STATEMENT OF PETER A. VALBERG, Ph.D.

I, Peter A. Valberg, Ph.D.., hereby state as follows:

1. I am a public health professional who has worked in research, teaching, and consulting for many years on the science of air quality, inhalation toxicology, and human health risk assessment. I have undergraduate and graduate degrees in Physics and Mathematics and a Master of Science in Human Physiology and Inhalation Toxicology from the Harvard School of Public Health. I am a Principal at Gradient, a health-risk environmental consulting firm near Boston. I was a faculty member at the Harvard School of Public Health, in the Department of Environmental Health, for 20 years, and I have published over 100 peer-reviewed articles on toxicology, risk assessment, and public health. I have worked extensively on health risk assessments with government agencies such as the Environmental Protection Agency and the National Academy of Sciences, as well as with the regulated community affected by the projections of such health risk assessments.

2. I oversaw Gradient's preparation of a comprehensive Health Risk Assessment ("HRA") for the Palmer Renewable Energy ("PRE") Project. The purpose of the HRA was to quantitatively compare project-specific environmental impacts against guidelines for protecting health, including sensitive populations.

3. The HRA was reviewed by both the Massachusetts Department of Public Health ("MassDPH") and the Massachusetts Department of Environmental Protection ("MassDEP"), with neither agency noting any methodology or analytic errors that would affect the conclusions of the HRA. MassDEP, in a letter dated November 9, 2010, to Secretary Ian Bowles of the Massachusetts Environmental Policy Act Office, stated: "The PRE/Gradient health risk assessment for the proposed facility provides a much more comprehensive evaluation of human health risks than what is typically included in air emission source project proposals."

4. The procedures used in health risk assessment are endorsed by a wide range of public health agencies, including MassDPH and US EPA. A health-protective characteristic of the risk assessment process is that it's designed to overpredict, rather than underpredict, the likelihood of health effects.

5. The final HRA included the following components, focused on impacts of PRE project stack air emissions:
   - a public health evaluation of criteria air pollutants;
   - an assessment of chronic inhalation non-cancer and cancer health risks from air toxics;
   - an acute (short-term) exposure evaluation for respiratory irritants;

- a screening assessment of the soil ingestion pathway for arsenic, lead, and dioxins/furans;
- for mercury (Hg) emissions, a screening assessment of impacts on the fish ingestion pathway;
- for lead (Pb) emissions, an evaluation of blood-lead impacts; and
- in addition, an assessment of potential health risks associated with PRE Project mobile and fugitive source emissions.

6. Thus, the HRA assessed the air quality impacts of both air emissions from the PRE facility stack, as well as associated vehicle exhaust and fugitive dust emission sources. The time periods evaluated considered both peak short-term exposures and maximum annual-average exposures. That is, the health risk assessment included evaluation of potential adverse health outcomes that may occur both from brief exposures and from the long-term operation of the project.

7. The comprehensive HRA demonstrated that the project's air emissions would not lead to adverse effects on the health of nearby residents, schoolchildren, or sensitive populations. In fact, the health risks for nearby Springfield residents exposed to maximum incremental stack impacts were well within acceptable public health limits.

8. The HRA addressed specific requests from MassDPH and MassDEP regarding potential health risks posed by mobile and fugitive source emissions (i.e., of exhaust emissions from heavy duty diesel trucks delivering fuel, emissions from entrained roadway dust, and emissions of particulates generated by the loading and unloading of the primary fuel as well as reagents and fly ash). The HRA demonstrated that PRE-Project mobile and fugitive sources are not expected to contribute significantly to chronic inhalation non-cancer and cancer health risks.

9. The HRA included a detailed analysis of the baseline community health status of Springfield and nearby communities that included summaries of the rates of cancer, asthma, and cardiovascular disease, plus data on blood-lead levels. This analysis of baseline community health statistics indicated that some health statistics are elevated for Springfield as compared to state average rates (e.g., pediatric asthma prevalence rates based on MassDPH school surveys, childhood lead poisoning), while other Springfield health statistics are reduced or no different from state averages (e.g., adult asthma prevalence, cancer incidence rates, cardiovascular mortality and hospitalizations). There is no evidence that any of these differences in health statistics are related to outdoor air quality in the Springfield area versus other Massachusetts locales.

10. Importantly, given that the HRA demonstrated that maximum ground-level concentrations from PRE emissions were below levels of regulatory and health-effect concern, the health risk assessment refutes any speculation that operation of PRE will affect community baseline health conditions. Springfield's public health burdens are likely related to differences in health care delivery and demographic factors (e.g., stress, socioeconomic status, neighborhood violence, lifestyle/behavioral factors), and, in the

case of pediatric asthma, to indoor air quality (e.g., mold, moisture, cigarette smoking, pests, deteriorating housing stock).

11. In addition to overseeing the HRA, I provided testimony in the adjudicatory hearing on PRE's Conditional Approval to Construct. In the adjudicatory hearing, I testified that the permit for the project should be upheld because PRE demonstrated that the project would comply with the National Ambient Air Quality Standards ("NAAQS") set by the U.S. Environmental Protection Agency ("EPA"). "Compliance with the primary NAAQS is designed to assure an absence of any anticipated adverse health effects, because the primary NAAQS are solely health-based and are not adjusted for factors such as technological feasibility, or costs and benefits. By definition, the NAAQS are intended to be protective of the public health of exposed populations, with an adequate margin of safety. By incorporation of a margin of safety, the NAAQS are set to address both uncertainties in the state of the science and the possibility of additional harms that might be identified in the future. Furthermore, the NAAQS are intended to be protective of the health of sensitive subpopulations, such as people with pre-existing disease *(e.g.,* cardiovascular diseases or asthma), children, and the elderly."

12. In contrast, the expert retained by the Petitioners in the adjudicatory hearing, Jonathan Levy, Sc.D., tried to argue that the NAAQS are not protective of public health. Dr. Levy's theoretical approach was not only inconsistent with the underlying facts regarding the Project's extremely low impact on air quality and public health, but it failed to recognize the established regulatory standards for evaluating air-quality issues by MassDEP. Dr. Levy's conclusions were not based on any substantive analyses that focused on the Project's predicted air emissions. Moreover, Dr. Levy did not explain that all outdoor ambient PM contributes only a fraction of personal exposure to airborne PM, with the majority of personal PM exposure deriving from indoor and nearby-activity sources (*e.g.*, cooking, dusting, lawn mowing, barbequing, leaf blowing, nearby traffic).

13. The Presiding Officer in the adjudicatory hearing agreed with my position that the NAAQS "are based upon a scientifically rigorous assessment of current research and they are specifically designed to protect public health, including particularly susceptible subpopulations." Ultimately, the Presiding Officer determined that "the Permit's compliance with the NAAQS and the recommended NAAQS for $PM_{2.5}$ demonstrates that the Permit complies with the regulations and the state Clean Air Act and PRE will not cause or contribute to a condition of air pollution."

14. Commissioner Kenneth Kimmel agreed with the Presiding Officer's analysis and issued a Final Decision on September 11, 2012 finding that the Approval to Construct complied with the law and regulations.

15. Given that the PRE HRA was completed in 2010, for the purpose of the Public Health Council hearing on January 20, 2016, we have recently revisited our risk calculations, confirming that the small number of changes to health-based standards and guidelines that we relied upon would not change any of the HRA conclusions.

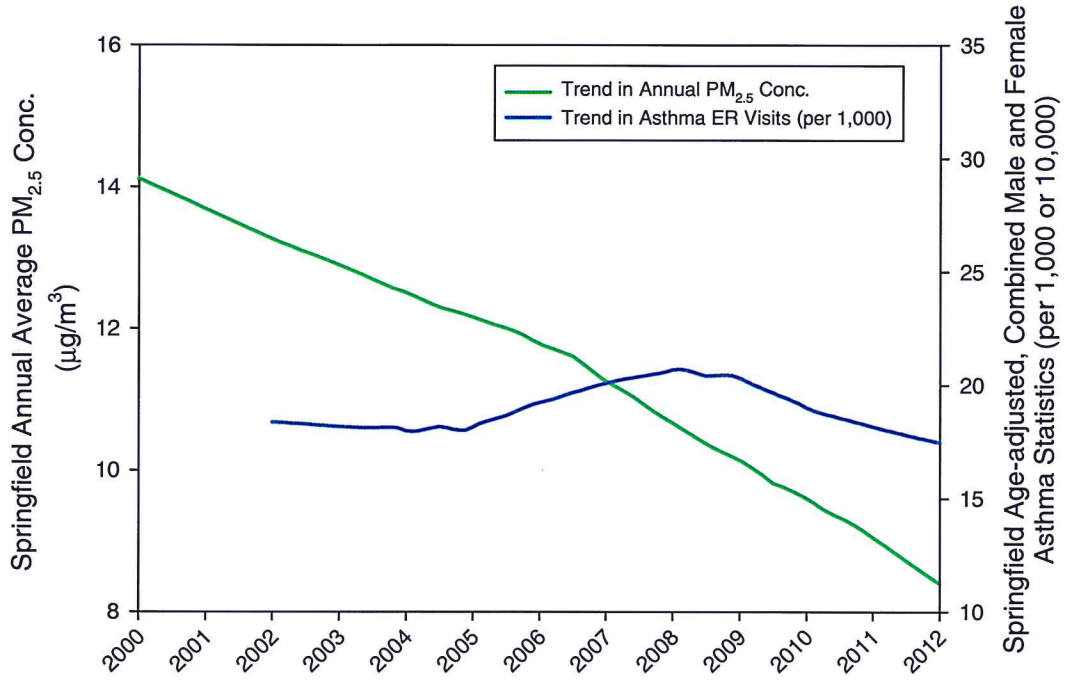
16. Since 2010, some health-based standards and guidelines have been reduced (e.g., the US EPA annual average $PM_{2.5}$ National Ambient Air Quality Standard [NAAQS]), while others have been increased (e.g., the MassDEP annual Allowable Ambient Limit [AAL] and 24-hour Threshold Effects Exposure Limit [TEL] for arsenic); however, these changes do not have significant impacts on the HRA results and conclusions, as maximum ground-level concentrations from PRE emissions remain below levels of regulatory and health-effect concern.

17. Importantly, while US EPA reduced the NAAQS for annual average $PM_{2.5}$ concentrations from 15 to 12 $\mu g/m^3$ in 2012, measured ambient $PM_{2.5}$ concentrations in Springfield have decreased by a larger fraction in recent years as compared to this reduction in the standard, such that the sum of the maximum modeled PRE annual average $PM_{2.5}$ increment and the Springfield monitored background concentration is a smaller fraction of the health-protective NAAQS than previously (approximately 63% versus 71%).

18. In fact, annual average $PM_{2.5}$ concentrations at air quality monitors across the state have decreased significantly in recent years- *i.e.*, air quality has significantly improved in Springfield and throughout the state since 2010 when the HRA was performed.

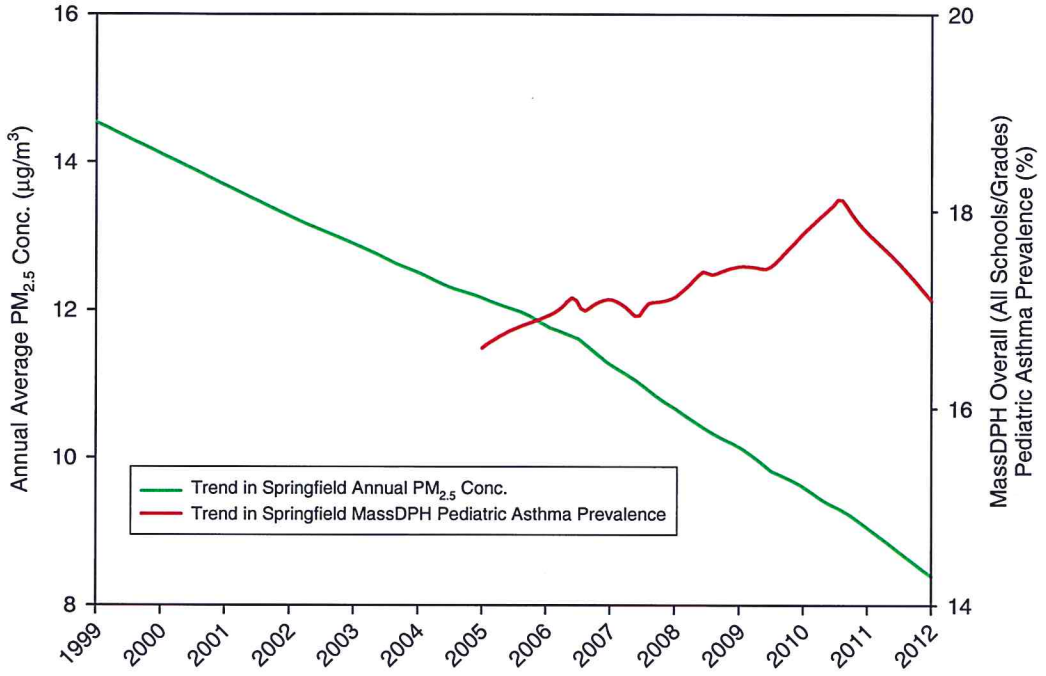
19. In contrast to the downward trend and substantial overall reductions in ambient levels of $PM_{2.5}$ in the Springfield area, community health statistics do not show similar trends that would support ambient air pollution as a determining factor behind these health statistics. For example, Figure 1 contrast the trends in annual average $PM_{2.5}$ concentrations in Springfield with the trends for MassDPH health data on asthma emergency room [ER] visits that are currently available up through 2012. As shown in the figure, the data for asthma emergency room visits show a fairly flat trend over the decade from 2002 to 2012, with little change in the data for 2002 as compared to 2012. In contrast, $PM_{2.5}$ concentrations in Springfield, as measured at the downtown Liberty Street Parking Lot monitor, have showed a steady downward trend throughout the period.

Figure 1. $PM_{2.5}$ Trends in Springfield *versus* Springfield Trends in Emergency Room (ER) Visits (annual rates)



20. Figure 2 below plots time trends in MassDPH school survey data on pediatric asthma prevalence rates, which show Springfield pediatric asthma statistics remain elevated compared to state average rates, as reported previously in the HRA. Similar to Figure 1 above, Figure 2 contrasts the trends in overall pediatric asthma prevalence rates across schools and grades (ages 5 through 14) in Springfield with the significant reductions in ambient $PM_{2.5}$ levels in Springfield. Figure 2 shows no decline in pediatric asthma prevalence rates despite the consistent downward trend in ambient $PM_{2.5}$ levels in Springfield. More generally, ambient air pollutant emissions and concentrations in the United States have decreased significantly over the past several decades while the prevalence of asthma has increased, consistent with the conclusion that factors other than exposure to outdoor air pollutants are the important risk factors underlying the trends in increased asthma prevalence.

Figure 2. $PM_{2.5}$ Trends in Springfield *versus* Springfield Trends in Pediatric Asthma Prevalence Rates from MassDPH Surveys of School Children



In summary, in 2010 Gradient conducted a comprehensive health risk assessment for the PRE Project that demonstrated that maximum predicted levels of specific substances associated with PRE Project air emissions are not expected to contribute to adverse health effects among nearby populations. The findings and conclusions of the HRA remain unchanged in 2016, despite a few changes to health-based standards and guidelines and updates to community health statistics for Springfield. Regarding $PM_{2.5}$, which has been singled out as a particular public health concern related to the PRE Project emissions, it is important to recognize that one entire year of exposure of the nearby community to PRE Project incremental $PM_{2.5}$ concentrations yields an inhaled dose less than typical exposures repeatedly received from many everyday indoor and outdoor activities such as cooking, yard work, or driving in a car. That is, breathing in $PM_{2.5}$ at 0.015 $\mu g/m^3$ (the community-wide [within 5-km of the PRE Project] $PM_{2.5}$ impact attributable to PRE stack emissions) for a whole year is an inhaled dose equivalent to –

- <5 minutes a week driving in a car on an urban freeway [1]
- about 3 minutes a week of cooking in the home [2]
- <10 minutes mowing the lawn [3]
- 3 visits to indoor food courts (assuming a ½ hour duration) [4]
- about 2 hours breathing air inside a home where someone smokes [5]
- about 1 day inside a house with a clean-burning woodstove [6]
- about 6 hours inside a house with a traditional woodstove [7]
- about 5 minutes a week burning candles in the home [8]

Based on the foregoing and my understanding from working on this project, it is my professional opinion that air quality impacts of the Palmer Renewable Energy, LLC project cannot be expected to result in a nuisance or be harmful to the inhabitants, injurious to their estates, dangerous to the public health, or attended by noisome and injurious odors.

Peter A. Valberg, Ph.D.

Endnote Reference Material for $PM_{2.5}$ from Everyday Activities

(1) Based on mean in-vehicle concentration of 48 $\mu g/m^3$ for measurements on two LA freeways. (Source: Zhu, Y; Fung, DC; Kennedy, N; Hinds, WC; Eiguren-Fernandez, A. 2008. "Measurements of ultrafine particles and other vehicular pollutants inside a mobile exposure system on Los Angeles freeways." *J Air Waste Manag Assoc.* 58(3):424-34.)

(2) Based on average whole-house concentration of 50 $\mu g/m^3$ attributed to cooking activities with a gas stove and/or gas oven. (Source: Wallace, LA; Emmerich, SJ; Howard-Reed, C. 2004. "Source strengths of ultrafine and fine particles due to cooking with a gas stove." *Environ Sci Technol.* 38(8):2304-11.)

(3) Based on average $PM_{2.5}$ concentration of 936 $\mu g/m^3$ measured during eight test periods with mowing with a gas-powered lawnmower. (Source: Baldauf, R; Fortune, C; *et al.* 2006. "Air contaminant exposures during the operation of lawn and garden equipment." *J. Expo. Sci. Environ. Epidemiol.* 16:362-370.)

(4) Based on mean reported concentration of 200 $\mu g/m^3$ for measurements in Boston-area food courts, divided by 2.5 to account for high bias of DustTrak instrument. (Source: Levy, JI; Dumyahn, T; Spengler, JD. 2002. "Particulate matter and polycyclic aromatic hydrocarbon concentrations in indoor and outdoor microenvironments in Boston, Massachusetts." *J. Expo. Anal. Environ. Epidemiol.* 12(2):104-114.)

(5) Based on mean $PM_{2.5}$ concentration reported for distal areas in smoking homes. (Source: Van Deusen, A; Hyland, A; Travers, MJ; Wang, C; Higbee, C; King, BA; Alford, T; Cummings, KM. 2009. "Secondhand smoke and particulate matter exposure in the home." *Nicotine Tob Res.* 11(6):635-41.) ["In smoking homes, the mean $PM_{2.5}$ level for the primary smoking areas was statistically significantly higher than that for distal areas (84 and 63 $\mu g/m^3$, respectively)."]

(6) Based on average concentration of 15 $\mu g/m^3$ reported for measurements in 16 Montana homes following change-out to US EPA-certified woodstoves, divided by 2.5 to account for high bias of DustTrak instrument. (Source: Ward, T; Noonan, C. 2008. "Results of a residential indoor $PM_{2.5}$ sampling program before and after a woodstove change out." *Indoor Air* 18(5):408-15.)

(7) Based on average concentration of 51 $\mu g/m^3$ reported for measurements in 16 Montana homes prior to change-out to US EPA-certified woodstoves, divided by 2.5 to account for high bias of DustTrak instrument. (Source: Ward, T; Noonan, C. 2008. "Results of a residential indoor $PM_{2.5}$ sampling program before and after a woodstove change out." *Indoor Air* 18(5):408-15.)

(8) Based on average concentration of 28 $\mu g/m^3$ measured during candle-burning events. (Source: Long, CM; Suh, HH; Koutrakis, P. 2000. "Characterization of indoor particle sources using continuous mass and size monitors." *J. Air Waste Manage. Assoc.* 50:1236-1250.)