



USC University of  
Southern California

DEPARTMENT OF PREVENTIVE MEDICINE

June 15, 2017

Los Angeles City Council  
200 N. Spring St.  
Los Angeles, CA 90012

RE: Oil and Gas Extraction in Los Angeles (Council File #17-0447)

Dear Council President Wesson and Los Angeles City Council:

Air surrounding oil and gas production areas is particularly vulnerable to toxic emissions. Increasingly, petroleum extraction is occurring in highly urbanized areas, and yet, little is known about the health consequences for nearby residents.<sup>1-4</sup> A single drill site typically operates for decades and the extraction process itself produces emissions of multiple health-hazardous air pollutants, including benzene, toluene, ethylbenzene, xylene, formaldehyde, hydrogen sulfide, and methylene chloride.<sup>5-8</sup> These chemicals can migrate off-site due to fugitive emissions, spills, leaks, or accidents and have been shown to be higher near drill sites compared to other areas. Air quality is further compromised by truck traffic to and from the drilling site or operation of diesel equipment.

Exposure to these air pollutants have been shown to be higher in areas near drilling sites<sup>2,9-11</sup> – and are associated with a range of acute health symptoms, including eye, nose, and throat irritation, impaired lung function, dizziness, fatigue and asthma exacerbation.<sup>2,12</sup> Recent health surveys near petroleum extraction sites have reported symptoms of throat and nasal irritation, eye burning, sinus problems, headaches, skin problems, loss of smell, cough, nosebleeds and stress.<sup>13-15</sup>

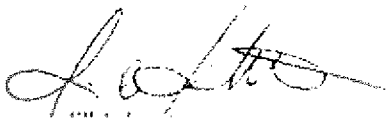
The scientific literature demonstrates the human health impacts from exposure to these chemicals. Studies of acute inhalation exposures to petroleum hydrocarbons in occupational settings as well as among residents living near refineries, oil spills or gas stations have found increased risks of eye irritation and headaches,<sup>16,17</sup> and asthma symptoms.<sup>18-20</sup> Furthermore, Inhalation of petroleum VOCs, such as benzene, toluene, ethylbenzene and xylenes (BTEX) is known to adversely affect the nervous system. Reported effects range from dizziness, headaches, and fatigue at lower exposures to numbness in the limbs, incoordination, and tremors, and respiratory system irritation, difficulty breathing, and impaired lung function at higher levels.<sup>12</sup> Recent health surveys

near gas extraction and hydraulic fracturing sites have reported symptoms of throat and nasal irritation, eye burning, sinus problems, headaches, skin problems, loss of smell, cough, nosebleeds and stress.<sup>13,14,21</sup> These symptoms were more common in individuals living near gas facilities compared to those farther away.

Hydrogen sulfide (H<sub>2</sub>S) is an odorant gas associated with oil drilling. Most human organ systems are susceptible to the toxic effects of H<sub>2</sub>S, particularly mucus membranes, including the central nervous system, the respiratory system, the cardiovascular system and the gastrointestinal system.<sup>22</sup> At ambient levels, odorant chemicals may produce irritation of the eyes, nose, and throat. Such compounds can induce symptoms such as nausea, vomiting, headaches, stress, negative mood, and a stinging sensation.<sup>23,24</sup> Odors that are viewed as unpleasant, embarrassing, or sickening may interfere with mood, beneficial uses of property, and social activities. There is evidence that chronic exposure to elevated ambient concentrations contribute to harm to the respiratory system in both adults and children in addition to elevated cough, headaches and wheezing.<sup>25,26</sup>

From a public health perspective, it is important to act to reduce exposures to harmful pollutants at home, in schools and at work places.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jill Johnston', with a stylized flourish at the end.

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## References

1. Colborn T, Kwiatkowski C, Schultz K, Bachran M. Natural gas operations from a public health perspective. *Hum Ecol Risk Assess An Int J*. 2011;17(5):1039-1056.
2. McKenzie LM, Witter RZ, Newman LS, Adgate JL. Human health risk assessment of air emissions from development of unconventional natural gas resources. *Sci Total Environ*. 2012;424:79-87.
3. Werner AK, Vink S, Watt K, Jagals P. Environmental health impacts of unconventional natural gas development: A review of the current strength of evidence. *Sci Total Environ*. 2015;505:1127-1141.
4. Adgate JL, Goldstein BD, McKenzie LM. Potential public health hazards, exposures and health effects from unconventional natural gas development. *Environ Sci Technol*. 2014;48(15):8307-8320. d
5. Zielinska B, Campbell D, Samburova V. Impact of emissions from natural gas production facilities on ambient air quality in the Barnett Shale area: a pilot study. *J Air Waste Manag Assoc*. 2014;64(12):1369-1383.
6. Moore CW, Zielinska B, Pétron G, Jackson RB. Air impacts of increased natural gas acquisition, processing, and use: A critical review. *Environ Sci Technol*. 2014;48(15):8349-8359.
7. Field RA, Soltis J, Murphy S. Air quality concerns of unconventional oil and natural gas production. *Env Sci Process Impacts*. 2014;16(5):954-969.
8. Colborn T, Schultz K, Herrick L, Kwiatkowski C. An Exploratory Study of Air Quality Near Natural Gas Operations. *Hum Ecol Risk Assess An Int J*. 2013;20(1):86-105.
9. Colborn T, Schultz K, Herrick L, Kwiatkowski C. An Exploratory Study of Air Quality near Natural Gas Operations. *Hum Ecol Risk Assess An Int J*. 2014;20(1):86-105. d
10. Pétron G, Frost G, Miller BR, et al. Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study. *J Geophys Res Atmos*. 2012;117(D4).
11. Macey GP, Breech R, Chernaik M, et al. Air concentrations of volatile compounds near oil and gas production: a community-based exploratory study. *Environ Health*. 2014;13:82.
12. ATSDR. Toxicological Profile for Total Petroleum Hydrocarbons (TPH). *Agency Toxic Subst Dis Regist US Dep Heal Hum Serv*. 1999;(September):315.
13. Steinzor N, Subra W, Sumi L. Investigating links between shale gas development and health impacts through a community survey project in Pennsylvania. *NEW Solut A J Environ Occup Heal Policy*. 2013;23(1):55-83.
14. Rabinowitz PM, Slizovskiy IB, Lamers V, et al. Proximity to natural gas wells and reported health status: results of a household survey in Washington County, Pennsylvania. *Environ Health Perspect*. 2015;123(1):21-26.
15. Bamberger M, Oswald RE. Impacts of gas drilling on human and animal health. *New Solut a J Environ Occup Heal policy*. 2012;22(1):51-77.
16. Kim BM, Park EK, LeeAn SY, et al. BTEX exposure and its health effects in pregnant women following the Hebei Spirit oil spill. *J Prev Med Public Heal*. 2009;42(2):96-103.
17. Tunsaringkarn T, Ketkaew P, Siri Wong W, Rungsiyothin A. Benzene Exposure

and Its Association with Sickness Exhibited in Gasoline Station Workers. 2013;1-8.

18. White N, teWaterNaude J, van der Walt A, Ravenscroft G, Roberts W, Ehrlich R. Meteorologically estimated exposure but not distance predicts asthma symptoms in schoolchildren in the environs of a petrochemical refinery: a cross-sectional study. *Environ Health*. 2009;8:45.
19. Rovira E, Cuadras A, Aguilar X, et al. Asthma, respiratory symptoms and lung function in children living near a petrochemical site. *Environ Res*. 2014;133:156-163.
20. Wichmann FA, Müller A, Busi LE, et al. Increased asthma and respiratory symptoms in children exposed to petrochemical pollution. *J Allergy Clin Immunol*. 2009;123(3):632-638. d
21. Ferrar KJ, Kriesky J, Christen CL, et al. Assessment and longitudinal analysis of health impacts and stressors perceived to result from unconventional shale gas development in the Marcellus Shale region. *Int J Occup Environ Health*. 2013;19(2):104-112.
22. Reiffenstein RJ, Hulbert WC, Roth SH. Toxicology of hydrogen sulfide. *Annu Rev Pharmacol Toxicol*. 1992;32(1):109-134.
23. Schiffman SS, Miller EA, Suggs MS, Graham BG. The effect of environmental odors emanating from commercial swine operations on the mood of nearby residents. *Brain Res Bull*. 1995;37(4):369-375.  
<http://www.ncbi.nlm.nih.gov/pubmed/7620910>. Accessed March 17, 2016.
24. Wing S, Horton RA, Marshall SW, et al. Air pollution and odor in communities near industrial swine operations. *Environ Health Perspect*. 2008;116(10):1362.
25. Jaakkola JJ, Paunio M, Virtanen M, Heinonen OP. Low-level air pollution and upper respiratory infections in children. *Am J Public Health*. 1991;81(8):1060-1063.
26. Marttila O, Jaakkola JJK, Vilkkä V, Jappinen P, Haahtela T. The South Karelia Air Pollution Study: The Effects of Malodorous Sulfur Compounds from Pulp Mills on Respiratory and Other Symptoms in Children. *Environ Res*. 1994;66(2):152-159.