



Chapter 2

Risk-Based Strategy

Prioritizing efforts that will achieve the
greatest health benefits



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2.1 WHAT IS THE RISK-BASED STRATEGY?

EPA sets health-based air quality standards (National Ambient Air Quality Standards, or NAAQS) based on the latest health science for several “criteria pollutants,” including PM_{2.5}. Once a region is designated nonattainment of a NAAQS, the state and local agencies of that region compile a State Implementation Plan (SIP), like this *2012 PM_{2.5} Plan*, to show expeditious attainment of that health-based NAAQS within the framework of the federal Clean Air Act (CAA).

The Valley’s air quality and public health have improved significantly over the past twenty years under the CAA’s current NAAQS-SIP process and the District’s resulting 500+ rules and rule amendments since 1992. With many of the nation’s toughest rules already in place in the Valley, it has become increasingly difficult to identify feasible new regulation opportunities for sources under the District’s jurisdiction.

At the same time, the Valley’s challenges will intensify as EPA considers increasingly stringent air quality standards, which are approaching the Valley’s naturally-occurring background concentrations. Under these anticipated changes in federal air quality standards, even the Valley’s cleanest counties could begin to record air pollutant concentrations above the levels of federal standards – despite improving air quality. Attainment of new EPA standards will require transformative new air pollution controls, including zero-emission technologies, alternatives to long-practiced development patterns and transportation systems, and perhaps even the elimination of fossil-fuel combustion in the Valley.

The NAAQS that continue to motivate new emissions controls and air quality improvements are indeed health-based, but they are essentially generic mass-based standards that do not account for pollutant size, speciation, surface area, and other characteristics that further identify pollutants’ full risk to the public health. In contrast, recent health-science research has been substantially deepening our knowledge of air pollutant health risk beyond the current CAA framework and EPA standards. Thus, while the CAA’s NAAQS-SIP process is motivated by public health, this process alone does not fully address public health impacts of ambient air pollution.

In September 2010, the District Governing Board adopted a research-driven Risk-based Strategy to proactively prioritize public health improvements within the District’s attainment strategies and other efforts. As the District puts this strategy into practice, the District will be looking for opportunities to prioritize future control strategies, incentive programs, and public engagement efforts that achieve the greatest health benefits.

Several of the District’s existing rules and programs already prioritize public health benefits beyond the NAAQS-SIP process, providing a model of the success and future potential of a Risk-based Strategy:

- **District Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters) and the District's corresponding Check Before You Burn program** have been reducing harmful specific of PM_{2.5} when and where those reductions are most needed: in impacted urbanized areas when the local weather is forecast to hamper PM dispersion. By decreasing emissions from residential wood burning, Rule 4901 decreases directly-emitted PM_{2.5} as well as carbon monoxide, formaldehyde, sulfur dioxide, irritant gases, and known and suspected carcinogens, such as polycyclic aromatic hydrocarbons (PAH). In 2008, the Central Valley Health Policy Institute found that District wood burning curtailments on days with high PM concentrations reduced annual PM exposure by about 13% in Bakersfield and Fresno, resulting in 30 to 70 avoided cases of annual premature mortality.

Even though the *2008 PM_{2.5} Plan* was developed per EPA requirements for the 1997 PM_{2.5} standards (with a 24-hour standard of 65 µg/m³), the 2008 plan included a commitment to amend Rule 4901 in 2009 (with implementation in 2010) to align the wood burning curtailment threshold with the newer 2006 PM_{2.5} standard (with a 24-hour standard of 35 µg/m³). Then, based on research reiterating the effectiveness of Rule 4901 in protecting public health as well as public support for a stronger rule, the District amended and implemented Rule 4901 in 2008 – one year ahead of scheduled rule development and two years ahead of scheduled implementation. The amended rule also set the curtailment level lower than initially planned, to 30 µg/m³, to provide an extra margin of safety and to address air quality forecast uncertainties.

The District's prioritization of Rule 4901 and forward-thinking alignment with an upcoming NAAQS-SIP process is one of the best examples of a Risk-based Strategy so far.

- **District grant programs** reach beyond the current CAA NAAQS-SIP process to reduce emissions in advance of or beyond regulations. For example, through the District's popular Clean Green Yard Machine grant program, the District has replaced over 2,000 high-polluting gas-powered lawn mowers with clean electric mowers, decreasing the urban, localized health risks associated with the use of gas-powered equipment. As described in Appendix C of this plan, the District is now expanding its lawn care emissions reductions programs to the commercial sector.
- **The District's information and educational programs, such as the Real-Time Air Quality Advisory Network (RAAN)**, also contribute to the Risk-based Strategy. RAAN utilizes real-time data from air monitoring stations throughout the Valley to provide hour-by-hour air quality updates to schools and other subscribers. Subscribers can use this information to make more informed decisions and plan outdoor activities for times with the best air quality, reducing potential air quality health risks.

- **The District tracks and sponsors health research.** The District has sponsored several Valley-based health research projects in recent years. In 2010-2011, the District sponsored a first-of-its-kind epidemiological investigation of health effects of air pollution in Modesto, Fresno, and Bakersfield. The study found that high PM and ozone concentrations clearly correlate to increased hospital and ER admission rates, especially for those 19 and younger. During 2011 and 2012, the District is sponsoring a follow-up epidemiological study to examine which of the chemicals found in Valley PM_{2.5} are most highly-correlated with elevated ER and hospital admission rates. The District is also sponsoring a pilot study of ultrafine particulates in Fresno, partnering with UCSF-Fresno to investigate the quantity and spatial distribution of ultrafine particle plumes from motor vehicles, lawn care equipment, wood burning, and restaurants.

Another principle step in the Risk-based Strategy is to determine what new options are available to reduce the most health-impacting pollutants. The District will be evaluating which potential regulations, incentives, and outreach strategies would be most effective. This *2012 PM_{2.5} Plan* brings this step to fruition, as articulated in the following plan Guiding Principle:

Prioritize strategies that contribute to the District's Risk-based Strategy by achieving the greatest public health benefits.

2.2 HOW IS THE RISK-BASED STRATEGY BEING INCORPORATED INTO THIS PLAN?

Though there are several existing District programs that readily fit into this strategy, this *2012 PM_{2.5} Plan* is the District's first formal effort to synthesize research, population-exposure analysis, and comprehensive emissions reductions efforts into a cohesive Risk-based Strategy. This is also the District's first opportunity to demonstrate how the Risk-based Strategy fits within and effectively supplements EPA's current CAA framework.

The District will be integrating the Risk-based Strategy into every stage of analysis in the *2012 PM_{2.5} Plan*. As of this April 2012 draft, this integration is still in progress, to be more fully developed in future drafts with public/stakeholder input and with continued analysis. The District expects to incorporate the Risk-based Strategy into this plan with the following:

- **Health research discussion:** Chapter 1 includes a discussion of the health impacts attributable to various types of PM_{2.5} in the Valley. The District will expand this discussion in future plan drafts.
- **Ambient data analysis:** In addition to evaluating PM_{2.5} mass trends per CAA and EPA guidelines, the District will include discussion of PM_{2.5} species-based

trends. The District will utilize this species analysis with health research to identify which types of PM_{2.5} might be prioritized under a Risk-based Strategy. As of April 2012, this speciation data is still being collected and analyzed. The District is also evaluating the timing of higher PM_{2.5} concentrations, to see if there are certain times of the day or times of the year when PM_{2.5} reductions might have more public health benefits.

- **Emissions, modeling, and weight-of-evidence analyses:** The District will use these analyses to determine which sources of emissions most likely connect to the species of interest identified through the PM_{2.5} species analysis discussed above. The District also uses these analyses to look beyond average emissions inventory totals (Appendix B) and evaluate the timing and location of emissions. This can help refine the District's selection of emissions control measures for attainment purposes as well as for the purposes of the Risk-based Strategy.
- **Population exposure analysis:** The District will be using BENMAP to evaluate population exposure reductions and health benefits under the District's proposed attainment strategy.
- **Control measure prioritization:** To meet CAA requirements for this plan and assure expeditious attainment of EPA's 2006 PM_{2.5} NAAQS, the District is conducting a thorough analysis of all potential opportunities to reduce emissions of directly-emitted PM_{2.5} and significant PM_{2.5} precursors in the Valley. The resulting attainment strategy will include regulatory control measures as well as incentive programs, technology advancement efforts, policy initiatives, and public outreach.