



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

ADVISORY COUNCIL TECHNICAL COMMITTEE

AGENDA

COMMITTEE MEMBERS

ROBERT BORNSTEIN, PH.D., CHAIRPERSON
SAM ALTSHULER, P.E.
LOUISE BEDSWORTH, PH.D.
IRVIN DAWID

WILLIAM HANNA
STAN HAYES
JOHN HOLTZCLAW, PH.D.

WEDNESDAY
AUGUST 9, 2006
1:00 P.M.

7TH FLOOR BOARD ROOM

1. **Call to Order – Roll Call**
2. **Public Comment Period**

Public Comment on Non-Agenda Items, Pursuant to Government Code Section 54954.3. The public has the opportunity to speak on any agenda item. All agendas for Committee meetings are posted at the District, 939 Ellis Street, San Francisco, at least 72 hours before a meeting. At the beginning of the meeting, an opportunity is also provided for the public to speak on any subject within the Committee's purview. Speakers are limited to five minutes each.

3. **Approval of Minutes of April 12, 2006 and June 14, 2006**
4. **Update on the District's Community Air Risk Evaluation (CARE) Program**

Staff will provide the Committee with an update on the CARE Program.

5. **Committee Member Comments/Other Business**

Committee members, or staff, on their own initiative, or in response to questions posed by the public, may ask a question for clarification, make a brief announcement or report on his or her own activities, provide a reference to staff regarding factual information, request staff to report back at a subsequent meeting on any matter or take action to direct staff to place a matter of business on a future agenda. .

6. Time and Place of Next Meeting.

At the call of the Chair.

7. Adjournment

CONTACT CLERK OF THE BOARDS - 939 ELLIS STREET SF, CA 94109

(415) 749-4965
FAX: (415) 928-8560
BAAQMD homepage:
www.baaqmd.gov

- To submit written comments on an agenda item in advance of the meeting.
- To request, in advance of the meeting, to be placed on the list to testify on an agenda item.
- To request special accommodations for those persons with disabilities notification to the Clerk's Office should be given in a timely manner, so that arrangements can be made accordingly.

BB:mr

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET, SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

EXECUTIVE OFFICE:
MONTHLY CALENDAR OF DISTRICT MEETINGS

AUGUST 2006

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	2	9:45 a.m.	Board Room
Advisory Council Public Health Committee	Tuesday	8	10:00 a.m.	4 th Floor Conf. Room
Advisory Council Air Quality Planning Committee	Wednesday	9	9:30 a.m.	Board Room
Advisory Council Technical Committee	Wednesday	9	1:00 p.m.	Board Room
Board of Directors Mobile Source Committee <i>(Meets 2nd Monday of each Month) – TO BE RESCHEDULED</i>	Monday	14	9:30 a.m.	4 th Floor Conf. Room
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	16	9:45 a.m.	Board Room
Board of Directors Budget & Finance Committee <i>(Meets 4th Wednesday of each Month)</i>	Wednesday	23	9:45 a.m.	4th Floor Conf. Room
Board of Directors Public Outreach Committee <i>(Meets 4th Monday every other Month)</i>	Monday	28	9:30 a.m.	4 th Floor Conf. Room

SEPTEMBER 2006

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	6	9:45 a.m.	Board Room
Board of Directors Mobile Source Committee <i>(Meets 2nd Monday of each Month)</i>	Monday	11	9:30 a.m.	4 th Floor Conf. Room
Advisory Council Executive Committee	Wednesday	13	9:00 a.m.	Room 716
Advisory Council Regular Meeting	Wednesday	13	10:00 a.m.	Board Room
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	20	9:45 a.m.	Board Room
Joint Policy Committee	Friday	22	10:00 a.m. – Noon	MetroCenter Auditorium 101 – 8 th Street Oakland, CA 94607

SEPTEMBER 2006

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Stationary Source Committee <i>(Meets 4th Monday of every Quarter)</i>	Monday	25	9:30 a.m.	Board Room
Board of Directors Budget & Finance Committee <i>(Meets 4th Wednesday of each Month)</i>	Wednesday	27	9:45 a.m.	4 th Floor Conf. Room
Board of Directors Personnel Committee <i>(At the Call of the Chair)</i>	Thursday	28	9:30 a.m.	4 th Floor Conf. Room

OCTOBER 2006

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	4	9:45 a.m.	Board Room
Advisory Council Public Health Committee	Thursday	10	10:00 a.m.	Room 716
Board of Directors Mobile Source Committee <i>(Meets 2nd Monday of each Month)</i>	Monday	16	9:30 a.m.	4 th Floor Conf. Room
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	18	9:45 a.m.	Board Room
Board of Directors Budget & Finance Committee <i>(Meets 4th Wednesday of each Month)</i>	Wednesday	25	9:45 a.m.	4th Floor Conf. Room

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7/25/06 (2:20 p.m.)
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Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

DRAFT MINUTES

Advisory Council Technical Committee
9:30 a.m., Wednesday, April 12, 2006

1. **Call to Order – Roll Call.** Chairperson Bornstein called the meeting to order at 9:44 a.m. Present: Robert Bornstein, Ph.D., Chairperson, Sam Altshuler, P.E., Louise Bedsworth, Ph.D., William Hanna, John Holtzclaw, Ph.D. Absent: Stan Hayes.
2. **Public Comment Period.** There were no public comments.
3. **Approval of Minutes of Technical & Air Quality Planning Committee Meeting of February 7, 2006.** Dr. Holtzclaw moved approval of the minutes; seconded by Dr. Bedsworth; carried.
4. **Climate Change Control Programs in California: An Overview.** Amy Luers, Climate Impact Scientist, Union of Concerned Scientists, presented “Global Warming in California: Choosing our Future,” stating that from 1880 global temperatures on the earth’s surface have risen from 0.2 C° to 0.6 C°. The effect of global warming since that time has increased sea levels by seven inches and significantly melt portions of large glaciers. Weather patterns are also becoming more extreme, with increased hurricane and tropical cyclone intensity, and heat waves such as the one in Europe in 2003 which killed 30,000 people. By 2040, European summer temperatures will more often be as warm as those of 2003.

The consensus in the scientific community is that the earth’s temperatures are increasing because of the deforestation of large segments of land and emissions from fossil fuel combustion for transportation and energy generation. While the rate of change in the global climate is unusual, it matches what is expected in climate models from increasing greenhouse gases (GHGs) and other human activities. Such warming is occurring despite natural solar and volcanic activities which would have contributed to cooling the earth’s surface.

Modeled responses to natural forcings differ from observed temperatures. That is, in the absence of human activities, little variation in temperatures would be expected. However, the contribution of GHGs and other emissions in contemporary models match well with observed temperatures. This type of match also extends to oceanic patterns of warming.

As temperatures increase, impacts will prove more severe and costly. The more severe impacts can be avoided by reducing greenhouse gases now. A compilation of various studies by scientific researchers and set forth in a White Paper entitled “Scenarios of Climate Change in California: An Overview” addresses the impacts of different global warming scenarios across several major sectors in California.

Three different warming emission projections were derived from the Intergovernmental Panel on Climate Change (IPCC) and address higher-, medium-high-, and lower emissions of CO₂. These scenarios are linked with growth pattern projections. Taking three GHG emissions projections in three different climate models to capture differences in sensitivity, the researchers attempted to ascertain how much the climate responds to changes in GHG scenarios. One challenge which arises in such studies is the emergence of a feed-back event in the system: climate changes themselves influence the reflectivity of the sun and oceanic temperatures, and these changes, in turn, have further impacts on the overall warming phenomena. The models account for these variations in different ways.

Results for today's presentation were selected from a parallel climate model for the lower sensitivity temperature change, along with two medium- and medium-high sensitivity models. The Union of Concerned Scientists has evaluated the emission scenarios in California for each of the scenarios. The worst-case projection was for an 11°F increase in the summer by the end of the century, with other scenarios projecting smaller temperature increases. As global climate models, which are large-scale, were used, a statistical downscaling was conducted in order to achieve a smaller-scale prediction for California.

As to the findings on the impacts on air quality and public health from global temperature increases, 90% of the California population does not live in areas that meet the state air quality standards, and it will become even more difficult to meet these standards. There is the potential for up to 9,000 additional deaths annually from air pollution and \$3.5 billion in economic impacts. Significant increases in ozone exceedances will occur in Southern California and the San Joaquin Valley.

In reply to Dr. Bornstein's question on the impact of the sea breeze on mitigating temperature increases and therefore ozone concentrations in coastal areas, Ms. Luers noted that in terms of downscaled and non-downscaled data, there is an inland gradient with a slight cooling on the coast, but even so, temperatures in Los Angeles nevertheless increased in the scenarios evaluated.

If temperatures increase according to the mid-range scenario, air pollution will still be further aggravated by a doubling in the number of major wildfires, exposing the population to large amounts of particulate matter over several days. The cost of responding to such disturbances in the ecosystem in the state will prove costly, on the order of hundreds of millions of dollars.

The analysis on water resource impacts of various temperature projection scenarios indicates that precipitation levels will not vary that much from current levels, but significant losses in the snow pack in the Sierras will occur. Between 2070 and 2099 only 30 % of the current snow pack will remain in the lowest temperature rising model and 10% in the highest range. This has negative implications for the state's water supply and for the ski industry. The Sierra snow pack provides approximately one-third of California's surface water storage.

Global warming also presents challenges for the state's agricultural industry, which is dependent on the availability of water for irrigation. Increases in ozone concentrations can adversely affect crop productivity, and also the spread of weeds and pests. Temperature increases will reduce the number of chill hours (below 45°F) that are necessary for fruit trees to set their fruits properly, resulting in either deformed or no fruit produced.

Sea levels will rise in each of the global warming scenarios studied, such that between 2000 and 2100, there will be an increased likelihood of flooding and coastal erosion. In the highest warming scenario, the rise is predicted to be up to 30 inches, and up to 10 inches in the lower temperature scenario. The models that have been used show a slower rate of destabilization of the arctic glaciers than what is actually occurring.

In the overall context of global warming, however, the hopeful news is that the more severe impacts can be avoided if GHGs emissions are sufficiently reduced:

- In the high temperature increase scenario, there is an anticipated 90% loss of the Sierra snow pack, a 20-30 inch increase in the sea level, and an 85% increase in days conducive to ozone formation.
- In the medium-high scenario, there is an projected loss of 70-80% in the Sierra snow pack, a 12-20 inches in sea level, and a 75-85% increase in the days conducive to ozone formation.
- In the lowest temperature increase scenario, there is an anticipated 30-60% loss of the Sierra snow pack, a 4-12 inch rise in the sea level, and a 25-30% increase in the days conducive to ozone formation.

Ms. Luers concluded her presentation by noting that, in order to avoid the worst-case scenarios by 2050, the industrialized world must follow California's lead and reduce emissions of GHGs 80% below 1990 levels.

Chairperson Bornstein invited Ms. Luers to give her lecture to his students at San Jose State University. He added that the University has atmospheric models that can conduct simulations on a one-kilometer basis for California meteorology. While these focus on urban areas and sea breezes, there is interest in conducting further downscaling. Dr. Holtzclaw urged that Ms. Luers also provide her presentation to the District's Governing Board.

In reply to questions, Ms. Luers noted that the model assumes that CO₂ emissions have a consistent mix. California is the 12th largest emitter of GHGs in the world, and has the power to influence policy in the United States, which contributes 25% of worldwide GHG emissions. Dr. Bornstein replied that both China and India will contribute increasing GHG emissions in the coming years, but seem unwilling to take the emission reduction measures identified as necessary by scientists, unless the western developed countries are prepared to pay for such measures. Ms. Luers noted that in 30-40 years, China and India will compete with the United States, but the latter will still be a major contributor of emissions, especially on a *per capita* basis. While emission trading might be a component of emission reduction strategies, the inequity of emissions impacts needs to figure into the overall evaluation.

Ms. Luers noted that while additional study of global warming *per se* is not needed, three key steps should be taken now: (a) more study to evaluate better the dynamics of the impacts that must be avoided, and also how on to adjust to them; (b) investment in efficiency programs and clean technologies; and (c) setting a cap on GHG emissions based on current science.

Chairperson Bornstein inquired if Ms. Luers had studied the effect of coastal flooding in the San Francisco Bay Area if the sea level were to rise. Ms. Luers responded that the Union of Concerned Scientists assessed the San Francisco Bay for the additive effect of a sea rise, storm intensity and variations in oceanic warming patterns. The graph that resulted was complex from a technical perspective. She noted that there are two websites that address this and that she would forward that information to the Chairperson.

- 5. Committee Member Comments/Other Business.** Dr. Holtzclaw called attention to a letter from Jack P. Broadbent, Executive Officer/APCO to each Council member, which announces that ethics training will take place for the Board of Directors, Advisory Council and Hearing Board members regarding AB 1234 on Thursday, May 11, 2006, from 9:30 a.m. – 11:30 a.m. in the District's Board Room.
- 6. Time and Place of Next Meeting.** 10:00 a.m., Wednesday, June 14, 2006, 939 Ellis Street, San Francisco, CA 94109.
- 7. Adjournment.** 11:05 a.m.

James N. Corazza
Deputy Clerk of the Boards

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

DRAFT MINUTES

Advisory Council Technical Committee
1:00 p.m., Wednesday, June 14, 2006

- 1. Call to Order – Roll Call.** Mr. Altshuler called the meeting to order at 1:17 a.m. Present: Sam Altshuler, P.E., Irvin Dawid, John Holtzclaw, Ph.D. Absent: Louise Bedsworth, Ph.D., Robert Bornstein, Ph.D., Chairperson, William Hanna, Stan Hayes.
- 2. Public Comment Period.** There were no public comments.
- 3. Approval of Minutes of April 12, 2006.** The approval of minutes was deferred to the next meeting due to the lack of a quorum.
- 4. Ambient Particulate Matter (PM) and the Evolution of Concern to Ultrafine PM.** Technical Committee member Sam L. Altshuler, P.E., Senior Program Manager, Clean Air Transportation Group, Pacific Gas & Electric, San Francisco, California, stated he would review key information presented at a recent conference on Ultrafine PM held at the South Coast Air Quality Management District.

Mr. Altshuler reviewed the history of PM measurements from the 1950's with the British Smoke measurements to the early category of "Total Suspended Particulates" (TSP) at the level of 50 microns. In the mid-1980's, PM₁₀ was the new fraction of measurement, followed in the 1990's by PM_{2.5}. At the present time, the nanoparticle (nPM) of 1-100 nanometers is getting attention.

The size fraction of measurement has evolved in parallel with the ability to measure smaller fractions of PM. Motivations to assess the impacts of fine PM are due to the greater visibility impairment in blockage of light, the soiling of materials and monuments, and health impacts related to diesel PM, both in terms of chronic effects (cancer, silicosis) and acute effects (asthma and pulmonary symptoms).

Measurement techniques have also evolved over time from 8"x10" filters, impactors with size separation, coefficient of haze, Tapered Element Oscillating Microbalance (TEOM) and beta gauges, particle number counters, Scanning Electron Microscopy(SEM)-(E-Ray Fluorescence)XRF for size and chemistry, and real time sulfate and nitrate monitors.

PM sizes from the primary sources include TSP—wind blown dust, combustion ash and soot; PM₁₀—chiefly sea salt, dust, combustion soot; PM_{2.5}—combustion soot, and atmospherically formed NO₃ and SO₄; and PM_{0.1} and nPM—combustion soot, aerosols (condensed oils and fuels), and atmospherically formed NO₃ and SO₄.

At the South Coast conference, David Kettleon presented a slide showing the interaction between particle count and size of a number of different types of PM from typical engine exhaust, in terms of distribution by mass, number and surface area showing varying health impacts.

Health issues associated with PM have also evolved over time. Many early air pollution studies were conducted as chamber exposure studies. In the 1990's, many epidemiological studies were published. These examined population, morbidity and mortality, and found correlations that linked to PM exposure. However, causality was never established. Other studies argued at that time that extremes of heat and cold could be correlated with similar health effects.

A slide presented at the conference by Dr. John R. Froines addressed the potential pulmonary effects of PM. It showed mitochondria at extreme magnification and revealed how PM is lodged within the interior of the lung cells. Dr. Froines hypothesized that PM causes cardio-respiratory effects because it induces oxidative stress.

Mr. Altshuler added that Dr. Robert Sawyer, Chairperson of the California Air Resources Board (CARB), also gave a noon time presentation at this conference summarizing many aspects being discussed at the conference. He observed that there are health-related findings that ultrafine particles cause greater inflammatory response and greater cellular damage than fine PM. Even though they have less mass than fine PM, ultrafine particles have large surface areas and occur in great numbers. They contain toxic components that can initiate harmful oxidant injury in the lung and have high deposition rates in the lung. They can also access the circulatory system and move from the lungs to other organs.

Dr. Sawyer spoke on the health effects as a function of particle size, with ultrafine PM being the most serious in comparison with coarse and fine PM. With respect to the source distribution of PM, Dr. Sawyer opined that ultrafine PM comes primarily from vehicle exhaust and fuel use. Concentrations of ultrafine PM along freeways with heavy gasoline or heavy diesel traffic are similar. Mr. Altshuler observed that diesel PM is primarily related to the chronic 70-year cancer potential, while the smaller particles are associated with causing more acute symptoms. This has generated some interesting discussion in strategies for mitigating vehicular emissions.

Mr. Altshuler showed a chart that set forth the source contributions to primary ultrafine particle emissions in the South Coast air basin in 1996. Ultrafine particles were found to originate almost exclusively from combustion sources. Another chart assessing the annual average PM₁₀ source contribution in the San Joaquin Valley for large particulates indicated that over one-half derived from fugitive dust, 27% directly from mobile sources, 11% from burning and cooking, 5% from ammonium sulfate, and 4% directly from mobile sources, 11% from wood burning and meat cooking, and 27% from secondary formation from ammonium nitrate.

Taking these data into account, Mr. Altshuler stated he had tabulated the health effects associated with fugitive dust, ammonium nitrate, ammonium sulfate, burning/cooking, and direct mobile sources. The preliminary calculations indicated that the highest risk factor was found in direct mobile sources for both chronic and acute symptoms. At the conference, however, there was no discussion of the possible health effects of ammonium nitrate, and to date no literature on this subject has been published. Wood burning and cooking also showed higher risk factors for acute and chronic pulmonary symptoms.

Mr. Altshuler stated that, at the conference, Charles Stanier presented a chart on how ultrafine PM is formed in the atmosphere throughout the day and found that it greatly resembles the ozone formation plot. A second slide by Stanier showed the formation of ultrafine PM on a cloudy and sunny day in Pittsburgh on November 10 and 11, 2001. The plot also paralleled the plot for ozone formation.

Mr. Altshuler concluded that adverse health effects of PM are determined by the concentration of PM, the potency/unit risk factor of the chemical constituents contained therein, and then the size and number of the particles. He added that controls are separately needed for nPM as well as ultrafine PM in order to complement the reductions in diesel PM. Such controls ought to consider lube oil regulations and its formulation for internal combustion engines.

While no health impacts have been reported to date for PM nitrate, the San Joaquin Valley plans to reduce PM nitrate to attain the PM_{2.5} standard. However, health impacts from nitrogen dioxide (NO₂) are being reported at increasingly lower levels. This should be closely followed along with the evolution of a lower NO₂ standard by CARB.

Mr. Altshuler added that the following anecdotal conclusions are fairly well-known:

- Diesel smoke is linked to chronic health effects (cancer).
- Ultrafine particulates are linked to acute and chronic cardiopulmonary health effects (heart attacks, asthma, etc.).
- Diesel soot seems to adsorb ultrafine PM aerosols.
- Reducing diesel smoke with a diesel PM increases exposure to ultrafine (a tradeoff between cancer and cardiopulmonary health effects) as well as increased NO₂.
- Other lube oil using IC engines can emit ultrafine PM similar to diesel.
- nPM falls off rapidly within 300 meters of a freeway but grows into larger particles as they move away from the freeway.
- Exposure to PM when your respiratory system is compromised exasperates the situation: extreme heat or old does the same.
- The question of second hand cigarette smoke may be related ultrafine PM.
- Meat should be salted after, and not before, it is grilled to reduce dioxin exposure.

Mr. Altshuler stated that ultrafine PM will become an increasingly important issue in the regulation of PM. Mr. Hess added that this will be addressed at the forthcoming Air & Waste Management Association conference.

- 5. Committee Member Comments/Other Business.** Mr. Dawid stated that in recent news articles, a trend toward an increase in diesel fuel vehicles in the fleet has been identified, and this raises serious air quality questions. Mr. Altshuler replied that this also raises issues of greenhouse gas emissions (GHGs), exhaust standards and other regulatory categories. The Council must assess whether or not it has a role to play in assessing the issue of increasing diesel fuel vehicles in the overall vehicle fleet. This could initially be discussed at the Committee level in the future.

6. Time and Place of Next Meeting. 1:00 p.m., Wednesday, August 9, 2006, 939 Ellis Street, San Francisco, California 94109.

7. Adjournment. 2:25 p.m.

James N. Corazza
Deputy Clerk of the Boards