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ERODING THE PUBLIC'S RIGHT TO CLEAN AIR: EXAMINATION OF THE HAZARDOUS AIR POLLUTANTS EXEMPTION FOR NATURAL GAS DRILLING UNDER THE CLEAN AIR ACT

KAITLYN R. MAXWELL

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I. INTRODUCTION

Natural gas drilling has been a staple of energy production in Texas along the Barnett Shale since the 1990s.¹ Recent natural gas exploration has focused on the eastern coast of the United States along the Marcellus Shale in New York, Pennsylvania, and West Virginia.² Public officials as well as oil and gas industry representatives promote natural gas as a sound alternative to the United States' reliance on foreign oil.³ States have a strong financial incentive to capitalize on their natural resources. Improvements in drilling technology, including hydraulic fracturing and horizontal drilling, have made it possible for these states along the Marcellus Shale to extract natural gas in previously unobtainable locations.⁴

An overly optimistic vision of natural gas production serving as the solution to the country's dependence on foreign oil overlooks crucial environmental and public health concerns linked to drilling.⁵ In order to proceed with natural gas drilling in the most responsible manner, this Note argues that the Clean Air Act

⁴ See Reeder, supra note 1, at 1009.

⁵ See, e.g., Report from Timothy Considine, Natural Resources Economics, Inc., for American Petroleum Institute, *The Economic Impacts of Marcellus Shale: Implications for New York, Pennsylvania, and West Virginia*, ii (Jul. 14, 2010), http://www.scribd.com/doc/ 34656839/The-Economic-Impacts-of-the-Marcellus-Shale-Implications-for-New-York-Pennsylvania-West-Virginia; *see also* Reeder, *supra* note 1, at 1009.

¹ See generally Laura C. Reeder, Note, Creating a Legal Framework for Regulation of Natural Gas Extraction from the Marcellus Shale Formation, 34 WM. & MARY ENVIL. & POL'Y REV. 999, 1001-05 (2010).

² See generally id. at 999, 1012, 1021.

³ See e.g., Reeder, supra note 1, at 1002; Michael Krancer, Sec'y of Pa. Dep't. of Envtl. Prot., Opening Remarks at the Pennsylvania Bar Institute's Sixteenth Annual Environmental Law Forum (April 6, 2011). Mr. Krancer opened the 2011 Environmental Law Forum by emphasizing the tremendous benefits that natural gas provides for Pennsylvania residents. Most notably, he stated that Pennsylvania generates an excess of solar power and that changes must occur so that the state can rely on realistic domestic energy production like natural gas. If the state only invests in alternative energy, Mr. Krancer argued that the next generation will be forced to turn off the television for the next twenty years due to an inadequate electricity supply. Mr. Krancer also cited natural gas production as a means for reducing dependence on foreign oil. This summary is based on the author's attendance at the event and is not a direct quotation from Mr. Krancer; however, it is an accurate and truthful summary of his remarks.

("CAA") must be strengthened to improve monitoring and control of emissions from natural gas production throughout the United States.⁶ Exemptions for natural gas drilling in crucial environmental regulations like the Safe Drinking Water Act ("SDWA") and the CAA have unnecessarily exacerbated the environmental harms of natural gas drilling because the loopholes in these statutes have prevented adequate government oversight.⁷ In recent years, commentary on the environmental impact of natural gas drilling has focused primarily on the environmental impact of drilling on ground water.⁸ This Note focuses on a less publicized environmental risk of natural gas production: the adverse health effects of reduced air quality in drilling communities.⁹

The CAA is the primary federal statutory vehicle for regulating air pollution.¹⁰ The CAA's Hazardous Air Pollutants ("HAP") provisions regulate emission sources that release hazardous air pollutants.¹¹ Natural gas drilling sites release hazardous air pollutants into the atmosphere during the drilling and extraction processes. Drilling sites contain multiple emissions sources on contiguous properties and the sources share operational control. Therefore, the emissions from these sources should be aggregated and the units regulated jointly as "major sources." Regulation of major sources under the CAA imposes more stringent limitations than those promulgated for "area source" emissions because there is a greater potential for adverse health effects from large contributions.¹²

Unfortunately, § 112(n)(4) of the CAA provides an exemption for natural gas drilling operations.¹³ The exemption prohibits aggregation of emissions from single sources, which are jointly used for natural gas production.¹⁴ Therefore, Congress and the United States Environmental Protection Agency ("EPA"), the administrative agency charged by Congress with implementing and overseeing environmental regulations, have effectively allowed drilling companies to escape the otherwise stringent regulation of hazardous air pollu-

⁶ See, e.g., Angela C. Cupas, Note, The Not-So-Safe Drinking Water Act: Why We Must Regulate Hydraulic Fracturing at the Federal Level, 33 WM. & MARY ENVTL. L. & POL'Y REV. 605 (2009).

⁷ See also id. See generally Hannah Wiseman, Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation, 20 FORDHAM ENVTL. L. REV. 115 (2009).

⁸ See, e.g., Reeder, supra note 1; Wiseman, supra note 7; Cupas, supra note 6.

⁹ See Renee Lewis Kosnik, The Oil and Gas Industry's Exclusions and Exemptions to Major Environmental Statutes, OIL AND GAS ACCOUNTABILITY PROJECT, EARTHWORKS, 13 (2007), www.earthworksaction.org/pubs/petroleumexemptions1c.pdf.

 $^{^{10}}$ Holly Doremus et al., Environmental Policy Law: Problems, Cases, and Readings 608 (5th ed. 2008).

¹¹ Id.

¹² See id.

¹³ See 42 U.S.C. § 7412(n)(4) (2006).

¹⁴ See Kosnik, supra note 9, at 13.

tants through this prohibition on aggregation.¹⁵ Despite the high cumulative impact of multiple single sources within a facility, taken individually, emissions from production wells and associated equipment, pipeline compressors and pump stations may not trigger regulation as a major source. Thus, the prohibition on aggregation causes the sources to be regulated under the lower standards for area sources.

This Note addresses the detrimental impact of the CAA's exemption, 112(n)(4), on air quality and public health. Legislative action is necessary to remedy the harmful effects of this exemption and there needs to be a comprehensive federal body of regulation in place to properly monitor the environment and public health impact of natural gas drilling throughout the United States. Part II of this Note will discuss the history of natural gas drilling as well as resulting environmental and public health issues. Part III will present an overview of the CAA and the emissions standards for HAPs, examine the exemption of natural gas activities from aggregation for purposes of determining maior sources of emissions, and identify the public health and environmental consequences of the exemption. Part IV will explore tort remedies available to respond to air pollution from natural gas drilling in the absence of legislative change. Part V will argue that Congress should amend or abrogate § 112(n)(4) to permit aggregation of emissions from point source emissions in natural gas drilling, and in the absence of legislative change, injured residents in drilling communities should pursue actions in nuisance, trespass, or negligence. Finally, Part VI will summarize the preceding analysis and conclude that to hold drilling activities to the appropriate emissions standards, EPA must aggregate the emissions from single stationary sources in natural gas drilling operations and cumulatively regulate the facilities as major sources under the CAA.

II. OVERVIEW OF NATURAL GAS DRILLING

A. History of Special Treatment of Natural Gas Industry

As natural gas development expanded across state boundaries in the 1900s, the need to regulate the interstate industry led to states forming public utility commissions.¹⁶ Despite the presence of state regulatory bodies, the lack of federal regulation caused interstate pipelines to remain largely uncontrolled.¹⁷ The Natural Gas Act ("NGA") of 1938 provided the first step toward federal regulation by granting the Federal Power Commission jurisdiction to oversee natural gas companies' sales from interstate pipelines.¹⁸ Despite this step toward federal regulation, wellhead prices remained largely unregulated until

¹⁵ See Kosnik, supra note 9, at 13.

¹⁶ See The History of Regulation, NATURALGAS.ORG, http://naturalgas.org/regulation/ history.asp (last visited Mar. 31, 2011).

¹⁷ See id.

¹⁸ Id.

1954.¹⁹ The Supreme Court then held that natural gas producers selling in the interstate pipeline market were considered "natural gas companies" under the NGA.²⁰ Therefore, the wellhead prices for these producers were subject to federal oversight by the Federal Power Commission.²¹

The federal regulation of the interstate market created an incentive for producers not to ship gas across state borders.²² Thus, producing states continued to enjoy the benefits of production, but consuming states faced a shortage.²³ Congress responded to the national shortage by enacting the Natural Gas Policy Act of 1978, which sought to create a "single national natural gas market," to "equalize[e] supply with demand," and "to allow[] market forces to establish the wellhead price of natural gas."²⁴ This Act essentially represented the start of deregulating oil and natural gas.²⁵

B. Introduction to the Environmental and Public Health Consequences of Natural Gas Production

Environmental and public health scientists, scholars, and policymakers have identified two fundamental environmental and public health concerns associated with natural gas drilling: (1) drinking water contamination caused by hydraulic fracturing used to extract natural gas; and (2) reduced air quality due to the release of hazardous air pollutants during production.²⁶ This Note focuses on the latter; however, it is important to consider air pollution and the CAA exemption in the context of treatment of the natural gas industry as a whole. Discussion of hydraulic fracturing demonstrates that the detrimental impact of natural gas drilling on air quality is not the first environmental consequence linked to the industry. Hydraulic fracturing is exempted from permitting requirements under the SDWA, which exemplifies the favorable treatment of the gas industry. Through EPA's interpretation of the SDWA, the natural gas industry has not been held to the same monitoring and permitting requirements as other actors. Now, the environmental degradation from largely unregulated and lax drilling practices has expanded to include the decline in air quality.

Locations such as the Marcellus Shale are deemed unconventional sources of

¹⁹ Id.

²⁰ Id.

²¹ Id.

²² Id.

²³ Id.

²⁴ Id.

²⁵ See id.

²⁶ See, e.g., Robert W. Howarth, Assessment of the Greenhouse Gas Footprint of Natural Gas from Shale Formations Obtained by High-Volume, Slick-Water Hydraulic Fracturing, CORNELL UNIVERSITY (2010), http://www.eeb.cornell.edu/howarth (identifying the effects of air pollution resulting from natural gas production and the impact on surrounding communities); Cupas, *supra* note 6, at 606-09 (discussing contamination of drinking water supplies and the lack of regulation due the exemption for natural gas drillers in SDWA).

natural gas because the gas's location prevents extraction using traditional drilling practices.²⁷ Horizontal drilling combined with the method of hydraulic fracturing ("fracing") have enabled gas service companies to tap into this otherwise unreachable natural resource.²⁸ Fracing involves pumping large volumes of water mixed with chemicals and sand (approximately one to five million gallons of water per well) through an underground pipeline to release natural gas from the shale formation.²⁹ The pressure created by the fracing fluid fractures the shale around the natural gas well and releases the natural gas to the surface through the pipeline.³⁰ When extraction is complete, the fluids are pumped back out of the well, and then, must be transported to wastewater treatment plants.³¹ The concerns about fracing are twofold. First, when the fracing fluid is pumped into the ground through the well casing, the fluid may leak into the groundwater supply if the casing is not properly sealed with cement. Fracing fluid contains harmful chemicals that can contaminate local drinking water supplies if released into the groundwater.³² The second concern arises after extraction. Once the gas is extracted, the fluid must be pumped back out of the ground and disposed of at wastewater treatment plants.³³ Due to the chemical composition of the fluid, environmental scholars are concerned about whether this fluid can be properly treated at traditional waste treatment facilities before being released back into the environment.³⁴

The Safe Drinking Water Act was enacted in 1975 "to protect underground sources of drinking water."³⁵ The relevant provision of the SDWA, 42 U.S.C. §§ 300h, 300h-8he, required Underground Injection Control (UIC) permits for

³⁰ Marcellus Shale: Natural Gas Extraction & Impacts on Air, CLEAN AIR COUNCIL 1, http://www.cleanair.org/sites/default/files/Air%20Emissions%20Brochure%20Marcellus% 20Shale%204.4.11.pdf (last visited Apr. 17, 2011).

³⁵ Weston Wilson, Safe Drinking Water Act & The 'Halliburton Loophole' Timeline of Events: 1974–2010, SPECTRA ENERGY WATCH, 1 (2010), http://www.spectraenergywatch.com/wp-content/uploads/2010/10/timeline-e28093-sdwa.pdf. Weston Wilson, a retired EPA Environmental Engineer and whistleblower, filed a complaint in October 2004 regarding EPA's failure to regulate fracing fluids.

²⁷ Hydraulic Fracturing Overview, PA. DEP'T. OF ENVTL. PROT., http://www.dep.state.pa. us/dep/deputate/minres/oilgas/new_forms/marcellus/Reports/DEP%20Fracing%20overview. pdf (last visited Apr. 17, 2011).

²⁸ Id.

²⁹ Air Emissions and Regulations, CHESAPEAKE ENERGY (March 2009), http://www.chk. com/Media/CorpMediaKits/Air_Emissions_Fact_Sheet.pdf; see Scott A. Gould, SRBC and PADEP Regulation of Frac, Flowback and Produced Water Relating to Hydrofracturing Natural Gas Wells, 2 PA. B. INST. LL-1, L-17 (2011) (on file with Pennsylvania Bar Institute: Environmental Law Forum).

³¹ Air Emissions and Regulations, supra note 29.

³² See generally Cupas, supra note 6.

³³ See Reeder, supra note 1, at 1012

 $^{^{34}}$ See Reeder, supra note 1, at 1012. See generally Cupas, supra note 6 (arguing for federal regulation of hydraulic fracturing).

any underground injection of fluid and limited the type of materials that could be injected.³⁶ In 2001, the Eleventh Circuit held that the EPA must regulate injection of fracing fluids as an underground injection under the SDWA.³⁷ But, in 2005, Congress passed, and President Bush signed into law, the Energy Policy Act of 2005, which amended the SDWA by adding an exemption for natural gas drillers: Section 1421(d).³⁸ Based on this exemption, fracing does not require UIC permits under the SDWA.³⁹ The oil and gas industries benefit from this exemption because it removes significant federal permitting requirements that would otherwise be in effect under the SDWA. Due to the industry-friendly nature, former Vice-President Cheney's ties to Halliburton, and the fact that Halliburton is one of the largest producers of fracing fluids, the exemption has been deemed the "Halliburton Loophole."⁴⁰ This loophole in federal regulation leaves hydraulic fracturing monitoring to the states, resulting in a disarray of state regulations.⁴¹ Arguably, state officials receive internal pressure to capitalize on the economic potential of natural gas drilling within their state borders, and thus, may not be in the best position to regulate fracing.⁴²

Environmental monitoring and testing of drinking water in drilling communities suggests that fracing has led to groundwater contamination.⁴³ Litigation has erupted across the nation as citizens in drilling communities have brought suits against natural gas producers to seek damages for the alleged contamination of their drinking water.⁴⁴ Because there is no federal standard for guaran-

⁴⁰ See Wiseman, supra note 7, at 145-46; Wilson, supra note 35; see also Halliburton Loophole, EARTHWORKS, http://www.earthworksaction.org/halliburton.cfm (last visited Jan. 12, 2012).

⁴¹ See Wiseman, supra note 7, at 145-46; see also Wilson, supra note 35; Reeder, supra note 1, at 1015-20.

⁴² See Reeder, supra note 1, at 1009.

⁴³ See Wiseman, supra note 7, at 126-27 (citing concerns in Colorado, New Mexico, Virginia, and Wyoming).

⁴⁴ See Michael A. Arthur, Professor of Geosciences at Pennsylvania State University, Presentation on Pennsylvania Oil and Gas Geology at the Pennsylvania Bar Institute's Sixteenth Annual Environmental Law Forum (Apr. 6, 2011) (referencing the lack of cementing standards in Pennsylvania); see also Wiseman, supra note 7, at 126-27.

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³⁶ Id.

³⁷ *Id.* (citing Legal Envtl. Assistance Found. v. U.S. Envtl. Prot. Agency, 276 F.3d 1253 (11th Cir. 2001)).

³⁸ *Id.* at 2; *see* Wiseman, *supra* note 7, at 145-46 (citing Energy Policy Act of 2005, Pub. L. No. 109-58, § 1(a), 119 Stat. 594 (2005)).

³⁹ See Wiseman, supra note 7, at 145-46. The amended section of the Safe Drinking Water Act now states: "(1) UNDERGROUND INJECTION - The term 'underground injection' - (A) means the subsurface emplacement of fluids by well injection; and (B) excludes - (i) the underground injection of natural gas for purposes of storage; and (ii) the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities." 42 U.S.C. § 300h(d) (2006).

teeing that well casings are properly sealed and cemented, plaintiffs have identified the varying practices and techniques used by drillers as the culprit of the contamination.⁴⁵ In February 2010, the House Committee on Energy and Commerce, chaired by California Representative Henry A. Waxman, commenced an investigation into the potential environmental impact of fracing.⁴⁶ In response, EPA announced in June 2010 that it would conduct a two-year study of fracing to assess its long-term impact on public health.⁴⁷

On September 9, 2010, EPA sent out voluntary information requests to nine natural gas service companies to request information regarding the chemical composition of fracing fluid.⁴⁸ Notably, these were only voluntary requests.⁴⁹ EPA intends to use this information in its study of the environmental and public health concerns associated with fracing.⁵⁰ As a result of EPA's voluntary requests, state environmental protection agencies have posted lists on their respective state websites disclosing chemicals used in fracing fluids within their state borders.⁵¹ In June 2010, Wyoming became the first state to require drilling companies to disclose to the public the fracing ingredients being used in the local communities.⁵² Overall, the fracing issue demonstrates the passive role that federal regulation has taken in monitoring natural gas drilling. It has largely been left up to states to take action.

III. CLEAN AIR ACT – REGULATING AIR POLLUTION FROM NATURAL GAS DRILLING

Congress enacted the Clean Air Act in 1970 in an effort to create a national uniform system for monitoring air quality by promulgating standards for specif-

⁴⁵ See Wiseman, supra note 7, at 126-27; see also Arthur, supra note 44 (referencing the lack of cementing standards in Pennsylvania).

⁴⁶ Wilson, *supra* note 35, at 3 (citing Sabrina Shankman and Abrahm Lustgarten, *Con*gress Launches Investigation Into Gas Drilling Practices, PROPUBLICA (Feb. 19, 2010), http://www.propublica.org/article/congress-launches-investigation-into-gas-drilling-prac tices-219).

⁴⁷ Id.

⁴⁸ Press Release, U.S. Environmental Protection Agency, EPA Formally Requests Information From Companies About Chemicals Used in Natural Gas Extraction (Sept. 9, 2010), http://www.epa.gov/newsroom (follow link for "find news results by date" then search by "9/9/2010").

⁴⁹ Id.

⁵⁰ See Timothy Gardner, EPA Subpoenas Halliburton Over Fracing Fluids, THOMAS REUTERS, Nov. 9, 2010, available at http://www.reuters.com/article/2010/11/09/us-epa-halliburton-subpoena-idUSTRE6A83YY20101109.

⁵¹ See, e.g., PA. DEP'T OF ENVIL. PROT., SUMMARY OF HYDRAULIC FRACTURING SOLUTIONS, http://www.dep.state.pa.us/dep/deputate/minres/oilgas/FractListing.pdf (last visited Apr. 15, 2011); see also Arthur, supra note 44.

⁵² Wilson, *supra* note 35, at 3.

ic pollutants.⁵³ The standards are technology-forcing to promote continued improvement in air quality and to protect human health.⁵⁴ Congress delegated the air quality standard setting to EPA.⁵⁵ Section 109 of the CAA requires EPA to issue National Ambient Air Quality Standards ("NAAQS") for the following criteria pollutants identified under § 108: sulfur dioxide, nitrogen oxides, particulate matter, carbon monoxide, lead, hydrocarbons, and ozone.⁵⁶ States then must submit state implementation plans ("SIPs") to EPA to meet the NAAQS.⁵⁷

While criteria pollutants are harmful and may be linked to long-term health problems, these pollutants are not considered toxic in a typical concentration in ambient air.⁵⁸ The ambient air quality standards set a threshold concentration of each criteria pollutant in the air and a state may not exceed this concentration more than once per year.⁵⁹ Notably, NAAQS are set without consideration of the cost the standards may impose on industry for compliance.⁶⁰ The SIPs, which include detailed plans for implementation, maintenance, and enforcement, connect these federal air quality standards with state action to uphold the standards.⁶¹ EPA adopts the SIPs as federal law and is the only body that can grant a variance for noncompliance.⁶²

The CAA also requires technology-forcing standards for specific individual stationary sources.⁶³ New Source Performance Standards ("NSPS") provide regulation of emissions from individual sources and require installation of the "best system of emission reduction" for any new source of emissions within an industry.⁶⁴ Under this standard, EPA considers cost, specifically, whether a proposed technology requirement would be detrimental to the industry.⁶⁵ The federal judiciary helped create the Prevention of Significant Deterioration ("PSD") program to further the CAA's goal of cleaning up areas with significant existing pollution.⁶⁶ The DC Circuit Court prevented EPA from allowing states to submit SIPS that would permit air pollution to rise to the level of the

⁵⁸ FERREY, supra note 56, at 178.

⁶⁵ FERREY, supra note 56, at 186.

⁶⁶ DOREMUS, *supra* note 10, at 610 (citing Sierra Club v. Ruckelshaus, 344 F. Supp. 253 (D.D.C 1972)).

⁵³ DOREMUS, *supra* note 10.

⁵⁴ Id.

⁵⁵ Id. at 608-09.

⁵⁶ STEVEN FERREY, ENVIRONMENTAL LAW 180 (5th ed. 2010); DOREMUS, *supra* note 10, at 608-09.

⁵⁷ DOREMUS, *supra* note 10, at 608-10.

⁵⁹ Id.

⁶⁰ Id.

⁶¹ Id. at 181.

⁶² *Id.* at 182.

⁶³ Id. at 186.

⁶⁴ Id.

NAAQS, rather than reducing or maintaining existing air quality.⁶⁷ Therefore, the overall objective and enforcement of the CAA reflects a move toward tighter regulations, rather than loose-ended exemptions like 112(n)(4).

Legislative, administrative, and judicial actions in the formation of the CAA legal framework, illustrate a strong presumption in favor of holding industry to higher, technology-forcing standards that promote internal changes.⁶⁸ The framework also supports a desire to prevent the public from bearing the externalities of inefficient production.⁶⁹ The natural gas industry receives preferential treatment through the § 112(n)(4) exemption, which does not require aggregation of emissions for purposes of determining whether a facility is a major source. This preferential treatment comes at the price of reducing air quality for the public. Thus, this Note contends, the enactment of § 112(n)(4) undermined and thwarted essential tenets of the CAA.

A. Regulation of Hazardous Air Pollutants Under CAA § 112

In 1970, Congress enacted CAA § 112 to regulate hazardous air pollutants.⁷⁰ Congress required EPA to "identify, and develop health-based emission standards providing an ample margin of safety for, any pollutant that might cause or contribute to serious adverse health effects."71 Congress established the creation of National Emission Standards for Hazardous Air Pollutants ("NESHAPs") to address dangerous and toxic pollutants not covered by NAAOS.⁷² Like the NAAOS, these standards for hazardous air pollutants are set without consideration for the economic implications of compliance.⁷³ NESHAPs require use of maximum achievable control technology ("MACT") for major sources, which "provides the 'maximum degree of reductions in emissions of hazardous air pollutants."⁷⁴ The standards are focused on protecting the public welfare from pollutants that "'may cause, or contribute to, an increase in mortality, or an increase in serious, irreversible, or incapacitating reversible illness."⁷⁵ Because the standards are set without economic consideration, it is inconsequential if the standards force an industry to shut down because it cannot meet the technology requirements of the standard.⁷⁶

Litigation has demonstrated the challenges of characterizing emissions as

⁶⁷ Id.

⁶⁸ Id.

⁶⁹ See, e.g., id.

⁷⁰ Id.

⁷¹ Id.

⁷² FERREY, *supra* note 56, at 187.

⁷³ See id.

⁷⁴ Victor B. Flatt, Gasping for Breath: The Administrative Flaws of Federal Hazardous Air Pollution Regulation and What we can Learn from the States, 34 Ecology L.Q. 107, 115 (2007) (citing 42 U.S.C. § 7412(d)(2)); Kosnik, supra note 9.

 ⁷⁵ FERREY, *supra* note 56, at 187 (citing NRDC v. EPA, 824 F.2d 1146 (D.C. Cir. 1987)).
 ⁷⁶ Id.

HAPs under § 112.⁷⁷ The Natural Resources Defense Council ("NRDC") filed a suit against EPA for failure to list vinyl chloride as a hazardous air pollutant under § 112.⁷⁸ NRDC and EPA disagreed about the interpretation of the statute's required emissions limits.⁷⁹ EPA adopted emissions limits based on best available control technology ("BACT").⁸⁰ NRDC contended that because EPA found vinyl chloride to present risk to human health, the emissions limit needed to be zero. EPA countered that such a limit would cause industry shut-downs.⁸¹ The District of Columbia Court of Appeals disagreed with both parties' interpretations.⁸² The court remanded the case and required EPA to "consider the health effect of the chosen emission standard while making the initial determination of what is 'safe."⁸³

Furthermore, the court interpreted "safe" not to mean "risk-free."⁸⁴ EPA has discretion to determine the "acceptable risk to health," and is required to set the emissions level at zero only if there is not an acceptable level.⁸⁵ EPA must then set the emissions level that "ensures an ample margin of safety" to protect public health.⁸⁶ Only at this point may EPA consider the costs of implementation.⁸⁷ Because HAPs can be dangerous in small amounts, prevalent industrial chemicals may be banned.⁸⁸ Although the court clarified that the standard is not "risk-free," it left open the interpretation of "protection of human health."⁸⁹

Initially, EPA struggled to promulgate emissions limits, fearing that the limits would be too stringent and would cause industry shutdowns.⁹⁰ By 1990, EPA had regulated only eight substances.⁹¹ Because of EPA's lack of action, Congress intervened and "order[ed] EPA to issue technology-based regulations for a list of 189 pollutants, and require[ed] EPA to add substances to the list if they may cause adverse human health effects."⁹² The hazardous air pollutants program "illustrates the challenges of risk-based regulation" because of the delays in implementation and the high demand on resources.⁹³

⁷⁷ See, e.g., NRDC, 824 F.2d at 1146. ⁷⁸ Flatt, supra note 74, at 12-13 (citing NRDC, 824 F.2d at 1146). ⁷⁹ Id. ⁸⁰ Id. ⁸¹ Id. ⁸² Id. ⁸³ Flatt, *supra* note 74, at 113. ⁸⁴ Id. ⁸⁵ Id. ⁸⁶ Id. ⁸⁷ Id. ⁸⁸ Id. ⁸⁹ Id. ⁹⁰ See DOREMUS, supra note 10, at 610. ⁹¹ Id. ⁹² Id. 93 Id.

The 1990 amendments to § 112 lowered the threshold for including a pollutant on the HAP list.⁹⁴ Congress required EPA to list pollutants that *could* adversely impact human health, whereas the previous trigger required listing only when the pollutant *would* cause serious illness.⁹⁵ The change in language arguably lowers the trigger for listing hazardous pollutants because serious illness is no longer a prerequisite as long as there is reason to believe the pollutant may adversely affect human health.⁹⁶ Furthermore, adverse human health is a vague term that leaves room for judicial interpretation.

B. HAP Emissions Standards for Oil and Gas Activities

§ 112(b) of the CAA requires EPA to develop "rules to control all major and some area sources emitting HAP."⁹⁷ EPA determined that oil and gas production facilities and transmission and storage facilities as an industry as a whole are major sources of HAP emissions.⁹⁸ Therefore, EPA needed to promulgate standards specifically for the industry. EPA submitted its final rule establishing NESHAPs for Oil and Natural Gas Production and Natural Gas Transmission and Storage on June 17, 1999.⁹⁹ EPA determined that oil and gas production and natural gas transmission and storage facilities emit approximately 69,000 megagrams per year of HAPs, including benzene, toluene, ethyl benzene, mixed xylene, and n-hexane.¹⁰⁰ Benzene is carcinogenic and the other chemicals are known to cause other health effects.¹⁰¹ The proposed NESHAPs for oil and natural gas emissions were intended to address the adverse health effects of exposure to HAPs by reducing HAP emissions from major sources in natural gas production by 77 percent and by 95 percent in natural gas transmission and storage.¹⁰²

1. The Significance of Being a "Major Source"

The primary distinction under § 112 is whether a source is considered a "major source" for purposes of implementing emissions reduction technology.¹⁰³ NESHAPs for natural gas production and storage are directed at major

⁹⁴ Flatt, *supra* note 74, at 115.

⁹⁵ Id.

⁹⁶ See id.

⁹⁷ National Emissions Standards for Hazardous Air Pollutants: Oil and Natural Gas Production and Natural Gas Transmission and Storage; Final Rule, 64 Fed. Reg. 32610, 32611 (proposed June 17, 1999) (to be codified at 40 C.F.R. pt. 63), available at http://www.gpo. gov/fdsys/pkg/FR-1999-06-17/html/99-12894.htm [hereinafter National Emissions Standards].

⁹⁸ See id. at 32610.

⁹⁹ Id.

¹⁰⁰ Id.

¹⁰¹ Id.

¹⁰² *Id.* at 32618.

¹⁰³ See National Emissions Standards, supra note 97, at 32612.

sources.¹⁰⁴ A major source is defined as:

[A]ny stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, *in the aggregate*, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants.¹⁰⁵

If a stationary source is not considered a major source under § 112(a)(1), then it is deemed an "area source."¹⁰⁶ EPA defines area sources "as sources that emit less than 10 tons per year of a single air toxic, or less than 25 tons per year of a combination of air toxics."¹⁰⁷ EPA further recognizes on its website the cumulative impact of these smaller emission sources: "Though emissions from individual area sources are often relatively small, collectively their emissions can be of concern - particularly where large numbers of sources are located in heavily populated areas."¹⁰⁸ The distinction between major and area sources extremely important for regulation of HAP emissions under § 112 because major sources are subject to the most stringent emissions reduction standard and owners or operators of major sources must apply MACT to reduce emissions.¹⁰⁹ Whereas area sources are not subject to the same standards or monitoring provisions, unless otherwise specified.¹¹⁰ Furthermore, the 1999 amendment to the CAA, which added Subpart HH - National Emissions Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities, limited the amount of HAP emissions from specific emissions points.¹¹¹ If the facility is considered a major source, it can only release specific amounts of emissions from (1) process vents for glycol dehydration units, (2) storage vessels with flash emissions, and (3) equipment leaks.¹¹² Therefore, the owner or operator of a major source must apply air emission control equipment, pollution prevention measures, or a combination of both methods, to reduce HAP emissions from glycol dehydration units and storage vessels.¹¹³ The owner or operator must also reduce emissions leaks from equipment by establishing a leak

¹⁰⁷ Technology Transfer Network Air Toxics Web Site, U.S. Environmental Protection Agency, http://www.epa.gov/ttn/atw/pollsour.html (last visited Jan. 12, 2012).

¹⁰⁸ Id.

¹⁰⁹ See National Emissions Standards, supra note 97, at 32612.

¹¹⁰ See id.; see also 42 U.S.C. § 7412(c).

¹¹¹ Id.

¹¹² National Emissions Standards, *supra* note 97, at 32613 (stating that flash emissions occur during the transport of a hydrocarbon liquid from the production separator to the storage vessel); *see Air Emissions and Regulations, supra* note 29 (indicating a glycol dehydration unit is used to remove water from the natural gas).

¹¹³ National Emissions Standards, *supra* note 97, at 32613.

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¹⁰⁴ Id.

¹⁰⁵ 42 U.S.C. § 7412(a)(1) (emphasis added).

¹⁰⁶ 42 U.S.C. § 7412(a)(1).

detection and repair ("LDAR") program.¹¹⁴ These point sources are fundamental to natural gas production and transmission.¹¹⁵ Thus, it is clear that a burden comes with the classification of being a major source because it requires additional and costly control and monitoring efforts.¹¹⁶

2. The Exemption - \$ 112(n)(4)

A facility's status as a major source is based on all activities at the facility, except those provisions exempted from aggregation under § 112(n)(4).¹¹⁷ Generally, under NESHAPs, emissions from smaller sources that are "under common control and are located in close proximity to perform similar functions" are aggregated for purposes of determining a major source.¹¹⁸ This aggregation is important because the cumulative impact of several smaller sources may be more severe than the impact of one larger source.¹¹⁹ Without this aggregation, the full impact of the emissions is not recognized because the sources are only considered area sources. Under § 112(n)(4), emissions from oil and gas wells or pipelines are not aggregated for purposes of constituting a major source.¹²⁰

[E]missions from any oil or gas exploration or production well (with its associated equipment) and emissions from any pipeline compressor or pump station shall not be aggregated with emissions from other similar units, whether or not such units are in a contiguous area or under common control, to determine whether such units or stations are major sources, and in the case of any oil or gas exploration or production well (with its associated equipment), such emissions shall not be aggregated for any purpose under this section.¹²¹

The effect of this exemption is that "HAP emissions from each well and each piece of equipment considered to be associated with the well must be evaluated separately in a major source determination" rather than evaluating the emissions in the aggregate. Therefore, most production facilities will not be regulated as major sources because it is unlikely that the individual wells or pieces of equipment alone will reach the major source emission levels.¹²²

Under § 112(c), Congress directed EPA to provide a list of source categories for all major sources.¹²³ The subsection does not require EPA to specify source

¹¹⁴ Id.

¹¹⁵ See Air Emissions and Regulations, supra note 29 (indicating a glycol dehydration unit is used to remove water from the natural gas).

¹¹⁶ See National Emissions Standards, *supra* note 97, at 32617 (summarizing the total economic impact and costs of compliance with the standards under § 112).

¹¹⁷ *Id.* at 32613.

¹¹⁸ Kosnik, *supra* note 9, at 13; *see* National Emissions Standards, *supra* note 97, at 32612.

¹¹⁹ Kosnik, supra note 9, at 13.

¹²⁰ See 42 U.S.C. § 7412(n)(4)(A); Kosnik, supra note 9.

¹²¹ 42 U.S.C. § 7412(n)(4)(A).

¹²² See National Emissions Standards, supra note 97, at 32619; Kosnik, supra note 9.

¹²³ 42 U.S.C. § 7412(c).

categories for area sources unless the Administrator determines the area source "presents a threat of adverse effects to human health or the environment (by such sources individually or in the aggregate) warranting regulation."¹²⁴ Part of the exemption for natural gas production includes a reference to listing requirements for area sources.¹²⁵ EPA is not required to list the source categories of production wells (as an area source) under §112(c) unless the wells are located in geographic area with over one million people:

The Administrator shall not list oil and gas production wells (with its associated equipment) as an area source category under subsection (c) of this section, except that the Administrator may establish an area source category for oil and gas production wells located in any metropolitan statistical area or consolidated metropolitan statistical area with a population in excess of 1 million, if the Administrator determines that emissions of hazardous air pollutants from such wells present more than a negligible risk of adverse effects to public health.¹²⁶

Because \$112(c) specifies the need to list source categories when there is a "threat of adverse effects to human health or the environment," the fact that the \$112(n)(4) exemption takes into consideration the potential need for EPA to list production wells in greater density populations demonstrates the legislative intent to keep human health at the forefront of the CAA. It is unclear why the listing turns on the population size.

The number may have been selected based on statistical analysis that compares human exposure levels to every one million people.¹²⁷ Overall, EPA has recently focused on improving air quality in urban communities where population densities are the highest.¹²⁸ EPA submitted a report to Congress in 2000 to satisfy the reporting requirements under § 112(k) by providing an update on steps taken to improve overall air quality in urban areas.¹²⁹ Congress ordered EPA to identify metropolitan areas that are in high risk for public health safety due to emissions from area sources.¹³⁰ Overall, it is important to assess the significance of the one million population indicator under § 112(n)(4). This Note argues that because drilling is occurring in more rural areas, the ability of EPA to list source categories for wells that "present more than a negligible risk

¹²⁹ See id.

¹³⁰ See id. In 2000, EPA was unable to specify these metropolitan areas and requested additional time for review.

¹²⁴ Id. at § 7412(c)(3).

¹²⁵ Id. at § 7412(n)(4)(B).

¹²⁶ Id.

¹²⁷ See id.

¹²⁸ See, e.g., U.S. ENVTL. PROT. AGENCY, NATIONAL AIR TOXICS PROGRAM: THE INTE-GRATED URBAN STRATEGY REPORT TO CONGRESS, ES-1 (Jul. 2000) (on file with author), available at http://www.epa.gov/ttnatw01/urban/natprpt.pdf.

of adverse effects to public health" should pertain to smaller, rural populations in addition to areas with a population in excess of one million.

3. Clarification of the Exemption Through Notice and Comment

EPA's final rulemaking responded to comments from both the public and the natural gas industry and provided an explanation for specific provisions under § 112.¹³¹ Key parts of § 112(n)(4) include the reference to "associated equipment," which potentially expands the scope of the exemption by permitting a broader interpretation of emissions.¹³² Through its final rulemaking, EPA clarified the scope of associated equipment because Congress did not provide a definition.¹³³ In developing a definition, EPA sought to (1) maintain ease in implementation; (2) be consistent with congressional intent; (3) prevent the aggregation of small, scattered HAP emissions sources; and (4) not prevent aggregation of significant emission points.¹³⁴ EPA defined associated material as "all equipment up to the point of custody transfer, excluding glycol dehydration units and storage vessels with the potential for flash emissions."¹³⁵

In the 1999 final rule, EPA also provided an overview of the role of aggregation and the purpose of the § 112(n) exemption in the 1999 Federal Registry.¹³⁶ Notably, aggregation is generally required under § 112 for hazardous air pollutant emissions points within a contiguous area and under common control in order to regulate these emissions as a major source.¹³⁷ However, EPA determined that aggregation would impose unreasonable burdens on natural gas drillers.¹³⁸ EPA considered the burden of aggregation on natural gas producers to exceed the burden on other industries:

Given that some oil and natural gas operations (e.g., a production field) may cover several square miles or that leases and mineral rights agreements give some companies control over a large area of contiguous property, determination of major source status strictly by the language of section 112(a)(1) could mean in this industry that HAP emissions must be aggregated from emission points separated by large distances.¹³⁹

EPA determined the limitation on aggregation contained in § 112(n)(4) exemption was reasonable because it did not prevent aggregation of larger HAP emission sources such as glycol dehydration units.¹⁴⁰ Overall, review of the

¹³¹ Id.

¹³² See 42 U.S.C. § 7412(n)(4)(A).

¹³³ National Emissions Standards, *supra* note 97, at 32618-19.

¹³⁴ Id. at 32620.

¹³⁵ Id.

¹³⁶ Id.

¹³⁷ Id.

¹³⁸ Id.

¹³⁹ Id.

¹⁴⁰ Id. at 32619-20.

exemption demonstrates that the failure to address the cumulative impact of natural gas drilling emissions is not due to a lack of federal regulation. Instead, a regulatory framework *is* in place to monitor drilling emissions, but an exemption within this framework makes the regulation ineffective in monitoring and controlling natural gas emissions.

C. General Aggregation Practices Under the CAA

1. Lessons from PSD and NSR Programs

Aggregation is crucial for the "NSR applicability test" because it "describes the process of grouping together multiple projects (i.e., physical changes or changes in the method of operation) and summing their emissions changes for purposes of determining whether a significant emissions increase has occurred from the combined project."¹⁴¹ However, EPA's policy on aggregation was not always clear because "[n]either the CAA nor current EPA rules specifically address the basis upon which to aggregate projects."¹⁴² For many years, EPA relied on a case-by-case analysis to determine if sources should be aggregated.¹⁴³ In 2006, EPA proposed revising the regulations to create a more concrete standard and trigger for aggregation: "a source must aggregate emissions from projects that are technically or economically dependent."¹⁴⁴ The technical and economic dependence trigger was also used for ex post analysis of whether a source failed to meet NSR requirements.¹⁴⁵

Natural gas liquids and transports fall within the aggregation provision under the PSD and NSR regulations.¹⁴⁶ EPA acknowledges that failure to aggregate may undermine the purpose of the CAA regulations because the combined impact amounts to a "significant net emissions increase."¹⁴⁷ Furthermore, the Agency emphasized the importance of consistent application of the aggregation policy to promote the program goals.¹⁴⁸ However, the determination of technical and economic dependence is still largely case-specific because EPA declined to adopt a bright line rule in its final action.¹⁴⁹

EPA's historical support and protection of aggregation policies is demon-

¹⁴⁹ Id.

¹⁴¹ Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Aggregation and Project Netting, 71 Fed. Reg. 54244 (proposed Sept. 14, 2006) (to be codified at 40 C.F.R. pt. 51-52), *available at* http://www.epa.gov/NSR/fr/20060914_54235.pdf [hereinafter PSD and NSR].

¹⁴² Id.

¹⁴³ Id. at 54245.

¹⁴⁴ Id.

¹⁴⁵ Id.

¹⁴⁶ Id. at 54236.

¹⁴⁷ Id. at 54244.

¹⁴⁸ Id. at 54245.

strated through an analysis of the "timing" component.¹⁵⁰ Timing of the activities must be considered in determining whether to aggregate emissions; however, consecutive or simultaneous occurrence cannot be the sole basis for aggregation.¹⁵¹ EPA considered creating a rebuttable presumption that activities are not substantially related if changes occur more than three years apart; however, EPA declined to establish this presumption due to concerns about the environmental effects of limiting aggregation to a specific time period.¹⁵² EPA's deliberate attempt to preserve aggregation further demonstrates that the oil and gas industry has received preferential and uncharacteristic treatment in avoiding aggregation under § 112(n)(4).

2. Further Clarification About When Aggregation is Required

On September 22, 2009, EPA Assistant Administrator Gina McCarthy withdrew the previous guidance issued in 2007 by Acting Assistant Administrator William Wehrum on source determinations for the oil and gas industry.¹⁵³ Wehrum's non-binding guidance sought to streamline the process for determining whether permitting authorities should consider multiple emissions producing activities as a single stationary source for purposes of permitting requirements under NSR and other CAA permitting programs.¹⁵⁴ Wehrum's guidance was deemed "industry-friendly" because the guidance identified proximity as "the most informative factor in making source determinations for [the oil and gas] industries."¹⁵⁵ Furthermore, the memo stated "[w]e do not believe that it is reasonable to aggregate well site activities, and other production field activities

¹⁵⁴ Id.

¹⁵⁰ Id. at 54245.

¹⁵¹ *Id.* at 54248.

¹⁵² See id. at 54248 (EPA noted that "[t]he establishment of a presumption, rebuttable or irrebuttable, would go beyond the codification of the status quo and would apply prospectively only. Furthermore, before establishing such a presumption, we would attempt to analyze its environmental effects on the NSR program. The possibility of such an analysis, and its completeness, would be highly dependent on whether appropriate data exist that describe past aggregation and non-aggregation decisions, along with timing data regarding the affected activities.").

¹⁵³ Memorandum from Gina McCarthy, U.S. Environmental Protection Agency Administrator, to Regional Administrators, *Withdraw of Source Determinations for Oil and Gas Industries* (Sept. 2009) (on file with U.S. Environmental Protection Agency), http://www.epa. gov/region7/air/nsr/nsrmemos/oilgaswithdrawal.pdf.

¹⁵⁵ Memorandum from William L. Wehrum, U.S. Environmental Protection Agency Acting Assistant Administrator, to Regional Administrators, *Source Determinations for Oil and Gas Industries*, 3 (Jan. 2007) (on file with U.S. Environmental Protection Agency), http:// www.epa.gov/region7/air/nsr/nsrmemos/oilgas.pdf; *see* Michael Winek, Presentation on Air Emissions from Natural Gas Industry at the Pennsylvania Bar Institute's Sixteenth Annual Environmental Law Forum (April 6, 2011) (referring to the Wehrum memo as "industryfriendly").

that occur over large geographic distances, with the downstream processing plant into a single major stationary source."¹⁵⁶ Therefore, under Wehrum's interpretation, locations that were "contiguous or adjacent" or operationally dependent could not be aggregated if the activities were "geographically-dispersed."¹⁵⁷ Further, Wehrum focused on Congress's intent in enacting the exemption for natural gas drillers under § 112(n)(4): "Congress explained its basis for creating special treatment for these industries under Section 112 partially based on a finding that emissions, 'are typically located in widely dispersed geographic areas, rather than concentrated in a single area.'"¹⁵⁸ Therefore, Wehrum concluded it was permissible for permitting authorities to treat natural gas drilling surface sites as separate stationary sources if the sites were not in close proximity even though the activities were dependent on one another.¹⁵⁹

EPA's revised guidelines, now referred to as the "McCarthy Memo," state that the "review criteria" for making source determinations continues to be the criteria established under the NSR regulation.¹⁶⁰ The reliance on the NSR regulation was consistent with the historical practice of making source determinations under the CAA.¹⁶¹ To determine whether sources are connected, permitting authorities rely on three regulatory requirements for identifying emissions that belong to the same building, structure, facility, or installation.¹⁶² Under 40 C.F.R. 52.21(b)(6), the three criteria are (1) whether the same person controls the emissions activities, (2) whether the activities are located on contiguous or adjacent properties, and (3) whether the activities are part of the same industrial group.¹⁶³ Therefore, one factor alone (proximity) is not dispositive.¹⁶⁴ The source determinations are fact-specific and largely require case-by-case analysis.

D. Why the Exemption is a Problem: Environmental and Public Health Effects of Air Pollution from Natural Gas Drilling

Natural gas drilling emits air pollution during each stage of production through a variety of point sources, such as internal compression engines, com-

¹⁵⁶ Id. at 3-4.

¹⁵⁷ Wehrum, supra note 156, at 4.

¹⁵⁸ Id. at 4 at n. 13.

¹⁵⁹ Id. at 5.

¹⁶⁰ McCarthy, *supra* note 153; *see Natural Gas Sparks Change in Air Pollution Assessments*, Society of Environmental Journalists (Nov. 11, 2009), http://www.sej.org/publications/tipsheet/natural-gas-case-sparks-change-in-air-pollution-assessments [hereinafter Natural Gas Sparks Change].

¹⁶¹ McCarthy, *supra* note 153.

¹⁶² Id.; see Natural Gas Sparks Change, supra note 160.

¹⁶³ McCarthy, supra note 153.

¹⁶⁴ Id.

pressor engine exhausts, tank ventilation systems, and wells.¹⁶⁵ Internal compression engines are used to pump fracing fluids into the ground and release diesel emissions.¹⁶⁶ Compression engines are used to facilitate transportation of the natural gas to and from the processing plants through pipelines and are often fueled by natural gas.¹⁶⁷ When the fracing fluid is pumped back out of the ground it is often stored in open-air ponds or storage vessels until it can be transported to wastewater treatment plants.¹⁶⁸ These open-air ponds release chemical vapors from the fracing fluids.¹⁶⁹ Although the exact chemical composition of the fracing fluid is unknown, it contains VOCs, like propane, that are harmful when released into the atmosphere.¹⁷⁰

The extracted natural gas often contains other chemicals such as propane, butanes, and pentanes, which must be separated through heat treatment.¹⁷¹ The byproduct from this separation is also stored on-site.¹⁷² A significant source of cumulative air pollution is fugitive emissions from leaks through normal wear and tear.¹⁷³ Fugitive emissions can contain a variety of pollutants, but methane is most often identified.¹⁷⁴ The presence of fugitive emissions from processing further highlights the need to aggregate emissions to take into account the impact of leaks from thousands of valves at different points during production.¹⁷⁵

Environmental monitoring of air quality in shale communities reveals that natural gas production is as harmful as coal in terms of the greenhouse gas footprint.¹⁷⁶ Overall, emissions from production consist of VOCs, nitrogen oxides, particulates, as well as hazardous air pollutants including benzene, toluene, ethyl benzene, mixed xylene, and n-hexane.¹⁷⁷ Hydrogen sulfide leaks can occur during production, releasing sulfur dioxide and trioxide into the atmos-

¹⁶⁸ See Marcellus Shale, supra note 30, at 2.

¹⁶⁹ See id.

¹⁷⁰ See Timothy Gardner, EPA Subpoenas Halliburton Over Fracing Fluids, THOMAS REUTERS, Nov. 9, 2010, http://www.reuters.com/article/2010/11/09/us-epa-halliburton-subpoena-idUSTRE6A83YY20101109; Air Emissions and Regulations, supra note 29.

¹⁷¹ Gardner, supra note 170.

¹⁷² Id.

- ¹⁷⁴ See Marcellus Shale, supra note 30, at 2.
- ¹⁷⁵ Armendariz, supra note 165, at 34.

¹⁷⁶ Howarth, *supra* note 26 (comparing greenhouse gases which include carbon dioxide, methane, and nitrous oxides to fluorinated gases that trap heat in the atmosphere).

¹⁷⁷ See National Emission Standards, *supra* note 97, at 32610; *Marcellus Shale*, *supra* note 30.

¹⁶⁵ Al Armendariz, Report, *Emission from Natural Gas Production in the Barnett Shale* Area and Opportunities for Cost-Effective Improvements, SOUTHERN METHODIST UNIVERSI-TY, 5 (2009), *available at* http://www.edf.org/documents/9235_Barnett_Shale_Report.pdf; see Marcellus Shale, supra note 30, at 1.

¹⁶⁶ See Marcellus Shale, supra note 30, at 2.

¹⁶⁷ Armendariz, *supra* note 165, at 5.

¹⁷³ Armendariz, supra note 165, at 6.

phere.¹⁷⁸ Because hydrogen sulfide is heavier than air, it accumulates close to the ground and can harm both animals and humans.¹⁷⁹ Emissions also produce smog and ground-level ozone, which are dangerous for children and the elderly, and can exacerbate existing respiratory problems such as asthma, emphysema, and bronchitis.¹⁸⁰ Ozone can trigger new conditions such as chest pain and scarring to lung tissue.¹⁸¹ Human lung tissue is vulnerable to environmental pollutants, such as those released in natural gas drilling, and once the tissue is damaged or destroyed, it does not regenerate.¹⁸² The elderly are particularly susceptible to health problems stemming from air pollution because, as people age, they naturally lose a percentage of lung function.¹⁸³ Therefore, the air pollution further diminishes the elderly's already reduced lung capacity.¹⁸⁴ Furthermore, the hazardous air pollutants have been linked to elevated levels of cancer and neurological health issues as well as physical symptoms such as dizziness and headaches.¹⁸⁵

The health effects from the HAPs (benzene, toluene, ethyl benzene, mixed xylene, and n-hexane) are especially concerning.¹⁸⁶ Benzene is "a known human carcinogen," which has contributed to the occurrence of increased leukemia in exposed workers. Short-term exposure can damage the central nervous system,¹⁸⁷ while long-term exposure can cause blood disorders and impair the immune system.¹⁸⁸ High concentrations of benzene exposure have been linked to death.¹⁸⁹ Short-term exposure to toluene can affect the nervous system and cause fatigue, headache, nausea, and irregular heartbeat.¹⁹⁰ Long-term exposure to a high concentration of toluene can also kill brain cells and cause tremors, involuntary eye movement, and impaired speech.¹⁹¹ Additionally, in-

¹⁸⁶ National Emission Standards, *supra* note 97, at 32619-10.

¹⁸⁷ Id. at 32611

¹⁷⁸ Kosnik, *supra* note 9, at 14.

¹⁷⁹ *Id.* EPA removed hydrogen sulfide from the hazardous air pollutants list despite the potential dangers of an accidental release during oil and gas production. EPA claims that hydrogen sulfide was originally added due to clerical error, and thus, was removed. However, there is reason to believe that the removal was due to lobbying efforts by oil and gas representatives. *See Modifications to the 112(b)1 Hazardous Air Pollutants*, U.S. ENVIRON-MENTAL PROTECTION AGENCY, (last visited Jan. 24, 2011) http://www.epa.gov/ttn/atw/pollutants/atwsmod.html.

¹⁸⁰ See Marcellus Shale, supra note 30, at 2.

¹⁸¹ Id.

¹⁸² FERREY, supra note 56, at 179.

¹⁸³ Id. at 180.

¹⁸⁴ Id.

¹⁸⁵ See Marcellus Shale, supra note 30, at 1.

¹⁸⁸ Id.

¹⁸⁹ Id.

¹⁹⁰ Id. at 32611-12.

¹⁹¹ Id. at 32612.

halation of toluene by pregnant women can result in spontaneous abortions.¹⁹² Short-term exposure to high levels of ethyl benzene can cause throat and eye irritation, chest constriction, and dizziness, while long-term exposure may cause blood disorders.¹⁹³ Exposure to xylene and n-hexane also causes similar health problems.¹⁹⁴ These vast health risks are the basis for Congress setting stringent emissions standards for HAPs under NESHAPs.¹⁹⁵ Additionally, not holding these emissions to the more stringent MACT standard would completely undermine the purpose of NESHAPs.

E. Evaluation of State Monitoring

General state regulation of HAPs and specific regulation of natural gas operations provide insight into potential federal regulatory schemes regulating air pollution from natural gas drilling. Because natural gas production has a long history in Texas, it is instructive to look at air quality in Texas to assess both short-term and long-term implications of drilling on air quality. In 2009, researchers estimated there would be more hazardous air pollutants, including nitrogen oxide and VOCs, released from natural gas production along the Barnett Shale than from automobiles in the Dallas and Fort Worth areas.¹⁹⁶ The Barnett Shale formation extends approximately 5,000 square miles in Texas, primarily near Fort Worth.¹⁹⁷ Natural gas production along the Barnett Shale formation began in the late 1990s.¹⁹⁸ The number of well permits issued each year has increased rapidly: approximately 1,100 permits were issued in 2004 and approximately 4,000 permits were issued in 2008.¹⁹⁹

In May 2010, the Toxicology Division of the Texas Commission of Environmental Quality ("TCEQ") released an interoffice memorandum on the public health effects of natural gas drilling along the Barnett Shale formation.²⁰⁰ Toxicologists detected levels of three chemicals that exceeded short-term air quality levels: n-octane, n-pentane, and 1,2-dibromethane.²⁰¹ But because the levels exceeded only short-term limits rather than long-term limits, TCEQ concluded

¹⁹² Id.

¹⁹³ Id.

¹⁹⁴ See National Emission Standards, supra note 97, at 32619-10.

¹⁹⁵ See id. at 32610.

¹⁹⁶ Josh Kirkland, Natural Gas: Fears of Pervasive Air Pollution Stirs Up Politics in Texas Shale Gas Country, New YORK TIMES (Aug. 2, 2010), http://www.nytimes.com/cwire/2010/08/02/02climatewire-fears-of-pervasive-air-pollution-stir-up-pol-89138.html.

¹⁹⁷ Armendariz, *supra* note 165, at 2.

¹⁹⁸ Id.

¹⁹⁹ Id.

²⁰⁰ Interoffice Memorandum from Sharon Ethridge, M.S., Texas Commission of Environmental Quality, to Mark Vickery, Executive Director, Texas Commission of Environmental Quality, 2 (May 25, 2010), http://www.tceq.state.tx.us/assets/public/implementation/barnett_ shale/healthEffects/2010.05.25-healthEffectsMemo.pdf.

²⁰¹ Id. at 8.

that the concentrations would not cause "adverse health effects."²⁰² Additional chemicals exceeded permissible odor concentrations, causing the TCEQ Office of Compliance and Enforcement to further investigate.²⁰³ Based on the presence of benzene at facilities, TCEQ voiced concern that although the levels did not exceed short-term limits, the facilities may contribute to long-term cumulative exposure of benzene in the surrounding communities.²⁰⁴ The Toxicology Department recommended continued observation and review of the Barnett Shale formation.²⁰⁵ In light of these findings, merely requiring continued surveillance and monitoring of the shale formation is insufficient regulation. Aggregation of emissions under the CAA from natural gas production would provide a more accurate depiction of cumulative air pollution.²⁰⁶

In September 2010, community members in Denton County, Texas, met with political representatives and environmental experts in a forum held by the Environmental & Energy Committee of the Denton County Democratic Party to address concerns about the impact of toxic emissions from natural gas drilling on air quality and drinking water.²⁰⁷ Testimony by an environmental expert pinpointed the health effects of permitting largely unregulated natural gas operations in Texas.²⁰⁸ Environment Texas, an environmental organization, expressed the need to aggregate emissions at both the state and federal level because individually the facility does not exceed emission thresholds, but cumulatively, the facilities produce "dangerous levels" of pollutants.²⁰⁹ Furthermore, Dr. Al Armendariz from Southern Methodist University completed a health study along the Barnett Shale.²¹⁰ He explored the specific impact of aggregating sources in one drilling town, Dish, Texas.²¹¹ Dr. Armendariz concluded that the cumulative emissions from eleven compressor engines and associated piping amounted to a significant source of emissions (hundreds of tons per year).²¹²

States like Massachusetts have attempted to fill in the gaps in federal regula-

²⁰⁹ Id.

²¹⁰ Health Issues Follow Natural Gas Drilling in Texas, NPR (Nov. 3, 2009), http://www.npr.org/templates/story/story.php?storyId=120043996.

²¹¹ Id.

²¹² Id.

²⁰² Id.

²⁰³ Id.

²⁰⁴ Id. at 8–9.

²⁰⁵ Id. at 9.

²⁰⁶ Kosnik, supra note 9, at 13-14.

²⁰⁷ L.B. Woodgate, *Gas Drilling in the Barnett Shale: Community Health and Legislation*, Associated Content from YAHOO (Sept. 24, 2010), http://www.associatedcontent. com/article/5824178/gas_drilling_in_the_barnett_shale_community.html?cat=8.

²⁰⁸ See, e.g., Joyce Yao, Drilling in the Barnett shale?, ENVIRONMENT AMERICA BLOG (Nov. 19, 2010, 2:43 PM), http://www.environmentamerica.org/blog/home/drilling-in-the-barnett-shale.

tion to regulate the emissions of oil and gas processing facilities.²¹³ Massachusetts's state regulatory scheme is among the most protective in terms of hazardous air pollutant controls.²¹⁴ This scheme includes an examination of the cumulative harm of pollutants and the interaction of sources.²¹⁵ Part of Massachusetts's review of hazardous air pollutants includes annual reports.²¹⁶ All emitting sources are required to submit reports to supplement the traditional permitting process.²¹⁷ This reporting requirement could be used to assist with aggregation under the federal CAA by identifying sources within a specific geographical area each year, which in turn, necessitates aggregation.

Each state typically has an oil and gas act that regulates natural gas drilling operations.²¹⁸ Colorado's oil and gas regulation has attempted to fill in the gap of federal legislation without overburdening industry.²¹⁹ For instance. Colorado's Rule 324(a), requires natural gas producers to "take precautions to prevent significant adverse environmental impacts to air, water, soil, or biological resources to the extent necessary to protect public health, safety and welfare."220 Under EPA's federal guidelines, states are permitted to devise their own methods of aggregation.²²¹ Recently, an environmental group, WildEarth Guardians, challenged the Colorado Air Permitting Agency's decision to renew an operating permit for Anadarko Petroleum Company.²²² WildEarth claimed that the state permitting agency should have aggregated the emissions from the compression site as well as other gas wells in the area to be regulated as a single source for permitting requirements.²²³ On February 2, 2011, EPA denied WildEarth's petition for EPA to object to Colorado's agency action.²²⁴ Despite the McCarthy Memo, which undermined the significance of proximity, EPA still relied on distance as an important factor in concluding that the Colorado

²¹⁶ Id.

²¹⁷ Id.

²¹⁸ See Kosnik, supra note 9, at 13.

²¹⁹ See id.

²²⁰ See Colorado Laws: Intermountain Oil and Gas BMP Project, NATURAL RESOURCES LAW CENTER, http://www.oilandgasbmps.org/laws/colorado_law.php (last visited Jan. 24, 2011) (providing information and links to the following laws relevant to natural gas drilling in Colorado Colorado Oil and Gas Conservation Act, Colo. Rev. Stat. § 34-60-100; Colorado Air Pollution and Prevention Control Act, § 25-7-100; Colorado Water Quality Control Act, § 25-8-100).

²²¹ Natural Gas Sparks Change, supra note 160.

²²² Rick Pearce, Anadarko Finally Wins Aggregation Battle Over Permit for Compressor Station, RYAN WHALLY COLDIRON SHANDY (Feb. 17, 2011), http://www.ryanwhaley.com/anadarko-finally-wins-aggregation-battle-over-permit-for-compressor-station.

²²³ Id.

²²⁴ Id.

²¹³ Flatt, *supra* note 74, at 138.

²¹⁴ Id.

²¹⁵ Id.

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agency acted correctly in determining the compression station was not a major source.²²⁵

IV. LITIGATION - WHEN LEGISLATION FAILS TO CREATE CHANGE

Tort litigation provides an alternative means of recourse for those affected by air pollution from natural gas production. However, the ex post application of litigation to address air pollution has limited potential and legislative change is the preferred route. Plaintiffs have potentially three torts available to address air pollution from natural gas drilling: nuisance, trespass, and negligence. This Note seeks to use the example of Pennsylvania laws of nuisance, trespass, and negligence, to explore the availability of tort actions for addressing the harm caused by air pollution. However, this Note will also argue that the potential beneficial aspects of these actions may be negated by the burdensome inquiry and the costly nature of litigation.

A. Nuisance

Private nuisance is "the non-possessory invasion of another's interest in the use and in the enjoyment of land."²²⁶ To prove a public nuisance, the plaintiff must show that "a nuisance exists and affects the community at large."²²⁷ Conduct constitutes a nuisance if it is proscribed by statute or ordinance, or if it imposes a significant threat to public health.²²⁸ A nuisance action may prevail if the drilling company violates a specific statute such as the Pennsylvania Air Pollution Control Act (APCA), 35 P.S. § 4001 et seq. To establish standing, the party must show specific injury beyond harm suffered by the general public.²²⁹

In general, lawful or authorized use of property cannot be a nuisance per se.²³⁰ While most air pollution cases rely on a showing of nuisance in fact, an activity may constitute a nuisance per se depending on the location and public

²²⁵ Id.

²²⁶ Russell Davis, 2 Summary of PA Jurisprudence (Second) Torts § 21:1 (2010)

²²⁷ Karpiak v. Russo, 676 A.2d 270, 274 (Pa. Super. 1996) (holding a public nuisance could not exist because plaintiff failed to establish a private nuisance).

²²⁸ Noerr v. Lewistown Smelting & Refining, Inc., 60 Pa. D. & C.2d 406 (1973) (holding brass smelting plan is not ultra-hazardous because modern technology makes it possible to limit the harmful effects of its operation on surrounding landowners).

²²⁹ Davis, *supra* note 226, at § 21:1-2 (2010); *see also* Alexander v. Wilkes-Barre Anthracite Coal Co., 98 A. 794 (Pa. 1916) (holding plaintiff must show special damage to bring private nuisance action; if only public wrong, then only a public action may be brought).

²³⁰ Peter Guthrie, Annotation, *Operation of Incinerator as Nuisance*, 41 A.L.R. 3d 1009, § 3 (1972) (citing Roberts v. Lower Merion Twp., 5 A.2d 106 (Pa. 1939); Siwak v. Rankin Borough, 72 Pa. Super. 218 (1919) (holding that whether an incinerator was a nuisance depended on the facts because it is not a nuisance per se)).

impact.²³¹ For instance, commercial activity in a residential area does not in itself create a nuisance per se, but it may be considered a nuisance as a matter of law if it harms human health.²³² Additionally, the activity must be suitable for the location. An activity in an industrial zoned area may not be a nuisance per se, but the same activity in a residential area may be a nuisance per se because of the differences in location and expectations of use of property.²³³ The release of air contaminants from a source located near residents is a nuisance if it limits neighbors' ability to use and enjoy their land.²³⁴ An activity that may not be a nuisance per se if operated properly may become a nuisance in fact when conducted improperly.²³⁵ Thus, if natural gas drilling occurs in a residentially zoned area, a plaintiff could argue the use is inconsistent with the location.

The plaintiff has the burden of proving injury, but once demonstrated, the burden shifts to the defendant to prove that "the injury was not reasonably avoidable."²³⁶ The invading activity must cause substantial harm to a person of ordinary sensitivity.²³⁷ A plaintiff of unusual sensitivity will be denied relief. The invasion must be "offensive, seriously annoying, or intolerable."²³⁸ A showing of physical impact or invasion of the air pollution satisfies the requirement of harm.²³⁹ But minor annoyances from a legal business are not actiona-

 $^{^{231}}$ See Roberts, 1095 A.2d 106 (finding an open dump is not a nuisance per se, but may become a nuisance in fact if located in a residential area).

²³² Blue Mountain Preservation Ass'n v. Twp. of Eldred, 867 A.2d 692, 704–05 (Pa. Commw. 2005) (quoting Menger v. Pass, 80 A.2d 702, 703 (Pa. 1951)).

²³³ See Ness v. York Colonial Brick Co., 60 York 157 (Pa. Com. Pl. 1947) (finding brick burning does not constitute a nuisance per se because it is an essential part of business); see also Tobin v. Kolb, 88 Pa. Super. 80 (1926) (holding that persons in residential areas will be protected against "immediate encroachment of business enterprises interfering with quiet and cleanliness").

²³⁴ See Sitzman v. Heikel, 10 Pa. D. 673 (Pa. Com. Pl. 1901); see also Babinetz v. Generose, 46 Luzerne Leg. Reg. 273 (1955) (enjoining the use of an incinerator due to physical damage to neighbor's property and the ability of the owner to abate the nuisance without causing undue hardship); see also Guthrie, supra note 230, at § 3 (citing Berger v. Presser, 46 Luz.L.R. 19 (Pa. Com. Pl. 1955) (finding an incinerator that released odors, fumes, and smoke within a close proximity to residences likely would be offensive and subsequently enjoined).

²³⁵ Noerr v. Lewistown Smelting & Refining, Inc., 60 Pa. D. & C.2d 406, 454 (1973) (holding "a brass smelting plant in a rural area is not a nuisance per se but becomes a nuisance in fact when improperly conducted.").

²³⁶ Id. at 466-67.

²³⁷ See Karpiak v. Russo, 676 A.2d 270, 272-73 (Pa. Super. 1996) (holding that appellants failed to establish "invasion was seriously annoying or intolerable").

²³⁸ *Id.* at 273; *see Noerr*, 60 Pa. D. & C.2d at 459 (citing Waschak v. Moffat, 109 A.2d 310 (Pa. 1954)).

²³⁹ See Waschak, 109 A.2d 310 (owners brought an action against a coal mining opera-

ble.²⁴⁰ The burden of proof is greater when a nontoxic activity causes the harm.²⁴¹ However, interference of nontoxic pollutants still constitutes a nuisance when it causes a significant harm to the aggrieved party.²⁴² Specifying the health impact is unnecessary because demonstrating that the air pollution adversely affects public health satisfies the requirement of harm under nuisance law.²⁴³ Courts have held that "[t]he corruption of the atmosphere by the use of property which impregnates it with smoke or offensive odors to the annoyance of a resident or residents nearby constitutes a nuisance."²⁴⁴ Additionally, certain gas releases, like lead fumes, have been held to constitute a nuisance as a matter of law.²⁴⁵

The activity causing the interference must be intentional and unreasonable.²⁴⁶ Conduct is intentional when the actor knows with substantial certainty that the result will occur from his conduct.²⁴⁷ Receiving notice of harm establishes

²⁴⁰ Bennington v. Klein, Logan & Co., 1 Luz. L.T.N.S. 1 (Pa. Com. Pl. 1878).

²⁴¹ See generally Karpiak, 679 A.2d 270 (holding dust from a landscaping business that settled on neighbors' property was not poisonous or harmful and did not cause physical injury; therefore, dust released was not a private nuisance since the area was zoned for business use and residents must expect to bear some burdens).

²⁴² See Harford Penn-Cann Serv., Inc. v. Zymblosky, 549 A.2d 208 (Pa. Super. Ct. 1988) (holding sufficient amount of dust from a business constituted a nuisance because it caused significant harm to neighbors).

²⁴³ Health effects fall within personal injury and Pennsylvania case law does not distinguish between personal injury and injury to property; therefore, showing personal injury from the invasion is sufficient to establish harm. *See* Francis C. Amendola, *Trespass*, 23 SUMMARY OF PA JURISPRUDENCE (SECOND) TORTS (1999); *see generally Noerr*, 60 Pa. D. & C.2d 406.

²⁴⁴ Noerr v. Lewistown Smelting & Refining, Inc., 60 Pa. D. & C.2d 406, 454-55 (1973) (quoting Babinetz v. Generose, 46 Luz. 273 (1956)).

 245 Id. at 455 (citing Eisenbrown v. Bowers B & Spark Plug Co., 48 Berks. 248 (Pa. Com. Pl. 1956)).

²⁴⁶ Evans v. Moffat, 160 A.2d 465 (Pa. Super. 1960) (finding release of gases from a mine-refuge dump were unreasonable because the fumes caused plaintiffs to suffer physical ailments of headaches, nausea, and dizziness, and also were intentional because "defendants knew the invasion was resulting and was substantially certain to result from their conduct").

²⁴⁷ Waschak v. Moffat, 109 A.2d 310 (Pa. 1954) (adopting the Restatement (Second) of Torts § 822 definition of nuisance in its holding that the conduct was not a nuisance because it was not unreasonable; Folmar v. Elliot Coal Min. Co., 272 A.2d 910, 912 (Pa. 1971); *see Evans*, 160 A.2d at 467; *Noerr*, 60 Pa. D. & C.2d at 451 (holding the invasion of gas and smoke from a smeltering facility was unreasonable based on several rulings: it was in a residential location and a nonnatural use of the land and it caused substantial damage and therefore was unreasonable even if precautions were taken); Burr v. Adam Eidemiller, Inc., 126 A.2d 403, (Pa. 1956) (adopting Restatement (Second) of Torts § 825 definition of "intentional").

tion for damage to the paint on their house from the hydrogen sulfide gas emitted from the operation).

knowledge, which makes conduct intentional.²⁴⁸ In the case of drilling, a plaintiff may argue the air emissions from drilling falls within intentional conduct because the operator knows with substantial certainty that the production activities emit harmful air contaminants into the atmosphere. Even if the conduct of emitting air pollutants is deemed unintentional, it may still be actionable if the actor is negligent, reckless, or the activity is considered ultra-hazardous.²⁴⁹

The reasonableness of the invasion turns on weighing the invasion of one party's use and enjoyment of his land against the utility of the conduct causing the harm.²⁵⁰ Conduct may be considered unreasonable even if the defendant took "practicable measures to avoid harm."²⁵¹ Furthermore, use may unreasonable if it is not a natural use of the land.²⁵² Overall, when the party causing the interference does not obtain the most up-to-date control devices, and adoption of such a device would have avoided harm to neighbors without imposing an undue burden on the operating party, the release of pollutants, such as smoke and gas, constitutes unnecessary and unreasonable interference.²⁵³ Even if the court declines to enjoin the activity as a nuisance based on a finding that the harm does not outweigh the utility of the use, the court may still require the defendant to take steps to reduce the overall environmental impact by using new devices or technology.²⁵⁴

 250 See Burr, 126 A.2d at 408 ("An intentional interference with a use or enjoyment of land which is well suited to the character of the locality cannot ordinarily be justified as reasonable when the conduct which causes it is unsuited to that locality.").

²⁵¹ Noerr, 60 Pa. D. & C.2d at 451 (citing RESTATEMENT (SECOND) OF TORTS § 831, cmt. a.).

²⁵² See Id.

²⁵³ See Id.; Clark v. Interstate Amiesite Co., 15 Cambria C.R. 129 (Pa. Com. Pl. 1947) (residents in industrial zones must bear some burdens and annoyances, but if there is available technology to mitigate smoke, odors, and gases at a reasonable expense, then it is the duty of the plant owner to obtain the devices. If the operator fails to do so, the interference may be considered unnecessary and unreasonable); see also Hannum v. Gruber, 31 A.2d 99 (Pa. 1943) (holding although persons in an industrial community must bear some burdens that are reasonable given the location, they are entitled to protection against unreasonable and unnecessary gases, fumes, odors, and smokes, and industry operators should use available devices to improve efficiency and lower environmental impact of operations); Ebur v. Alloy Metal Wire Co., 155 A. 280 (Pa. 1931).

²⁵⁴ See Ballard v. Florey's Brick Works, Inc., 47 Montg. 250 (Pa. Com. Pl. 1931) (holding operation of a brick kiln in a rural locality was not a nuisance but required defendant to use a type of fuel that produced less smoke and gas); see also Folmar v. Elliot Coal Min. Co., 272 A.2d 910 (Pa. 1971) (holding non-trespassory invasion of plaintiff's property by air pollution from a coal cleaning plant was not unreasonable because defendant planned to install a wet scrubber and there was no showing of when the technology would become technically and economically feasible); Eisenbrown v. Bowers Battery and Spark Plug Co., 48 Berks 248 (Pa. Com. Pl. 1956) (enjoinment in equity of nuisance for failure to use proper

²⁴⁸ Noerr, 60 Pa. D. & C.2d at 406.

²⁴⁹ *Id.* at 443-44.

Under the law of nuisance, a plaintiff may seek in equity to enjoin the interfering activity.²⁵⁵ The court may grant an injunction to restrain the activity if there is a sufficient showing of physical damage to property or evidence of danger and injury to health and safety.²⁵⁶ The location of the activity and the suitability of the use of land are additional factors that influence whether a court will grant an injunction and the extent of any imposed restrictions.²⁵⁷ The balancing aspect of the nuisance inquiry will prove to be the most significant hurdle for a plaintiff seeking to enjoin natural gas activity. The court must weigh the gravity of the harm caused by the interference against the utility and benefit of the activity causing the interference.²⁵⁸ If the overall adverse public health impact and material injury to the aggrieved parties outweighs the benefits of the polluting activity, then the court may grant an injunction.²⁵⁹ However, the court will not grant an injunction if the plaintiff fails to show injury to public health or otherwise fails to establish sufficient evidence to prove harm.²⁶⁰ Additionally, the court may deny injunctive relief if society's need for a product outweighs the harm caused during its production.²⁶¹

devices to control discharge); Collins v. McKeesport, 53 Pitts. L.J. 331 (Pa. Com. Pl. 1906); Yeager v. Schillip Soap Co., 51 Pitts. L.J. 24 (Pa. Com. Pl. 1903) (restrained factory because it emitted vapors that rendered surrounding houses unfit for habitation and a properly operated facility would not omit offensive odors).

²⁵⁵ See 5 Christine M. Gimeno, Goodrich-Amram (Second) § 1531:1 (2010).

²⁵⁶ See Appeal of Pa. Lead Co., 29 Am. Law Reg. 649, 650 (Pa. 1881) (holding that smelting operations may be a nuisance and operations may be restrained if evidence shows "continuous and irreparable injury"); see also Galbraith v. Oliver, 3 Pitts. 78 (Pa. Com. Pl. 1867) (issuing an injunction to prevent a mill's release of soot and noxious vapors on nearby residences).

²⁵⁷ See Straus v. Barnett, 21 A. 253, 253 (Pa. 1891) (holding that a manufacturing business located in an area reserved exclusively for industrial activity will not be restrained by injunction when activity causes discomfort and annoyances but no substantial injury to neighboring manufacturer); see also Appeal of Czarniecki, 11 A. 660, 661 (Pa. 1887) (restricting use of property in a residential neighborhood to prevent use of building for boiling bones and carcasses, but permitting the construction of the building itself).

²⁵⁸ See Noerr, 60 Pa. D. & C.2d at 463 (observing that the harm of defendant's activity must be evaluated in light of the benefit it provides).

²⁵⁹ Id. (holding the gravity of the harm to plaintiffs outweighed the overall importance of brass smelting operations); see Adams v. Joyce, 94 Pitts. L.J. 77 (Pa. Com. Pl. 1946) (enjoining defendant from hauling or burning garbage, ash, and refuge because the nuisance was injurious to the health and comfort of neighbors and caused material injury to their properties); see also Appeal of Richards, 57 Pa. 105, 113 (Pa. 1868) (denying injunction to enjoin the use of coal in manufacturing because the injury to defendant would exceed the degree of injury to plaintiff).

²⁶⁰ See Post v. Young, 7 Kulp 102, 103 (Pa. Com. Pl. 1893).

²⁶¹ RESTATEMENT (SECOND) OF TORTS § 826 cmt. b (1979); *see* Appeal of Richards, 57 Pa. 105 at 113 (denying injunction to enjoin use of coal in manufacturing because injury to defendant would exceed the degree of injury to plaintiff).

In light of the utility of energy production, a plaintiff will face an uphill battle in proving particularized injury from air emissions sufficient to outweigh the benefits of natural gas drilling. Furthermore, "apprehension of danger" of proposed lawful activity is not enough to sustain an injunction.²⁶² Thus, a drilling community may not act until they have already suffered harm from the activity. This requirement illustrates how the community's use of litigation only provides ex post relief and is insufficient in preventing harm to the particular community. Nonetheless, action taken in one community may promote change in practices that will prevent harm to another community in the future.

In the absence of obtaining an injunction, a plaintiff may pursue monetary damages to compensate for the air interference.²⁶³ An award of damages is appropriate for a permanent injury when a court in equity would not enjoin the activity because such injunction would adversely effect the public interest because of the utility of the activity.²⁶⁴ As a general rule, damages are calculated based on the reasonable value of the property at the time of destruction or loss.²⁶⁵ The measure of damages depends on whether the nuisance is temporary or permanent.²⁶⁶ Temporary nuisances provide for damages in the amount of the diminished use and enjoyment of the property up to the time of the suit.²⁶⁷ Permanent nuisances allow for compensation of the difference between the estimated value of the property after the interference and its previous value.²⁶⁸ The judge or jury has discretion to award damages for "personal annoyances, inconvenience and discomfort from odors, gases, smoke and lead particulate."²⁶⁹ Such discretionary damages may supplement damages for physical loss or injury.²⁷⁰ Calculation of damages does not require "mathemati-

²⁶⁵ Noerr v. Lewistown Smelting & Refining, Inc., 60 Pa. D. & C.2d 406, 457-58 (1973) (citing Taylor v. Canton Twp., 30 Pa. Super. Ct. 305 (1906)).

²⁶⁷ Id.

²⁶⁸ *Id.* at 779 (holding that lower court erred in stating that award of diminution in market value for permanent nuisances was "*in addition to*" diminished enjoyment and use; award of damages may only be for one or the other, not both, because that would amount to double compensation).

²⁶⁹ Noerr, 60 Pa. D. & C.2d at 458; see Evans v. Moffat, 160 A.2d 465, 473 (Pa. Super. 1960) (holding additional damages were appropriate because plaintiffs suffered from nausea and headaches, irritation to nose and throat, and had to repaint their house).

²⁷⁰ Evans, 160 A.2d at 473.

²⁶² McKinney v. McCullough, 17 Phila. 395 (Pa. Com. Pl. 1885).

²⁶³ See Eppley v. Naumann, 5 Pa. D. 471, 472-73 (Pa. Com. Pl. 1896) (awarding plaintiff damages but denying plaintiff's request to restrain dye factory's operation as a nuisance, which emitted noxious vapors, because the stack was constructed properly and plaintiff could re-plaster his wall to prevent penetration of vapors).

²⁶⁴ Milan v. City of Bethlehem, 94 A.2d 774, 777 (Pa. 1953) (holding that proper measure of damages for permanent nuisance of municipal dump which served the community warranted the same compensation as a taking through eminent domain).

²⁶⁶ Milan, 94 A.2d at 776.

cal certainty," but instead, only "reasonable certainty."²⁷¹ An award of damages for liability up to the date of trial does not preclude future action for subsequent damages.²⁷² In conclusion, the tort of nuisance provides plaintiffs with a possible means of obtaining damages for harm resulting from the air emissions. However, it is unlikely nuisance actions alone will promote significant change to industry practices.

B. Trespass

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As an alternative tort remedy, a plaintiff may pursue a cause of action in trespass to address harm resulting from air emissions. In Pennsylvania, liability for trespass "arises from the intentional entry upon the land of another without privilege."²⁷³ A plaintiff must have the right to exclusive use and possession of impacted property to bring an action under trespass for an invasion or entry.²⁷⁴ Trespass does not require a showing of harm to a legally protected interest because the interference is with "the landowner's right to peaceably enjoy full, exclusive use of her or his property."²⁷⁵ Therefore, a landowner does not need to allege actual injury or damage to bring an action under trespass.

To recover for trespass, a plaintiff must show the following: "(1) an intentional doing of the act which results in the invasion; (2) the reasonable foreseeability that the act done could result in the invasion of plaintiff's possessory interest; and (3) substantial damage to the res[idence]."²⁷⁶ If the conduct is unintentional, the plaintiff does not have a cause of action under trespass.²⁷⁷ Moreover, reckless or negligent conduct is not sufficient to establish an action under trespass.²⁷⁸ However, once a defendant receives notice of the trespass, continuation of the activity amounts to an intentional invasion and a plaintiff

²⁷¹ Noerr, 60 Pa. D. & C.2d at 461 (citing Kohr v. Weber, 57 Lanc. 57, 68 (1959).

²⁷⁶ Id. (citing Borland, 369 So.2d at 253).

²⁷⁷ See Buckley Motors, Inc. v. Amp, Inc., 23 Pa. D. & C. 2d 324, 330 (Pa. Com. Pl. 1961) (finding that plaintiff was not entitled to damages where defendant was unaware that particles of solid material from his smokestack caused damage to paint surface on plaintiff's vehicles, because the invasion was unintentional; however, once defendant received notice and continued to commit same trespass, plaintiff was entitled to relief).

²⁷⁸ Amendola, *supra* note 273, §23:3 (citing *In re* One Meridian Plaza Fire Litigation, 74 F.3d 1226 (3d Cir. 1995)).

²⁷² Id. at 463.

 $^{^{273}}$ Francis C. Amendola, Summary of PA Jurisprudence (Second) Torts § 23.1 (1999).

²⁷⁴ Id. § 23.5.

²⁷⁵ Id. § 23.1 (citing Jones v. Wagner, 624 A.2d 166, 169 (Pa. Super. Ct. 1993)); see also Larry D. Schaefer, Annotation, *Recovery in Trespass for Injury to Land Caused by Airborne Pollutants*, 2 A.L.R. 4d. 1054, § 1 (1980) (citing Borland v. Sanders Lead Co., 369 So.2d 523 (Ala. 1979) (framing trespass as the invasion of one's interest in exclusive possession of property). *Cf.* RESTATEMENT (SECOND) OF TORTS §§ 157-166.

may then recover damages.²⁷⁹

Traditionally, courts required a tangible physical invasion of land to establish a claim of trespass and held that the invasion of one's possessory rights due to air pollution was not a trespass.²⁸⁰ The invasion by noxious gases and odors from a garbage disposal site was considered a nuisance, not a trespass, because it did not involve a "natural physical invasion by tangible matter."²⁸¹ Furthermore, the settling of dust and other particles on a neighbor's property was not a trespass because of the minute, and often invisible, nature of the substance.²⁸² Some jurisdictions further limited the use of trespass actions to injuries that directly and immediately resulted from the invasion.²⁸³

However, courts abandoned the procedural requirement of showing direct invasion to prove a trespass, and now, the distinction between nuisance and trespass is "wavering and uncertain."²⁸⁴ Courts have struggled to distinguish between nuisance and trespass in cases involving air pollutants because there is arguably minimal difference between the two actions for such cases.²⁸⁵ A key distinction between nuisance and trespass is that nuisance requires a "substantial and unreasonable interference" whereas trespass only requires a "tangible invasion of plaintiff's property, however slight."²⁸⁶ In recent years, trespass actions have proceeded even when interference is indirect.²⁸⁷

To determine liability for trespass, many courts look at the character of the instrumentality causing the invasion and the property interest invaded, rather than applying a dimensional test that would examine the physical size and visibility of the invasion.²⁸⁸ Although the air contaminant causing the trespass does not need to be visible to the naked eye, some courts require a showing of actual damage or injury to recover for harms suffered from the release of microscopic particles.²⁸⁹ Landowners are entitled to recover damages under tres-

²⁸¹ Id.

²⁸³ Id. at § 1 (citing Arvidson v. Reynolds Metals Co., 125 F. Supp. 481 (D.C. 1954), aff^{*}d, 236 F.2d 224 (9th Cir. 1956)).

²⁸⁴ Bradley v. Am. Smelting and Ref. Co., 709 P.2d 782, 786 (Wash. 1985) (en banc).
 ²⁸⁵ Id.

²⁸⁶ *Id.* at 787 (citing W. RODGERS, HANDBOOK ON ENVIRONMENTAL LAW § 2.13, 154-57 (West 1977)).

²⁸⁷ Id. at 790 (citing Borland v. Sanders Lead Co., 369 So.2d 523, 529 (Ala. 1979)).

²⁸⁸ Schaefer, supra note 275, at §1.

²⁸⁹ Id. (citing Martin v. Reynolds Metals Co., 342 P.2d 790 (Or. 1959) (en banc), cert denied 362 U.S. 918 (1960) (holding a farmer was entitled to recovery for damages under trespass as a result of a company's release of fluorides, not visible to the human eye, which settled on his property and made it unfit for raising livestock)); see Fairview Farms, Inc. v. Reynolds Metals Co., 176 F. Supp. 178 (DC Or. 1959); see also Bradley, 709 P.2d at 792;

²⁷⁹ Id.

²⁸⁰ Schaefer, *supra* note 275, at § 1 (citing Ryan v. Emmetsburg, 232 4 N.W.2d 435 (Iowa 1942)).

²⁸² Id. at § 1 (citing Thackery v. Union Portland Cement Co., 231 P. 813 (Utah 1924)).

pass when a nearby facility causes the intentional release of substances or particulate matter that settle on their property or otherwise cause damage.²⁹⁰

A landowner may seek to enjoin a repeated and continuous trespass in equity.²⁹¹ However, before a court will grant an injunction, it will assess the adequacy of other available remedies, the relative hardship that the injunction would impose on the defendant if granted, as well as the hardship the plaintiff would suffer if the conduct were not enjoined, the interests of the public, and the adequacy of self-help.²⁹² Furthermore, to establish a continuous trespass, "the plaintiff must plead that the defendant committed and continued to commit harm-causing actions, not merely that harm continues to result from actions which have ceased."²⁹³

As in nuisance, here, damages also differ depending on whether the injury is permanent or temporary, which is a question for the fact finder.²⁹⁴ If there is a loss of use during the period of invasion, but no actual damage to the property, the plaintiff may seek to recover the rental value of the property during that time.²⁹⁵ An injury to property is compensated by the cost of repairs, unless the costs exceed the value of the injured property.²⁹⁶ When the injury is permanent, damages compensate for the decrease in the fair market value.²⁹⁷ Moreover, a trespasser is liable for personal injuries that are a direct and proximate cause of the trespass or that are indirect and consequential.²⁹⁸ Specifically, Pennsylvania law "recognizes a cause of action for inconvenience and discomfort caused by interference with another's peaceful possession of real estate."²⁹⁹

C. Negligence

The law of negligence provides a third tort remedy for air pollution when there is a duty or obligation recognized by law and a party's breach of that duty

²⁹⁵ Amendola, *supra* note 273, at §23:8.

Karpiak v. Russo, 676 A.2d 270, 275 (Pa. Super. 1996) (holding the court did not need to determine whether dust that settled onto land was a sufficient particle to constitute a trespass because plaintiffs failed to demonstrate harm).

²⁹⁰ See Bradley, 709 P.2d at 792 (citing Roberts v. Permanente Corp., 10 Cal. Rptr. 519, 521 (Cal. Dist. Ct. App.)) (holding conduct that will almost certainly cause the "entry of foreign material" onto another's land is an intentional trespass).

²⁹¹ Amendola, *supra* note 273, at §23:7.

²⁹² Id.

²⁹³ Id. (citing Graham Oil Co. v. BP Oil Co., 885 F. Supp. 716 (W.D. Pa. 1994)).

²⁹⁴ Milan v. City of Bethlehem, 94 A.2d 774, 778 (Pa. 1953).

²⁹⁶ Id.

²⁹⁷ Id.

 $^{^{298}}$ Id. § 23:9. Based on this liability provision, it appears health effects are relevant and a defendant would not be able to assert such effects are not actionable under trespass.

²⁹⁹ Amendola, *supra* note 273, at §23:9 (citing Houston v. Texaco, Inc., 538 A.2d 502, 506 (Pa. Super. Ct. 1988)).

causes the air pollution.³⁰⁰ Furthermore, there must be a causal connection between the actor's breach of the duty and the resulting actual loss or damage suffered by complainant.³⁰¹ For example, failing to install pollution control devices when mitigating devices are available, continuing to operate without making improvements after notice of escaping air contaminants, or not hiring appropriate personnel to conduct the potentially harmful activity, support a claim of negligence.³⁰² Additionally, a party may be held liable under negligence for release of air contaminants if the party carelessly purchased inadequate equipment.³⁰³ As an alternative route to liability, a plaintiff may prove negligence per se when the defendant violated a regulation or statute that specified a level of due care.³⁰⁴ However, proving negligence per se does not guarantee relief because the plaintiff still must show the defendant's negligence was the legal cause of his injuries.³⁰⁵

Overall, the remedy of negligence is less preferred to that of nuisance because it is often more difficult to establish an obligation of reasonable care. To illustrate, a drilling company may exercise a defense that it cannot be subjected to claims of tortious interference because it followed standard industry practices and did not violate any ordinances or statutes. As the CAA currently stands, it is likely natural gas operators will be able to meet the bare minimum requirements of the statute even though the facility emits significant levels of hazardous air pollutants. Without the exemption, a plaintiff would have a stronger case because aggregating the emissions and regulating the facility as a major source would impose more stringent standards and monitoring. The more stringent the restriction, the more likely a plaintiff could prove a violation.

Even with the minimal regulations imposed due to the current exemption, a drilling company may not have an absolute defense of exercising due care by merely complying with the statute. Compliance with a statute or regulation "does not establish, as a matter of law, that due care was exercised."³⁰⁶ A defendant may have a common law obligation independent of a statute's requirements.³⁰⁷ A statute may establish only minimum requirements that do not

³⁰⁰ See Kramer v. Pittsburg Coal Co., 19 A.2d. 362, 364 (Pa. 1941) (finding operator negligent in mining cleaning); see also Noerr v. Lewistown Smelting & Refining, Inc., 60 Pa. D. & C.2d 406, 452 (1973).

³⁰¹ SUMM, PA, JUR. 2d. § 20.

³⁰² Noerr, 60 Pa. D. & C.2d at 452-53.

 $^{^{303}}$ *Id.* (holding defendant negligent for carelessly purchasing a second and lead smelter with knowledge of defects, such as fume problems).

³⁰⁴ Anne M. Payne, *Handling the Air Pollution Case Seeking Damages*, 91 AMERICAN JURISPRUDENCE OF TRIALS 1, III § 18 (2004).

³⁰⁵ Id.

³⁰⁶ Rachel M. Kane, 2 SUMM. PA. JUR. 2D TORTS § 20:77 (2011).

³⁰⁷ Rivera v. Philadelphia Theological Seminary of St. Charles Borromeo, Inc., 507 A.2d 1, 10 (Pa. 1986).

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sufficiently meet the level of care required by other common law duties.³⁰⁸ Therefore, it will be necessary identify common law duties that hold operators to a more stringent standard than the current regulation to show that compliance with the CAA is not sufficient to prove exercise of due care.

V. ARGUMENT

A. Statutory Amendment to Eliminate the Natural Gas Drilling Exemption

1. More Stringent HAP Emissions Standards Should Apply to Production

Congress enacted the CAA to protect and enhance the nation's air quality and to improve overall public health by investing in new research and development to prevent air pollution.³⁰⁹ Arguably, the natural gas exemption provided by § 112(n)(4) is a result of the industry's opposition to the 1990 CAA amendments, which increased the stringency of emissions standards. In many instances, § 112(n)(4) precludes regulating and monitoring natural gas facilities as major sources because the emissions from its pipelines, production wells, and associated equipment are examined individually.³¹⁰ Without aggregating the emissions from theses sources, pipelines, production wells, and associated equipment will often only be regulated as area sources. Thus, these point sources will not be subject to the more stringent emissions standards under NESHAPs.³¹¹ The HAP provision was designed to address less common but dangerous air pollutants that have the potential to cause serious illnesses or death.³¹² HAP established categorical emissions limits for specific pollutants that are particularly dangerous to human health and the limits were set low enough to ensure an "ample margin of safety."³¹³ Emissions limits for these hazardous pollutants are thus set lower than other pollutants due public health concerns.³¹⁴ The loophole provided by 112(n)(4) of the CAA undermines the legislature's intent in the enactment of NESHAPs and perpetuates favorable treatment of gas producers under federal regulations.³¹⁵

2. Public Health Will Not be Protected Unless Single Sources are Aggregated

The exemption directly contradicts other CAA provisions that seek to set emissions levels to safeguard human health. Under § 112(d)(2), the CAA specifies that new or existing sources of hazardous air pollutants "require the maxi-

³⁰⁸ LaGorga v. Kroger Co., 275 F.Supp. 373 (W.D. Pa. 1967).

³⁰⁹ 42 U.S.C. § 7401(b) (2006).

 $^{^{310}}$ See id.

³¹¹ See Kosnik, supra note 9, at 13.

³¹² See DOREMUS, supra note 10, at 610.

³¹³ See id.; see also 42 U.S.C. § 7412(c)(9)(B)(ii) (2006).

³¹⁴ See DOREMUS, supra note 10, at 610.

³¹⁵ Kosnik, *supra* note 9, at 14.

mum degree of reduction in emissions," which supports the assertion that in promulgating the hazardous air pollutants regulation, Congress was conscious of increases in emissions and attempted to safeguard against further deterioration of air quality.³¹⁶ Additionally, the section focuses on adverse health effects, which are relevant to the impact of natural gas processing emissions that cause increased asthma and release of carcinogens.³¹⁷ There are channels available under the Act to promote legislative change. The Surgeon General may review health studies, consult with the Administrator, and then the Administrator may recommend to Congress the need for legislation to address health risks.³¹⁸ Therefore, since § 112(n) perpetuates diminished air quality, it would be consistent with the purpose of the Act to provide legislative change to counterbalance or eliminate the harmful effects of this exemption.³¹⁹

Under § 112(d)(7), an emission standard shall not be "interpreted, construed or applied to diminish or replace the requirements of a more stringent emission limitation or other applicable requirement."³²⁰ The exemption permits a lower emission standard for facilities by not aggregating emissions for purposes of determining whether the operating unit is a major source because the unit is then not subject to NESHAP standards. By diminishing the more stringent limits outlined elsewhere in the Act, the exemption potentially violates § 112(d)(7).³²¹

Furthermore, EPA interpreted Congress's intent in drafting the § 112(n)(4) exemption to "preclude the aggregation of small emitting sources over vast distances."³²² This reading of "aggregation" focuses solely on the proximity criteria and does not take into account the interrelated nature of the activities or whether the activities are under "common control."³²³ Aggregation under other CAA programs, like the NSR and PSD programs, demonstrates that aggregation of pollution sources is necessary where there is a substantial relationship or dependence among single sources.³²⁴ There is clearly a substantial technical and economic dependence between the wells and pipelines in a facility along the shale line, but § 112(n)(4) prevents aggregating these sources of emissions for purposes of determining whether the facility should be regulated as a major source.³²⁵

Under § 112(n)(4), emissions from production wells and its associated equipment, pipeline compressors, or pump stations, are not "aggregated with

³²² Id.

³¹⁶ 42 U.S.C. § 7412(d)(2) (2006).

³¹⁷ Id. § 7412(f).

³¹⁸ See id. § 7412(f)(1)(D).

³¹⁹ See Kosnik, supra note 9, at 12-15.

^{320 42} U.S.C. § 7412(d)(7).

³²¹ Id.

³²³ See 42 U.S.C. § 7412(n)(4)(A) (2006).

³²⁴ See PSD and NSR, supra note 141, at 54244.

³²⁵ See id.

emissions from other similar sources" for purposes of determining "whether such units or stations are major sources. . . .³²⁶ Congress did not provide a definition of "associated equipment" in the statute.³²⁷ Therefore, EPA sought to develop a definition to assist with implementation of the exemption.³²⁸ EPA did not include glycol dehydration units, which are the greatest producer of emissions within the range of production point sources, in the definition of "associated equipment."³²⁹ Through this interpretation of the exemption, EPA demonstrated its understanding that Congress did not intend to preclude aggregation of all emissions points within natural gas production and transmission.³³⁰ EPA should expanded on this interpretation to further limit the reach of the exemption because the otherwise broad definition of "associated equipment" prevents aggregation of many other point sources that release HAP.³³¹

Based on the harmful release of volatile organic compounds from natural gas drilling and the increasing prevalence of operations throughout the country, there is a need to regard these activities as a major source under the HAP provision of the CAA.³³² Due to the harmful health effects of emissions, it is essential to apply NESHAPs to these drilling activities to require more stringent technology emissions controls and monitoring.³³³ Because processing involves many individual emissions sources with small releases, regulation is insufficient if it looks at the sources individually.³³⁴ The cumulative effect of multiple emissions sources contributes to long-term health concerns.³³⁵ If the emissions were regulated in the aggregate, many facilities would be deemed a major source, and thus, regulators would be better equipped to protect public health by having the tool of more stringent monitoring standards.³³⁶

3. State Action is Not Enough - The Federal-Floor Must be Improved

To realize the goals of the HAP provision of the CAA, EPA and Congress must eliminate favorable treatment of the oil and gas industry by requiring the same standards of aggregation for all industries releasing hazardous air pollutants. EPA recognized through rulemaking for PSD and NSR that aggregation promotes consistency and reduces the need for state action, which results in the

³²⁶ 42 U.S.C. § 7412(n)(4)(A).

³²⁷ National Emissions Standards, *supra* note 97, at 32618-19.

³²⁸ Id.

³²⁹ Id. at 32620.

³³⁰ Id.

³³¹ See id.

³³² See DOREMUS, supra note 10, at 610.

³³³ See Clean Air Council, Marcellus Shale: Natural Gas Extraction & Impacts on Air, *supra* note 30.

³³⁴ See Kosnik, supra note 9, at 13.

³³⁵ See id.

³³⁶ See id.

regulation of individual sources on a case-by-case basis.³³⁷

State regulations that provide for aggregation of natural gas emissions within a facility provide a step in the right direction, but fall short in addressing the cumulative impact of emissions nationwide. Emissions are not contained within state borders. Therefore, a federal floor regulation must be established based on the interstate nature of natural gas drilling.³³⁸ Relying on state regulations will only encourage a race to the bottom. Based on the economic benefits of drilling, there is a disincentive for states to impose stringent regulations that may reduce economic gain. Therefore, states have no incentive within their borders to increase standards above the federal limit.

4. Our Smaller Communities Deserve Equal Protection

The natural gas exemption requires additional inquiry into the size of the population affected by emissions, which undermines the goal of consistent application.³³⁹ Population size is an arbitrary limitation to the exemption. Congress and EPA should not force small communities to bear risks that are more carefully monitored in larger communities that exceed one million people.³⁴⁰ Most drilling operations occur in small towns with populations under one million. Thus, these drilling communities do not have populations that trigger statutory protection in the form of providing EPA with the ability to list source categories for production wells. Often, smaller communities have fewer resources to mount resistance to natural gas producers and are less likely to bring legal action to seek damages or injunctive relief. Therefore, they suffer the consequences without any statutory protection solely because of their population size.

Even though the inquiry into population size is not a persuasive regulatory mechanism, the fact that the exemption recognizes the risk of emissions to large communities supports the overall argument for increased federal regulation. The inclusion of the clause itself may be subsequently used by Congress to amend the exemption because it permits EPA to regulate natural gas production more closely in limited instances by specifying source categories under § 112(c).³⁴¹ By acknowledging that some production wells, even though deemed area sources, emit levels of hazardous air pollutants that may endanger public health, the statutory language acknowledges that there is some inherent danger of operations. In the absence of EPA producing policy justifications to support closer regulation in some circumstances (one million people), but not others (smaller populations), citizen groups should challenge the legitimacy of the provision. These groups must focus on expanding the listing provision to

³³⁷ See PSD and NSR, supra note 141, at 54244.

³³⁸ See Reeder, supra note 1, at 1000.

³³⁹ See 42 U.S.C. § 7412(n)(4)(B) (2006).

³⁴⁰ See id.

³⁴¹ See id.

smaller population sizes, rather than abrogating it completely, because it presents an open door for judicial or legislative action.

B. The Alternative: Relying on Air Pollution Tort Litigation and Allowing the Courts to Decide the Remedy

In the absence of a legislative response to amend the 112(n)(4) exemption, residents who are adversely impacted by the emissions from drilling sites must seek judicial recourse through tort actions. Residents may seek to enjoin the production or seek damages for the injury suffered. Yet, litigation will not change drilling practices unless drilling companies face damages that are high enough to impact their bottom line. Even so, litigation provides only a case-by-case enactment of change. Changes will occur only in the communities that have the resources needed to mount sufficient legal resistance.

First, a plaintiff mounting a nuisance action is highly unlikely to prevail in enjoining a natural gas processing operation in his or her community. An injunction requires the balancing of utility against the harm of the activity.³⁴² Here, the utility of natural gas production as an energy source for thousands of people creates a significant obstacle for plaintiffs to overcome. The harm is not fully recognized in the short-term due to the long-term nature of health effects associated with air emissions. The long-term implications can only be extrapolated from studies and past results, which creates great uncertainty for a litigant hoping to prove injury.³⁴³ Thus, courts may view the harm of natural gas processing as minimal when compared to the utility of domestic energy production.

Second, although a trespass lawsuit may be less burdensome for plaintiffs, plaintiffs likely will face a hurdle in a trespass action if landowners consented to lease their mineral rights (the right to extract natural gas from their land).³⁴⁴ Because, by consenting to the extraction of their mineral rights, the landowner's claim for intentional invasion of his property is significantly diminished or eliminated entirely.

Finally, negligence presents a possible cause of action because failing to install pollution control devices when mitigating devices are available, continuing to operate without making improvements after notice of escaping air contaminants, or not hiring appropriate personnel to conduct the activity leading to the interference each amount to negligence.³⁴⁵ But in light of the weak regulation of gas drilling operations, it is possible for operators to be in compliance, while

 $^{^{342}}$ See Noerr v. Lewistown Smelting & Refining, Inc., 60 Pa. D. & C.2d 406, 463 (1973) (observing that the harm of defendant's activity must be evaluated in light of the benefit it provides).

³⁴³ See Marcellus Shall, supra note 30, at 2.

³⁴⁴ See Reeder, supra note 1, at 1006 (highlighting landowners' unfamiliarity with leases for mineral rights and ensuing legal problems).

³⁴⁵ See Noerr, 60 Pa. D. & C.2d at 452-53.

continuing to cause interference through the release of hazardous air pollutants. Therefore, it will be necessary to show that compliance with the CAA is not sufficient to prove exercise of due care.³⁴⁶

Furthermore, even if litigation is successful, it will impose a burden on the courts. If one suit is successful, there will be a potential flood of litigation burdening the courts to answer a question that is better suited for the legislature. Additionally, decisions will differ between jurisdictions, which is especially problematic since drilling operations cross state lines as demonstrated by the fact that the Marcellus Shale covers multiple states.³⁴⁷ While emissions concentrate in the point source area, the effects of the emissions may be dispersed across great distances given the nature of the release into the atmosphere.

However, despite the weaknesses of relying on litigation, judicial action may prompt legislative change. In the past, judicial decisions regarding other provisions of the CAA have invoked regulatory responses. The PSD program was essentially created through a judicial mandate.348 Courts may analogize the judicial mandates leading to the PSD program to the need here for judicial action to curb cumulative exposure from natural gas drilling operations.³⁴⁹ Therefore, judicial interpretation of NESHAPs and judicial application of tort law remedies in the interim may force a more concrete, and long-term change, in emissions and other statutory requirements. Thus, the willingness of the courts to intervene in past CAA matters indicates that courts may be willing to intervene to mandate aggregation and abrogation of the § 112(n)(4) exemption.³⁵⁰ The statute is not stagnant and there is reason to believe judicial action may prompt legislative change.³⁵¹ Thus, while federal regulation and amendments to the existing exemption are the best solutions for remedying the shortcomings of current regulation of emissions under the CAA, judicial intervention in the short-term may serve as an appropriate vehicle for promoting longterm, legislative change.

VI. CONCLUSION

Federal regulation that permits aggregating emissions from natural gas production units is necessary to overcome the adverse health impacts of drilling operations on the surrounding communities. The best statutory vehicle for regulation is the CAA's Hazardous Air Pollutants provision. But, this provision must be modified to achieve its intended goal. In order to effectively regulate

³⁴⁶ See 2 SUMM. PA. JUR. 2D TORTS § 20:77.

³⁴⁷ See Reeder, supra note 1, at 1000.

³⁴⁸ See DOREMUS, ET AL., supra note 10, at 609-10.

 $^{^{349}}$ See id. The PSD program does not apply to hazardous air pollutants. 42 U.S.C 7412(b)(6)(2006).

³⁵⁰ See DOREMUS, ET AL., supra note 10, at 609-10.

³⁵¹ See 42 U.S.C. § 7412(c)(1) (2006).

natural gas emissions from processing sites, 112(n)(4) must be amended to allow for aggregation of production wells, its associated equipment, and pipeline compressors and pump stations. If EPA considers natural gas emissions in the aggregate, then emissions from these single point sources that are interrelated, within contiguous property, and under common control will often be regulated as major sources under the CAA's HAP provision. This is essential because as major sources, these facilities will be held to more stringent emissions limits. Consequently, designation of major sources will force drilling operators to use technology that achieves an ample margin of safety and promote drilling operations that expose the surrounding community to lower concentrations of toxic chemicals.

Although a statutory amendment is the most effective mechanism for improving oversight of natural gas production and transmission, litigation serves as an alternative, albeit temporary, solution. Tort remedies under the laws of nuisance, trespass, and negligence provide elementary steps toward holding the natural gas industry liable for air pollution. It is unlikely that a plaintiff will be able to enjoin operations based on the high yielding energy utility of natural gas production. However, the more the public becomes informed about the potential hazards tied to natural gas drilling, the more grass-roots resistance will take form.

In conclusion, amendment of 112(n)(4) is necessary to require natural gas producers to meet the appropriate level of stringency in air quality emissions standards. In the alternative, judicial action in response to tort litigation may serve as a temporary means of holding the industry accountable in the absence of a coherent federal statutory framework. However, federal regulation remains the best solution for preventing future harm to the air quality in our communities, which has been injured by under regulated natural gas drilling.