Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
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APPROVED MINUTES

Advisory Council Regular Meeting
9:00 a.m., Wednesday, June 8, 2011

CALL TO ORDER

Opening Comment: Chairperson Blonski called the meeting to order at 9:05 a.m.

ROLL CALL

Present: Chairperson Ken Blonski, M.S.; Secretary Robert Bornstein, Ph.D. and Council Members Sam Altshuler, P.E., Jennifer Bard, Louise Bedsworth, Benjamin Bolles, M.S., Jeffrey Bramlett, Harold Brazil, Peter Chamberlin, Jonathan Cherry, AIA; Alexandra Desautels; John Holtzclaw, Ph.D., Kraig Kurucz ; Gary Lucks, JD, CPEA, REA I; Liza Lutzker; Jane Martin, DrPh; Kendall Oku; Jonathan Ruel and Dorothy Vura-Weis, M.D., M.P.H.

Absent: Vice Chairperson Stan Hayes

Public Comment Period: There were no public comments.

CONSENT CALENDAR

1. Approval of Minutes of the May 11, 2011 Advisory Council Meeting:

Member Altshuler noted that his title was stated incorrectly on the May 11, 2011 minutes**.**

Council Action: Member Holtzclaw made a motion to approve the minutes of the May 11, 2011 Advisory Council Meeting, with the correction as noted; Member Martin seconded the motion and it carried unanimously without objection.

PRESENTATION: ULTRAFINE PARTICLES

2. Ultrafine Particles: Sources and Characteristics

A. Mobile Source Ultrafine Particle Emissions: Past, Present and Future

Deputy Air Pollution Control Officer, Jean Roggenkamp, introduced speaker Dr. Barbara Zielinska and offered the following biographical information about Dr. Zielinska:

Dr. Zielinska is a Research Professor at the Desert Research Institute, Division of Atmospheric Sciences, Reno, Nevada and the Director, of the Organic Analytical Laboratory.

Dr. Zielinska has been working in the field of organic analysis for over 30 years. She has extensive experience in development of measurement methods for organic compounds in both gas and particle phases in ambient air. She has also developed analytical methods for identifying biologically active compounds in primary and secondary particulate organic matter, kinetics and products of gas-phase reactions. She has published numerous articles on emissions sources of organics in the gas and particle phases, including leading edge work in diesel particulate matter emissions and secondary particle formation. She has served on the US EPA Clean Air Scientific Advisory Council (CASAC) that provides scientific guidance to Congress and is currently a member of the CASAC Ambient Air Monitoring and Methods Subcommittee.

Dr. Zielinska earned her M.Sc. in Chemistry at the Technical University of Lodz, Poland and Ph.D. in Chemistry from the Polish Academy of Sciences.

Dr. Zielinska gave her presentation to the Advisory Council. The power point presentation is attached to these minutes for further detail. Dr. Zielinska explained past scientific methods and results of measuring ultrafine particulate matter. She reviewed studies of emissions from gasoline and diesel engines, and showed comparisons of emissions that occur related to driving speed, load and temperature. She discussed particle size, composition and distribution for a variety of fuel types and engines.

Dr. Zielinska presented results from the Advanced Collaborative Emissions Study (ACES) which looked at four engine types and compared emissions against past standards to show improvements in emissions technology since 1998. The results showed significant decreases in regulated particulate matter (PM), carbon monoxide (CO), and non-methane hydrocarbons (NMHC) emissions, close to 90% or greater below the 2007 standard; and nitrogen oxide (NOx) was 10% below the standard. Comparisons between a 2004 engine and a 2007 engine showed decreases in unregulated emissions of between 71 – 99%.

Dr. Zielinska affirmed that the concentrations and spatial variations in the diesel particulate matter (DPM) estimated from the West Oakland Monitoring Study (WOMS) data were consistent with the adjusted modeled results from the California Air Resources Board (ARB) and the Air District's health risk assessment.

Dr. Zielinska talked about the Health Effects Institute (HEI) studies performed using the EUPHORE photo-reactor located in Valencia, Spain. The HEI Special Committee on Emerging Technologies produced a report titled "The Future of Vehicle Fuels and Technologies: Anticipated Health Benefits and Challenges" that discussed promising new technologies such as engine modification and exhaust aftertreatment, as well as electric drive technologies and new fuels for the future of emissions reductions.

Dr. Zielinska discussed her answers to the questions posed by the Advisory Council prior to her appearance. She stated that ultrafine particles (UFP) can originate from anthropogenic sources (i.e. direct motor vehicle emissions) and from biogenic sources (secondary organic aerosol (SOA) from terpenes/ sesquiterpenes emissions). She assessed that ambient UFP standards are difficult to enforce, as biogenic SOA is not controllable, and a UFP standard on motor vehicle emissions would be more effective and easier to implement. Dr. Zielinska discussed the European standard for UFP, based on the number of particles, will be phased in for all diesel vehicles in 2011 and fully in place in 2013; and will be extended to all gasoline vehicles in 2014 with full implementation in 2015. She stated the European Particulate Measurement Program (PMP) includes solid particles only, down to 23 nm in size, and debate continues regarding whether volatile particles should be included.

Dr. Zielinska noted elevated concentrations of UFP have been observed near major roadways in many studies and the exponential decay of particle number concentrations was observed with increasing distance from the roadways. She stated that the Environmental Protection Agency is developing guidance for expanded monitoring capability, and the main pollutants recommended for monitoring were nitrogen dioxide (NO_2), nitrogen monoxide (NO), nitrogen oxide (NOx), black carbon, carbon monoxide (CO), ultra-fine particles (UFP), particle-size distribution, particulate matter between 10 microns and 2.5 microns ($PM_{10-2.5}$), particulate matter of 2.5 microns or less ($PM_{2.5}$), elemental carbon (EC), organic carbon (OC), carbon dioxide (CO_2), ozone (O_3), total reactive nitrogen (NOy), sulfur dioxide (SO_2), and benzene, toluene, ethyl benzene and xylene (BTEX).

Dr. Zielinska concluded her presentation and Advisory Council members held their questions until after the second presentation was completed.

B. Physical, Chemical and Toxicological Properties of Ambient Ultrafine Particles and their Sources

Deputy Air Pollution Control Officer, Jean Roggenkamp, introduced speaker Anthony S. Wexler, Ph.D. and offered the following biographical information about Dr. Wexler:

Anthony S. Wexler, Ph.D. is a Professor, Mechanical and Aerospace Engineering, Civil and Environmental Engineering and Land, Air and Water Resources at UC Davis; and Director, Air Quality Research Center, Crocker Nuclear Laboratory and EPA's San Joaquin Valley Aerosol Health Effects Research Center at UC Davis.

Dr. Wexler has worked on the atmospheric transport and transformation of airborne particles for over 20 years. Currently, he is investigating how early childhood exposure may lead to lung function decrements, where particles deposit in the airways, the thermodynamic properties of organic and inorganic compounds in the atmosphere, ion mobility spectrometry for aerosol chemical composition analysis, and source-oriented sampling of ambient particles. Dr. Wexler has developed new equipment for analyzing nanoparticles in air and has participated in multiple

Environmental Protection Agency projects to measure air quality impacts in selected cities including Pittsburgh, Pennsylvania; Houston, Texas; and Fresno, California.

Dr. Wexler earned his B.S. in Engineering Physics at UC Berkeley, an M.S. in Mechanical Engineering at Massachusetts Institute of Technology and Ph.D. in Mechanical Engineering at California Institute of Technology. Dr. Wexler gave his presentation to the Advisory Council and focused on roadway particle dynamics, source-oriented sampling and toxicity, and the disruption in lung growth after juvenile exposure to ozone and particles. The power point presentation is attached to these minutes for further detail.

Dr. Wexler stated that health effects are connected to emissions and roadway particles cause health concerns for children growing up near freeways. Children may be uniquely susceptible because their lungs are developing, and studies show lung function deficits, and increased asthma. He added that freeway emissions contain fresh combustion emissions, close to populations, and road and tire wear dust are part of those emissions.

Dr. Wexler explained the event chain of roadway emissions, starting with hot tailpipe emissions in particle and gas phases, then the tailpipe-to-roadway dilution which includes rapid cooling and reduction of vapor pressure, and then the roadway-to-community dilution.

Dr. Wexler concluded that particle composition and size was similar on the roadway and far from the roadway, near the roadway particles are larger and have more organic content. He stated that the health impacts depend on the composition and toxicity of the condensing organics and whether they are more or less toxic in the gas and particles phases. Studies show impacts of near roadway exposure but do not conclusively define the specific cause, whether it is the high concentration of particles, size or composition, or the concentrations of course material.

Dr. Wexler discussed ways to deduce health effects from different sources using source oriented sampling. He showed results of source oriented sampling collected in Fresno using 10 high-volume ChemVol samplers assigned to different sources. He presented data on particle classes, source combinations and single particle summary statistics.

Dr. Wexler discussed his research about lung growth and his study of rats exposed to high levels of ozone, and how that relates to disruption in lunch growth for children. Results suggested that ozone was more damaging than PM for lung development.

Dr. Wexler explained the use of the Rapid Single-ultrafine-particle Mass Spectrometer (RSMS-III) in his research and the methods of collection of data and the parameters.

PANEL DISCUSSION:

3. Ultrafine particles: Sources and Characteristics

Council members discussed the findings with both of the speakers. Topics discussed included: health concerns for truck drivers, and comparing occupational roadway exposure with community exposure. Dr. Zielinska responded to a question regarding her recommendations for UFP standards by stating regulating is best done at the source, that Europe has limits of 23 nm for PM and regulations should include semi-volatile organics and PM. Dr. Wexler noted regulations are motivated by health effects and climate change, and UFP is mostly having effect on cardiovascular systems but little is known about the pathway.

Council members asked questions about infill and transit oriented housing near freeways, mitigation measures and standards. Both speakers stated that 300 meters was a preferable buffer distance to minimize exposure for housing and schools, noting that studies show children who live within 300 meters have health effects from exposure. Dr. Zielinska stated that although there are sources of indoor PM, such as cooking, they are not the same toxicity as PM from fuel combustion, and said it was important to know the source of the PM. The speakers explained high efficiency particulate air (HEPA) filters are effective, as is air conditioning but both methods require energy; barriers around freeways disrupt the flow of air and reduce exposure.

There was discussion about the Dr. Wexler's research with rats, including the levels of ozone exposure, the standards used when doing testing, and the findings.

Lubrication oil in vehicles was discussed as a source of black smoke; particles can be tested to determine the signature of lubricant oil and gross polluters are a large part of the problem.

Planning Division Modeling Manager, Saffret Tanrikulu addressed the Advisory Council and updated the members about exposure studies and inventory being planned, and monitoring currently performed by the Air District.

Polycyclic aromatic hydrocarbons (PAHs) were discussed and Dr. Zilenska stated PAHs are hazardous air pollutants and on the toxics list; they are found in wood smoke, combustion from gas, diesel and lube oil and some are specific to biomass burning.

The speakers were asked what they felt was the biggest challenge in the UFP area. Dr. Wexler replied that measurement was important, and controlling emissions by particle number was preferred. Dr. Zielinska added that UFP is emitted from all kinds of engines, but newer engines decrease the number.

OTHER BUSINESS

4. Council Member Comments / Other Business

Member Lucks said that he would present a regulatory primer on air quality law during the next Advisory Council meeting. The presentation will be placed on the agenda and begin around 11:00 a.m.

5. Next meeting: The next meeting of the Advisory Council will be held on Wednesday, July 13, 2011 at 9:00 a.m. at 939 Ellis Streets, San Francisco, CA 94109.

6. Adjournment: Chair Blonski adjourned the meeting at 12:05 p.m.

/S/ Kris Perez Krow

Kris Perez Krow
Clerk of the Boards

Attachments:

A. Mobile Source Ultrafine Particle Emissions: Past, Present and Future
B. Physical, Chemical and Toxicological Properties of Ambient Ultrafine Particles and their Sources

Please note: Attachments are part of the recorded minutes, but will not be included in the packet for the July 13, 2011 Advisory Council meeting.