



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

ADVISORY COUNCIL MEETING

WEDNESDAY
MAY 11, 2011
9:00 A.M.

7TH FLOOR BOARD ROOM
939 ELLIS STREET
SAN FRANCISCO, CA 94109

AGENDA

CALL TO ORDER

Opening Comments
Roll Call

Ken Blonski, Chairperson
Clerk

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 Advisory Council 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 Council's purview. Speakers are limited to three minutes each.

CONSENT CALENDAR

1. Approval of Minutes of the April 13, 2011 Advisory Council Meeting.

DISCUSSION

PRESENTATION: ULTRAFINE PARTICULATE

2. Ultrafine Particulate: Characteristics, Sample Analysis and Study Results
Speakers from UC, Davis and Desert Research Institute will present materials on the chemical and physical characteristics, toxicity and source and sample analysis of ultrafine particulate:
 - A. **Physical, Chemical and Toxicological Properties of Ultrafine Particulate and its Sources**
Anthony S. Wexler, Ph.D.
Professor, Civil and Environmental Engineering
Director of Air Quality Research Center
UC Davis

B. Sample and Data Analysis of Ultrafine Particulate

Barbara Zielinska, Ph.D.
Division of Atmospheric Sciences
Desert Research Institute

OTHER BUSINESS

3. Council Member Comments/Other Business

Council Members may make a brief announcement, provide a reference to staff about factual information, or ask questions about subsequent meetings.

4. Time and Place of Next Meeting

Wednesday, June 8, 2011, at 9:00 a.m. at 939 Ellis Street, San Francisco, CA 94109.

5. Adjournment

CONTACT EXECUTIVE OFFICE - 939 ELLIS STREET SF, CA 94109

(415) 749-5130
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.
- Any writing relating to an open session item on this Agenda that is distributed to all, or a majority of all, members of the body to which this Agenda relates shall be made available at the District's offices at 939 Ellis Street, San Francisco, CA 94109, at the time such writing is made available to all, or a majority of all, members of that body. Such writing(s) may also be posted on the District's website (www.baaqmd.gov) at that time.

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

EXECUTIVE OFFICE:
MONTHLY CALENDAR OF DISTRICT MEETINGS

MAY 2011

<u>TYPE OF MEETING</u>	<u>DAY</u>	<u>DATE</u>	<u>TIME</u>	<u>ROOM</u>
Board of Directors Stationary Source Committee <i>(At the Call of the Chair)</i>	Thursday	5	9:30 a.m.	Board Room
Board of Directors Legislative Committee <i>(At the Call of the Chair)</i> - CANCELLED	Monday	9	9:30 a.m.	4 th Floor Conf. Room
Advisory Council Meeting	Wednesday	11	9:00 a.m.	Board Room
Board of Directors Climate Protection Committee <i>(At the Call of the Chair)</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 Hearing <i>(At the Call of the Chair)</i>	Wednesday	18	Immediately following Board Meeting	Board Room
Board of Directors Budget & Finance Committee <i>(At the Call of the Chair)</i>	Wednesday	25	1:00 p.m.	4 th Floor Conf. Room
Board of Directors Mobile Source Committee <i>(Meets 4th Thursday each Month)</i> - CANCELLED	Thursday	26	9:30 a.m.	4 th Floor Conf. Room

JUNE 2011

<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	1	9:45 a.m.	Board Room
Advisory Council Meeting	Wednesday	8	9:00 a.m.	Board Room
Board of Directors Regular Meeting <i>(Meets 1st & 3rd Wednesday of each Month)</i>	Wednesday	15	9:45 a.m.	Board Room
Board of Directors Budget Hearing <i>(At the Call of the Chair)</i>	Wednesday	15	Immediately following Board Meeting	Board Room
Board of Directors Mobile Source Committee <i>(Meets 4th Thursday each Month)</i>	Thursday	23	9:30 a.m.	4 th Floor Conf. Room

JULY 2011

<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 Stationary Source Committee <i>(At the Call of the Chair)</i>	Thursday	7	9:30 a.m.	Board Room
Advisory Council Meeting	Wednesday	13	9:00 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
Board of Directors Mobile Source Committee <i>(Meets 4th Thursday each Month)</i>	Thursday	28	9:30 a.m.	4 th Floor Conf. Room

HL – 5/4/11 (3:35 p.m.)
P/Library/Forms/Calendar/Calendar/Moncal

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Blonski and
Members of the Advisory Council

From: Jack P. Broadbent
Executive Officer/APCO

Date: May 4, 2011

Re: Advisory Council's Draft Meeting Minutes of April 13, 2011

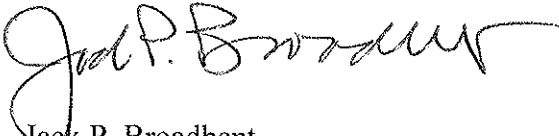
RECOMMENDED ACTION

Approve attached draft minutes of the Regular Advisory Council Meeting of April 13, 2011.

DISCUSSION

Attached for your review and approval are the draft minutes of the April 13, 2011 Advisory Council Meeting.

Respectfully submitted,



Jack P. Broadbent
Executive Officer/APCO

Prepared by: Gary Kendall
Reviewed by: Rex Sanders

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
(415) 749-5000

DRAFT MINUTES

Advisory Council Regular Meeting
9:00 a.m., Wednesday, April 13, 2011

CALL TO ORDER

Opening Comment: Chairperson Blonski called the meeting to order at 9:00 a.m.

ROLL CALL

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

Absent: Council Members Jeffrey Bramlett, Jane Martin, Ph.D., and Jonathan Ruel

Also in attendance: Mr. Gary Kendall, Advisory Council Liaison

Staff: Brian Bunger, Air District Counsel
Eric Stevenson, Director of Technical Services
Henry Hilken, Director of Planning, Rules & Research

Public Comment Period: There were no public comments.

CONSENT CALENDAR

1. Approval of Minutes of the March 9, 2011 Advisory Council Meeting:

The following amendments to the minutes of March 9, 2011 were proposed:

Page 2: spell out the meaning of the abbreviation CPCs “Condensation Particle Counters”

Page 3: replace “science distribution” with “size distribution”

Page 4: replace “is not a simple whatsoever” with “is not simple”

Page 6: Change “organic compounds in metals” to “organic compounds and metals”

Page 13: Delete remaining paragraph after: “the District must look into chemical composition”

Page 14: replace “envitro” with “in-vitro”

Page 14: Add “or cells” after “identify a set of indicator species”

Page 14: Change “regulate something” to “regulate UFP or chemical species”

Page 14: Nrf2 is the correct term

Page 14: Correct spelling of Dr. Vura-Weis’ name

Council Action: Member Holtzclaw made a motion to approve the minutes of the March 9, 2011 Advisory Council Meeting, as amended; Member Kurucz seconded the motion; carried unanimously without objection.

DISCUSSION

2. Discussion of Draft Report on the Advisory Council’s March 9, 2011 Meeting on Ultrafine Particulate: Health Effects, Measurement and Analysis.

Mr. Altshuler presented a power point slide show (attached to these minutes), titled “Ultrafine Particulate Matter (UFP): Cause for Concern” to the Advisory Council. Dr. Vura-Weis and Ms. Lutzker also assisted with the presentation. The slide show and the report are the basis for the future presentation and report to the Board of Directors.

The following comments were made about the slide show and report:

- Ensure that the report backs up the power point.
- Power point is a good introduction to discuss the draft report.
- Very positive.
- Good review of the issues.
- Regarding the recommendation - whether and to what extent should the Air District regulate PM or UFP in terms of permitting? Where does this lead in terms of policy?
- Are we ready to make a presentation to the Board and make a recommendation? Perhaps we should give them an update.
- Certain conclusions in the presentation are less controversial, fairly certain, tell the Board about that.
- CEQA runs parallel with permitting, and UFP would be a significant impact.
- The big point is that we need to follow the science. Don’t know where it may take us. The science is not mature, but promising. We can see the cell changes now, rather than waiting for the epidemiology. We need to follow the testing and see where it goes.
- Look more at the PM numbers near freeways. Look into data about filters and ultra-tight windows.
- It’s premature to set a CEQA threshold.
- Historically we’ve been given 10 minutes to present before the Board of Directors, maybe they’ll give us more time. Can this be broken down into 5 minutes summary of

the science, 5 minutes of emerging issues? A science introduction is needed. Don't count on more time. What's the most important 5 minutes?

- May need to pick the ten best slides.
- Indoor air quality information and the historical background helped paint the whole picture.
- Reorganize the slides. The report is clear and condensed. Liked the order/logic of the recommendations. Monitoring is intended to answer the questions "What is in the air and where does it come from?" Add that to the report. Combine recommendations 2 and 4 which are both related to health impacts, link them together.
- For Recommendation #3, broaden or expand that to control measures. How might this affect the design of our PM 2.5 control program; need to understand the implications of the PM 2.5 control measures have on UFP. Need to understand how they correlate with our other control measures. We haven't established the measurements or metrics. Emerging issue is that particles numbers are going up, while mass is going down. We have reduced PM 2.5; is that increasing the UFP?
- We've just begun to touch on this issue, and need to go deeper. What is the implication of what we've heard? Let's agree on some things to talk to the Board about and tell them to stay tuned, and that we have more coming.
- Tell the Board up front that this is our first look at this. The first recommendation, regarding monitors in environmental justice areas; prefer that monitoring occur in high impact areas, wherever they are. A variety of monitors and locations is not a bad idea.
- Look into the correlation between the UFP and the PM 2.5. The part we are leaving behind may be what we couldn't even measure before. Smaller particles may not be of the same nature, and there are different issues.
- Don't just focus on the UFP. Would like an explanation of particle mass decreasing, but with particle numbers increasing. How can this be? If we have these controls, how can there be more particles?
- We need an explanatory on vapors. Where are we are looking, and how are we monitoring? Needs clarification.
- Regarding the detail in the presentation: cubic centimeter note was helpful.
- UFP monitoring should measure particle numbers and composition.
- Indoor exposure occurs when people use common cleaning products. Sealed windows will keep the outdoor air from entering, but they don't allow the indoor air to exit. How do feel about indoor air quality?
- The maximum exposure you get is on the freeway, or if you live in the zone around the freeway. Someone needs to come in and talk about exposure.
- Regarding Recommendation #1 - where does the money come from? What would you recommend as location, how many and where is the money coming from? They will be put in high traffic, high diesel, and high population areas to measure exposure. We are developing a strategy to place these near road ways.

- Try to not be too detailed and specific. They are looking into it and thinking about it. Should be worded “as appropriate” instead of listing specific steps.
- Is it particle numbers or composition we want to monitor? You won’t use the same monitor. What do we want to track? We will watch the science as it emerges. Let’s not do the recommendations now. Prepare a report after we have more information and hear more speakers.
- During a normal smog test, there is no attempt to measure burning oil. If we look at gross polluters, we may end up going in that direction. Expand it to gross polluters.
- Timing on this. Are we doing it sooner or later? 4 recommendations – set up, track, look and compare. Tell the Board what we want to do with the information. Is this a one, four or five year process?
- I am very concerned about the health effects. What are other regulatory agencies doing for this now?
- Show that PM 0.1 is UFP.
- Reference the power point in the report. Put the science in report and highlight it on the power point.
- Emerging issues – how the technology for UFP is changing. Make a recommendation of what we should be monitoring, number or size or composition. Where is this going? Making policy that is flexible as our knowledge deepens, not to put on blinders as we get more information.

Secretary Hayes recommended that Advisory Council members send emails to the team if they had further comments or additions. Please send comments to Mr. Altshuler within a week. The team will make the changes they feel are necessary. There will be final action on this report at the next meeting.

Chair Blonski thanked Ms. Lutzker, Dr. Vura-Weis and Mr. Altshuler for their hard work on the report and presentation.

3. Discussion of Advisory Council Members attending the Annual Air & Waste Management Association (A&WMA) Meeting in June.

Chair Blonski noted that five members had expressed interest in attending.

Mr. Brazil, Dr. Bornstein, Mr. Holtzclaw and Mr. Altshuler will be representing the Advisory Council at the A&WMA conference. Chair Blonski requested that the representatives report back to the Advisory Council after their trip. Mr. Hayes is also attending the conference, but his trip is not being funded by the District.

OTHER BUSINESS

4. Council Member Comments / Other Business

Mr. Kendall spoke about scheduling speakers for the upcoming topic meetings. A team is needed to do a report on the information received. Mr. Kendall is arranging for a speaker at the June meeting who will talk about UFP from mobile sources; and another speaker is being considered who will talk about what happens between the tailpipe of a vehicle and 300 meters away; a discussion of the chemistry and physics of what occurs in the atmosphere with those particles as they are transported away from the source.

Mr. Altshuler, Dr. Bornstein and Mr. Bolles volunteered to join the next work team. Mr. Kendall asked if anyone else wants to help, let us know at the next meeting. (Mr. Brazil was added to the work team after meeting adjourned)

Mr. Lucks passed out an article that summarizes all the environmental legislation that passed last year.

Mr. Kendall announced that Mr. Lucks has volunteered to do a presentation to the Advisory Council about the legislative process, tentatively scheduled at 11:00 a.m., immediately after the May Advisory Council meeting.

Mr. Kurucz attended a meeting at UC Berkeley regarding green chemistry. The science is very interesting and ties in well with what we are talking about.

Ms. Bard stated that the Lung Association is working with the Air District in San Jose, on the development of a Community Risk Reduction Plan (CRRP). They have made an initial set of recommendations that look at healthy indoor air and reduction of emissions in communities located near freeways. There is a lot of community involvement and Ms. Bard had a handout for the Advisory Council.

Ms. Bard also reported that the American Lung Association's "State of the Air" report will be released on April 27, which is a national air quality report. They look at levels of ozone and PM 2.5 in counties through the country that have monitoring. The counties are graded on the number of days they exceed air quality standards. Ms. Bard also asked staff about the progress of a bill that the Air District and MTC are co-sponsoring. Mr. Hilken replied that the bill is in the pipeline and that an update would be given at a Legislative Committee meeting.

Mr. Hayes let the Advisory Council know that A&WMA is sponsoring an international conference "Greenhouse Gases in a Changing Climate" on November 16 - 17, 2011 in San Francisco. The deadline for abstracts is May 2, 2011. He is grateful that the Air District supports these events.

Mr. Altshuler alerted the Advisory Council to interesting articles about UC Berkeley professor, Richard Muller. Muller was a skeptic about global warming, and was hired by a group to perform a study to debunk previous global warming studies. Instead his results supported climate change science and he presented those results to the GOP.

5. **Next meeting:** The next meeting of the Advisory Council will be held on Wednesday, May 11, 2011 at 9:00 a.m. at 939 Ellis Streets, San Francisco, CA 94109
6. **Adjournment:** Chair Blonski adjourned the meeting at 10:58 a.m.



Kris Perez Krow
Clerk of the Boards

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Ken Blonski and
Members of the Advisory Council

From: Jack P. Broadbent, Executive Officer

Date: May 4, 2011

Re: Continued Discussion of Draft Report on the Advisory Council's March 9,
2011 Meeting on Ultrafine Particulate: Health Effects, Measurement and
Analysis

The attached *revised* draft report on the March 9, 2011 Advisory Council Meeting on Ultrafine Particulate: Health Effects, Measurement and Analysis was prepared by Advisory Council members Sam Altshuler, Dorothy Vura-Weis and Liza Lutzker.

The Advisory Council will discuss the *revised* draft report with Air District staff and finalize the recommendations and the report.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Gary Kendall
Reviewed by: Jean Roggenkamp

REVISED DRAFT REPORT ON THE MARCH 9, 2011 ADVISORY COUNCIL MEETING ON ULTRAFINE PARTICLES (UFP): HEALTH EFFECTS, MEASUREMENT AND ANALYSIS FOR DISCUSSION BY THE ADVISORY COUNCIL AT THE MAY 11, 2011 MEETING

SUMMARY

The following presentations were made at the March 9, 2011 Advisory Council meeting on Ultrafine Particles: Health Effects, Measurement and Analysis:

1. ***Ultrafine Particle Measurement: historical perspectives and recent developments*** by Susanne V. Hering, Ph.D., President, Aerosol Dynamics. Dr. Hering is the founder and President of Aerosol Dynamics, Inc. and has over thirty years of experience in the field of atmospheric aerosols. Her primary interest is the in-situ, automated characterization of the size and chemical composition of atmospheric particles. Dr. Hering holds a Ph.D. in Physics from the University of Washington, with postdoctoral work in Environmental Engineering at the California Institute of Technology. After many years at UCLA, she left the academic world to form Aerosol Dynamics Inc. She has served as a Board Member and as President of the American Association for Aerosol Research, and in 2007 was honored as the recipient of the BYH Liu Award, presented by the Association in recognition of contributions to aerosol instrumentation.
2. ***Research findings on particulate air pollution from the Southern California Particle Center*** by John R. Froines, Ph.D., Professor, Environmental Health Sciences, School of Public Health, UCLA. Professor Froines joined the faculty of the School of Public Health in 1981. He received a B.S. in chemistry from UC Berkeley (1963), and an M.S. in chemistry (1964) and Ph.D. in physical-organic chemistry (1967) from Yale University. Before coming to the UCLA School of Public Health, Dr. Froines was Assistant Professor of Chemistry at the University of Oregon and later served as Director of Toxic Substances at the Occupational Safety and Health Administration and Deputy Director of the National Institute for Occupational Safety and Health. Dr. Froines is the Director of the Southern California Particle Center and Supersite. His area of expertise is toxicology and exposure assessment. His research interests are in the qualitative and quantitative characterization of risk factors in environmental and occupational health. Dr. Froines chairs the State of California's Scientific Review Panel and the central review panel at the State level for identifying toxic air contaminants.

DISCUSSION MEETING

At the April 13, 2011 meeting, the Council discussed the presentations and the materials received at the March 9, 2011 meeting and the draft report. At the May 11, 2011 meeting the Council discussed the revised draft report and finalized the recommendations.

KEY POINTS

Dr. Susanne V. Hering

- Ultrafine Particles (UFP), <0.1 microns in diameter, account for the largest **number** of particles in PM, but only a small proportion of the total **mass** of PM; they also have a much higher surface area on which to carry other molecules.
- PM mass (PM_{2.5}) is not well correlated with PM number
- UFPs are more numerous in urban areas, especially near freeways, than in other areas, and are more numerous during rush hour than overnight.
- The technology exists to count the number of these tiny particles, regardless of their composition. However, new technology may be needed to characterize some of their components.
- There are also extremely high concentrations of UFP indoors (in fact often higher than outdoors), especially with furnaces and in kitchens, most notably when pilot lights are burning constantly.

Dr. John R. Froines

- For a given mass, as particle size decreases, the number of particles increases. Standards for PM_{2.5} or UFP based on total mass may not be the most appropriate criteria to use for regulation.
- Semi-volatile compounds go back and forth between vapor phase and liquid phase, by condensing into (and onto) particles. They interact more with cells while in the vapor phase, and can cross membranes in the lungs into the bloodstream, and travel to other organs such as the heart, liver, and brain.
- Health effects of UFP include premature death, cancers in the lungs and elsewhere, asthma and other respiratory disease, cardiovascular disease, adverse birth outcomes, neurotoxicity, and probably neurodegenerative diseases.
- Oxidative stress is associated more with UFP than with larger particles. UFP enter the mitochondria inside cells by means of diffusion (because they're so small) and disrupt the electron transport process.
- UFP (acting as adjuvants) make the body more susceptible to developing allergic responses to various substances and to reacting more strongly when re-exposed to the same substance
- Chronic inflammation in the brain caused by UFP may have serious chronic neurodegenerative effects. This is an area for more study.
- Toxicology studies done in a lab can demonstrate the impact of air pollution chemicals at the cellular level. Specific individual chemicals and combinations of chemicals can be studied, and we can determine the actual mechanism of cellular disruption. These studies can be done more quickly than epidemiologic studies.
- The rate or extent of cellular changes caused by an air sample could be used as the criteria for regulation, rather than the concentration of one or more specific components of the air sample.

EMERGING ISSUES FROM THE ADVISORY COUNCIL

- Identification of the chemical composition of UFP is necessary in order to determine the likely causes of the observed health effects and guide the in vitro lab studies examining cellular-level changes.
- Measurement of real-time concentrations of key chemical components of UFP such as vapors of organic compounds, metals, sulfates, nitrates, elemental and organic carbon is limited by the lack of available instrumentation.
- High concentrations of ambient UFP within 100 meters of freeways and other sources of combustion are a cause for concern.
- Specific mechanisms of health effects from exposure to UFP nitrates and sulfates are not well known or defined. More research is needed, as they can constitute an important fraction of ambient PM_{2.5}, and likely also in the UFP size range.
- Health effects of semi-volatile organic compounds and UFP metals are not well understood.
- The size distribution of particles emitted by diesel engines is affected by PM emissions control systems. Where significant diesel PM mass reductions have occurred in highly impacted areas, such as the Port of Oakland, studies are needed to evaluate potential increases of UFP concentrations and impacts on nearby residents.
- UFP may be emitted from engines not only as a result of combustion but also as a result of engine lubricating oil consumption. These UFPs may contain metals (iron, copper, and zinc), organics and sulfates in both the particulate and vapor phases.
- High emitter (gross polluter) vehicles may contribute disproportionately more UFP emissions.
- Indoor exposure to UFP can be equal to or greater than outdoor exposure. As people spend a greater proportion of time indoors, total exposure to UFP can be greater indoors depending on combustion sources and ventilation in the home. UFP exposure while commuting in heavy traffic may also be greater than other outdoor exposure.

ADVISORY COUNCIL RECOMMENDATIONS

The following Advisory Council recommendations to the Board are based on: the above presentations, and subsequent discussions among Advisory Council members. The Air District should:

- Continue efforts to establish a UFP monitoring program in the Bay Area near traffic sources (and away from them to get background levels). Consider locating monitors in highly impacted communities, such as West Oakland near the Port of Oakland, in communities near freeways, at the San Jose NCore site, or in conjunction with EPA-required roadside NO₂ monitors.

- Track epidemiologic and toxicological research on health effects of UFP, including the mechanisms responsible for causing those health effects. Pay particular attention to vapors, metals, organics, sulfates, and nitrates.
- Consider developing an inventory for UFP emissions, including motor vehicles using all types of fuel (gasoline, diesel, biodiesel, CNG, LNG, propane, hydrogen, ethanol, etc.), the contribution of engine lubricating oil to UFP emissions, the role of gross emitting vehicles, and other sources, such as industrial, commercial and residential fuel combustion, aircraft, ships, trains, etc.
- Examine the relative UFP exposures occurring indoors and outdoors and provide summaries and important information for public education.
- Continue tracking research on the interaction and growth of UFP from the point of emission (the nucleation mode) to the larger, more stable mode (accumulation mode) as occurs within the first 100 meters away from the edge of freeways.
- Consider hiring a Public Health Officer to track the UFP issues as identified above.