

**Criticism of Draft 2012 South Coast Air Quality Management District
Air Quality Management Plan Appendix I Health Effects
and
Request for California Health and Safety Code Section 40471 (b) Hearing on
Health Impacts of Particulate Matter Air Pollution in South Coast Air Basin**

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Summary of Attached Pages:

- 1) Enstrom Criticism of Draft 2012 AQMD AQMP Appendix I Health Effects makes the primary points that a) overwhelming epidemiologic evidence indicates particulate matter is not killing Californians; b) since 2001 AQMD has not prepared reports on “the health impacts of particulate matter in the South Coast Air Basin” in accord with California Health and Safety Code (CHSC) Section 40471 (b); c) the AQMD Advisory Council failed to properly peer review AQMP Appendix I Health Effects; and d) AQMD must hold a Governing Board Hearing on AQMP Appendix I Health Effects before the 2012 AQMP is finalized.
- 2) Enstrom Op-Ed for The Desert Sun on particulate matter in the Coachella Valley, which was scheduled to be published on April 4, 2012 but which has never been published, makes a strong case that a) particulate matter is not currently harming Coachella Valley residents and b) there will be no health risk from particulate matter after the Sentinal Power Plant is operational.
- 3) Figure 21 from 2000 Health Effects Institute Reanalysis Report by Krewski, Jerrett, et al., shows clear and large variation in PM_{2.5} mortality risk across the US, with low risk in California
- 4) Enstrom Table 1 summary of the epidemiologic evidence shows NO relationship between PM_{2.5} and total mortality in California.
- 5) Enstrom Table 2 summary of the epidemiologic evidence shows NO relationship between PM₁₀ and total mortality in California; also, US EPA summary of PM NAAQS indicates revocation of the annual PM₁₀ standard in 2006 due to lack of long-term health effects.
- 6) NCHS US map shows 2009 age-adjusted total death rate by state, with California third lowest; also, California county data shows that the death rate in the South Coast Air Basin is lower than the death rate in every state except Hawaii.

Criticism of Draft 2012 South Coast Air Quality Management District Air Quality Management Plan Appendix I Health Effects

The Southern California Air Quality Management District (AQMD) has released its Draft 2012 Air Quality Management Plan (AQMP) (<http://www.aqmd.gov/aqmp/2012aqmp/index.htm>). This plan proposes aggressive and costly emission control measures, such as, increased use of zero emission vehicles and severe restrictions on wood-burning fireplaces, in order to reduce air pollution in the South Coast Air Basin (SCAB). This air basin includes about 17 million residents in Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino Counties. The primary goal of the AQMP is to bring the SCAB into compliance with the US Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) for criteria pollutants, such as, particulate matter (PM2.5 and PM10) and ozone. These standards are based on the nationwide health effects of these pollutants (<http://www.epa.gov/air/criteria.html>).

However, the AQMP needs to address the health effects of air pollution in the SCAB. In particular, California Health and Safety Code (CHSC) Section 40471 (b) specifically states “On or before December 31, 2001, and every three years thereafter, as part of the preparation of the air quality management plan revisions, the south coast district board, in conjunction with a public health organization or agency, shall prepare a report on the health impacts of particulate matter air pollution in the South Coast Air Basin. The south coast district board shall submit its report to the advisory council appointed pursuant to Section 40428 for review and comment. The advisory council shall undertake peer review concerning the report prior to its finalization and public release. The south coast district board shall hold public hearings concerning the report and the peer review, and shall append to the report any additional material or information that results from the peer review and public hearings.” (<http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=40001-41000&file=40460-40471>).

As best I can determine, AQMD never prepared a “report on the health impacts of particulate matter air pollution in the South Coast Air Basin” at the end of 2001, 2004, 2007, or 2010. The only “health impacts” reports that I can find are Appendix I “Health Effects” of the 2003 AQMP, 2007 AQMP, and Draft 2012 AQMP. However these reports do not specifically address “the health impacts of particulate matter air pollution in the South Coast Air Basin.” Indeed, the 2003 AQMP Appendix I states “The purpose of this appendix is to provide an overview of air pollution health effects, rather than to provide estimates of health risk from current ambient levels of pollutants in specific areas of the SCAB.” (http://www.aqmd.gov/aqmp/docs/2003AQMP_AppI.pdf).

Failure to comply with CHSC Section 40471 (b) is a serious matter because the local health effects of PM provide the primary public health justification for the entire AQMP. Overwhelming epidemiologic evidence now indicates that there is NO relationship in California between PM and total mortality (also known as "premature deaths"), as I explained in the June 4, 2012 Orange County Register (<http://www.ocregister.com/articles/air-357230-california-pollution.html>).

This null relationship in California has been known since 2000, but the specific null evidence is only partially presented in the Draft 2012 AQMP and was entirely omitted from the earlier AQMPs. For instance, each AQMP Appendix I cites the 2000 Health Effects Institute Special Report "Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality," a major report relied upon by EPA and AQMD. However, only the nationwide PM2.5 mortality risk results in this report are cited in the AQMP, whereas Figures 5 and 21 show substantial geographic variation in PM2.5 mortality risk across the US, with Los Angeles ranking fifth lowest among 49 cities (<http://www.scientificintegrityinstitute.org/HEIFigure5093010.pdf>).

In total, ten separate analyses of five major California cohorts have found no relationship between PM2.5 and total mortality. Indeed, detailed analyses of two of these cohorts, funded by AQMD and completed in 2011, have found no relationship between any criteria pollutant and total mortality in California (www.scientificintegrityinstitute.org/Enstrom081512.pdf). Keep in mind, total mortality is the primary health impact that justifies the NAAQS. However, these national standards are not based on health effects or mortality in California or the SCAB. In 2009 the SCAB had an age-adjusted total death rate lower than the death rate in every state in the continental US (<http://www.scientificintegrityinstitute.org/NCHSRR070811.pdf>).

The 16 members of the 2012 AQMD Advisory Council were asked on June 7, 2012 to review and comment on Appendix I, particularly regarding the "health impacts of particulate matter air pollution in the South Coast Air Basin," and to attend a July 11, 2012 meeting at AQMD regarding Appendix I. Only 7 members submitted any written comments. The three members with the most relevant scientific expertise on PM did not address the "health impacts of particulate matter air pollution in the South Coast Air Basin". UCLA Professor John R. Froines did not submit any written comments; USC Professor Rob S. McConnell did not submit any comments on PM health effects; and LLU Professor Samuel Soret failed to reveal the null PM findings from AHSMOG in the December 2010 LLU Dr. P.H. dissertation of Lie Hong Chen (http://books.google.com/books/about/Coronary_Heart_Disease_Mortality_and_Lon.html?id=pA8ltwAACAAJ).

Dr. Soret served on the committee for Dr. Chen's highly relevant dissertation, CORONARY HEART DISEASE MORTALITY AND LONG-TERM EXPOSURE TO AMBIENT PARTICULATE AIR POLLUTANTS IN ELDERLY NONSMOKING CALIFORNIA RESIDENTS. The Abstract states "The purpose of this study is to assess the effect of long-term concentrations of ambient PM on risks of all causes The health effects of long-term ambient air pollution have been studied with up to 30 years of follow-up in the AHSMOG cohort, a cohort of 6,338 nonsmoking white California adults."

Before the Draft 2012 AQMP is finalized and approved, AQMD must hold a public hearing on the health impacts of air pollution in the SCAB, in accordance with CHSC Section 40471 (b). If the hearing confirms the overwhelmingly null evidence cited above, then the AQMP should not propose emission control measures necessary to comply with NAAQS that are not appropriate for California or the SCAB. Instead, AQMD should request a waiver from compliance with the NAAQS using the special waiver status granted to California in Section 209 of the Clean Air Act (<http://www.epa.gov/otaq/cafr.htm>).

From: "Folmer, James" <jfolmer@palmspri.gannett.com>
To: "James E. Enstrom" <jenstrom@ucla.edu>
Date: Tue, 3 Apr 2012 09:44:35 -0700
Subject: RE: Proposed Op-Ed on Particulate Matter Health Effects in CV

Dr. Engstrom, here's the edited version. I did minimal editing, just a few tweaks to match AP style. I replaced $\mu\text{g}/\text{m}^3$ with "micrograms per cubic meter." Please let me know if that's acceptable.

Also, I took your website references out of the body of the column and put them in a breakout (below) to make it more readable.

It will be in Wednesday's edition. Thanks for the contribution.

The Desert Sun has recently published a special report and an editorial on the Sentinel power plant that is under construction by Competitive Power Ventures. Substantial concern has been expressed about the impact of the particulate matter (PM) pollution that will be generated by the plant. I would like to provide my perspective on the PM levels associated with the plant and the health effects associated with PM. PM consists of "inhalable coarse particles" (PM10) and "fine particles" (PM2.5).

Based on the April 15, 2010, California Energy Commission air quality assessment for the Sentinel plant, Table 13 indicates that the maximum annual background PM10 level in the Coachella Valley will be increased from 54.9 microgram per cubic meter to 55.33 during plant operation. This represents a "worse case (maximum)" increase of only 0.8 percent. Based on the South Coast Air Quality Management District (AQMD) Final 2007 Air Quality Management Plan, the maximum annual average PM10 level in the Coachella Valley (Salton Sea Air Basin) is only 45.7 micrograms per cubic meter.

All these levels are quite similar to the U.S. EPA's 1987-2006 annual standard for PM10 of 50 micrograms per cubic meter. However, this standard was revoked in 2006 due to "inadequate" evidence of long-term health effects of PM10, as summarized in the 2004 and 2009 EPA Integrated Science Assessment for Particulate Matter.

The Desert Sun claim that "the Sentinel plant would increase the (PM10) level to 277 percent above the state standard" is highly misleading because it is based on the California Energy Commission's Table 13 comparison of 55.33 micrograms per cubic meter with the California annual standard for PM10 of 20. But this state standard was established by the California Air Resources Board in 2002 and does not reflect the extensive null evidence on PM10 health effects that has been published since 2002.

In January 2007, the Air Resources Board and AQMD approved \$1,034,358 in funding, half from each agency, for two major epidemiologic studies on the relationship between PM (PM10 and PM2.5) and death in California. The study based on the American Cancer Society cohort was conducted by UC Berkeley professor Michael Jerrett and 13 other investigators.

The study based on the California Teachers Study cohort was conducted by Michael Lipsett of the California Department of Public Health and nine other investigators. A primary purpose of these studies was to produce new California evidence "to assist with the review of ambient air quality standards."

The results of these two studies were published in 2011 and they both found no relationship between PM and total mortality in California. The Jerrett Study found that total mortality during 1982-2000

among about 75,000 California adults was not related to either PM10 or PM2.5 in eight of nine models tested. The Lipsett Study found that total mortality during 2000-2005 among about 75,000 female

California teachers was not related to either PM10 or PM2.5.

The studies found some unexplained evidence of increased cardiovascular disease risk and decreased cancer risk, but there was no overall increased risk of death. These null results agree with the overwhelmingly null results for California that have been published since 2000, which include my 2005 results.

Thus, based on all the evidence described above, there is no health risk associated with PM in the Coachella Valley or in California as a whole and there will be no health risk from PM after the Sentinal power plant is operational. However, since AQMD and others have a different perspective and since The Desert Sun stated that "Robust debate on this issue is needed," I propose that an open forum be organized so that AQMD Executive Officer Barry Wallerstein and I can debate our different views on the health effects of PM in the Coachella Valley. Hopefully, our debate will help resolve the PM health effects issue.

James E. Enstrom is on the research faculty at the UCLA School of Public Health and has been conducting epidemiologic research there since 1973. Email him at jenstrom@ucla.edu

LEARN MORE ABOUT PARTICULATE MATTER

Read the California Energy Commission air quality assessment for the Sentinel plant at mydesert.com/opinion

Websites cited by James E. Engstrom:

www.epa.gov/pm/

www.aqmd.gov/aqmp/07aqmp/aqmp/Chapter_2.pdf

www.epa.gov/ttn/naqs/standards/pm/s_pm_history.html

cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546

www.arb.ca.gov/board/books/2007/012507/07-1-4pres.pdf

wmbriggs.com/blog/?p=4587

ajrccm.atsjournals.org/content/184/7/828.short

www.scientificintegrityinstitute.org/Enstrom081111.pdf

From: "Folmer, James" <jfolmer@palmspri.gannett.com>

To: "James E. Enstrom" <jenstrom@ucla.edu>

Date: Wed, 28 Mar 2012 13:11:05 -0700

Subject: RE: April 5 DSun Op-Ed on PM Health Effects & Enstrom Photo

Photo is fine. I'll try to remember to send you the edited version. Feel free to pester me on Tuesday, but we can never promise exactly when a column will run depending on what's happening in the news.

Thanks.

2000 Krewski Jerrett HEI Report Figure 21 1982-1989 CPS II PM2.5 Mortality Risk <1.0 in CA

Fine Particles and Mortality Risk

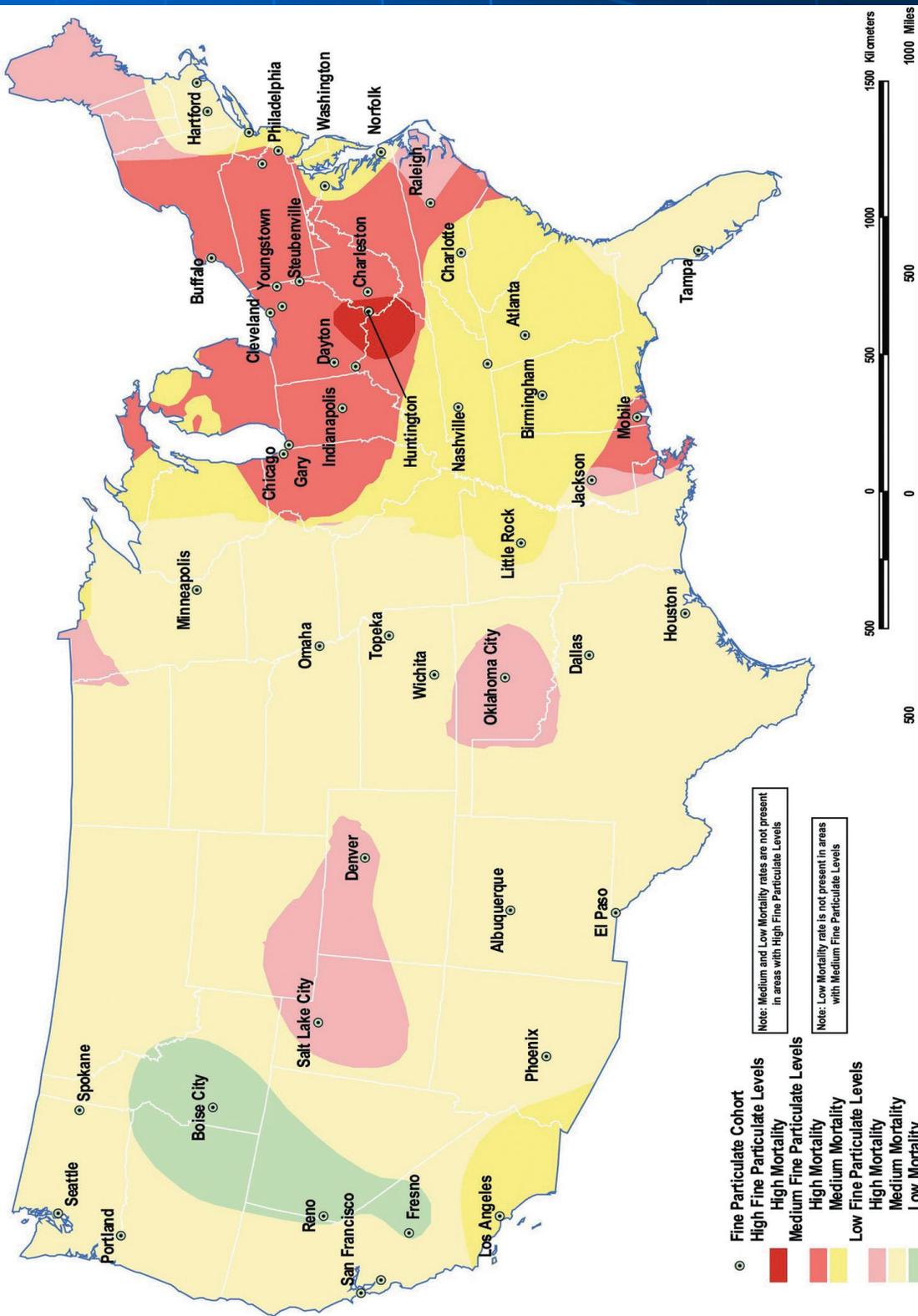


Table 1. Major Epidemiologic Studies of PM2.5 and Total Mortality in California

<http://scientificintegrityinstitute.org/Enstrom081512.pdf>

Relative risk of death from all causes (RR and 95% CI) for increase of 10 µg/m³ in PM2.5

| | | | |
|---|------------------------|--|------------------------|
| McDonnell 2000 (N~3,800 [1,347 M + 2,422 F]; SC&SD&SF AB Adventists in 9 airsheds, used to estimate PM2.5) | CA AHSMOG Cohort | RR ~ 1.03 (0.95 – 1.12) | 1977-1992 |
| Krewski 2000 (2010) (N=40,408 [18,000 M + 22,408 F]; 4 MSAs; 1979-1983 PM2.5; 44 covariates) | CA CPS II Cohort | RR = 0.872 (0.805-0.944) | 1982-1989 |
| Jerrett 2005 (N=22,905; 267 zip code areas in LA basin only; 1999-2000 PM2.5; 44 cov + max confounders) | LA Basin CPS II Cohort | RR = 1.11 (0.99 - 1.25) | 1982-2000 |
| Enstrom 2005 (N=35,783 [15,573 M + 20,210 F]; 11 counties; 1979-1983 PM2.5; 25 county internal comparison) | CA CPS I Cohort | RR = 1.039 (1.010-1.069) RR = 0.997 (0.978-1.016) | 1973-1982 1983-2002 |
| Zeger 2008 (3.1 M [1.5 M M + 1.6 M F]; Medicare enrollees in CA+OR+WA [CA = 73%]; 2000-2005 PM2.5) | MCAPS Cohort “West” | RR = 0.989 (0.970-1.008) | 2000-2005 |
| Jerrett 2010 (N=77,767 [34,367 M + 43,400 F]; 54 counties; 2000 PM2.5; KRG ZIP; 20 ind cov+7 eco var; Slide 12) | CA CPS II Cohort | RR ~ 0.994 (0.965-1.025) | 1982-2000 |
| Krewski 2010 (N=40,408; 4 MSAs; 1979-1983 PM2.5; 44 cov) (N=50,930; 7 MSAs; 1999-2000 PM2.5; 44 cov) | CA CPS II Cohort | RR = 0.960 (0.920-1.002) RR = 0.968 (0.916-1.022) | 1982-2000 1982-2000 |
| Jerrett 2011 (N=73,609 [32,509 M + 41,100 F]; 54 counties; 2000 PM2.5; KRG ZIP Model; 20 ind cov+7 eco var; Table 28) | CA CPS II Cohort | RR = 0.994 (0.965-1.024) | 1982-2000 |
| Jerrett 2011 (N=73,609 [32,509 M + 41,100 F]; 54 counties; 2000 PM2.5; Nine Model Ave; 20 ic+7 ev; Fig 22 & Tab 27-32) | CA CPS II Cohort | RR = 1.002 (0.992-1.012) | 1982-2000 |
| Lipsett 2011 (N=73,489 [73,489 F]; 2000-2005 PM2.5) | CA Teachers Cohort | RR = 1.01 (0.95 – 1.09) | 2000-2005 |
| Ostro 2011 (N=43,220 [43,220 F]; 2002-2007 PM2.5) | CA Teachers Cohort | RR = 1.06 (0.96 – 1.16) | 2002-2007 |

Table 2. Major Epidemiologic Studies of PM10 and Total Mortality in California

Relative risk of death from all causes (RR and 95% CI) for increase of 10 µg/m³ in PM10

| | | | |
|---|--------------------|--------------------------|-----------|
| McDonnell 2000 (N~3,800 [1,347 M + 2,422 F]; SC&SD&SF AB Adventists with PM10 from CARB monitors) [deaths from all natural causes ICD9=001-799] | CA AHSMOG Cohort | RR ~ 1.01 (0.96 – 1.07) | 1977-1992 |
| Chen 2010 (N=4,830 [1,750 M + 3,080 F]; SC&SD&SF AB Adventists with PM10 from CARB monitors) [deaths from all natural causes ICD9= 001-799] | CA AHSMOG Cohort | RR = 1.01 (0.98 – 1.04) | 1977-2006 |
| Jerrett 2011 (N=76,135 [33,625 M + 42,510 F]; 54 counties; 1988-2002 PM10; 20 ind cov+7 eco var; Table 37) | CA CPS II Cohort | RR = 1.001 (0.987-1.017) | 1982-2000 |
| Lipsett 2011 (N=61,181 [61,181 F]; 1996-2005 PM10) | CA Teachers Cohort | RR = 1.00 (0.97 – 1.04) | 2000-2005 |

FOLLOWING THE SCIENCE: How National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM) Have Changed Over Time (<http://www.epa.gov/pm/agriculture.html>)

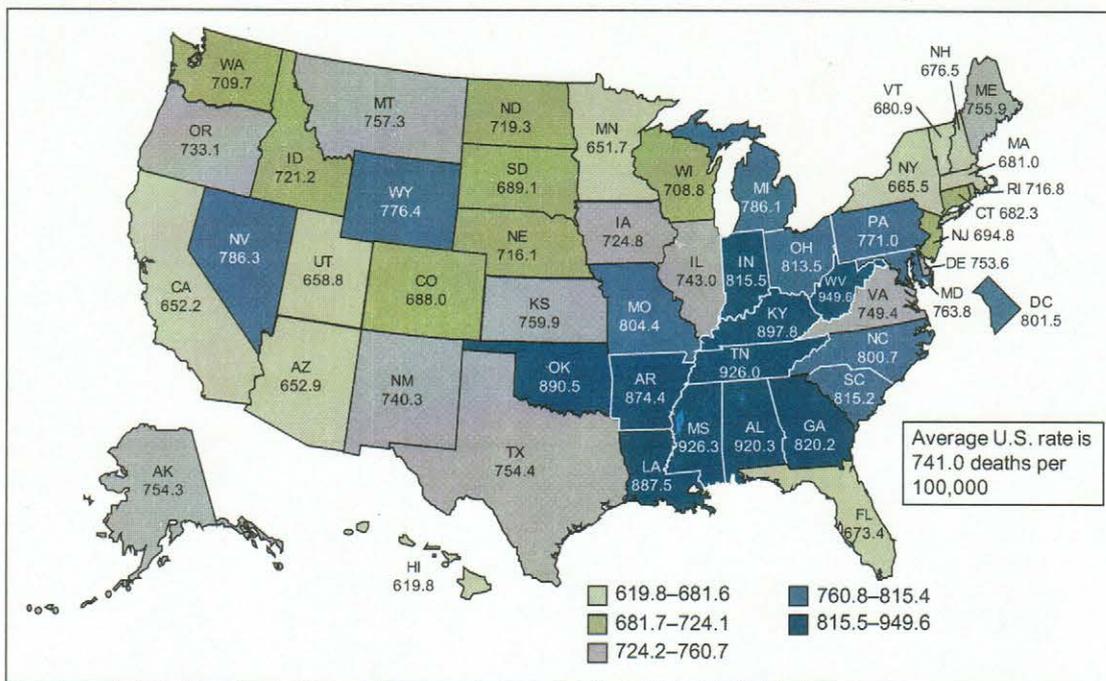
- EPA has regulated particle pollution since 1971. Our standards have evolved over time, as science has taught us more about how exposure to particles affects health and welfare.
- The 1971 standards, for example, set levels for all particles in the air, known as “total suspended particulate.” This covered all sizes of airborne particles, including dirt and other larger particles.
- In 1987, EPA changed the standards to focus on those particles 10 micrometers in diameter and smaller, because particles larger than that don’t generally get past the nose into the respiratory system. The Agency set both daily and annual PM10 standards at that time.
- In 1997, based on an expanding body of scientific evidence linking fine particles (PM2.5) to serious health effects, EPA added both daily and annual standards for fine particles.
- The Agency revised those standards in 2006, tightening the daily standard. That same year, **EPA revoked the annual standard for PM10, because there was insufficient evidence linking long-term exposure to inhalable coarse particle pollution to health problems.** EPA retained the daily PM10 standard – at 150 micrograms per cubic meter, the same level since 1987.

Do death rates vary by state?

States experience different risks of mortality. Hawaii has the lowest age-adjusted death rate (619.8 deaths per 100,000 population) of all the states, 16.4 percent lower than the average rate for the United States (741.0). West Virginia had the highest state age-adjusted death rate in 2009, 28.2 percent higher than the average U.S. rate.

In general, states in the Southeast region have higher rates than those in other regions of the country. Louisiana, for example, is typical of the region and has an age-adjusted death rate of 887.5 deaths per 100,000 population (3). States in other regions of the country, such as Illinois in the Midwest (743.0 deaths per 100,000 population) and Oregon in the West (733.1 deaths per 100,000 population), have rates that are more comparable with the average U.S. rate (3) (Figure 4).

Figure 4. Age-adjusted death rates, by state and the District of Columbia: United States, preliminary 2009



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality.

Ratio of 2009 Age-Adjusted Total Death Rates (deaths/100,000)

| | |
|---|-------------------------------|
| California / U.S. | $652.2 / 741.1 = 0.88 = 88\%$ |
| 'South Coast Air Basin' (4 Counties) / U.S. | $650.8 / 741.1 = 0.88 = 88\%$ |
| Los Angeles County / U.S. | $637.3 / 741.1 = 0.86 = 86\%$ |
| Orange County / U.S. | $570.9 / 741.1 = 0.77 = 77\%$ |