



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

ADVISORY COUNCIL TECHNICAL COMMITTEE

AGENDA

COMMITTEE MEMBERS

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

WILLIAM HANNA
JOHN HOLTZCLAW, PH.D.
KRAIG KURUCZ

MONDAY
AUGUST 6, 2007
9:00 A.M.

7TH FLOOR 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 April 16, 2007 Minutes and June 11, 2007 Minutes

4. Presentation on “Evaluating the use of ethanol and its impact on ozone and public health as well as an update on carbon and climate change”

Dr. Mark Z. Jacobson, Professor of Civil Environmental Engineering at Stanford University, will present to the Committee his recent work on evaluating the use of ethanol and its impact on ozone and public health as well as an update on carbon and climate change.

5. Presentation on ambient methane trends

Sam Altshuler will present information on ambient methane trends for discussion.

6. 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. .

7. Time and Place of Next Meeting. 9:00 a.m., Monday, October 8, 2007, 939 Ellis Street, San Francisco, CA 94109.

8. Adjournment.

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

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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.

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

EXECUTIVE OFFICE:
MONTHLY CALENDAR OF DISTRICT MEETINGS

AUGUST 2007

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Regular Meeting (Meets 1 st & 3 rd Wednesday of each Month) - CANCELLED	Wednesday	1	9:45 a.m.	Board Room
Advisory Council Technical Committee (Meets 2 nd Monday of each even Month)	Monday	6	9:00 a.m.	Board Room
Advisory Council Air Quality Planning Committee (Meets 2 nd Wednesday of each even Month) - CANCELLED	Wednesday	8	9:30 a.m.	Board Room
Advisory Council Public Health Committee (Meets 2 nd Wednesday of each even Month) - CANCELLED	Wednesday	8	1:30 p.m.	Board Room
Advisory Council Executive Committee	Thursday	9	9:00 a.m.	Room 716
Board of Directors Regular Meeting (Meets 1 st & 3 rd Wednesday of each Month) - CANCELLED	Wednesday	15	9:45 a.m.	Board Room
Board of Directors Budget & Finance Committee (Meets 4 th Wednesday of each Month) - CANCELLED	Wednesday	22	9:30.m.	4 th Floor Conf. Room
Board of Directors Mobile Source Committee - (Meets 4 th Thursday of each Month) - CANCELLED	Thursday	23	9:30 a.m.	4 th Floor Conf. Room
Board of Directors Legislative Committee (Meets 4 th Monday of every Month) - CANCELLED	Monday	27	9:30 a.m.	4 th Floor Conf. Room

SEPTEMBER 2007

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Regular Meeting (Meets 1 st & 3 rd Wednesday of each Month)	Wednesday	5	9:45 a.m.	Board Room
Board of Directors Public Outreach Committee (Meets 1 st Thursday every other Month)	Thursday	6	9:30 a.m.	4 th Floor Conf. Room
Advisory Council Executive Committee	Wednesday	12	9:00 a.m.	Room 716
Advisory Council Regular Meeting	Wednesday	12	10:00 a.m.	Board Room
Board of Directors Stationary Source Committee (Meets 3 rd Monday quarterly)	Monday	17	9:30 a.m.	4 th Floor Conf. Room

SEPTEMBER 2007

<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	19	9:45 a.m.	Board Room
Board of Directors Climate Protection Committee – <i>(Meets 3rd Thursday every other Month)</i>	Thursday	20	9:30 a.m.	4 th Floor Conf. Room
Joint Policy Committee	Friday	21	10:00 a.m. – 12:00 p.m.	Metro Center Auditorium 101 – 8 th Street Oakland, CA 94607
Board of Directors Legislative Committee <i>(Meets 4th Monday of every Month)</i>	Monday	24	9:30 a.m.	4 th Floor Conf. Room
Board of Directors Budget & Finance Committee <i>(Meets 4th Wednesday of each month)</i>	Wednesday	26	9:30 a.m.	4 th Floor Conf. Room
Board of Directors Mobile Source Committee – <i>(Meets 4th Thursday of each Month)</i>	Thursday	27	9:30 a.m.	4 th Floor Conf. Room

OCTOBER 2007

<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	3	9:45 a.m.	Board Room
Advisory Council Air Quality Planning Committee <i>(Meets 2nd Wednesday of each even Month)</i>	Wednesday	10	9:30 a.m.	Board Room
Advisory Council Public Health Committee <i>(Meets 2nd Wednesday of each even Month)</i>	Wednesday	10	1:30 p.m.	Board Room
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	17	9:45 a.m.	Board Room
Board of Directors Legislative Committee <i>(Meets 4th Monday of every Month)</i>	Monday	22	9:30 a.m.	4 th Floor Conf. Room
Board of Directors Budget & Finance Committee <i>(Meets 4th Wednesday of each Month)</i>	Wednesday	24	9:30.m.	4 th Floor Conf. Room
Board of Directors Mobile Source Committee – <i>(Meets 4th Thursday of each Month)</i>	Thursday	25	9:30 a.m.	4 th Floor Conf. Room

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7/25/07 (10:50 a.m.)

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

DRAFT MINUTES

Advisory Council Technical Committee
9:00 a.m., Monday, April 16, 2007

1. **Call to Order – Roll Call.** Chairperson Sam Altshuler called the meeting to order at 9:05 a.m. Present: Sam Altshuler, P.E., Chairperson, Louise Bedsworth, Ph.D, John Holtzclaw, Ph.D., Kraig Kurucz, William Hanna, (9:10 a.m.), Robert Bornstein Ph.D., (9:20 a.m.).
2. **Public Comment Period.** There were no public comments.
3. **Approval of February 28, 2007 Minutes.** The minutes carried unanimously.
4. **Overview of the South Coast Air Quality Management District’s (SCAQMD) MATES III Program and the Air District’s CARE program:** The Committee Members compared and contrasted the MATES III program and the CARE program. The following Matrix was developed. A draft of the matrix was sent to the SCAQMD for review.

Comparison of Programs

South Coast AQMD MATES Program	Bay Area AQMD CARE Program
MATES I 1987	CARE 2005
MATES II 1988-1999	Phase I 2006
MATES III 2004 - 2006	Phase II 2007
Population: 14? Million	Population: 7 million
Cost: \$2 Million Per Year	Cost: \$1 Million per Year
Focus: Marine Ports, Air Ports, Highways	Focus: Marine Ports, Region-wide, Freeways
Grid: 4/2 km	Grid: 2 km
20 Member Technical Advisory Group	15 Member Technical/Community Committee
Components Being Monitored: Metals, (Chromium VI, Nickel, Cd,) PAHs, VOC’s, (Benzene, Diesel PM, Formaldehyde, Acetaldehyde, Naphthalene, 1,3, Butadiene (Elemental Carbon), Acrolein-being considered	Components Being Monitored, (Chromium VI, Nickel, Cd,) PAHs, VOC’s, (Benzene, Formaldehyde, Acetaldehyde, Naphthalene, 1,3, Butadiene (Diesel PM, Elemental Carbon), Acrolein-being
PM Sizing	No PM Sizing
Woodsmoke from Wild fires	Special Study Markers for Woodsmoke – residential woodburning, Carbon dating

Neither Program looking @ Lube oil	
10 Fixed Sites; 3 microscale Sites Temp. Monitoring Stations	23 Permanent Sites
3 Mobile Sites/temporary sites	No temporary sites
Results: 1998/1999 Cancer Risk 1400 per mil from air toxics	Results: 2000 - Cancer Risk 700 per mil from air toxics
Diesel PM causes 71% of cancer risk	Diesel PM Causes 80% of cancer risk measurement
20% of cancer risk from Benzene, formaldehyde, 1,3/ Butadiene	?
Benzene is decreasing in South Coast Area	Benzene is decreasing in Bay Area
Perc is decreasing in South Coast Area	Per is decreasing in Bay Area
Formaldehyde, and Acetaldehyde are remaining flat	?
Acrolene is flat?	Acrolene is flat
Modeling: Some Regional and Local scale plans to update	Modeling: Plan to conduct regional and local

5. Presentation on “Health Effects of Fine PM Species in Daily Mortality and Morbidity in California”: Dr. Bart Ostro Ph.D., Chief Air Pollution Epidemiology Unit, Office of Environmental Health Hazard Assessment (OEHHA), California Environmental Protection Agency (Cal EPA); delivered to the Committee a presentation on the “Health Effect of Fine PM Species on Daily Mortality and Morbidity in California” which he co-authored. Dr. Ostro’s presentation included the following topics:

- Introduction – Background on PM2.5
- Previous Epidemiologic results on PM2.5 and its components
- Mortality Study
- Findings on Susceptible Subgroups (prelim)
- Findings on Morbidity (prelim)
- Biologic Mechanisms
- Summary
- Future Work

Dr. Ostro stated he is with the California Office of Environmental Health Hazard Assessment (Cal OEHHA) which is part of Cal EPA. His official responsibility is to recommend state air quality status to the Air Resource Board (ARB). Dr. Ostro did a great deal of research with regards to issues relating to Criteria Air Quality; his presentation focused on the issues published a month or two ago on Mortality. The Committee heard the first public presentation on Morbidity. Dr. Ostro states that he has worked on sensitive populations to see which population is particularly sensitive to some of the elements of the study that will be enumerated later. Most of the morbidity epidemiology discussion is based on the conditions, respirations and data. Bio-monitoring; a medium with which to see chemical analysis in the body; it captures chemical that people have in their bodies that are higher than the required standard

helped achieve result in this study. At this point, Mr. Altshuler noted that Richard Jackson from CDC gave a presentation of the subject to the Advisory Council about a year ago. Dr. Ostro added that findings show that people have much chemical in their body; about 100 times the normal amount.

Dr. Ostro explained the components of PM_{2.5} as a heterogeneous mixture of solid and liquid from multiple sources which can be gas to particle conversion or directly emitted particles. He added that to identify the components and sources of PM_{2.5} could help target its control and strategy. Several epidemiology studies link PM_{2.5} with mortality and these include:

1. Short Term exposure and daily mortality
 - Six United State cities (Schwartz et al. 1996, 2003)
 - Eight Canadian cities (Burnett et al. 2003)
 - Nine counties (Ostro et al. 2006)
2. Long term exposure and mortality
 - Dockery et al. 1993; Laden et al. 2006
 - Pope et al. 2006
 - Krewski et al 2000

Dr. Ostro noted a crucial question “what is the relative toxicity of PM_{2.5} components?” he also stated that one criticism is of control strategy, we think about high cost and things that are toxic. With all PM_{2.5} components; be it toxic or diesel, factory or restaurant, or from dwellings, the most important question is what kind of coefficient it has to health effect and what source it comes from. NAS and WHO recommended determining the toxicity of different particle characteristics and sources is a research priority because (1) Very few epidemiologic studies have examined components or sources; (2) it could help target pollution control effort and reduce overall abatement costs; (3) it could improve health impact assessments; and (4) it may help explain heterogeneity in multi-city studies.

Dr. Dave Fairley asked if any research has taken these multi-city studies and estimated the range to see the difference? In his response, Dr. Ostro said that John Hopkins and his group are looking into the variations to see the coefficient and what the specific elements are. Dr. Ostro also added that in some hypothesis, there are some generic responses due to the generic particles and generic depositors in different counties and countries. And the one for California is different due to the toxicity. The results and studies of components or sources on mortality include; (a) Mar et al. 2000 showed that EC/OC generated from motor vehicle exhaust related to mortality in Phoenix; (b) Laden et al. did studies in six US cities and showed that markers for motor vehicles and residual oil sulfates but not crusty materials relate to death; (c) Burnett et al. 2000 also did a study in Canada and found that sulfates, zinc, nickel and iron relate to death. However, NO₃, EC, OC in relation to mortality were not measured.

In California, PM_{2.5} studies are different from that typically studied; the source mix and chemistry are quite different with regards to PM_{2.5} in California and Southern California in particular. The study shows that Nitrate is greater share of PM_{2.5} but different in the east and many other parts of the world. Dr. Ostro also added that the winter concentration is higher than summer. At this point, Dr. Bornstein asked the reason why the winter is higher. Dr. Ostro

further explained that many pollutants come into play in different ways; the biomass, nature of gas constituent, adequate chemistry and other combination theory that change all the time. Dr. Ostro added that the data collected will depend on the country. Dr. Bornstein further clarified that ozone produces a lot of Nitrate particles in the summer and Nitrate is higher because it does not pull until it is colder and thus wood burning in winter along with the higher concentration of PM_{2.5}. Other reasons why PM_{2.5} in California is typically different according to Dr. Ostro's study is greater indoor penetration and people spending more time outdoors. In response to Dr. Bedsworth's question on outdoor penetration, Dr. Ostro noted that there are not enough data about outdoor models.

Methodologies in this study included:

Methodology I, Time-series regression analysis used follows that of Ostro et al. (2006) linking PM_{2.5} to mortality, and many others (HEI 2003). Daily counts of mortality that involve hospital admits modeled as Poisson, conditional on time-varying covariates of time, weather, and day of week were also used. The use of smoothing splines to control for time, temperature and humidity was also part of the methodology used. (Spline is non-linear data-driven functions that smooth the relation of mortality and time).

Dr. Ostro pointed out the All-cause mortality in Sacramento County for 2000-2003 and emphasized the differences between the Mortality and Time without Smooth versus the Mortality and Time with Smooth on the presentation. He noted that the smoothing made the control variation for seasonality more effective.

Methodology II comprised formula for Log(Mt) as well as examining single-day pollutant lags of 0 to 4 confounders like Smoking, Occupational exposure, and Indoor pollution that were taken into consideration.

Methodology III involved the random effects meta-analysis used to combine individual county results. Sensitive analysis like varying degree of freedom for time and weather, penalized spline, treatment of missing data and seasonal-specifics of cool season, October to March, were also used.

Results of the findings are as follows:

PM_{2.5} in the California Study of 2000-2003 showed that some counties have higher concentrations than others. The highest concentration is found in Riverside County with 27.1 followed by Orange County with 21.5 mean daily PM_{2.5} per microgram. Los Angeles came third with 20.8, Kern had 19.5; Fresno was 17.5, Santa Clara equaled 13.9 while Contra Costa and Sacramento had 12.8 and 12.6 respectively and San Diego came with the least amount of concentration of 15.3 mean daily PM_{2.5} per micrograms/cubic meter.

The components of PM_{2.5} studied in six California Counties where mean PM_{2.5} = 19.3 ug/m³; resulted in OC having the highest of 7.1 mass (ug/m³) followed by NO₃ with 5.5 mass (ug/m³); SO₄ came out with 1.9; EC resulted in 1.00; S was .5 while CU+Fe+Zn, K, Si and Cl

were at the barest minimum of a little above zero. However, some components noted as Other on the graph had the PM2.5 components of approximately 2.7 mass (ug/m3).

With regards to the Temporal Correlations of PM2.5 and Components, the presentation table showed the moderation of the chemicals overtime; with NO3 being the highest with 0.65 correlation. Also sulfate is seen to be higher in the summer.

The selective summary of meta-analytic associations for alternative lags is color-coded (red = $p < 0.05$; green = $p < 0.10$). Red denotes the most significant chemicals with health related problems. The chemicals that are most prominent in rate with cardiovascular health issues are PM2.5 (3), NO3 (3); denoted in green, SO4 (3), Zn (3), EC (2), Fe (2), K (2) also denoted in green. These chemicals; PM2.5, EC, OC, NO3, SO4, Cu, Fe, K, according to the findings do not show mortality caused by respiratory problem except for Zn that rate at 1 ($p < 0.10$). Mortality at age above 65 (age > 65) is seen in PM2.5 (3), Zn (3), and EC (2) all denoted with green that is equivalent to $p < 0.5$ while NO3 is (0) denoted in red. At this point, Phil Martien commented that it is surprising that not much respiratory death related issue existed in the findings.

The Cardiovascular Mortality 3 knots/year and 4 knots/year graph show the range of distribution possibilities of Excess Risk per Inter Quartile Range (IQR) and Species and Lag Days of 75th to 25th concentration risk of pollution per year differential. Knots were used to default the smoothing to see which is smoother. The graph shows which chemicals are at significant 5point level; these are PM2.5, SO4, and Zn while NO3 is at 10 point level whereas above zero percent is the normal range.

Selective summary of meta-analytic associations for Winter showed the cardiovascular related mortality traced the following chemicals; PM2.5 (3), NO3 (3), SO4 (3), Zn (3), all denoted in red ($p < 0.05$) and EC (2), Fe (2), K (2), Zn (2), denoted in green ($P < 0.10$). Respiratory related mortality was SO4 (3). Chemical related to death at age above 65 were significant in PM2.5, Fe, K and Zn.

Excess risks per microgram (ug/m3) for Cardiovascular Mortality of pollutants were tabularized with corresponding lags and percent change per microgram. The pollutants (PM2.5, EC, OC, NO3, SO4, K, Fe, Zn,) all have lags of three (3). Fe has the highest percent per microgram of 8.38 followed by K with 7.51, EC has 2.38, SO4 has 1.22 while PM2.5, OC, NO3, have 0.18, 0.34 and 0.36 respectively. However, Zn has overwhelmingly 194.9 and Sam Altshuler commented if Zn lined very well; that is if Zn is actually 194.6 or 1.946. Dr. Ostro responded that these numbers are not to be taken seriously and that 2.2% is the low estimate considering difference in measurement error and problems of measurement.

The Effect Modification and Mortality was examined with regards to gender, race and education. Cardiovascular mortality by education showed that non-high school graduates is about 10% while high school graduates is 46% of mortality related to EC, OC, Nitrate, Zn and Iron. Dr Ostro added that education is a proxy for a whole bunch of lag but possibility includes exposure study shows that lower income, lack of medical care and lack of exercise and smoking may be prime factors.

Future Work for the study will be based on the following areas:

- 1) Repeat study with larger data set
 - 2) Develop Chemical Mass Balance models to estimate effect of sources
 - 3) Estimate independent effects of temperature on mortality and morbidity and determine susceptible subgroups
 - 4) GIS-based analysis to examine exposure misclassification.
- 6. Committee Member Comments/Other Business:** Chairperson Altshuler stated that Tom Cahill, Professor Emeritus, University of California Davis will be at the next meeting. The Committee thanked Dr. Ostro for his presentation and presented him with a token of appreciation from the Air District.
- 7. Time and Place of Next Meeting.** The next meeting will be at 9:00 a.m., June 11, 2007, 939 Ellis Street, San Francisco CA 94109.
- 8. Adjournment.** 12:11p.m.

Chioma Dimude
Acting Executive Secretary

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

DRAFT MINUTES

Advisory Council Technical Committee
9:00 a.m., Monday, June 11, 2007

1. **Call to Order- Roll Call.** Chairperson Altshuler called the meeting to order at 9:08 a.m. Present: Sam Altshuler, P.E., Chairperson, Louise Bedsworth, Ph.D, John Holtzclaw, Ph.D, Robert Bornstein, Ph.D, Mr. Kraig Kurucz, (9:13 a.m.), Mr. William Hanna, (9:15 a.m.).
2. **Public Comment Period:** There were no public comments.
3. **Approval of Minutes of April 16, 2007.** Approval of minutes was deferred pending the Committee members input with regards to Dr. Bart Ostro's presentation on "The Effects of Fine Particle Species on Daily Mortality and Morbidity in California" that were not captured on the cassette tape on the day of the meeting.

Also the Committee requested that staff make changes on the comparison grid for the MATES and CARE programs. Changes and clarification requested regarding: A) Lube Oil Measurement; B) PM sizing; C) Acrolein trend. Clarify Grid: 4/2km and Grid: 2km as well as the term temporary vs. mobile sites.

4. **Presentation on "New Data on Heavily Traveled Secondary Roadways and their Mitigation":** Dr. Tom Cahill, Professor of Physics and Atmospheric Sciences, University of California Davis delivered to the Committee a presentation on "New Data on Heavily Traveled Secondary Roadways and their Mitigation." Dr. Cahill worked off of a 70 slide presentation. Key topics discussed included:
 - Information on health impacts of aerosols; the role of very fine and ultra fine particles.
 - Information on vehicular emissions; the increasing dominance of spark emission pollutants by mass; the higher toxicity of gasoline automobile car exhaust due to the presence of PAHs.
 - New information on air quality near freeways and secondary roadways

Dr. Cahill noted that his presentation was relatively new and was comprised of data gathered from different sources. Dr. Cahill's project in the Sacramento area is supported by the Sacramento Metropolitan Air Quality Management District. Dr. Cahill stated that the results of the Roseville study were not available, but would be soon. The Air District will receive the results when finalized.

Dr. Cahill started the discussion with current information about the inhalation of particulate matters, slides 4 and 5. Dr. Cahill directed the committees' attention to the health impact of ultrafine PM and how various sizes of PM are deposited in the lung and airways. Further, the ultrafine PM is laced with PAHs attributable to engine lube oil. Dr. Cahill pointed that with data on stroke ischemia heart disease result of 60% rise in the Central Valley, increasing from north to south, Shasta to Kern, slide 9. Dr. Cahill also added that according to the Health Effects Tasks Force Group meeting of January 2007, the health impacts include; short term trigger of asthmatic attacks, lung damage seen in children and increased mortality in the elderly. The Health Effect Task Force is an early warning group that meets every two months.

Interest in the study of PM air pollution near secondary roadways emerged from observing two lane streets in rural areas in Sacramento that accommodate about 65,000 vehicles a day that affected school and residents nearby. The roadways had expanded to about nine lanes and three rail lines. Dr. Cahill stated that new information was derived for vehicular emissions through several recent research projects for on-road diesel and gas emission rates. 75% of PM 2.5 is attributable to organic emissions from diesel and gasoline vehicles, Slide 13. Dr. Cahill directed the committees' attention to research results reported by Desert Research Institute, (DRI) linking toxicity to emissions associated with engine lube oil. Dr. Cahill promised to update the existing presentation after the meeting and email a copy to the committee. Chairperson Altshuler asked about DRI's opinion on the toxicity in lube oil. In response, Dr. Cahill stated that lube oil from cars is 10 to 20 times more toxic than emission from lube oil from diesels. In response to Dr. Bedsworth's questions of whether burning too much lube oil indicates that a vehicle is not running well? Dr. Cahill stated that lubricating oil should not burn at all.

Dr. Cahill spoke about another study of zinc aerosol at Fresno during the Fresno Asthmatic Children's Environmental Studies (FACES). There were sparks of zinc from pesticides being applied to fields many miles away; as well as from fireworks in Fresno and the Bay Area. The zinc was measured along with other elements (phosphorous, sulfur, Potassium, zinc) also found in the exhaust of diesel and gasoline engines.

New information on the toxicity of car exhaust showed that spark ignition car exhaust is more toxic than diesel truck or busses. Cars have more PAHs in their oil than diesels. Benzo-a-pyrene is the worst per mass. In response to Mr. Altshuler's question on why the Benzo-a-pyrene is the worst per mass, Dr. Cahill responded that Eric Fujiti's (DRI) theory is that the oil in small spark ignition vehicles exposes oil to conditions favorable for creating PAHs. Another point is that higher temperature in diesel combustion destroys the PAHs. Also Dr. Cahill reported CNG busses in Davis have about four times the ultra fine particles as normal diesel busses. When questioned by the committee, these busses were found to be old and not typical of state-of-the-art CNG engines sold today.

Dr. Cahill stated that the Roseville railyard trains are the most toxic and rich in PAH, this study revealed that the trains buy cheap Nevada fuels that is rich in sulfur and travel into California; and the oils also never get changed.

In slide 56, Dr. Cahill showed how very fine and ultrafine PM have relatively high removal rates via diffusion if a surface is close; vegetation can provide such a surface. Dr. Cahill stated that Redwood vegetation was used in an experiment to show how they capture fine particles and ultra fine particles. As wind speed increase above 1 mile per hour, the vegetation increased its effectiveness in capturing PM.

Dr. Bornstein asked a question regarding the fraction penetrating vegetation on the graph because Dr. Cahill related the experiment to his previous results on thermal plume study. However, Dr. Bornstein clarified that the vegetation experiment is horizontal advection through the trees and thermal plume is vertical transport; therefore for real highway and low speed, with thermal affect, the material will not move horizontally to be filtered by the trees hence; the result cannot be combined. Dr. Cahill stated that his data was derived from sampling derived from Lake Tahoe. During the sampling, at night, the wind comes down the mountain. Thus bubble of air moves up about 100 meters every night and diffuses laterally outward and both sides of the highway. However Dr. Bornstein cautioned that the data should be used with care when relating it with thermal plume result because the physics are different.

Data of eight drum samplers, Slide 57 were taken from Arden Middle School and compared to the sample from Roseville Railyard; Dr. Cahill noted that the data showed that at a period of time, transport from the Bay Area caused pollution. Also with the result, the EPA region IX felt that the Roseville Railyard was as worse as Arden Middle School in Sacramento area. When the particles were measured, mass in coarser fractions showed Arden Middles School with less aerosol but when the mass finer fractions was measured, Arden Middle School rose in proportion to Roseville Railyard. The comparison also showed that for nickel, copper and zinc, there is more zinc at Arden Middle School than there is at Roseville Railyard, Slide 66.

In summary, Dr. Cahill stated that roadways in residential areas are the overwhelming contributor to all California Toxic Air Contaminants (TAC) impacts statewide, Slide 66. Most vehicular aerosols are from cars; car exhaust is more toxic than diesel exhaust per unit mass. Also freeways are less of an impact because there are fewer freeways than secondary roadways; they are generally better buffered from residences; the high traffic velocities induce better mixing and lofting of emissions, and the vehicles tend to be cleaner.

Dr. Cahill noted that since roadways, traffic, and toxic emissions cannot be eradicated; mitigation will be the line of action. The most important is mitigating from the source which include: 1) Roadway source improvement; cleaner engines,

fuel, and new synthetic lubricating oils; also removal of gross emitting vehicles from roadways; reduce traffic via transportation alternative; 2) Roadway design options – “Complete streets”; highway design; cut section, tunnel cleaned, pollution barriers- use waste heat and vegetation to loft and trap ultra fine particles; 3) Reduce transportation efficiency to residences; distance, pollution barriers.

Mr. Kurucz asked how the three measurement factors impact the measurement of particulate sizes, if there was any cascading factor. In response, Dr. Cahill noted that the measurement method called Multiple Office Uniform Deposit Impact (MOUDI) was developed by the University of Minnesota; a non rotating single stage factor that has ultra fine capabilities used mostly for chemistry though very hard to work with. The Drum sampler was used also as well as the Cad point factor and Advanced light source in Berkeley. Altogether, 81,000 analyses were done in the last six months. Particle counters was also used in the measurement.

Mr. Kurucz also asked for clarification about the ambient air; whether its measurement involves over sampling or under sampling in regards to the changes in wind velocity. Dr. Cahill stated that they used EPA certified PM tin elipse.

Mr. Altshuler commented on his concern regarding lube oil, he stated, there should not be a generalization about natural gas having more oil emissions. The issue is that old diesel engines can be sucking oil in the valvegide probably oil control was not taken into consideration at time of manufacture; but a recent model Honda natural gas passenger car engine shows cleaner engines. He also added that when oil is being used it is evaporating not burning. Mr. Altshuler stated that oil is a big issue that relates to zinc, phosphorous, and should be added to the Air District’s CARE program study.

Dr. Holtzclaw added that one of the major issues is the impact of certain urban design; high density areas of busses and cars using the road, there are also more lungs breathing those particles. Thus “Complete Street” as mentioned in the presentation seems to be a good solution and will make people walk more and drive less.

Dr. Bornstein pointed that circulation should be clarified regarding the thermal effect of low wind speed at night and high wind effect, stating that the meteorology should be clearly stated.

Mr. Kurucz requested the full data of the critical graph that Dr. Cahill showed briefly on Roseville Railyard data be sent to the Technical Committee when completed. Mr. Kurucz also asked how reliable is the higher level model, in terms of validating recommendations? Dr. Cahill responded that using a better model will be helpful but the team does not have a better model at the moment. Dr. Bornstein added that the Monte Carlo model involves particles and sophisticated meteorology but the model that Dr. Cahill used had one wind thus particle model is usually

driven by meteorological factors that has variation in space and time; this made the meteorology and dispersion transport captured in a more sophisticated way.

Mr. Altshuler presented to Dr. Cahill a token of appreciation for his trip and presentation to the Committee.

- 5. Committee Member Comments/Other Business:** Mr. Hanna raised the issue he heard concerning Honda hybrid vehicles which should be serviced after 100,000 miles at the cost of \$1,500 but it actually cost \$5000 to recharge. The desirability of this model will be decreased by the cost for battery service replacement.

Mark Jacobson of Stanford will be presenting to the Committee; the topic of ethanol/ozone/public health as well as an update on black carbon and climate change.

Mr. Altshuler asked Mr. Hess if there is anything staff wants the Technical Committee to look into. Mr. Hess responded that after the summer recess, the staff will look into what the Council has completed with regards to assignment and look at what direction to take.

Staff member, Mr. Saffet Tanrikulu relayed to the Committee the following topics that might be of interest, 1) ammonia emission inventory; the Air District has a contract with STI who is developing ammonia emissions inventory for the Air District, the results may be in by October; 2) Trend Analysis for Ozone; two groups are working on this issue; Charles Blancha (Consultant) and UC Davis; 3) Particulate Matter and episodes in the winter time and meteorology. The District is working with UC Davis on characterizing the meteorology; the result may be available by next year, 2008.

Dr. Bornstein stated that Mr. Bart Cruz liked the work they did on the Cooling in the Coastal Area, however, Mr. Cruz commented that the models cannot reproduce the downward trend in ozone observations solely by emission and reduction, thus he thought that perhaps the cooling that was observed in the Los Angeles area and the Bay Area might also be a factor in lowering ozone. Dr. Bornstein asked if the work that the staff is doing involved modeling and does the modeling fail to capture the magnitude of downward trend.

Dr. Bornstein promised to give the staff the results of the work that was done on 'The Cooling in the Coastal Area'.

Dr. Bornstein inquired if staff would be interested in the Committee focusing on shipping and aircraft emissions if there is someone specialized in that area.

Mr. Tanrikulu responded that staff has been looking into those emission issues.

Chairperson Altshuler thanked Mr. Hess for his leadership and support all these years, Mr. Hess will be retiring from the Air District in July.

6. **Time and Place of next meeting:** 9:00 a.m., Monday, August 6, 2007, 939 Ellis Street, San Francisco, CA 94109.
7. **Adjournment:** The meeting adjourned at 12: 08 p.m.

Chioma Dimude
Acting Executive Secretary