

Bay Area Air Quality Management District  
939 Ellis Street  
San Francisco, CA 94109  
(415) 749-5073

## **APPROVED MINUTES**

Advisory Council Regular Meeting  
Wednesday, February 13, 2013

### **CALL TO ORDER**

Chairperson Robert Bornstein called the meeting to order at 9:10 a.m.

### **ROLL CALL**

Present: Chairperson Robert Bornstein, Ph.D., Vice-Chairperson Sam Altshuler, P.E.; Secretary Liza Lutzker, M.P.H.; and Council Members Jennifer Bard, Benjamin Bolles, Harold Brazil, Jonathan Cherry, A.I.A., LEED A.P., Heather Forshey, Stan Hayes, John Holtzclaw, Ph.D., Kraig Kurucz, Gary Lucks, J.D., C.P.E.A., Rick Marshall, P.E., P.L.S., Timothy O'Connor, J.D., Estes Al Phillips, Jessica Range, LEED A.P., and Murray Wood.

Absent: Council Members Jeffrey Bramlett, M.S., C.S.P., Caryl Hart, J.D., Ph.D., and Kathryn Lyddan, J.D.

Also Present: None.

**PUBLIC COMMENT:** None.

### **OPENING COMMENTS**

Chairperson Bornstein made introductory comments regarding the meeting schedule, report drafting process and webcast information.

Members Bolles, Forshey, Kurucz, O'Connor and Phillips were selected as the report drafting committee.

### **CONSENT CALENDAR**

#### **1. Approval of the Minutes of the Advisory Council meeting of January 9, 2013**

Approval of the Minutes of the Advisory Council meeting of January 9, 2013, was postponed to allow time for a comprehensive revision of the draft minutes.

## **PRESENTATION**

### **2. Black Carbon: Introduction to Issues**

#### **A. Black Carbon – Concepts and Issues, A National Perspective**

Sarah Rizk

Environmental Scientist

Clean Energy and Climate Change Office

United States Environmental Protection Agency (EPA), Region 9

Jean Roggenkamp, Deputy Air Pollution Control Officer, introduced Sarah Rizk, Environmental Scientist, Clean Energy and Climate Change Office, United States (U.S.) Environmental Protection Agency, Region 9, and provided a brief description of her background.

Ms. Rizk gave a presentation entitled, “Black Carbon” (a copy of which is available on the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov>), with supplemental comments from and discussion with the Council as follows:

Member Hayes asked, regarding slide #16, Bounding Study: Black Carbon (BC) Forcing is net warming; best estimate is that it is second only to carbon dioxide (CO<sub>2</sub>), if she can speak to “BC + co-emitted species,” as noted at the bottom of the slide. Ms. Rizk said that no source has BC as a single emission and suggested the topic would be revisited later in the presentation.

Ms. Rizk continued the presentation.

Ms. Rizk noted, regarding slide #21, Analysis for BC-rich source categories, that the data excludes CO<sub>2</sub> and represents a global view.

Chairperson Bornstein asked, regarding slide #27 Considerations for choosing & applying a metric, what is meant by the abbreviation “SLCF”, to which Ms. Rizk responded “short-lived climate forcer.”

Ms. Rizk completed the presentation.

#### **Council Comments:**

Member O’Connor asked the rank of California in terms of per capita emissions. Ms. Rizk offered to provide that information in follow up.

Member O’Connor asked if estimates of decreased diesel emissions take into account a conversion of the national fleet to natural gas. Ms. Rizk answered she was unsure but it likely does not assume a significant transition to natural gas.

Bart Croes, Division Chief, Research Division, California Air Resources Board, suggested that fuel type is irrelevant to emissions targets.

Member Hayes said he is seeking the big picture view and asked how big an effect on climate is likely through accelerated BC mitigation measures. Ms. Rizk answered that she suspects a big effect, particularly in terms of climate tipping points, but a great deal of uncertainty persists and it is unlikely that long-lived greenhouse gases abatement will be sufficient.

Member Bard suggested diesel has no cooling component and is ripe for reduction targets. Ms. Rizk clarified that diesel does have a cooling component but it is more than offset by the heating aspects.

Member Bard asked how biomass burning is factored in the overall model. Ms. Rizk answered that it is unclear but there is some talk of brown carbon (BrC) and its possible net warming effect.

Member Lutzker asked for clarification on the 10-day lifespan. Ms. Rizk answered that it is in the atmosphere for 10 days and that auxiliary effects can continue beyond that time. Member Holtzclaw asked if BC has a 10-day half-life, to which Mr. Rizk answered yes.

Member Holtzclaw provided a description of the combustion and filtration process in a diesel engine and asked if there are any special or heated filters that function to abate the BC that results from incomplete combustion. Mr. Rizk responded that some filters do mitigate BC, such as particulate matter (PM) filters. Member Holtzclaw said one of the photographs shows particles of approximately 25 nanometers and suggested they will likely pass through the filter. Ms. Rizk agreed but clarified that conglomerates of the aggregated spheres are emitted. Member Holtzclaw asked if sulfurs and metals can be co-emitted, to which Ms. Rizk answered yes. Member Holtzclaw asked if that affects the aggregation rate. Mr. Croes answered that low sulfur fuel is necessary and the filters physically capture the soot, which is periodically burned during certain events, and that very little soot ever escapes a well-operating filter.

Member Phillips noted the percentages of global BC attributed to various regions and asked what more can reasonably be done in the U.S. and California. Ms. Rizk answered diesel fleet modernization plus biomass and woodstoves are worth looking at more closely.

Member Altshuler asked if BC is larger than ultrafine particulate matter (UFP), which is less than 0.1 microns, to which Ms. Rizk responded yes.

Member Altshuler asked if BC becomes a radiator at night and has a cooling effect. Ms. Rizk said that was not examined. Chairperson Bornstein asked if the climate models had a diurnal cycle. Ms. Rizk said she believed they do have a diurnal cycle but she is unsure about the radiating effect. Member Altshuler asked if BC absorbs ozone during the smoggy times of year. Mr. Croes said it would but it is pretty dilute so it would not substantially reduce atmospheric ozone levels and actually has a bigger effect on ultraviolet radiation (UV). Member Altshuler said that during a forest fire you do not tend to see ultra-high ozone and wondered whether the carbon in the atmosphere was actually mitigating the ozone or blocking the UV. Mr. Croes said yes, when you have a denser concentration of particles, such as with a forest fire, you would have a larger ozone removal effect by adsorption.

Chairperson Bornstein asked what “Bond et al. *AGU* 2013” refers to in slide #55, Analysis by activity. Ms. Rizk offered to provide the referenced work. Chairperson Bornstein asked if the details were delivered to the U.S. Congress and at what level of detail was delivered. Ms. Rizk said that a substantial report was delivered but she was unsure whether they received an oral briefing.

Public Comments: None.

B. Black Carbon – Concepts and Issues from a Statewide Perspective

Bart Croes

Division Chief

Research Division

California Air Resources Board

Ms. Roggenkamp introduced Mr. Croes and provided a brief description of his background.

Mr. Croes gave a presentation entitled, “California Black Carbon Control” (a copy of which is available on the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov>), with supplemental comments from and discussion with the Council as follows:

Chairperson Bornstein asked, regarding slide #4, Projected Climate Impacts on California, 2070-2099, what is “Lower Warming Range.” Mr. Croes answered 3 to 5.5 degrees Fahrenheit.

Mr. Croes continued the presentation.

Mr. Croes added, regarding slide #5, California Targets, that BC plays a role in all of the targets listed.

Mr. Croes added, regarding slide #16, High Emitting Heavy-Duty Trucks, that two individual trucks in the Caldecott Tunnel during the study accounted for 10% of the total BC from 809 trucks.

Chairperson Bornstein asked, regarding slide #18, California Tailpipe PM Standards, if the chart is relative to PM only. Mr. Croes answered primarily fine particulate matter (PM<sub>2.5</sub>).

Mr. Croes continued the presentation.

Chairperson Bornstein requested, regarding slide #21, Climate Forcing by Black Carbon and Brown Carbon, the definition of and abbreviation for BrC. Mr. Croes answered that BrC is brown or yellow particles, as seen in the burning of agricultural waste, that there is some evidence that it is formed in secondary processes, it has only been recognized recently as a significant contributor to warming, and “BC” stands for “black carbon” while “BrC” stands for “brown carbon.”

Mr. Croes concluded the presentation.

### Council Comments:

Member Altshuler asked if the weekday/weekend differential was considered. Mr. Croes answered yes, there is a strong effect and the topic is the subject of a study currently underway. Member Altshuler asked if there is a climate effect. Chairperson Bornstein suggested the models cannot do that.

Member Altshuler asked if lube oil-burning gasoline engines are a significant contributor. Mr. Croes said, although not studied like diesel engines, automobiles should have filters that capture a great deal of the material just as diesels do. Member Altshuler noted that a study presented to the Council last year revealed high levels of UFP on a freeway with no diesel traffic and the Council linked that to the burning of lube oil. Mr. Croes said that makes sense but urged caution relative to UFP because the studies are just beginning on light-duty vehicles and noted while increases in UFP are found, it is not combustion particles but rather nucleation where sulfur from lube oil or fuel is a compound that seems to have different features and, as a result, health effects different than from the combustion particles.

Member Lucks noted that BC seems to be primarily found in PM<sub>2.5</sub> and asked if there is any larger BC. Mr. Croes said some BC takes the form of ash but it has a minimal impact on climate.

Member Hayes asked, regarding slide #9, 40 Years of Progress on BC, if the decreases show that the BC work is already done or, if not, how the Air District should move forward. Mr. Croes said studies suggest that California's response to BC will be a model for the world and mitigation is merely a question of cost-effectiveness.

Member Bolles recalled his experience with diesel equipment at construction sites and asked if standards have changed since 2003, to which Mr. Croes answered yes.

Member Kurucz asked, regarding slide #7, Climate Pollutant Emissions, whether this is a measure of mass or climate impact. Mr. Croes said it shows the current climate impact of current emissions.

Chairperson Bornstein asked if it is accurate to say that some pollutants have a quick impact on climate and others a slow one, but none are solely regional in effect. Mr. Croes agreed that local decreases in emissions are certainly not proportionally equal to local decreases in climate change, depending on meteorological conditions. Mr. Rizk said that some local effect is measurable because of the short life of BC. Chairperson Bornstein said it is hard to believe it is significant if it lives for 10 years [sic] and only takes a few hours to travel out of the state and suggested that while California BC has a significant climate impact but not necessarily a significant impact for California. Ms. Rizk said that research demonstrates that emissions reductions in California have coincided with cooling in California so while there certainly is some export effect, unlike globally distributed pollutants, some BC does stay in the state through deposits, in particular on snow and ice packs. Chairperson Bornstein noted the effect where warming inland areas serve to pull cool ocean air into coastal areas.

Member Wood asked, regarding slide #2, Premature Deaths from Air Pollution, how these are attributed to air pollution and from where the data was obtained. Mr. Croes answered through the synthesis of hundreds of studies, including one which followed a test group of 500,000 people for 16 years and separate studies explaining the biological mechanism which established the causal relationship; and that intervention studies provide notable information regarding a reduction in the death rate immediately following a significant reduction in exposure.

Member Wood asked, regarding slide #19, California Burning Restrictions, how biomass burning might be reduced if all other factors remain the same. Mr. Croes said there are many options, including but not limited to cleaner and less burning.

Public Comments: None.

## **PANEL DISCUSSION**

### **3. Black Carbon – Concepts and Issues**

Chairperson Bornstein provided background on the goals and past work of the Council as context for the panel discussion.

Member Lutzker asked, regarding Mr. Croes' slide #30, BC Equivalence Scenarios, whether diesel is the best target for Air District BC reductions in light of the emissions attributed to charbroiling, the jurisdictional authority of the Air District and the significant progress made in diesel. Mr. Croes said there are a number of issues with the equivalency chart and it is need of refinement before any conclusions are drawn from it. Ms. Roggenkamp said there are fairly new Air District regulations in place regarding charbroiling and review of new regulations is part of the standard process so the question is well taken. Ms. Rizk said there is a fair amount of organic carbon from charbroiling so a look at net climate effect is recommended. Member Lutzker suggested the direct health effects make the organic component less relevant and Ms. Rizk agreed. Chairperson Bornstein said cooking was significant for California.

Member Bard noted, regarding Mr. Croes' slide #20, BC Emissions, that wildfires were excluded and asked what percentage would be attributed to them. Mr. Croes answered that he does not have a number for the Bay Area but is very roughly 25% in California.

Member Bard asked, regarding Ms. Rizk's slide #31, Open Biomass Burning, for discussion about the potential for reducing wild fires in light of their immediate and dire health effect. Ms. Rizk said it is an interesting place to look as it is both an adaption and mitigation measure; noted that Placer County did a recent study regarding biomass burning and offered to provide the same; a look at co-pollutants, net emissions and net climate effect would be important components; it is one of the larger sources of BC in total; and some management of wildfires to create significant climate and health benefits is possible but there are no known revenue streams to offset the cost at this time.

Chairperson Bornstein asked how future wildfire emissions are spatially included in a climate model. Ms. Rizk said she suspected it is fractionally distributed throughout those areas that are forested.

Member Cherry asked, regarding Mr. Rizk's slide #11, BC Emissions, about the methodology for attributions and asked if it involved any extrapolation from air monitoring. Ms. Rizk said it is from a technology-based inventory that looked at emission factors from different sources and the amount of combustion from that source and noted there is a huge amount of uncertainty in these inventories because burning practices vary widely around the globe. Member Cherry asked if this sort of speciation is extractable with the existing air quality monitoring network. Eric Stevenson, Director of Technical Services, answered yes but with large amounts of uncertainty.

Member Range asked if it is true that the current in-use, off-road diesel regulation remains unenforceable until CARB gets a waiver from the EPA and, if so, for a status report on the waiver. Member Bolles said he has never seen any approvals by CARB at construction sites. Mr. Croes responded that the rule is subject to a long phase-in so it might not be seen immediately and newer vehicles are much cleaner. Ms. Rizk said the on-road rule is part of state implementation plan for California. Member Range said the CARB website seemed to indicate otherwise. Mr. Croes said he would report back.

Member Lucks suggested the Bay Area, California and the U.S. are success stories and that connecting regional air quality with international sources is an important step, then asked if the speakers agreed and, if so, what can be done about it. Mr. Rizk said there are a number of EPA programs in place regarding international air quality, particularly as they pertain to sensitive regions such as the Arctic, and that mitigation measures are currently being researched, including the revision of flight paths and shipping channels. Member Lucks asked if there are significant emissions from aircraft that are BC-related, to which Ms. Rizk answered yes and that international work is definitely important, as is national. Mr. Croes said his group did the studies about the long-range transport from Asia and its impact on California and found that while continuous transport occurs the plume travels over the marine boundary layer, goes mostly over the coastal mountain range and hits the Sierra Nevada Mountains so that at higher elevations the Asian impact is about 25% for affected regions. Member Lucks asked what percentage of that is BC-related. Mr. Croes said he does not recall but believes it is fairly small.

Member Holtzclaw said the EPA reported to Congress that high concentrations of BC exist in the northeastern U.S., southern Brazil, Eastern Europe, eastern India, China and Siberia.

Chairperson Bornstein asked how much of the Asian impact is attributable to dust storms. Mr. Croes answered the vast majority.

Member Marshall suggested the inclusion of a strong core statement in the Council committee report that details why BC is a topic of interest; another statement to address why the great successes and progress made are inadequate; and another to address why there is uncertainty and that it is acceptable to move forward relying on what is known despite that uncertainty.

Member Bard said continued work on transportation sources is an obvious need but one that is addressed by many Air District programs; suggested a look at the cooking/managed burning/residential side as it falls within the jurisdiction of the Air District; and asked for elaboration on the earlier statement that any strategies also look to co-pollutants. Ms. Rizk recommended a wide assessment like that in the Bond study, apply some climate equivalencies

or do some modeling, and look for different categories of interest and the current net effect from that source and then compare that to what your mitigation strategy would be and what the new profile would be. Chairperson Bornstein asked about the definitions of the uncertainties in the graph on Ms. Rizk's slide #21, Analysis for BC-rich source categories. Ms. Rizk said it is mostly the scientific uncertainty associated with BC forcing. Chairperson Bornstein said it is usually a quantitative measure in a graph of this sort. Ms. Rizk said she was unsure. Member Lutzker asked if this takes into account the findings about BrC and its potential warming effects. Ms. Rizk said she was unsure. Member Lutzker asked if it was not taken into account, whether the net cooling effect shown in some cases may turn out to be smaller or even possibly warming, to which Ms. Rizk tentatively agreed.

Chairperson Bornstein asked if the Bond and Ramanathan papers will be made available to the Council, to which Mr. Croes answered yes.

Member Brazil asked, regarding Mr. Croes' slide #18, California Tailpipe PM Standards, whether gasoline vehicles were mainly responsible for the 2004 drop. Mr. Croes answered the initial regulations in 1988 were primarily geared towards diesel light-duty vehicles and in 2004, the standard was applied to all light-duty vehicles regardless of fuel type and it was found that most gasoline vehicles were a factor of ten below the standard and inherently did not have high PM emissions so instead of over-complying, the standard was amended. Member Brazil asked if passenger vehicles are included, to which Mr. Croes answered yes.

Chairperson Bornstein requested lists of important emerging issues from the perspective of the speakers.

Ms. Rizk said the issue of co-pollutants is an interesting one, including localized studies on particular sources and the application of a co-pollutant analysis to that as was done at the global level, with modeling being the ideal approach. Chairperson Bornstein asked what kind of horizontal grid spacing should be seen on these regional, local climate modeling studies. Ms. Rizk deferred to the Council and staff.

Ms. Rizk said ambient monitoring, such as improving some of the intersections between tail pipe speciation and ambient monitoring, to see if a consistent picture can be developed. Chairperson Bornstein asked about whether the state of the art allows these measurements. Ms. Rizk said it depends on how it is done and Mr. Stevenson agreed.

Ms. Rizk said the development of a methodology or framework is necessary to handle some of the uncertainties of BC so as to encourage action despite those remaining uncertainties.

Mr. Croes agreed with Ms. Rizk and added, based on the presumption that health and climate are co-drivers for the Council, that there is no reason to single out BC from the other components of PM; some sources have disproportionate impact due to proximity, so controlling on-road sources has the biggest impact on health and high emitters are disproportionate contributors and thus he views this as an important area ready for the development of mitigation tools; and BrC as an eye-opening topic that may not lend itself to local- or state-level action but the sourcing of which is an important area of research.



Chairperson Bornstein invited recommendations to the Board of Directors from the perspective of the speakers.

Mr. Croes said reconcile or verify emissions so as to better understand BC emissions in this region; if health focused, look at on-road sources and high emitters; if climate focused, look at all short-lived pollutants, of which methane and nitrous oxide are equally important; tracking the BrC issue to determine contributors; and looking at wood smoke as it presents a potentially heavy dose for those exposed.

Ms. Rizk said multi-pollutant planning that builds upon that started by the Air District and EPA; develop a data-driven approach by getting monitoring source speciation data; if climate focused, discuss metrics, best approach and the range of values to be incorporated; mitigation of diesel is still relevant despite the significant progress made; mitigation of biomass sources because although progress has been made on BC and PM, there is room for improvement that requires a cost/benefit analysis and consideration of how that analysis is undertaken; and consider how BC may change existing air quality best management practices to provide insight about how to look at and think about BC from an air quality perspective.

Chairperson Bornstein recommended staff pay close attention to the model results and understand the assumptions and sophistication of the parameterizations of aerosols, radiation and clouds.

Public Comments: None.

Council Action: None; informational only.

## **OTHER BUSINESS**

### **4. Chairperson's Report**

Chairperson Bornstein asked about speakers for the next presentation meeting. Mr. Stevenson said that initial contact has been made regarding more BC information. Chairperson Bornstein asked what aspects of BC. Mr. Stevenson said measurement and health effects. Chairperson Bornstein invited suggestions from the Council for the topic of the third presentation meeting of the year.

Member Bolles asked how the annual report of the Council will be structured if two topics are taken up in the year. Chairperson Bornstein said that question, as well as how to structure the second report editing meetings, are important questions that remain unanswered.

Chairperson Bornstein reported that Air District letters to Council Members' employers as expressions of gratitude are in progress.

Chairperson Bornstein, Member Altshuler and Mr. Stevenson discussed the logistics of the report drafting process.

**5. Council Member Comments/Other Business:**

Member Altshuler said there was no notice that this meeting would be webcast and recommended it be included in the future. Chairperson Bornstein encouraged Council members to send lists of suggested announcement recipients to Mr. Stevenson. Mr. Stevenson said there is notification of the webcast in the announcements that he sends.

Member Lutzker asked that the flyer be converted to PDF format before distribution.

**6. Time and Place of Next Meeting:** Wednesday, March 13, 2013, Bay Area Air Quality Management District Office, 939 Ellis Street, San Francisco, CA 94109 at 9:00 a.m.

**7. Adjournment:** The meeting adjourned at 12:11 p.m.

*151 Sean Gallagher*

Sean Gallagher  
Clerk of the Boards