

August 8, 2016

Utah State Legislators  
Salt Lake City, Utah  
(sent via email)

Re: BYU Professor Pope and the \$38.2 Billion Question

Dear Utah State Legislators,

I am an environmental epidemiologist and physicist who has had a long academic career at UCLA and I am an expert on the health effects of air pollution in California. I am writing to you because research findings and claims that fine particulate matter (PM2.5) *causes* premature deaths by Brigham Young University Professor of Economics C. Arden Pope, III, are being used by the South Coast Air Quality Management District (SCAQMD) to justify proposed new \$38.2 billion air pollution regulations in Southern California. However, the scientific validity of Dr. Pope's findings has been continuously challenged since they were first published in 1995. Recently a very strong case has been made by nine accomplished experts, including myself, that "Particulate Matter Does Not *Cause* Premature Deaths" ([https://www.nas.org/articles/nas\\_letter](https://www.nas.org/articles/nas_letter)). In addition, there is overwhelming evidence from over a dozen sources, including both Dr. Pope and me, that PM2.5 is NOT related to total mortality in California (<http://scientificintegrityinstitute.org/NoPMDeaths112215.pdf>). Finally, in a June 12, 2013 letter to EPA, Congressmen Lamar Smith and Chris Stewart described the urgent need for transparency and reproducibility regarding Dr. Pope's research findings and they (unsuccessfully) requested the underlying data for his 1995, 2002, 2005, 2009, and 2009 research papers.

Since Dr. Pope is widely regarded as "The World's Leading Expert on the Effects of Air Pollution on Health," and since his extensive advice to CARB and SCAQMD is taken very seriously, I now ask Dr. Pope for a YES or NO answer to the following question: "In light of the above challenges to your PM2.5-mortality findings, do you support the way that the SCAQMD has used three studies co-authored by you (Jerrett et al. 2005, Krewski et al. 2009, and Jerrett et al. 2013) to calculate their 'Preliminary Health Impacts – Mortality', knowing that that these preliminary mortality impacts are the primary public health justification for a Draft 2016 Air Quality Management Plan (AQMP) that will impose an estimated \$38.2 billion in compliance costs on the South Coast Air Basin economy?" The July 28, 2016 SCAQMD tables containing the preliminary mortality impacts and the preliminary AQMP costs are attached to this letter, with full details available at this weblink ([http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=STMPRSocio\\_072816](http://www.aqmd.gov/home/library/meeting-agendas-minutes/agenda?title=STMPRSocio_072816)). A table summarizing all studies of PM2.5 and total mortality in California, with the 2005, 2009, and 2013 studies highlighted in red, is also attached. Relative risk of unity (RR = 1.00) means no relationship between PM2.5 and mortality. Finally, the 2013 letter by Congressmen Smith and Stewart is attached.

Because his findings will be discussed at an SCAQMD AQMP meeting next week, I request an answer from Dr. Pope by August 15, 2016. Until I receive a response to the contrary, I will assume that his answer to my question is YES. If you have the time to examine this matter, I request that you send your own answer to the above question to me ([jenstrom@ucla.edu](mailto:jenstrom@ucla.edu)) and/or to SCAQMD ([aqmp@aqmd.gov](mailto:aqmp@aqmd.gov)). Please let me know if you would like to discuss any aspect of this request with me.

Thank you very much for your consideration of this important matter.

Sincerely yours,

A handwritten signature in blue ink that reads "James E. Enstrom". The signature is written in a cursive style with a clear, legible font.

James E. Enstrom, Ph.D., M.P.H.  
UCLA and Scientific Integrity Institute  
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# Preliminary Health Impacts - Mortality

- Health impacts for mortality are based on the previous data and:
  - Ozone: Pooling of L.A.-specific NMMAPS and meta-analysis estimates from Bell et al. (2005).
  - PM<sub>2.5</sub>: Pooling of Jerrett et al. (2005), Jerrett et al. (2013), and Kriging and LUR estimates from Krewski et al. (2009).
- No threshold effects assumed for either pollutant
  - IEC recommendation based on latest scientific evidence
  - U.S. EPA's practice

In the absence of substantial information in the scientific literature on alternative forms of C-R functions at low O<sub>3</sub> concentrations, the best estimate of the C-R function is a linear, no-threshold function.

U.S. EPA, 2014 Health Risk and Exposure Assessment for Ozone

Note: Confidence intervals provided on supplementary handout.

# Preliminary Health Impacts – Mortality (cont'd)

Premature Mortalities Avoided		
	2023	2031
<b>Mortality, All Cause</b>	<b>2193</b>	<b>2563</b>
<b>Short-term Ozone Exposure</b>	<b>51</b>	<b>87</b>
Los Angeles	22	40
Orange	10	14
Riverside	11	16
San Bernardino	9	15
<b>Long-term PM<sub>2.5</sub> Exposure</b>	<b>2111</b>	<b>2425</b>
Los Angeles	1481	1707
Orange	321	356
Riverside	141	166
San Bernardino	169	197

Note: Confidence intervals provided on supplementary handout.

## What Costs Are Being Quantified?

- Measures with quantified emission reductions ready to be committed into State Implementation Plan (SIP)  
(Note: Measures that recognize co-benefit ozone emission reductions from other programs will not have incremental costs.)
- MOB-14 existing projects, which are in baseline emissions inventory
- Measures with TBD/NYQ emission reductions – preliminary costs or unit costs, wherever available, will be discussed separately

## Preliminary Costs of Draft 2016 AQMP

Measures	Present Value of Compliance Cost (2017) \$MM	Column	Present Value of Incentives (2017) \$MM	Column	Present Worth Value (2017) \$MM	Average Annual Amortized Cost (2017-2031) \$MM
Stationary Source	\$6,639.3	+	\$1,366.6	=	\$8,005.9	\$402.6
SCAQMD Mobile Source	\$861.9	+	\$588.7	=	\$1,450.6	\$120.1
CARB Mobile Source	\$16,945.3	+	\$11,815.8	=	\$28,761.2	\$1,987.6
<b>Total</b>	<b>\$24,446.6</b>	<b>+</b>	<b>\$13,771.1</b>	<b>=</b>	<b>\$38,217.7</b>	<b>\$2,510.3</b>

Note: Numbers may not add up due to rounding.

**Summary Table.** Epidemiologic cohort studies of PM<sub>2.5</sub> and total mortality in California, 2000-2016  
Relative risk of death from all causes (RR and 95% CI) associated with increase of 10 µg/m<sup>3</sup> in PM<sub>2.5</sub>  
<http://scientificintegrityinstitute.org/NoPMDeaths112215.pdf>)

Krewski 2000 & 2010	CA CPS II Cohort	N=40,408	RR = 0.872 (0.805-0.944)	1982-1989
(N=[18,000 M + 22,408 F]; 4 MSAs; 1979-1983 PM <sub>2.5</sub> ; 44 covariates)				
McDonnell 2000	CA AHSMOG Cohort	N~3,800	RR ~ 1.00 (0.95 – 1.05)	1977-1992
(N~[1,347 M + 2,422 F]; SC&SD&SF AB; M RR=1.09(0.98-1.21) & F RR~0.98(0.92-1.03))				
<b>Jerrett 2005</b>	<b>CPS II Cohort in LA Basin</b>	<b>N=22,905</b>	<b>RR = 1.11 (0.99 - 1.25)</b>	<b>1982-2000</b>
<b>(N=22,905 M &amp; F; 267 zip code areas; 1999-2000 PM<sub>2.5</sub>; 44 cov + max confounders)</b>				
Enstrom 2005	CA CPS I Cohort	N=35,783	RR = 1.039 (1.010-1.069)	1973-1982
(N=[15,573 M + 20,210 F]; 11 counties; 1979-1983 PM <sub>2.5</sub> )				
			RR = 0.997 (0.978-1.016)	1983-2002
Enstrom 2006	CA CPS I Cohort	N=35,783	RR = 1.061 (1.017-1.106)	1973-1982
(11 counties; 1979-1983 & 1999-2001 PM <sub>2.5</sub> )				
			RR = 0.995 (0.968-1.024)	1983-2002
Zeger 2008	MCAPS Cohort “West”	N=3,100,000	RR = 0.989 (0.970-1.008)	2000-2005
(N=[1.5 M M + 1.6 M F]; Medicare enrollees in CA+OR+WA (CA=73%); 2000-2005 PM <sub>2.5</sub> )				
Jerrett 2010	CA CPS II Cohort	N=77,767	RR ~ 0.994 (0.965-1.025)	1982-2000
(N=[34,367 M + 43,400 F]; 54 counties; 2000 PM <sub>2.5</sub> ; KRG ZIP; 20 ind cov+7 eco var; Slide 12)				
<b>Krewski 2010 (2009)</b>	<b>CA CPS II Cohort</b>			
<b>(4 MSAs; 1979-1983 PM<sub>2.5</sub>; 44 cov)</b>		<b>N=40,408</b>	<b>RR = 0.960 (0.920-1.002)</b>	<b>1982-2000</b>
<b>(7 MSAs; 1999-2000 PM<sub>2.5</sub>; 44 cov)</b>		<b>N=50,930</b>	<b>RR = 0.968 (0.916-1.022)</b>	<b>1982-2000</b>
Jerrett 2011	CA CPS II Cohort	N=73,609	RR = 0.994 (0.965-1.024)	1982-2000
(N=[32,509 M + 41,100 F]; 54 counties; 2000 PM <sub>2.5</sub> ; KRG ZIP Model; 20 ind cov+7 eco var; Table 28)				
Jerrett 2011	CA CPS II Cohort	N=73,609	RR = 1.002 (0.992-1.012)	1982-2000
(N=[32,509 M + 41,100 F]; 54 counties; 2000 PM <sub>2.5</sub> ; Nine Model Ave; 20 ic+7 ev; Fig 22 & Tab 27-32)				
Lipsett 2011	CA Teachers Cohort	N=73,489	RR = 1.01 (0.95 – 1.09)	2000-2005
(N=[73,489 F]; 2000-2005 PM <sub>2.5</sub> )				
Ostro 2011	CA Teachers Cohort	N=43,220	RR = 1.06 (0.96 – 1.16)	2002-2007
(N=[43,220 F]; 2002-2007 PM <sub>2.5</sub> )				
<b>Jerrett 2013</b>	<b>CA CPS II Cohort</b>	<b>N=73,711</b>	<b>RR = 1.060 (1.003–1.120)</b>	<b>1982-2000</b>
<b>(N=[~32,550 M + ~41,161 F]; 54 counties; 2000 PM<sub>2.5</sub>; LUR Conurb Model; 42 ind cov+7 eco var+5 metro; Table 6)</b>				
<b>Jerrett 2013</b>	<b>CA CPS II Cohort</b>	<b>N=73,711</b>	<b>RR = 1.028 (0.957-1.104)</b>	<b>1982-2000</b>
<b>(same parameters and model as above, except including co-pollutants NO<sub>2</sub> and Ozone; Table 5)</b>				
Ostro 2015	CA Teachers Cohort	N=101,884	RR = 1.01 (0.98 -1.05)	2001-2007
(N=[101,881 F]; 2002-2007 PM <sub>2.5</sub> ) (all natural causes of death)				
Thurston 2016	CA NIH-AARP Cohort	N=160,209	RR = 1.02 (0.99 -1.04)	2000-2009
(N=[~95,965 M + ~64,245 F]; full baseline model: PM <sub>2.5</sub> by zip code; Table 3) (all natural causes of death)				
Enstrom 2016 unpub	CA NIH-AARP Cohort	N=160,368	RR = 1.001 (0.949-1.055)	2000-2009
(N=[~96,059 M + ~64,309 F]; full baseline model: 2000 PM <sub>2.5</sub> by county)				

# Congress of the United States

## House of Representatives

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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June 12, 2013

The Honorable Robert Perciasepe  
Acting Administrator  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, D.C. 20460

Dear Acting Administrator Perciasepe:

On March 4, 2013, a letter was sent from this Committee to Gina McCarthy, Assistant Administrator for the Office of Air and Radiation at the Environmental Protection Agency (EPA), requesting that EPA take immediate steps in accordance with current law and Administration policy to obtain and release the underlying research data from specific PM<sub>2.5</sub> studies that EPA has relied on to support multiple rulemakings. In this same letter, we also requested that EPA obtain and immediately release the underlying data supporting a critical ozone study (Jerrett 2009) that relies on these same datasets and that EPA has referenced 18 times in its Integrated Scientific Assessment (ISA) in preparation for the upcoming ozone rulemaking.

The Agency's April 10, 2013, response to that letter acknowledges that the previously released information is "not sufficient" to allow replication of the study results. In the three months that have passed since our most recent request, we have yet to receive any commitment from the Agency that, in the case of Jerrett 2009, it will discontinue the use of this data or in the case of the most recent PM<sub>2.5</sub> long term cohort studies, immediately obtain and release that data. In May, EPA proposed new Tier III Vehicle Emission and Fuel Standards that depend on these same datasets to provide a majority of the claimed benefits. EPA's response also shows a general lack of understanding of Administration policy and the nature of the requested data:

- While EPA is correct in noting that the responses to the personal interview questionnaires collected 30 years ago include confidential information, the electronic input and output files used in the actual analysis for these studies are unlikely to contain confidential data. This was confirmed by Health Effects Institute (HEI) in 2000 when it conducted a reanalysis of the studies.<sup>1</sup>

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<sup>1</sup> Krewski et al. 2000, *Part I: Replication and Validation*; (p 42). The HEI Report confirms that an electronic data file ("Mort6C.file") containing a copy of the Harvard Six cities database "did not contain any information that could be used to identify the individual study participants."

- EPA's proffered excuse for not obtaining the data because the studies "received funding from a number of different sources, including the EPA, other federal agencies, and non-federal sources" conflicts with OMB policy which clearly states that funding Agencies retain the right to obtain all data developed from mixed funding sources.<sup>2</sup>
- EPA's response also incorrectly states that NDI data cannot be released, ignoring the fact referenced in its own attachment on page 3 that Harvard University had released (and EPA transmitted) coded NDI data in 2011.

We also remain deeply concerned that EPA continues to rely on this data, even while the National Research Council has cautioned against using them in its 2004 report.<sup>3</sup> In that report, the NRC concluded that updates of these two cohorts alone would be of "little use for decisionmaking" due to the outdated nature of the information and dwindling relevance to today's population and risk profile. The full NRC discussion on this point is attached for review. For example, since the time the data were initially collected, smoking rates have declined from 40 to 20 percent, while education levels (used as a surrogate for socioeconomic status in air pollution studies) have increased. A number of other factors affecting the surveyed population's health status have also changed, including improved treatments for hypertension and cholesterol that have contributed to reductions in the cardiovascular mortality rates in the U.S. Because the American Cancer Society and Harvard Six City cohorts have not been updated, there is a clear concern that the health benefits attributed to reduced PM<sub>2.5</sub> and ozone levels over the past 30 years could in fact be incorrect due to other changes affecting the health status of the surveyed individuals that may have a much greater bearing.

EPA's recent clarification about which studies it relies upon fails to acknowledge this central point. Indeed, the fact that EPA has chosen not to rely on two studies using this outdated cohort information (Pope 2002 and Laden 2006) in the Regulatory Impact Assessment for the Tier III rulemaking but instead to use Krewski 2009 and Lepeule 2012 does not address this weakness but rather exacerbates the problem since both of these more recent studies use more recent and lower air pollution data but continue to rely on the same outdated cohort information.

Throughout this process, EPA has responded to our questions in a cavalier manner, hoping perhaps we were not reading the NRC reports carefully or were simply unaware of the law or guidance governing data access. The opposite is true. Our examination has underscored two central points:

- EPA must immediately refrain from relying on and citing studies that continue to use 30-year old cohort data. This includes all PM<sub>2.5</sub> and ozone studies that rely on the American Cancer Society and the Harvard Six Cities cohorts. The NRC's main criticism in 2004 is even more relevant today, nine years later.

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<sup>2</sup> *Federal Register*, Vol. 64, No. 195 (Friday, October 8, 1999). See section G: Projects Funded From Multiple Sources.

<sup>3</sup> National Research Council, *Research Priorities for Airborne Particulate Matter: IV. Continuing Research Progress* (2004), Board on Environmental Studies and Toxicology (BEST), p 135.

- EPA must immediately obtain all of the underlying research data supporting the previously requested PM<sub>2.5</sub> and ozone studies, and release all non-confidential data in accordance with current law and Administration guidance. EPA must also take steps to determine whether confidential data sets can be de-identified to help ensure transparency in its decision making.

Current law and OMB guidance are clear in requiring EPA to obtain and release the data. To confirm there are no confidential data in the electronic input and output files and whether de-identification procedures can be applied, EPA must first obtain the data – which it openly admits to not having. The EPA's continued refusal to comply with this Committee's oversight request undermines the credibility of its regulations.

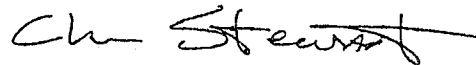
EPA officials should justify their agenda through an open and transparent process that is based on good science, if they can. EPA has projected that its upcoming ozone standard will be the most costly environmental regulation in U.S. history. Working families will bear these costs. They have a right to know what scientific data supports EPA's claims.

EPA must respect the law and the public's right to this information. In order to avoid formal action by this Committee to obtain the requested information, we urge you to comply with our request by July 8, 2013.

Sincerely,



Lamar Smith  
Chairman  
House Science, Space and Technology



Chris Stewart  
Chairman  
Environment Subcommittee

cc: Rep. Eddie Bernice Johnson, Ranking Member, Committee on Science, Space, and Technology  
Ms. Gina McCarthy, Assistant EPA Administrator  
Dr. Glenn Paulson, Science Advisor to the EPA Administrator  
Dr. Ken Olden, NCEA Director  
Dr. John Holdren, Director, OSTP  
Ms. Sylvia Mathews Burwell, Director, Office of Management and Budget



## References

Jerrett et al. "Spatial analysis of air pollution and mortality in Los Angeles." *Epidemiology* 16(2005): 727-736.

Jerrett et al. "Long-term ozone exposure and mortality." *N Engl Med* 360 (2009): 1085-1095

Krewski et al. "Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality." Special Report to the Health Effects Institute, Cambridge MA. (2000) <http://pubs.healtheffects.org/getfile.php?u=274>

Krewski et al. "Extended follow-up and spatial analysis of the American Cancer Society study linking particulate air pollution and mortality." *HEI Research Report, 140*, Health Effects Institute, (2009) Boston, MA

Laden et al. "Reduction in Fine Particulate Air Pollution and Mortality." *American Journal of Respiratory and Critical Care Medicine*. 173 (2006): 667-672

Lipfert et al. "PM<sub>2.5</sub> constituents and related air quality variables as predictors of survival in a cohort of U.S. military veterans." *Inhal. Toxicol.* 18 (2006): 41-72.

Lepeule et al. "Chronic Exposure to Fine Particles and Mortality; An Extended Follow-Up of the Harvard Six Cities Study from 1974 to 2009." *Environ Health Perspect.* Jul; 120(7) (2012): 965-70

Pope et al. "Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution." *Journal of the American Medical Association* 287 (2002): 1132-1141.

Pope et al. "Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults." *Am. J. Respir. Crit. Care Med* 151 (1995): 669-674.