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Air Quality Standards and Oil and Gas Production in Texas: Know Your AMCVs

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AIR QUALITY STANDARDS AND OIL AND GAS PRODUCTION IN TEXAS: KNOW YOUR AMCVS

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I. INTRODUCTION

The need for America to reduce its dependence on foreign oil is heavily debated in the news today.[3] Reducing our need for foreign oil will result in an increase in domestic production of oil and natural gas here in the United States.[4] Those who oppose more production in the United States often use the environment as a cornerstone of their ar-

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3. *See, e.g., Obama Calls for U.S. to Reduce Oil Imports, Defends Domestic Policy*, FOX NEWS.COM (Mar. 30, 2011), http://www.foxnews.com/politics/2011/03/30/obama-energy-security-strategy/; Press Release, Sen. Murkowski, Five Ways to Boost America's Oil Production (Mar. 3, 2011), http://energy.senate.gov/public/index.cfm?FuseAction=pressReleases.detail&PressRelease_id=fab7b931-5640-482e-9907-a5662e7709c6.

4. *Id.*

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gument.[5] In Texas, companies that drill for oil and natural gas are under the microscope, and public awareness of the environmental impacts of their operations is at an all time high.[6] Thus, it is important for citizens, companies, attorneys, and courts to understand the basics of environmental regulation and how the odd nomenclature and acronyms associated with environmental rules and environmental testing procedures may be misunderstood.

II. STATUTORY OVERVIEW: REGULATION OF AIR QUALITY IN TEXAS

A. *The Federal Clean Air Act*

Understanding air quality regulation of oil and gas production in Texas begins at the federal level. In 1970, Congress passed the Clean Air Act of 1970 (known as "The Federal Clean Air Act"), which resulted in a "major shift in the federal government's role in air pollution control."[7] The Federal Clean Air Act ("FCAA") "authorized the development of comprehensive federal and state regulations to limit emissions from both stationary (industrial) sources and mobile sources" such as oil and gas wells, compressor stations, pipeline stations, and the like.[8] On December 4, 1970, the United States Environmental Protection Agency ("EPA") was created at the urging of then President Richard Nixon.[9] Among the many powers given to the EPA, the FCAA requires the EPA to set standards for the cleanliness of ambient air.[10] These ambient air standards established by the EPA are called "national ambient air quality standards, or NAAQS."[11] Under this authority, the EPA has promulgated NAAQS for the following six air pollutants: carbon monoxide (CO), nitrogen dioxide

5. *See* Tom Zeller, Jr., *Studies Say Natural Gas Has Its Own Environmental Problems*, N.Y. TIMES (Apr. 11, 2011), http://www.nytimes.com/2011/04/12/business/energy-environment/12gas.html?_r=1&hp; Alexis Madrigal, *Washington Energy Consensus Could Be Splintered by Shale Gas Carbon Footprint*, THE ATLANTIC (Apr. 10, 2011), http://www.theatlantic.com/technology/archive/2011/04/washington-energy-consensus-could-be-splintered-by-shale-gas-carbon-footprint/237070/.

6. *See* Nicholas Sakelaris, *Gas drilling in Southlake is put on hold*, FORT WORTH STAR-TELEGRAM (Apr. 18, 2011), http://www.star-telegram.com/2011/04/18/3009686/gas-drilling-in-southlake-is-put.html; Wendy Koch, *Study finds methane in wells near natural gas drilling*, USA TODAY (May 9, 2011), http://www.usatoday.com/tech/science/environment/2011-05-09-fracking-environment-water-methane_n.htm.

7. *History of the Clean Air Act*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/air/caa/caa_history.html (last updated Nov. 16, 2010); *see also* 42 U.S.C. §§ 7401–7515 (2006).

8. *History or the Clean Air Act*, *supra* note 7.

9. Jack Lewis, *The Birth of EPA*, U.S. ENVTL. PROT. AGENCY (Nov. 1985), http://www.epa.gov/history/topics/epa/15c.htm.

10. 42 U.S.C. § 7409; *see also* Brazoria County v. Tex. Comm'n on Envtl. Quality, 128 S.W.3d 728, 732 (Tex. App.—Austin 2004, no pet.).

11. 42 U.S.C. § 7409; *see also* JAMES E. MCCARTHEY, ET AL, CLEAN AIR ACT: A SUMMARY OF THE ACT AND ITS MAJOR REQUIREMENTS 3 (Jan. 6, 2011), http://www.fas.org/sgp/crs/misc/RL30853.pdf.

(NO_2), particulate matter ($PM_{2.5}$ and PM_{10}), sulfur dioxide (SO_2), ozone, and lead.[12]

While the EPA has authority under the FCAA to establish the NAAQS, the individual states must establish written procedures to meet the NAAQS and comply with the FCAA.[13] Section 110 of the FCAA requires each state to adopt written plans, known as State Implementation Plans, or "SIPs," that establish how each state will implement, maintain, and enforce the requirements of the FCAA.[14] There is only one SIP for each state, and each state's SIP must be reviewed and approved by the EPA.[15] Once a state submits a SIP to the EPA for approval, the EPA can: (1) approve or reject a state's SIP; (2) replace a state's SIP with a Federal Implementation Plan; and (3) monitor the achievement goals in each state's SIP.[16] The FCAA also gives the EPA power to impose sanctions and penalties on those states that fail to submit or implement a SIP approved by the EPA or that fail to enforce an approved SIP that complies with the FCAA.[17] Texas's SIP was initially approved in May of 1972.[18]

B. *The Texas Clean Air Act*

Subsequent to the passage of the FCAA, Texas passed its own air quality legislation to enable it to meet the requirements of the FCAA. First, Texas passed the Clean Air Act of Texas in 1965, the purpose of which was to control air pollution in the state.[19] Two years later in 1967, Texas passed more comprehensive legislation—the Texas Clean Air Act ("TCAA")—which superseded the Clean Air Act.[20] The TCAA is now codified in Chapter 382 of the Texas Health & Safety Code.[21]

The purpose of the Texas Clean Air Act is "to safeguard the state's air resources from pollution by controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the esthetic enjoyment of air resources by the public and the maintenance of adequate visibility."[22] The TCAA defines "air pollution" as "the pres-

12. *National Ambient Air Quality Standards (NAAQS)*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/air/criteria.html (last visited June 18, 2011).
13. 42 U.S.C. § 7407(a).
14. *Id.*
15. *Id.* § 7410; *see also* 40 C.F.R. § 52.02 (2010).
16. 40 C.F.R. § 52.02.
17. *Id.* § 52.23; *see also* 42 U.S.C. § 7413.
18. 40 C.F.R. § 52.2273.
19. TEX. COMM'N ON ENVTL. QUALITY, DALLAS-FORT WORTH ENVIRONMENTAL SPEED LIMIT CONTROL STRATEGY CONVERSION TO A TRANSPORTATION CONTROL MEASURE (2010), http://www.tceq.state.tx.us/assets/public/implementation/air/sip/dfw/09026SIP_pro.pdf.
20. *Id.*
21. TEX. HEALTH & SAFETY CODE ANN. § 382.001 (West 2010).
22. *Id.* § 382.002(a).

ence in the atmosphere of one or more air contaminants or combination of air contaminants in such concentration and of such duration that: (A) are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property; or (B) interfere with the normal use or enjoyment of animal life, vegetation, or property."[23] The TCAA defines "air contaminates" as "particulate matter, radioactive material, dust, fumes, mist, smoke, vapor, or odor, including any combination of those items, produced by a process other than natural."[24]

C. *The Texas Commission on Environmental Quality*

With the passage of the TCAA, the state of Texas created an agency charged with enforcing its provisions and ensuring compliance with the FCAA—the Texas Air Control Board ("TACB").[25] In 1991, the TACB was abolished in favor of the Texas Natural Resource Conservation Commission ("TNRCC").[26] In 2001, the legislature changed the name of the TNRCC to the Texas Commission on Environmental Quality ("TCEQ").[27]

The TCEQ is charged with protection of air, water, and all other natural resources in the state.[28] In the area of air quality regulation, the TCEQ has the legal authority to implement, maintain, and enforce the NAAQS set by the EPA and to control the quality of the state's air.[29] The TCEQ's power is derived from the authority granted by the Texas Clean Air Act, as well as through authority delegated to it by the EPA by way of the state's approved SIP.[30] As of 2011, the TCEQ

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23. *Id.* § 382.003(3).

24. *Id.* § 382.003(2).

25. TEX. COMM'N ON ENVTL. QUALITY, Dallas-Fort Worth Environmental Speed Limit Control Strategy Conversion to a Transportation Control Measure, *supra* note 19, at i.

26. *Id.*

27. The Act of May 28, 2001, 77th Leg., R.S., ch. 965, § 18.01(a)(1), 2001 Tex. Gen. Laws 1933, 1985. While the Health and Safety Code provision under which the Commission was established still describes it as the Texas Natural Resources Conservation Commission, all references in the Texas Clean Air Act to the Texas Natural Resources Conservation Commission now mean the Texas Commission on Environmental Quality. *Id.*; *see also* TEX. COMM'N ON ENVTL. QUALITY, DALLAS-FORT WORTH ENVIRONMENTAL SPEED LIMIT CONTROL STRATEGY CONVERSION TO A TRANSPORTATION CONTROL MEASURE, *supra* note 19, at i.

28. *See, e.g.*, TEX. HEALTH & SAFETY CODE ANN. § 382.011 (West 2010); *see also About the TCEQ*, TEX. COMM'N ON ENVTL. QUALITY, http://www.tceq.texas.gov/about (last visited June 18, 2011).

29. TEX. COMM'N ON ENVTL. QUALITY, DALLAS-FORT WORTH ENVIRONMENTAL SPEED LIMIT CONTROL STRATEGY CONVERSION TO A TRANSPORTATION CONTROL MEASURE (2010), *supra* note 19, at i–ii.

30. TEX. HEALTH & SAFETY CODE ANN. § 382.001, et seq. (West 2010); *see also* AIR ALLIANCE HOUSTON, TCEQ AIR PERMITTING AND ENFORCEMENT, IMPROVING TEXAS' AIR QUALITY THROUGH THE SUNSET REVIEW PROCESS, (June 2010), http://airalliancehouston.org/files/TCEQ%20Sunset%20AQ%20Recs.pdf.

had approximately three thousand employees, sixteen regional offices, and an operating budget of $466 million.[31]

III. THE "ALPHABET SOUP" OF AIR QUALITY REGULATION AND AIR TESTING PROCEDURES

Environmental regulations and regulators employ a multitude of strange acronyms, which appear to be a mix of letters plucked out of an alphabet soup. Because of the complexity and confusion created by this "alphabet soup," one must understand the acronyms and their purpose to understand how air quality regulations impact oil and gas production in Texas.

A. *Effects Screening Levels ("ESLs")*

Effects Screening Levels ("ESLs") are chemical concentration levels that are used by the TCEQ during its air permitting process to evaluate the potential for health, odor, and nuisance effects as a result of exposure to constituents in the air from an emitting source, such as a power plant.[32] The TCEQ has assigned ESL values to several hundred chemical compounds.[33] ESLs are not ambient air standards and are not intended to be used as ambient air standards.[34] Moreover, ESLs do not represent the predictive toxicity of a chemical concentration.[35] According to the TCEQ, ESLs are levels of chemical concentrations in the air that are safe.[36]

TCEQ ESLs are inherently conservative standards.[37] For example, the EPA's long-term, health protective value for carbon disulfide is 224ppb, more than 200 times higher than TCEQ's long-term ESL.[38] If

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31. *About the TCEQ*, *supra* note 28.

32. Interoffice Memorandum from the Tex. Comm'n on Envtl. Quality to Interested Parties (June 30, 2010), http://www.dentonrc.com/s/dws/img/drc/03-11/0330screening.pdf; Interoffice Memorandum from Joseph T. Haney, Toxicology Div., Tex. Comm'n on Envtl. Quality, to Michael E. Honeycutt (Feb. 8, 2010), http://www.dentonrc.com/s/dws/img/drc/03-11/0330toxicology.pdf.

33. *Effects Screening Levels (ESL)*, TEX. COMM'N ON ENVTL. QUALITY (June 30, 2010), *data table available for download at* http://www.tceq.texas.gov/toxicology/esl/list_main.html (last visited June 18, 2011).

34. *About Effects Screening Levels (ESLs)*, TEX. COMM'N ON ENVTL. QUALITY, http://www.tceq.texas.gov/toxicology/esl (last visited June 18, 2011).

35. TEX. COMM'N ON ENVTL. QUALITY, USES OF EFFECTS SCREENING LEVELS (ESLs) AND AIR MONITORING COMPARISON VALUES (AMCVs) 2 (May 2010) [hereinafter USES OF EFFECTS SCREENING LEVELS (ESLs) AND AIR MONITORING COMPARISON VALUES (AMCVs)], http://www.tceq.texas.gov/assets/public/implementation/tox/monitoring/amcv/document.doc.

36. TEX. COMM'N ON ENVTL. QUALITY, TCEQ FACT SHEET, GENERAL INFORMATION ABOUT REGULATORY GUIDELINES (Nov. 2010), http://tceq.com/assets/public/implementation/tox/dsd/facts/general.pdf.

37. Interoffice Memorandum from Joseph T. Haney to Michael E. Honeycutt, *supra* note 32.

38. *Id.*; *Carbon disulfide (CASRN 75-15-0)*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/iris/subst/0217.htm (last visited April 12, 2011).

airborne levels of a constituent do not exceed the ESL for that constituent, adverse health effects are not expected.[39] Even if airborne levels of constituents in the air exceed the ESL, it does not indicate a problem but simply triggers a more in-depth permitting review by the TCEQ.[40] Thus, air quality reports that use ESLs as a basis for comparing constituents in ambient air are fundamentally flawed if the report asserts or infers that levels that exceed ESLs automatically signify an environmental hazard. Nonetheless, such reports have surfaced in a number of air quality studies in North Texas, including in lawsuits.[41]

ESLs have both short-term and long-term values, and the distinction in TCEQ's air permitting process is important.[42] For air permit applications, short-term ESLs are used to evaluate predicted one-hour air concentrations of emissions.[43] In contrast, long-term ESLs are used to evaluate predicted one-year average concentrations from an emitting source and are meant to protect human health-effects and plant damage that could be expected by lifetime exposure to an airborne constituent.[44] Thus, comparison of a twenty-four hour air sample to a long-term value is both "ill-advised and scientifically inaccurate."[45] Using ESLs as ambient air standards is improper, and comparing twenty-four hour air samples to long-term ESLs compounds the problem. Nevertheless, it is not uncommon to see air quality studies improperly comparing twenty-four hour air samples to long-term ESLs.[46]

B. *Air Monitoring Comparison Values ("AMCVs")*

Air Monitoring Comparison Values ("AMCVs") are "chemical-specific air concentrations set to protect human health and welfare."[47] Unlike ESLs, which the TCEQ uses specifically for the limited purpose of air permitting, AMCVs are more "realistic, predictive values"

39. *See About Effects Screening Levels (ESLs)*, *supra* note 34.

40. *Id.*

41. *See, e.g.*, Indus. Hygiene & Safety Tech., Inc., *Review of Ambient Air Monitoring Project and Related Communications Concerning Gas Well Emissions* 7 (Aug. 24, 2009), http://www.askchesapeake.com/Barnett-Shale/Production/Documents/benzenereview02.pdf.

42. *See About Effects Screening Levels (ESLs)*, *supra* note 34; *see also* USES OF EFFECTS SCREENING LEVELS (ESLs) AND AIR MONITORING COMPARISON VALUES (AMCVs), *supra* note 35, at 3.

43. *About Effects Screening Levels (ESLs)*, *supra* note 34.

44. *See* USES OF EFFECTS SCREENING LEVELS (ESLs) AND AIR MONITORING COMPARISON VALUES (AMCVs), *supra* note 35, at 2.

45. Letter from John Sadlier, Deputy Director, Office of Compliance & Enforcement, Tex. Comm'n Envtl. Quality, to Brien Boerner, Director, Envtl. Mgmt. Dep't, City of Fort Worth (June 1, 2010), http://www.tceq.state.tx.us/assets/public/implementation/barnett_shale/Letter-BrianBoerner_6-1-2010.pdf.

46. *See, e.g.*, Indus. Hygiene & Safety Tech., Inc., *supra* note 41, at 7.

47. USES OF EFFECTS SCREENING LEVELS (ESLs) AND AIR MONITORING COMPARISON VALUES (AMCVs), *supra* note 35, at 3.

used by the TCEQ for ambient air monitoring.[48] AMCV is a collective term that refers to all "odor, vegetative, and health-based values used in reviewing air monitoring data."[49] While ESLs are "useful screening values for air permitting," there are significant differences between TCEQ's air permitting process and its ambient air-monitoring program.[50]

The TCEQ compiles both long-term and short-term AMCV values.[51] Short-term AMCVs are based on acute exposure health limits and welfare data and are compared to samples collected at a specific location for a period of no more than one hour.[52] Health AMCVs are conservative and set "well below" levels at which adverse health effects would be expected, and if a chemical concentration detected in ambient air is less than its corresponding AMCV, "no adverse health effects would be expected to occur."[53] If a chemical concentration exceeds its AMCV, it does not mean that adverse health effects will occur, but rather further evaluation is warranted.[54]

Long-term AMCVs, which are based on chronic exposure health and welfare data, are used to evaluate annual averages of monitored concentrations averaged over multiple years.[55] Long-term AMCVs should only be used in conjunction with monitoring data collected and averaged over a full year or more, such as a year's worth of data collected from a gas chromatograph.[56] In fact, the TCEQ designed long-term AMCVs to be compared to samples that are collected "at a minimum of every sixth day for an entire year."[57] Comparison of one, twenty-four hour air sample to a long-term AMCV value is inappropriate and is not indicative of actual long-term conditions.[58]

The difference between ESLs and AMCVs may be illustrated by comparing the ESL and AMCV value for benzene, which is often discussed in air quality reports.[59] The short-term ESL for benzene is

48. *Id.* at 2.
49. *Id.* at 3.
50. *Id.* at 2.
51. *Id.*
52. *Id.* at 1.
53. *Id.* at 5.
54. *Id.* at 1–2.
55. *Id.* at 1.
56. Letter from John Sadlier to Brien Boerner, *supra* note 45, at 1.
57. Interoffice Memorandum from Carla Kinslow, Ph.D. to Tony Walker, Regional Director, Region 4 (Jan. 28, 2011), http://www.tceq.state.tx.us/assets/public/implementation/barnett_shale/healthEffects/2011.03.16-healthEffectsMemo.pdf.
58. *Id.*
59. *See, e.g.*, Associated Press, *Agency finds high benzene levels on Barnett Shale*, (Jan. 27, 2010, 7:03 PM), http://www.wfaa.com/news/business/82821907.html; Mike Lee, *State finds high benzene levels at 2 more Fort-Worth area sites*, FORT WORTH STAR-TELEGRAM (June 2, 2010), http://www.star-telegram.com/2010/06/01/2231962/state-finds-high-benzene-levels.html.

54ppb.[60] However, the ambient air monitoring AMCV short-term value for the same compound is 180ppb.[61] The AMCV of 180ppb represents a safe level for short-term exposure to benzene, which is over three times higher than the ESL. Thus, air quality reports in which ESLs are utilized as the benchmark for comparing air sample results are flawed and misleading.

C. *Tentatively Identified Compounds ("TICs")*

Tentatively Identified Compounds ("TICs") are observed measurements in an air sample for which the instrument used to collect the sample, typically a gas chromatograph-mass spectrometer, is not specifically calibrated.[62] The tentative identification of a chemical compound is made by comparing the air sample collected to a previously compiled computerized library of compounds.[63] The laboratory then assigns an estimated concentration and a "match quality" to each sample collected.[64] "The match quality is the probability that the TIC has been correctly identified."[65] Positive identification of TICs, however, is highly uncertain.[66] This is due, in large part, to the fact that the air laboratory analyzing the sample cannot be certain that the "TIC reported is, in fact, the compound that was present in the sample" because the laboratory equipment is not calibrated to detect the compound.[67] The EPA has stated that assigning identities to TICs "may be inaccurate," and the quantitation of TICs is "certainly inaccurate."[68] Thus, air quality reports that base conclusions on the identity and quantitation of TICs are inherently inaccurate. Notwithstanding these inaccuracies, a number of air quality reports have surfaced in North Texas that almost exclusively focus on TICs.[69]

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60. Interoffice Memorandum from Joseph T. Haney to Michael E. Honeycutt, *supra* note 32.

61. *Air Monitoring Comparison Values for Evaluating VOCs*, TEX. COMM'N ON ENVTL. QUALITY (June 2011), http://www.tceq.texas.gov/toxicology/AirToxics.html#amcv (last visited June 18, 2011).

62. Interoffice Memorandum from Shannon Ethridge, Toxicology Div., to Distribution (Oct. 27, 2009), http://www.nctcog.org/trans/air/TCEQHealthEffectsEvaluationforDISHTX.pdf.

63. *Id.*

64. Sierra Research, Inc., *Screening Health Risk Assessment Sublette County, Wyoming* 33 (Jan. 2011), http://www.sublettewyo.com/DocumentView.aspx?DID=438.

65. *Id.*

66. *Id.*; *see also* Interoffice Memorandum from Shannon Ethridge to Distribution, *supra* note 62.

67. Sierra Research, Inc., *supra* note 64, at 10; *see also* Interoffice Memorandum from Shannon Ethridge to Distribution, *supra* note 62.

68. U.S. ENVTL. PROT. AGENCY, EPA-540-1-89-002, RISK ASSESSMENT GUIDANCE FOR SUPERFUND VOLUME I, HUMAN HEALTH EVALUATION MANUAL (PART A) § 5.6.1 (1989), http://www.epa.gov/oswer/riskassessment/ragsa/pdf/rags-vol1-pta_complete.pdf.

69. *See, e.g.*, Law v. Range Res. Corp., No. 236-236781-09 (filed Mar. 31, 2009); Ashford v. Chesapeake Operating, Inc., No. 048-23267308 (filed Sept. 10, 2008); FORT WORTH LEAGUE OF NEIGHBORHOODS, RECOMMENDATIONS FOR POLICY CHANGES

D. *Air Dispersion Modeling ("AERMOD")*

Air Dispersion Modeling ("AERMOD") is a computer-generated simulation of how pollutants disperse in the atmosphere.[70] AERMOD computer-generated modeling is a tool used to enable regulators to obtain a general idea of how emissions from a particular source may disperse in varying atmospheric conditions.[71] Air samples are collected and information is input into a computer program that uses mathematical equations and algorithms to simulate pollution dispersion.[72] The dispersion models are then used to estimate or predict the downwind concentrations of air pollutants from a source, such as a power plant.[73] However, because of the multiple layers of hypothetical data input into the simulation—wind, temperature, elevation—the data output from AERMOD can result in "significant uncertainties" when compared to actual conditions.[74] For example, the mathematical algorithms used by AERMOD in its dispersion modeling have an accepted error rate in the scientific community of 20%.[75]

IV. CURRENT APPLICATION: RECENT AIR QUALITY REPORT IN FORT WORTH, TEXAS

The Fort Worth League of Neighborhoods commissioned a recent air quality report in Fort Worth, Texas that garnered a lot of public attention.[76] This report was provided to the Fort Worth Independent School District and recommended natural gas wells be drilled no closer than one mile from any school in order "to adequately protect the children" from harmful emissions from natural gas wells.[77] This recommendation was heavily based on a finding in the report that "[l]evels of carbon disulfide are *predicted* in the model at levels as high as 1000 times the short term health benchmarks."[78] However, the underlying laboratory results show that carbon disulfide is a TIC.[79]

FOR GAS DRILLING NEAR SCHOOLS (Feb. 22, 2011), http://www.fwlna.org/documents/ISDReport.pdf.

70. ALAN J. CIMORELLI, ET AL., U.S. ENVTL. PROT. AGENCY, EPA-454/R-03-004, AERMOD: DESCRIPTION OF MODEL FORMULATION 40 (2004), http://www.epa.gov/scram001/7thconf/aermod/aermod_mfd.pdf.

71. Aff. of Kirby H. Tyndall at 3, Law v. Range Res. Corp., No. 236-236781-09 (filed Apr. 5, 2010).

72. CIMORELLI, ET AL., *supra* note 70, at 40; Aff. of Kirby H. Tyndall, *supra* note 71.

73. CIMORELLI, ET AL., *supra* note 70, at 40.

74. Aff. of Kirby H. Tyndall, *supra* note 71.

75. Milton R. Beychok, *Error Propagation in Air Dispersion Modeling*, AIR-DISPERSION.COM, http://www.air-dispersion.com/feature.html (last visited Jun 12, 2011).

76. John Henry, *Drilling study finds high pollution levels near Fort Worth school*, FORT WORTH STAR-TELEGRAM (Feb. 18, 2011), http://www.star-telegram.com/2011/02/17/2858911/drilling-study-finds-high-pollution.html.

77. FORT WORTH LEAGUE OF NEIGHBORHOODS, *supra* note 69, at 4.

78. *Id.* (emphasis added).

79. *See id.* at Appendix A.

Moreover, because the air sample was not collected at the site from which the authors of the report were attempting to measure emissions, additional calculations using a number of variables had to be prepared to estimate a "quantity" of carbon disulfide at the site under investigation. Thus, the problems inherent in this type of analysis are readily apparent: (1) a TIC forms a cornerstone of the report; (2) significant additional error (in addition to the error inherent in using a TIC to begin with)[80] is injected into the analysis because it is *assumed* that all of the carbon disulfide came from the site under evaluation; (3) to attempt to calculate the level of carbon disulfide at the site, numerous other variables have to be accounted for and all these assumptions and variables significantly lower the confidence level of the analysis; and (4) the computer model itself has a relatively high rate of error. When all of these factors are combined, the reliability of the conclusions is highly suspect.

V. CONCLUSION

Because of the complexities involved in the regulations and the methods used in evaluating air quality, headline-grabbing air studies, as well as air studies used in litigation, must be thoroughly reviewed to ensure that the alphabet soup within the report is assimilated in a manner that actually spells useful and reliable conclusions. Fortunately, in the courtroom, attorneys have methods for dealing with unreliable air quality studies.[81] But, the only recourse in the court of public opinion is a citizenry and electorate educated in the fundamentals of air quality regulation and air quality testing.

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80. *See* U.S. ENVTL. PROT. AGENCY, *supra* note 68, at § 5.6.1; Sierra Research, Inc., *supra* note 64, at 7.

81. *See* E.I. duPont de Nemours & Co. v. Robinson, 923 S.W.2d 549, 557 (Tex. 1995). The factors to be considered by a court during a *Daubert* hearing to strike an expert witness and opinion testimony are: (1) the extent to which the theory has been or can be tested; (2) the extent to which the technique relies upon the subjective interpretation of the expert; (3) whether the theory has been subjected to peer review and/or publication; (4) the technique's potential rate of error; (5) whether the underlying theory or technique has been generally accepted as valid by the relevant scientific community; and (6) the non-judicial uses which have been made of the theory or technique. If a purported expert's opinions are unsatisfactory in view of these factors, the expert's testimony is inadmissible in a court of law. *Id.* at 557. Additionally, when too great an analytical gap exists between the expert's opinion and the underlying facts, the opinion is inadmissible. Gammill v. Jack Williams Chevrolet, Inc., 972 S.W.2d 713, 726 (Tex. 1998). Thus, an expert opinion that harmful levels of certain constituents exist in air based on comparisons to ESLs should be inadmissible because the opinion is fundamentally flawed. Moreover, opinions based on the use of AERMOD computer programs to attempt to predict concentrations of constituents at specific locations are fraught with error and should not be admissible in a court of law.