</sup> In North Carolina, as in most states where hydraulic fracturing occurs, drilling is likely to take place mostly in rural areas where transportation infrastructure is not designed to handle heavy trucks.

---

<sup>66</sup>American Academy of Pediatrics, PEHSU Information on Natural Gas Extraction and Hydraulic Fracturing for Health Professionals 3 (2011),

[http://aoec.org/pehsu/documents/hydraulic\\_fracturing\\_and\\_children\\_2011\\_health\\_prof.pdf](http://aoec.org/pehsu/documents/hydraulic_fracturing_and_children_2011_health_prof.pdf).

<sup>67</sup>Stephen A. Stansfeld and Mark P. Matheson, Noise Pollution: Non-Auditory Effects on Health, 68 Br. Med. Bull. 243 (2003).

<sup>68</sup>*Id.* at 250-51.

<sup>69</sup>*Id.* at 250-51.

<sup>70</sup>Nuno Castelo Branco and Mariana Alves-Pereira, Vibroacoustic Disease, 6 Noise and Health 3 (2004).

<sup>71</sup>*Id.*

<sup>72</sup>N.Y. Dept. of Env'tl Conservation, Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program 6-302 (2011).

In a survey conducted in rural Texas counties in which fracking was occurring, the residents indicated that increased truck traffic was the single most negative impact.<sup>73</sup>

### Boom Bust Cycle

Natural resource exploitation tends to be characterized by a boom and bust cycle. The discovery of removable resources causes a rapid increase in regional economic activity in which population can skyrocket. As the available stores of the resource decrease and continued exploitation becomes increasingly expensive, population and jobs quickly depart.<sup>74</sup> There are costs to the local community from both the “boom” and “bust” portions of the cycle.<sup>75</sup>

### Rental rate increases that push out existing communities

Many of the workers needed to drill for natural gas have highly specialized training. Therefore, although fracking does create jobs, most of the workforce comes from outside the local community.<sup>76</sup> The influx of “outsiders” with relatively high-paying drilling jobs causes price inflation which affects all segments of the local economy but especially rental housing. Because these workers are usually in town only temporarily, there is little incentive to build additional permanent housing to accommodate them. Rents on existing space, including hotels, can increase dramatically, pushing out long-time local residents. This effect can be particularly severe for the elderly and others on fixed incomes.<sup>77</sup>

### Overcrowding at schools

The influx of new workers tends to bring with it an influx of school-age children. In a study of the population pressures in Sublette County, Wyoming resulting from a gas boom there, a significant portion of the newly arriving children were non-native English speakers. The increase in children and the consequent need to hire additional teachers, including English as a second language (ESL) teachers resulted in significant overcrowding in Sublette County schools. At the same time, similar concerns about the transitory nature of the workforce may discourage local officials from building additional schools. In addition, because many of these workers will rent rather than buy real estate, they do not contribute to the real estate taxes which are often a primary source of funding for school systems.<sup>78</sup>

---

<sup>73</sup>Gene L. Theodori, Paradoxical Perceptions of Problems Associated with Unconventional Natural Gas Development, 24 Southern Rural Sociology 97, 107 (2009).

<sup>74</sup>Susan Christopherson and Ned Rightor, How Should We Think About the Economic Consequences of Shale Gas Drilling?, in Working Paper Series: A Comprehensive Economic Impact Analysis of Natural Gas Extraction in the Marcellus Shale 8 (2011).

<sup>75</sup>Id.

<sup>76</sup>Jeffrey Jacquet, Workforce Development Challenges in the Natural Gas Industry, in Working Paper Series: A Comprehensive Economic Impact Analysis of Natural Gas Extraction in the Marcellus Shale (2011).

<sup>77</sup>Susan Christopherson and Ned Rightor, How Shale Gas Drilling Affects Drilling Localities: Lessons for Regional and City Policy Makers, 2 J. of Town and City Management 1, 10-11 (2012).

<sup>78</sup>Ecosystem Research Group, Sublette County Socioeconomic Impact Study: Phase I Final Report 44-49 (2008).

## Real Estate Devaluation

There is statistical evidence indicating that properties with gas wells on them are less valuable than other similarly situated properties. A study on methane wells in Colorado found that the presence of a well decreased the value of a given property by 22%.<sup>79</sup> The study also found that the presence of a well on an adjacent property increased the value of the property.<sup>80</sup> The study authors concluded that, given the spacing requirements for such wells, the positive effect was a result of the fact that a nearby well meant that no further drilling was possible.<sup>81</sup> A more recent study focusing on shale gas found contradictory evidence with regard to real estate values but suggested that devaluation was greatest for properties without access to piped water.<sup>82</sup>

## Lending Freeze

Real estate values are difficult to measure once drilling has begun because many banks will refuse to write mortgages for such properties, making them difficult to sell.<sup>83</sup> In addition, the terms of the drilling lease may be in violation of the terms of the existing mortgage, creating a “technical default” that neither the homeowner nor the lender wishes to pursue.<sup>84</sup> Mortgages on properties with mineral leases may also violate Fannie Mae and Freddie Mac secondary mortgage market guidelines, making those mortgages valueless on the secondary market.<sup>85</sup>

## Forced Pooling

Forced pooling is the practice of an oil or gas company forcing property owners to give up their mineral rights in order to provide a large enough pool of available resources to make drilling economically viable. Forced pooling, which is a common practice in other mineral extraction fields, is allowed by law in 40 states, including North Carolina. Texas courts have held that a landowner whose land has been pooled, even in bad faith, has no recourse against the driller except to seek royalties on the gas which he can prove has been drilled from his land.<sup>86</sup> This can be particularly difficult where, as with most fracking wells, the drilling is at least partially horizontal.<sup>87</sup>

## Air Pollution

The combination of drilling itself, as well as diesel engines from trucks, generators, and fumes from produced water and fracking fluids, adds up to significant air emissions, at least in

---

<sup>79</sup>BBC Research & Consulting, *Measuring the Impact of Coalbed Methane Wells on Property Values*, p. 17 (2001).

<sup>80</sup>*Id.* at p. 18 (2001).

<sup>81</sup>*Id.* pp. 18-19 (2001).

<sup>82</sup>Lucija Muehlenbachs et al., *Shale Gas Development and Property Values: Differences across Drinking Water Sources*, National Bureau of Economic Research (2012).

<sup>83</sup>[http://www.shalereporter.com/blog/tara\\_zrinski/article\\_00f2a88a-1c93-11e2-846a-0019bb30f31a.html](http://www.shalereporter.com/blog/tara_zrinski/article_00f2a88a-1c93-11e2-846a-0019bb30f31a.html).

<sup>84</sup><http://www.newsobserver.com/2012/04/27/2026640/lawmakers-hear-about-dangers-of.html>.

<sup>85</sup>Elisabeth N. Radow, “Homeowners and Gas Drilling Leases: Boon or Bust?”, 83 N.Y. State Bar Assn J. 11 (2011).

<sup>86</sup>Stephen Taylor Dennis, Comment: *Browning Oil Co. v. Luecke: Has Texas Illuminated a Dark Distinction Between Vertical and Horizontal Drilling?*, 34 St. Mary’s L.J. 215 (2002).

<sup>87</sup>*Id.*

the immediate vicinity of the drilling site and nearby roads. A study by researchers at the University of Colorado found a significant risk for cancer and other health hazards from air pollution for residents within ½ mile of drilling sites in Garfield County. Various hydrocarbons released into the air during drilling itself posed a risk for neurological or respiratory effects. Benzene in the air posed a risk for leukemia. The drilling site in the study was in a rural area and had no other nearby industry that could have caused these emissions.<sup>88</sup>

#### Severance of Mineral Rights from the Land

When there is a possible profit to be made from drilling, sellers, especially developers, have an incentive to retain the mineral rights to land that they sell. This severs the interests between the homeowner, who wants to preserve his land, and other developers, who want to make a profit from drilling. All of the profits from drilling are reaped by a distant party that does not have to suffer the consequences of environmental or other damage to the land. This retention of mineral rights by sellers is already a known problem in Lee County, where it is exacerbated by decades of poor recordkeeping.<sup>89</sup>

#### Predatory Leasing

Even where landowners retain the mineral rights to their land and are forcibly pooled, they tend to agree to mineral leases that contain disadvantageous terms. Some landowners, including rural farmers, may have little or no experience with mineral leasing and can be taken in by high-pressure gas company representatives who take leases door-to-door. This is a particular problem in states like North Carolina that have little history of mineral extraction. A study of existing leases by the New York Times found that significant numbers did not contain basic protections for the landowners.<sup>90</sup> Fewer than half of leases required the gas company to compensate the landowner for water contamination and a significant number of the leases allowed the gas company the option to extend the term unilaterally.<sup>91</sup>

### **IV. Recommendations**

It is premature to authorize moving forward with hydraulic fracturing in North Carolina. North Carolina's Oil and Gas study recognizes substantial gaps in information with regard to potential impacts on drinking water, air quality, social and economic stability and public health, from hydraulic fracturing. The same study devotes less than two pages to any discussion of environmental justice, despite requests during the comment period from several Environmental

---

<sup>88</sup>Lisa M. McKenzie et. al., Human Health Risk Assessment of Air Emissions From Development of Unconventional Gas Resources, 424 *Sci. Total Environ.* 79 (2012).

<sup>89</sup>John Murawski, "Ownership of Lee County Mineral Rights Muddled", *Raleigh News & Observer*, Nov. 18, 2011, <http://www.newsobserver.com/2011/11/18/1652335/ownership-of-lee-county-natural.html>; John Murawski, "Lee County Records Reveal Who Owns Rights to Drill for Natural Gas", *Raleigh News & Observer*, Feb. 16, 2013, <http://www.newsobserver.com/2013/02/16/2686176/lee-county-records-reveal-who.html>.

<sup>90</sup>Ian Urbina and Jo Craven McGinty, *Drilling Down: Learning Too Late of the Perils in Gas Well Leases*, N.Y. Times, Dec. 1, 2011, <http://www.nytimes.com/2011/12/02/us/drilling-down-fighting-over-oil-and-gas-well-leases.html>.

<sup>91</sup>*Id.*

Justice advocates for more attention to concerns of communities of color and low-income communities. We urge the EPA to review the recommendations provided in our 2012 comments to the state of North Carolina regarding potential impacts of hydraulic fracturing, as well as take specific action with regard to the environmental justice implications of hydraulic fracturing. At a minimum, the EPA should:

- Conduct an extensive environmental justice analysis regarding impacts of hydraulic fracturing and wastewater disposal on communities of color and low-income communities in North Carolina;
- Provide recommendations to North Carolina on inclusion of impacted communities in the regulatory process that reflect the principles of environmental justice; and
- Recommend that the State of North Carolina conduct a Health Impact Assessment<sup>92</sup> in Lee County, to evaluate the way that hydraulic fracturing may impact public health and make recommendations for the best way to limit negative effects.

## V. Conclusion

We urge the EPA to recommend that the state of North Carolina not rush forward with hydraulic fracturing, follow its own guidance as well as federal law, conduct additional study and do more effective outreach to communities of color and low-income communities to determine the extent of potential negative impacts to these populations from hydraulic fracturing. Because Lee County has a higher than state-wide and Sanford sub-basin average population of people of color, a higher than state and Sanford sub-basin average population of low-income people, a significant amount of land leased for gas exploration in communities of color and because of the numerous inadequacies and omissions in the 2012 North Carolina study, additional consideration should be given in order to implement, adequately, the principles of Environmental Justice and to avoid violation of Title VI of the Civil Rights Act of 1964.

Thank you for the opportunity to comment on this important matter.

Sincerely,



Chandra T. Taylor  
Mary Maclean Asbill  
Brooks Rainey Pearson  
Southern Environmental Law Center

---

<sup>92</sup>A Health Impact Assessment (HIA) is “a systematic process that uses an array of data sources and analytic methods, and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects” as defined by the National Resource Council.

cc with attachments

Via U.S. mail only:

Bob Perciasepe, Acting Administrator, USEPA  
Gwendolyn Keyes Fleming, Region IV Administrator, USEPA  
Denise Tennessee, Acting Region IV Environmental Justice Program Manager, USEPA

Via email only:

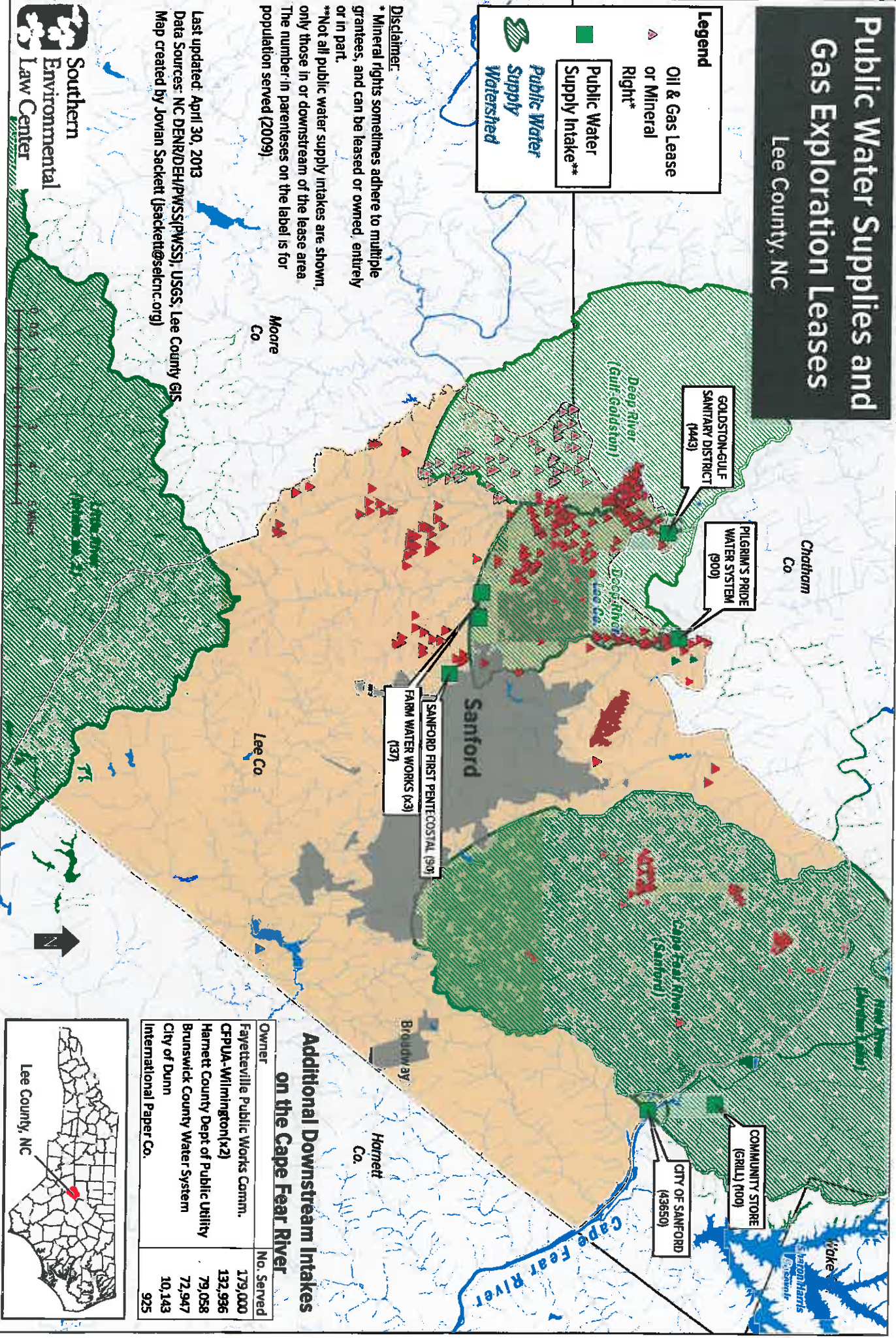
Gary H. Grant, North Carolina Environmental Justice Network, tillery@aol.com  
Amy Simes, NC Environmental Justice State Contact, NCDENR, amy.simes@ncdenr.gov  
North Carolina Mining and Energy Commission (MEC)  
Dr. Robert Mensah-Biney, robert\_biney@ncsu.edu  
Dr. Kenneth B. Taylor, PG, kenneth.b.taylor@ncdenr.gov  
Dr. Ray Covington, raycovington@triad.rr.com  
Charles Taylor, taylormec@windstream.net  
Charles Holbrook, cholbrook40@gmail.com  
George Howard, mec.commissioner.howard@gmail.com  
James Womack, commissioner.womack@gmail.com  
Ivan K. Gilmore, tex@gma-nc.com  
Dr. Vikram Rao, rao.energy@yahoo.com  
Jane Lewis-Raymond, jlewis.raymond@gmail.com  
Charlotte Mitchell, charlotte.a.mitchell2@gmail.com  
Amy Pickle, mec.pickle@gmail.com  
Dr. Marva Mizell Price, marva.price@duke.edu  
Tracy E. Davis, Staff to MEC, tracy.davis@ncdenr.gov  
Trina S. Ozer, Staff to MEC, trina.ozar@ncdenr.gov

# Public Water Supplies and Gas Exploration Leases

Lee County, NC

**Legend**

- ▲ Oil & Gas Lease or Mineral Right\*\*
- Public Water Supply Intake\*\*
- Public Water Supply Watershed



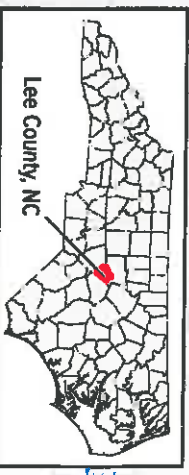
**Disclaimer:**  
 \* Mineral rights sometimes adhere to multiple grantees, and can be leased or owned, entirely or in part.  
 \*\*Not all public water supply intakes are shown, only those in or downstream of the lease area. The number in parentheses on the label is for population served (2009).

Last updated: April 30, 2013  
 Data Sources: NC DENR/DWH/PWSS(PWSS), USGS, Lee County GIS  
 Map created by Jovian Sackett (jsackett@selcnc.org)



## Additional Downstream Intakes on the Cape Fear River

Owner	No. Served
Fayetteville Public Works Comm.	179,000
CFPUA-Wilmington(x2)	132,996
Harnett County Dept of Public Utility	79,058
Brunswick County Water System	72,947
City of Dunn	10,143
International Paper Co.	925





# SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450

601 WEST ROSEMARY STREET, SUITE 220  
CHAPEL HILL, NC 27516-2356

Facsimile 919-929-9421

April 2, 2012

## *Via U.S. and Electronic Mail*

Trina Ozer  
N.C. DENR  
1601 Mail Service Center,  
Raleigh, N.C. 27699  
Shale\_gas\_comments@ncdenr.gov

**Re: Session Law 2011-276 Draft Study Comments**

Dear Ms. Ozer:

Please accept these comments on the Department of Environment and Natural Resources' study of hydraulic fracturing ("fracking") required by Session Law 2011-276 ("Draft Study"). The Southern Environmental Law Center submits these comments on behalf of itself, North Carolina Sierra Club, and Environment North Carolina. Overall, we believe DENR succeeded in identifying a significant number of important gaps in our understanding of hydraulic fracturing, its risks with respect to the environment and human health, and North Carolina's lack of a regulatory system that is capable of managing those risks. Because of these factual and a regulatory shortcomings, the Draft Study's conclusion, that fracking can be done safely, is unsupported and, as described in further detail below, cannot be made based on existing information.

**"The analysis is constrained by the limited information available at this time."<sup>1</sup>**

Deep in the Draft Study, DENR acknowledges the fundamental shortcoming of the study – that there simply is not enough information available to make a reasoned decision at this time. In fact, the agency goes on to specifically describe the limitations with respect to North Carolina, stating that "[w]e do not have detailed or comprehensive information on the extent and richness of the shale gas resource" in the state.<sup>2</sup> The estimates of potential reserves are based on a meager two wells with "significantly different values."

Continuing, DENR recognizes that "the depth and quality of groundwater resources in the Triassic Basins of North Carolina appear to be very different from conditions in the Marcellus shale" and that we do not yet know what those differences are or how they may affect public health and environmental effects of fracking.<sup>3</sup> Critically, the Draft Study states that "North Carolina does not seem to have as great a separation between potential drinking water resources and the gas-producing zone" highlighting our collective ignorance regarding one of the key issues that the industry has cited as a primary protection against drinking water

<sup>1</sup> Draft Study at 304.

<sup>2</sup> *Id.*

<sup>3</sup> *Id.*

contamination. In addition, the Triassic Basin is sprinkled with diabase dikes, formations that further complicate comparisons to other states. Moreover, a similar lack of separation and unusual groundwater circumstance appears to be important in the groundwater contamination EPA is studying in Pavillion, Wyoming, information that DENR was precluded from taking into account in this study due to the rushed timeline.<sup>4</sup>

Ultimately, that lack of information undermines any assertion that fracking can be done safely. The Draft Study acknowledges that “no comprehensive studies are currently available on the long-term impacts to health from hydraulic fracturing for natural gas, and DENR is not qualified to conduct such a study. DENR recognizes that questions remain about health impacts.”<sup>5</sup> Initial studies about broad impacts to public health issues from fracking are just emerging<sup>6</sup> or just beginning.<sup>7</sup>

A similar information deficit is apparent in the economic analysis. The use of the IMPLAN model for economic impacts is dubious, as that model does not consider the displacement effects of boom development (e.g., lost tourism revenue and so on) and generally doesn't look at counter-factuals (e.g., could the state benefit *more* from some other development mode). Therefore, the economic picture is no clearer than the environmental or regulatory view.

With the limited information on North Carolina's potential resources and the environmental and public health effects of extracting those resources largely unknown, it is not possible to determine whether fracking can be done safely.

**Nonexistent or outdated regulatory programs preclude any estimate of the ability to adequately regulate known and unknown impacts of fracking.**

Even if DENR had reliable information regarding the shale formation in North Carolina, environmental effects of fracking or public health impacts, it is clear that there is a substantial deficit of information regarding a potential regulatory structure. Much of the regulatory structure discussed in the report relies on nonexistent, undersized, or underfunded regulatory bodies. In terms of regulations that must be established, DENR identifies a need for the General Assembly or another entity, to:

- conduct a comprehensive air and water quality sampling program;
- develop an air toxics program that addresses hazardous air pollutant levels within a parcel;
- survey water withdrawals and approve water management plans;
- revise oil and gas construction standards to suit horizontal drilling and hydraulic fracturing;

---

<sup>4</sup> Id.

<sup>5</sup> Id.

<sup>6</sup> See Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources, available at <http://www.ucdenver.edu/about/newsroom/newsreleases/Pages/health-impacts-of-fracking-emissions.aspx>.

<sup>7</sup> Draft Study at 2.

- develop setback requirements that protect neighbors, adjoining property, wetlands, floodplains, water supply watersheds, and public lands;
- create a state stormwater program for oil and gas drilling;
- develop solid waste standards that account for:
  - radiation monitoring;
  - standards for landfills that accept exploration and production wastes;
  - fees for use of industrial landfills;
  - cover of wastes accepted into MSW landfills;
  - unknown interactions between wastes and liners; and
  - land application of waste;
- develop disclosure requirements and a method for disclosing fracking fluid constituents to the public;
- regulate contents of fracking fluids, including prohibition of diesel fuel;<sup>8</sup>
- create a data management system to collect baseline data, track production, facilitate public involvement, communicate with industry, and assist in permitting, inspections, and enforcement;
- prepare first responders to respond to a well blowout, chemical spill, or other emergency;
- develop a modern oil and gas regulatory program;
- establish procedures for coordinating permit review;
- define a system of taxes and fees that will support the regulatory program, environmental initiatives, and local governments;
- identify a source of funding to repair road damage;
- define the role of local governments in siting oil and gas facilities;
- conduct additional research on local governments, infrastructure, and economic impacts; and
- establish a scheme to allocate liability for environmental damage resulting from oil and gas activities.

DENR recommends, and we support, doing each of these things with “additional public participation opportunities.”<sup>9</sup> This list represents a significant number of detail-filled tasks which are interdependent and whose outcome is uncertain. At this point, no specifics have been proposed for any of these programs or standards, and it is unclear which agency would be tasked with filling these substantial holes.

In other states, the developments of these programs have taken years and, in many cases, are still works in progress. During those processes, the proposals have changed and adapted with input from the public and the industry. One example of an evolving regulatory program is the disposal of fracking wastewater. In Pennsylvania, wastewater was initially sent to public treatment works, but those facilities were not equipped to handle the waste and discharges into streams harmed the aquatic ecosystems. Wastewater was then shipped to Ohio, where it was injected underground. But Ohio has recently become more cautious about underground injection

---

<sup>8</sup> Any regulation of fracking fluids should also require the use of increasingly common non-toxic substitutes – an issue that was not addressed in the Draft Study and must be analyzed before judging whether fracking can be done safely.

<sup>9</sup> Draft Study at 303.

in the aftermath of several fracking-related earthquakes. The Draft Study does not provide a solution to this persistent wastewater problem, yet the conclusion that fracking can be done safely assumes that one exists – even though other states have been unable to discover it.

Given that the Draft Study has not been able to accurately assess the environmental and public health risks related to fracking – primarily because of constraints due to limited information as described above – and that the study acknowledges that entire programs must be created or overhauled to deal with fracking, it is not possible to say that the state can safely regulate fracking. Each of the programs and standards described above will have numerous parts which relate to, and rely on, one another and must be viewed in total before any entity can reasonably determine that a program is protective.

That need is particularly acute with fracking, where experience in other states shows that if North Carolina were to effectively regulate fracking in a manner that prevented significant environmental and public health problems, it would be the first state to do so. For example, if cementing standards are inadequate, even reasonable setback regulations could not be protective. And, as discussed in the next section, an ideal regulatory program can be severely hampered by an inadequate inspection and enforcement program.

#### **Robust inspections and enforcement are essential to any regulatory program.**

Even if DENR were able to design a program that included regulatory standards that were universally determined to be protective of public health and the environment, those standards would only be as good as the inspection and enforcement program. As evidenced by recent disasters offshore – including the Deepwater Horizon explosion, spills in Brazil, and the ongoing natural gas platform emergency in the North Sea – as well as reports of violations from onshore gas producing sites, regulatory standards are frequently violated.

Three studies of onshore oil and gas development illustrate the importance of inspections and enforcement in regulatory schemes. In Arkansas, a group recently reviewed inspection records from natural gas drilling and production sites for inspections that occurred between July 2006 and August 2010.<sup>10</sup> The analysis found that during that time more than half of the 538 inspections uncovered at least a single violation and that 544 violations were recorded in total.<sup>11</sup> Seventy five percent of those violations were for noncompliance with regulatory standards rather than paperwork or reporting requirements.<sup>12</sup> Fifty two percent of routine inspections, as opposed to inspections in response to a complaint, uncovered violations.<sup>13</sup> Finally, the analysis found that the largest companies were responsible for a significant number of violations, with the largest operator in the state, Seeco/Southwestern, being cited for violations on 53% of its inspections.<sup>14</sup>

---

<sup>10</sup> Arkansas Public Policy Panel, Violations of Water Quality Standards from Gas Production in Arkansas at 1 (Sept. 2011).

<sup>11</sup> *Id.* at 4.

<sup>12</sup> The report suggests that the remaining 25% of violations were less serious because they were paperwork or reporting violations. Given the nature of the industry and the chemicals used, failure to report appropriately or maintain proper records can create significant environmental and public health hazards.

<sup>13</sup> *Id.* at 6.

<sup>14</sup> *Id.* at 7.

A similar story has unfolded in Pennsylvania. PennEnvironment analyzed inspection reports from 2008 through 2011 and found that 64 companies were cited for 3,355 violations during that time period.<sup>15</sup> The group found that 2,392 of those violations posed a direct threat to the environment, including 650 instances of improper erosion and sedimentation control and 550 citations for faulty pollution control techniques.<sup>16</sup> Cabot Oil & Gas Corp and Chesapeake Energy combined to cause more than 800 violations, with Cabot being cited, on average, for nearly 2 violations per well drilled.<sup>17</sup>

Finally, a report from the Democratic staff of the House Natural Resources Committee describes a similar scenario on federal public lands. That study found that 2,025 violations were issued to 335 companies in 17 states between 1998 and 2011.<sup>18</sup> Surprisingly, the analysis found that some companies were cited for drilling without the proper permits or without giving required notifications.<sup>19</sup> More than 20% of the major violations documented involved deficient casing and cement.<sup>20</sup> Despite finding numerous violations, enforcement actions and fines were scarce, with only six percent of violations resulting in monetary penalties, which were insignificant even when issued.<sup>21</sup>

These analyses demonstrate that even a strong regulatory program cannot ensure that oil and gas companies comply with the law. Without widespread inspections and meaningful enforcement, the best regulatory program cannot be protective. In light of recent budget actions and proposals to eliminate regional DENR offices, it is unlikely that DENR would be able to effectively monitor the oil and gas industry or enforce violations without a significant budgetary increase. In addition to the gaps in information identified above, the absence of an inspection and enforcement program to implement whatever regulatory program could be created would guarantee an ineffective program.

#### **Emerging information and inadequate regulation: Air quality as an example.**

As DENR notes in the Draft Study, “air emissions associated with oil and gas activities may include a number of potential contaminants with differing health and environmental consequences.”<sup>22</sup> The issues surrounding air quality impacts demonstrate the weaknesses in our knowledge of air quality issues related to the industry, the effect on human health, and regulatory approaches in North Carolina and elsewhere which have successfully dealt with air emissions. It is critical that DENR assess what those health and environmental impacts are, and how to protect North Carolinians from them before fracking is allowed to occur here.

Shale gas development creates significant air pollution. A recent Colorado study found

---

<sup>15</sup> PennEnvironment, *Risky Business: An Analysis of Marcellus Shale Gas Drilling Violations in Pennsylvania 2008-2011* at 1 (Feb. 2012).

<sup>16</sup> *Id.* at 3.

<sup>17</sup> *Id.* at 4.

<sup>18</sup> Democratic Staff of the House Natural Resources Committee, *Drilling Dysfunction: How the Failure to Oversee Drilling on Public Lands Endangers Health and the Environment* at 20-21 (Feb. 8, 2012).

<sup>19</sup> *Id.* at 18.

<sup>20</sup> *Id.* at 17.

<sup>21</sup> *Id.* at 20-21

<sup>22</sup> Draft Study at 134.

residents within a half-mile of fracking operations were exposed to hazardous air pollutants at five times acceptable federal levels.<sup>23</sup>

To address some of these concerns, DENR must go beyond the Draft Study to:

- Collect baseline data of the air quality in areas where oil and gas exploration are proposed.
- Evaluate measures to ensure the minimization of the release of toxic chemicals and greenhouse gases into the atmosphere. Hydraulic fracturing can unleash volatile organic compounds and heavy metals into the air around well pads, especially when open pits are used to store drilling fluids and wastewater. Additionally, methane can leak into the atmosphere from storage tanks, leaking lines and throughout the supply chain, acting as a very potent greenhouse gas, and wasting the sought after product.
- Take advantage of information compiled with respect to U.S. EPA's proposed regulations for the oil and gas industry, and assess North Carolina's Air Toxics rules in conjunction therewith, to ensure that sources producing toxic air pollutants such as hydrogen sulfide, benzene, ethyl benzene, toluene, and xylene are regulated in a manner that protects human health.
- Reassess the use of property boundaries as the measuring point for ambient air levels for the air toxics.
- Assess the potential ozone impacts of fracking under existing ozone standards and the impacts under the 60-70ppb standard recommended by EPA, which could cause much of the area in the Triassic Basin to be designated non-attainment for ozone. Even short term increases in NOx emissions in those areas could contribute to an increase in ozone formation and impact future non-attainment designations.
- Identify and study other potential sources of air pollution related to natural gas extraction and production, including burning trash and burning brush to clear property for wells, and determine if North Carolina's open burning regulations are adequate to protect the public.
- Evaluate emission increases from mobile sources such as heavy -duty truck traffic associated with natural gas production, including higher emissions of NOx, VOC and PM2.5. DENR must analyze whether current North Carolina anti-idling and fugitive dust regulations are adequate to control these higher emissions or whether further regulation is required.

At the outset, the state must maintain existing protections. Of particular concern with respect to air quality is the current proposed amendment to N.C.'s Air Toxics Program that could be adopted as early as next month. Under that proposed legislation, North Carolina's Air Toxics rules "shall not apply to any air emission source that is subject to any requirement under 40 C.F.R. Parts 61 and 63 (as amended) or 42 U.S.C. § 7412(j) as amended." North Carolina's Air Toxics program regulates some very harmful toxins that are not regulated federally. However, the amendment means that the State will not be able to regulate sources that emit pollutants on the federal Hazardous Air Pollutants list, but also emit pollutants exclusive to North Carolina's

<sup>23</sup> See Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources, available at <http://www.ucdenver.edu/about/newsroom/newsreleases/Pages/health-impacts-of-fracking-emissions.aspx>.

state Toxics Air Pollution list. An example is hydrogen sulfide, a highly toxic and flammable gas that can have extreme impacts on the human nervous system, and is emitted into the air from natural gas production operations. If the exemption described above is enacted, then it appears that fracking activities in North Carolina will be exempted from the Air Toxics program, and DENR will not have the authority to regulate hydrogen sulfide emissions from these operations.

That result is counter to the recommendations of the recently completed STRONGER report. During the STRONGER meetings held in Raleigh in late 2011, the STRONGER team noted that North Carolina's Air Toxics rules would be helpful if fracking were to come to North Carolina. In fact, the Air Toxics Rules were one of the few programs that the report cited favorably. In its report, STRONGER noted that the N.C. Air Toxics Program regulates benzene and hydrogen sulfide which are both emitted in the fracking process. If the proposed amendment to the Air Toxics Rules is enacted, that protection will be lost. DENR should reconsider the amendment to the Air Toxics Rules and ensure that fracking operations are not exempted.

**Lack of information and regulatory structure undermines conclusion that fracking can be done safely.**

DENR should be commended for much of what is in the Draft Study. In numerous places, the agency acknowledges that we simply do not have enough information to fully understand the environmental and public health risks associated with fracking and lack baseline information about the potential shale gas resource in North Carolina. We have inadequately funded, developed, and staffed regulatory agencies with limited understanding of the oil and gas industry. That level of openness is essential if the State is to fairly evaluate the impacts of fracking and make an informed decision about whether fracking should be permitted in North Carolina and, if so, what rules must be put in place. Despite the candid acknowledgment that we do not yet know the effects of fracking, what the extent of industrial activity would be in North Carolina, or how we would regulate it, the Draft Study concludes it can be done "safely as long as the right protections are in place."

Jumping to this conclusion after recognizing the agency's substantial deficit in information and North Carolina's overwhelming lack of regulatory infrastructure to manage the oil and gas industry is reckless and undercuts the valuable work the agency has done compiling the Draft Study. Before DENR could legitimately venture to make that conclusion, the agency would, at a minimum, need to:


1. Review ongoing studies of public health and environmental impacts of fracking when they are concluded, including EPA's analyses and other state investigations, and draw appropriate inferences to North Carolina;
2. Conduct thorough analyses regarding the geology of the Triassic Basin, including a detailed fracture and fault study as well as an analysis of the effect of diabase dikes on migration of fracking fluids;
3. Prepare a realistic estimate of the number of wells North Carolina would support, identify water sources for those wells, and evaluate the potential effect on human and environmental uses of existing water supplies;

4. Evaluate the proposed changes to existing regulatory programs, including the Air Toxics Program and potential loss of DENR regional offices under this year's budget;
5. Develop and evaluate each of the additional regulatory programs listed above, paying particular attention to the interaction between the programs and coordination of the proposed permitting process; and
6. Develop an inspection and enforcement scheme that ensures that the State has a sufficient number of qualified inspecting facilities, and that companies who consistently violate environmental regulation pay fines and restrictions that deter future violations.

The Draft Study makes clear that we have much to learn regarding North Carolina's geology and hydrology as well as the effects of fracking on both. The Draft Study also makes clear that DENR does not know if fracking can be done safely or what must be contained in the detailed regulatory structure that would manage the industry. The final study should be revised to reflect this uncertainty.

If you have any questions regarding these comments, please contact me at (919) 967-1450 or [ggisler@selcnc.org](mailto:ggisler@selcnc.org).

Sincerely,



Geoffrey R. Gisler

cc:

Will Morgan, Sierra Club  
Elizabeth Outz, Environment North Carolina



**Table 1: Lee County Environmental Justice Indicators<sup>1</sup>**

County/State	% Unemployment <sup>2</sup>		Median Household Income	Below the Poverty Level	Communities of Color <sup>3</sup>	Total Population <sup>4</sup>
	Within entire pop. over 16 y/o	Within Civilian Labor Force <sup>5</sup>	2007-2011	2007-2011	2011	2012
Lee	6.80%	10.60%	\$44,836	16.8%	43.1%	59,715
Chatham	5.00%	7.90%	\$56,935	11.4%	30.8%	65,976
Moore	5.30%	9.70%	\$48,348	13.0%	23.4%	90,302
<b>North Carolina</b>	<b>6.10%</b>	<b>9.70%</b>	<b>\$46,291</b>	<b>16.1%</b>	<b>36.4%</b>	<b>9,752,073</b>

All demographic data from U.S. Census Bureau (USCB) Quickfacts.

<sup>1</sup> 2011 (and 2007-2011) data derived from US Census Bureau ("USCB"), 1/17/13, State & County QuickFacts. See <http://quickfacts.census.gov/qfd/states/37000.html>.

<sup>2</sup> Unemployment data from Economic Characteristics on State & County QuickFacts, USCB. 2007-2011 American Community Survey 5-Year Estimates. See [http://factfinder2.census.gov/bkmk/table/1.0/en/ACS/11\\_5YR/DP03/0400000US37](http://factfinder2.census.gov/bkmk/table/1.0/en/ACS/11_5YR/DP03/0400000US37).

<sup>3</sup> Communities of color include Black, American Indian and Alaska Native, Asian, Hawaiian and Pacific Islander, persons reporting two or more races, and Hispanic or Latino origin from the USCB.

<sup>4</sup> The USCB does not provide 2011 Total Population data.

<sup>5</sup> U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics. **Definition:** The civilian labor force comprises all civilians 16 years of age and over classified as employed or unemployed. Employed persons are (a) all civilians who, during the reference week, did any work at all as paid employees, in their own business, profession, or on their own farm, or who worked 15 hours or more as unpaid workers in an enterprise operated by a member of the family, and (b) all those who were not working but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, child-care problems, maternity or paternity leave, labor-management disputes, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs. Each person is counted only once, even if he or she holds more than one job. See [http://www.fedstats.gov/qf/meta/long\\_311024.htm](http://www.fedstats.gov/qf/meta/long_311024.htm).

# Communities of Color (COC) and Gas Exploration Leases

Census Blocks, Lee County, NC

Chatham Co.

Wake Co.

**Legend**

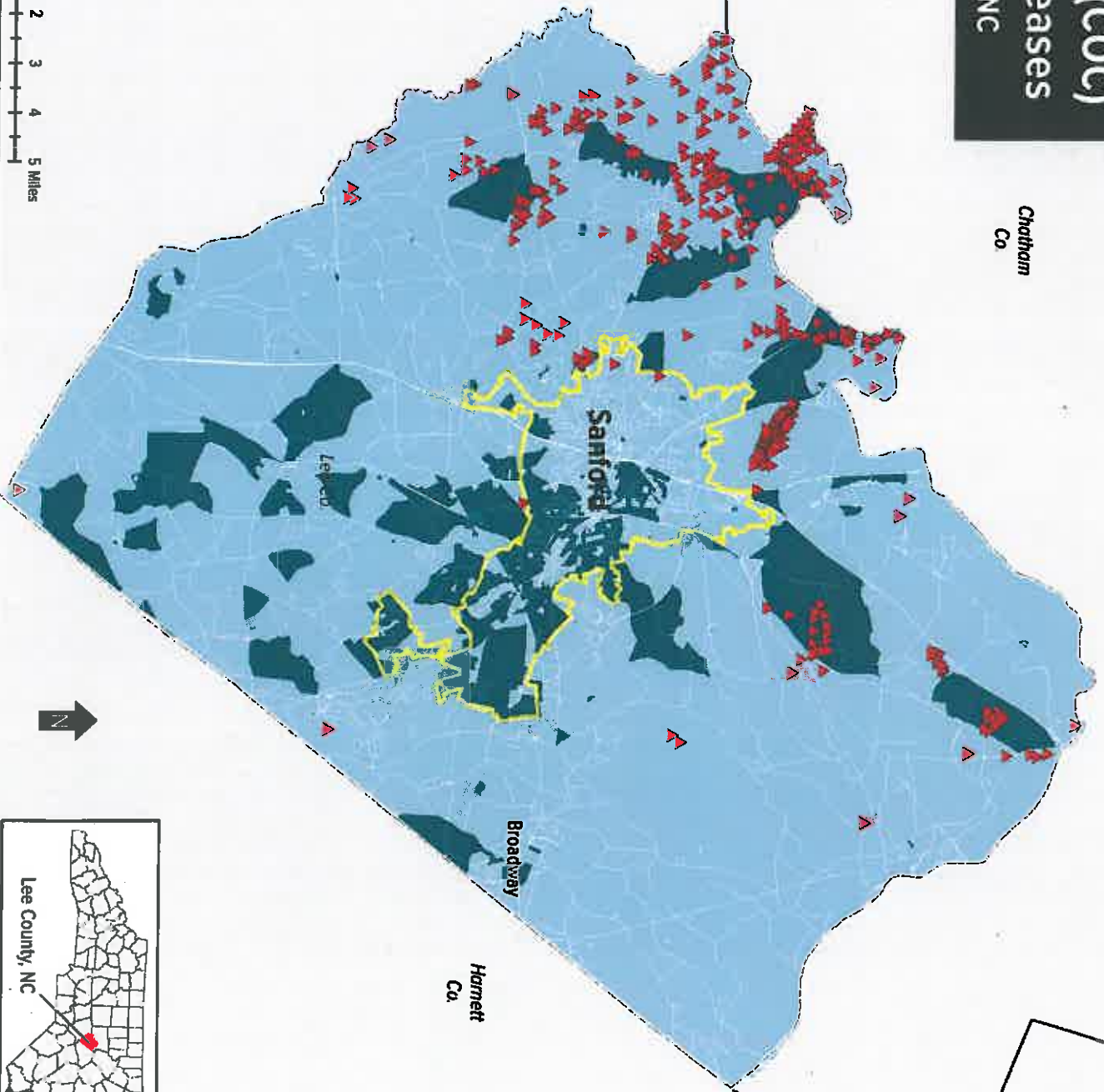
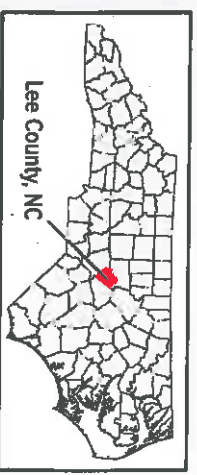
- ▲ Oil & Gas Lease or Mineral Right\*

**US Census Blocks**

- Light Blue: % Non-White (COC) below NC Average
- Dark Blue: % Non-White (COC) above NC Average

**Disclaimer:**  
 \* Mineral rights sometimes adhere to multiple grantees, and can be leased or owned, entirely or in part.  
 \*\*36.4%

Last updated: April 30, 2013  
 Data Sources: US Census Bureau, Lee County GIS  
 Map created by Jovian Sackett (jsackett@selcinc.org)



# RACE, POVERTY, AND HYDRAULIC FRACTURING IN NORTH CAROLINA

Emily Werder, MPH

University of North Carolina Chapel Hill, Gillings School of Global Public Health

## WHAT'S GOING ON: BACKGROUND

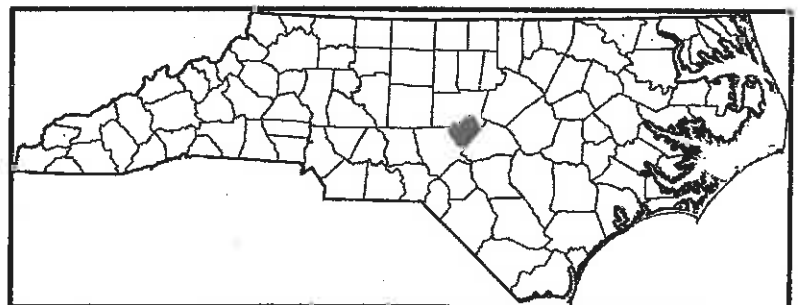
Hydraulic fracturing for natural shale gas extraction is a new industry that is growing rapidly, despite the fact that little is known about its impacts on the environment and human health. Citizens in communities across the U.S. have expressed concern that hydraulic fracturing has negatively impacted their lives by polluting the air, contaminating the water, disrupting the community, and harming their health. Many communities feel disempowered to prevent hydraulic fracturing near their homes. There is concern that communities of color and low wealth may be preferentially selected for hydraulic fracturing, and these citizens may be shouldering a greater burden of harmful exposures and health impacts.

Hydraulic fracturing is not currently permitted in North Carolina, but proposed legislation in the state House of Representatives would allow the practice to begin in 2014. Lee County would be the epicenter of hydraulic fracturing activity in North Carolina, and many parcels of land have already been leased to gas companies for that express purpose.

This research study investigates whether or not leases for future hydraulic fracturing in North Carolina are disproportionately located in communities of color and less wealth.

## WHAT WE DID: RESEARCH METHODS

Researchers gathered information about the locations of leases for hydraulic fracturing in Lee County from state records. They matched the leases to US Census blocks and compared information about race to the locations and volume of hydraulic fracturing leases. A similar comparison was made between poverty and lease location for census block groups.



The researchers did statistical analyses of US Census data from 2007-2011 to understand whether or not communities of color and low-wealth communities are more likely to have leases for hydraulic fracturing.

## MAJOR FINDINGS

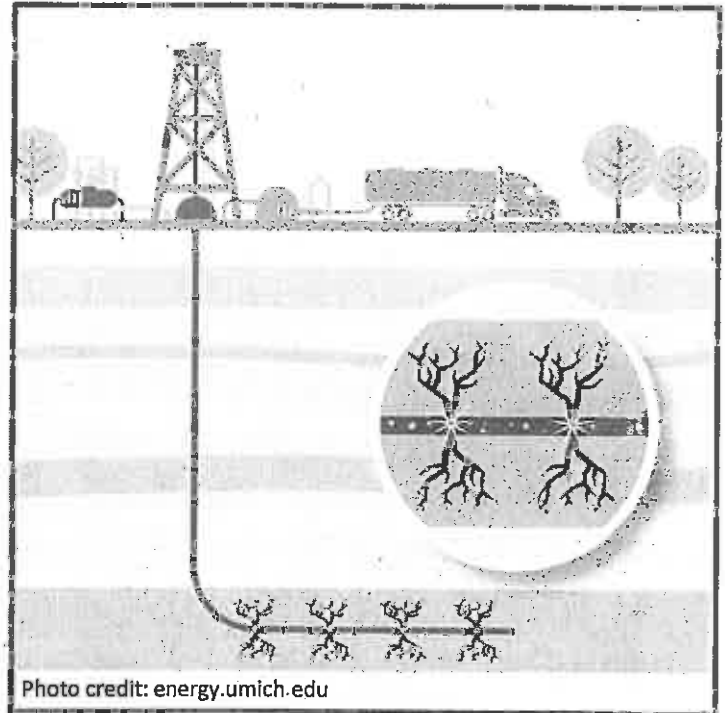
Communities with more than 50% people of color were 4.2 times as likely to have hydraulic fracturing leases as those with <10% people of color.

Communities with more than 50% people of color had an average of 50% of land leased for hydraulic fracturing, compared to 23% of the land leased for hydraulic fracturing in communities with <10% people of color.

## WHAT WE FOUND: RESULTS

There are currently 77 census blocks in Lee County with leases for hydraulic fracturing, 14% of which are in communities with a high proportion of people of color. In this study, communities of color are more likely to have leases for hydraulic fracturing than other communities.

- Communities with more than 50% people of color were 4.2 times as likely to have hydraulic fracturing leases as those with <10% people of color.
- Communities with more than 50% people of color had an average of 50% of land leased for hydraulic fracturing, compared to 23% of the land leased for hydraulic fracturing in communities with <10% people of color.
- Increasing the percent of people of color in a community by 10% leads to an 11% increase in the risk of having a hydraulic fracturing lease in that community.
- More than half (57%) of the census blocks with the highest proportion of land leased (greater than 75% land leased) are communities of color.



Almost one third (11) of census block groups in Lee County have land leased for hydraulic fracturing. Of those block groups with hydraulic fracturing leases, 36% are in communities with higher rates of poverty than the North Carolina rate.

- Communities with higher rates of poverty than the state average may be more likely to have hydraulic fracturing leases, but more research is needed to confirm this finding with precision.

## WHAT THE RESULTS MEAN: DISCUSSION

The findings from this study are evidence that hydraulic fracturing in Lee County, North Carolina will disproportionately affect communities of color, and may be concentrated in communities with more poverty. These results indicate that these communities will experience environmental injustice related to hydraulic fracturing.

Communities with hydraulic fracturing operations are exposed to hazardous air pollutants, toxic water contaminants, constant noise and light, social disruption, and the economic fluctuations of boom-and-bust cycles. Hydraulic fracturing may deplete property values and negatively impact agricultural production.



Preferentially selecting communities of color and low wealth for hydraulic fracturing operations puts an undue burden of exposure and adverse health outcomes on vulnerable groups, prioritizing corporate profit over the health of North Carolinians. Those who benefit from hydraulic fracturing are very far removed from the communities of color and low wealth that will be most negatively impacted by this industry.

**Table 2: North Carolina Coastal Counties Environmental Justice Indicators**

County/ State	% Unemployment <sup>1</sup>		Median Household Income	Below the Poverty Level	Communities of Color <sup>2</sup>	Total Population <sup>3</sup>
	Within entire pop. over 16 y/o	Within Civilian Labor Force	2007-2011	2007-2011	2011	2012
Beaufort	6.9%	11.8%	\$40,986	19.1%	35.6%	47,507
Bertie	8.4%	14.9%	\$29,326	23.6%	65.6%	20,653
Brunswick	6.9%	12.3%	\$45,132	15.0%	19.7%	112,257
Camden	4.5%	7.3%	\$63,998	8.8%	20.7%	10,090
Carteret	5.6%	9.4%	\$47,403	13.1%	13.6%	67,632
Chowan	6.4%	12.4%	\$34,565	23.7%	40.1%	14,772
Craven	5.9%	10.8%	\$46,251	16.2%	34.2%	104,770
Currituck	6.8%	10.2%	\$57,588	7.8%	12.5%	24,077
Dare	4.9%	6.9%	\$54,750	11.1%	8.2%	34,573
Hyde	4.4%	8.2%	\$40,753	25.1%	41.2%	5,859
New Hanover	6.0%	9.1%	\$48,893	15.9%	24.2%	209,234
Onslow	4.7%	9.8%	\$45,457	13.8%	33.7%	183,263
Pamlico	4.2%	8.3%	\$43,658	12.2%	26.2%	13,074
Pasquotank	7.7%	12.3%	\$45,298	19.9%	46.1%	40,591
Pender	4.8%	8.1%	\$44,568	15.9%	27.5%	54,195
Perquimans	6.2%	12.4%	\$37,862	20.6%	29.1%	13,563
Tyrrell	11.0%	21.2%	\$34,071	20.5%	48.5%	4,338
North Carolina	6.1%	9.7%	\$46,291	16.1%	36.4%	9,752,073

All demographic data from U.S. Census Bureau (USCB) Quickfacts.

<sup>1</sup>Unemployment data from Economic Characteristics on State & County QuickFacts, USCB. 2007-2011 American Community Survey 5-Year Estimates. See [http://factfinder2.census.gov/bkmk/table/1.0/en/ACS/11\\_5YR/DP03/0400000US37](http://factfinder2.census.gov/bkmk/table/1.0/en/ACS/11_5YR/DP03/0400000US37). U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics. **Definition:** The civilian labor force comprises all civilians 16 years of age and over classified as employed or unemployed. Employed persons are (a) all civilians who, during the reference week, did any work at all as paid employees, in their own business, profession, or on their own farm, or who worked 15 hours or more as unpaid workers in an enterprise operated by a member of the family, and (b) all those who were not working but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, child-care problems, maternity or paternity leave, labor-management disputes, job training, or other family or personal reasons, whether or not they were paid for the time off or were seeking other jobs. Each person is counted only once, even if he or she holds more than one job. See [http://www.fedstats.gov/qf/meta/long\\_311024.htm](http://www.fedstats.gov/qf/meta/long_311024.htm).

<sup>2</sup>Communities of Color include Black, American Indian and Alaska Native, Asian, Native Hawaiian and other Pacific Islander, persons reporting two or more races, and persons of Hispanic or Latino origin.

<sup>3</sup>The USCB does not provide 2011 Total Population data.