The Cumulative Health Impacts of Toxic Air Pollutants on Sensitive Subpopulations and the General Public

New Jersey Clean Air Council
2011 Annual Public Hearing

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New Jersey Clean Air Council
Public Hearing
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New Jersey Clean Air Council
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Introduction

The New Jersey Clean Air Council (CAC) is a statutorily created advisory body that provides ongoing input and recommendations to the New Jersey Department of Environmental Protection (NJDEP) on air quality issues. The CAC conducts annual public hearings that highlight the most pressing air quality issues affecting New Jersey. After considering the testimony received at a hearing, the CAC prepares a report of recommendations, presents the report to the Commissioner of the NJDEP, and makes the report available to the public. For 2011, we are pleased to present our report entitled, "The Cumulative Health Impacts of Toxic Air Pollutants on Sensitive Subpopulations and the General Public."

Currently, air pollution control in New Jersey is governed by the practice of regulating each pollutant individually, with no specific guidelines for considering the cumulative health impacts of multiple chemical and nonchemical stressors. A cumulative health impacts approach could move beyond the pollutant-by-pollutant method of regulation and take into account additive and possibly synergistic adverse health effects of exposure to multiple air pollutants and other environmental stressors, even when no single-pollutant standard may be violated.

The need for a cumulative impacts approach is greatest in urban communities that are burdened with higher levels of pollution and multiple stressors that may increase susceptibility to development of health-related disorders. Groups who are particularly vulnerable to air pollution include children, the elderly, and residents with pre-existing conditions such as asthma, other respiratory disorders, and heart disease. Socioeconomic status associated with both increased exposures to pollution and increased vulnerability includes poverty, race, and ethnicity. As the state strives to elevate its citizens and reduce unemployment numbers, it is strategically planning for revitalization of our urban core. Adding to this effort to bring in jobs, the NJDEP could recognize that stationary sources have made great strides in reducing pollution over the past decades.

Understanding, evaluating, and remediating air pollution and its impacts throughout New Jersey are challenges facing advocates of the environment and environmental justice, regulators, scientists and the regulated community. Several governmental environmental protection departments, including the NJDEP, the California Environmental Protection Agency (CALEPA), and the United States Environmental Protection Agency (USEPA), also are seeking methods to address the issue of cumulative impacts. Recently the USEPA issued a report on toxic air pollution that included a study on Paulsboro High School in South Jersey. The seven month study found that despite the schools proximity to an oil refinery, the toxins registered below levels of concern. As a result, the USEPA will cease monitoring at the school based on the findings.

On April 13, 2011, the CAC conducted its public hearing entitled "The Cumulative Health Impacts of Toxic Air Pollutants on Sensitive Subpopulations and the General Public." We took testimony from the public, scientific and regulated communities,

academia, other government agencies, and environmental justice organizations, as well as other interested parties. There was no representation from industrial stationary sources.

Two key policy recommendations were developed on the best approach to follow in developing a cumulative impacts policy that is incorporated into the NJDEP's decision-making process: there needs to be a robust stakeholder process and that the issue needs to be studied further. A series of more specific science and research oriented recommendations were also developed that address identifying vulnerable and overburdened communities, reaching out to those communities through education and assistance, and analyzing and monitoring pollutant exposure and chemical versus non-chemical stressor interaction through scientific research and enhanced data collection. These recommendations, as well as some background information, are outlined below.

The issues addressed by the CAC in this report are critical, difficult in resolution, and, for many, quite novel. As a result, a significant minority of the CAC is unable to fully support the policy recommendations as set forth below. Accordingly, the CAC has included a brief addendum appended to this report, setting forth the position of this minority.

Background

The disproportionate impact that pollution imposes on overburdened and vulnerable communities was examined and should be further discussed within the stakeholder process. Some NJDEP efforts in this area include:

● Port Authority of NY/NJ (Newark/Elizabeth) – A Clean Air Strategy, developed in partnership with the NJDEP and other stakeholders, commits the Port Authority to reduce diesel emissions from ocean-going vessels, cargo-handling equipment, heavy-duty diesel trucks, locomotives, and harbor craft.

● Construction Equipment – A Diesel Executive Order was signed by Governor Christie in April 2011. This initiates a pilot project to reduce emissions from non-road diesel construction equipment when used on large state-funded construction projects to improve air quality, especially in urban areas. This study will determine whether the pilot is successful at reducing air contaminant emissions and improving air quality, which would be the basis for determining if the pilot should be expanded to other construction projects.

● Fuel Sulfur Content – The State is a leader in adopting new rules requiring significant reductions in sulfur content for home heating oil and other types of fuel oil.

● Camden/Paterson Projects – In Camden, the NJDEP worked with community residents to find sources of air toxics and particulate matter, then modeled air toxics emissions and identified risk reduction strategies, including getting a facility to move a sand blasting operation indoors and rerouting trucks around the neighborhood. In Paterson, the NJDEP monitored air toxics for a year in order to address pollutants of concern. Risk reduction activities in Paterson were mainly focused on outreach and education which resulted in a

reduction of idling and getting a hospital to stop crushing fluorescent bulbs on site. These studies indicate most air toxics are vehicle-related.

● Dry Cleaning Equipment Grant Program – New Jersey has the first program in the nation to provide assistance to the dry cleaning industry to purchase newer, more efficient equipment, that does not use an air toxic (perchloroethylene) as a solvent. The primary focus is on replacing equipment at those dry cleaning facilities co-located in residential buildings, mostly in highly populated urban areas, and dry cleaning facilities located within 50 feet of a licensed day care center. Additional funds were provided for those facilities that switched to a professional wet (water) cleaning technology.

● Targeting of Air Toxic Emitters – Revised compliance inspection targeting procedures to focus on facilities that are large emitters of air toxics by using reported emissions from various Department databases (multi-media emissions report) to compare with allowable/permitted emissions.

● Out-of-State Air Pollution – The State has been fighting to reduce emissions of pollutants from out-of-state sources that create pollution that blows into New Jersey. In late April, NJDEP Commissioner Bob Martin appeared during a public hearing spurred by a NJDEP petition, testifying in support of a federal proposal to reduce sulfur dioxide and other harmful pollutants from the GenOn Energy coal-fired power plant in Portland, Pennsylvania. New Jersey is also battling out-of-state air pollution in two ongoing federal court cases dealing with power plants in western Pennsylvania that pour out huge volumes of sulfur dioxide and nitrogen oxides.

New Jersey's air quality has improved greatly over the years as a result of laws regulating industrial emissions, better pollution control on cars and trucks, and regional efforts to control pollution. While the initiatives listed above have collectively improved or have the potential to improve air quality, and have achieved varying degrees of success, they do not form a comprehensive cumulative impacts policy.

The purpose of the Hearing was to gather information and review what policy has been implemented on a federal and state level which could be replicated in New Jersey, with the goal of providing recommendations to the Commissioner. To date, neither the USEPA nor any other state has produced a policy that has been implemented and therefore further study is needed. New Jersey would be at a competitive disadvantage within our region to act at this time without a federal policy in place.

Key Findings

● There is currently no fully-developed state or federal cumulative impacts assessment policy model that New Jersey could implement at the present time.

● The cumulative impact of multiple sources of pollution affects many diverse communities throughout New Jersey. The NJDEP's cumulative impacts screening tool

shows that this pollution especially overburdens communities of color and low-income and disadvantaged neighborhoods in the state.

● New Jersey's stationary sources have significantly reduced their emissions over the past few decades. While mobile source emissions have also decreased, these emissions have become an increasingly dominant source of pollution in the State.

● The concept of cumulative impacts is already being used in various situations in science and law. For example, USEPA datasets such as the National Air Toxics Assessment (NATA) and the Integrated Risk Information System (IRIS) incorporate a cumulative impacts approach, and the National Environmental Policy Act (NEPA) also contains a cumulative impacts assessment. The NJDEP already uses IRIS and NATA for risk assessment and to prioritize risk reduction strategies. CALEPA is in the late stages of developing a cumulative impacts screening tool that identifies communities that are vulnerable to and overburdened by pollution. This tool incorporates health data, pollution emissions and concentrations data, socio-economic data, and land use information.

Recommendations

The CAC considered many recommendations from the hearing that focused directly on the promotion of a cumulative impacts approach to permitting and zoning through various regulatory and policy mechanisms. Given the complexities of the science, the potential environmental and health benefits, and the potential economic impact, the CAC believes that cumulative impacts is an emerging area of policy that needs to be developed through a robust stakeholder process.

New Jersey has a rich industrial past and, as we look to redevelop our urban areas for future growth, the CAC believes the stakeholder process used to develop a cumulative impacts policy should include input on environmental, health, and economic impacts.

The USEPA, along with several states in addition to New Jersey, is seeking methods to address this issue. By working in conjunction with these other states and agencies, the NJDEP can ensure that all developed policies conform to validated and reliable science-based standards and will preserve both New Jersey's business and environmental integrity. In moving forward, the CAC fully supports integrating stakeholder involvement, scientific research, and pilot project implementation to deal with this issue.

Implementation of a Cumulative Impacts Approach

1. The NJDEP should continue, through a stakeholder process, to develop its cumulative impacts screening tool in such a way as to identify overburdened and vulnerable communities and to best determine how the results generated from this tool may be integrated into a coherent cumulative impacts policy.

2. The NJDEP could research a coherent cumulative impacts policy that could be incorporated into its decision-making and fully implemented. A robust stakeholder process that includes representatives from affected residential communities, the general public, environmental groups, environmental justice groups, business, and other interested DEP constituencies should be utilized.

Defining and Identifying Overburdened Communities

3. The NJDEP should evaluate its current practices for measuring air pollution and other environmental stressors at construction and hazardous waste sites.

4. The NJDEP should initiate pilot studies of integrated real-time data monitoring systems in targeted high-density areas, and should also identify, test, and evaluate detector technology.

5. Multiple regional/air shed modeling tools have already been developed, tested and applied at the Computational Chemodynamics Laboratory (CCL)/Ozone Research Center (ORC) in the Environmental and Occupational Health Sciences Institute (EOHSI) at Rutgers, the State University of New Jersey. Among these tools is a comprehensive and extensive new modeling framework called MENTOR (Monitoring Environment for Total Risk), which has been designed and implemented collaboratively with the USEPA. The NJDEP may consider these modeling tools in situations of direct relevance to New Jersey.

6. Data regarding dispersion patterns of industrial and vehicular emissions throughout communities and personal exposure data for many air toxics are limited. As such, the NJDEP could consider support and conduction of further community air monitoring and modeling approaches to better define the population at high risk for exposure and to provide accurate data estimating health risks associated with exposure to air toxics. The NJDEP should use community air monitoring and modeling approaches to identify any harmful levels of exposure to air toxics and aid in developing effective control strategies to reduce community exposure to these pollutants. By conducting a cumulative impacts assessment in parallel with the traditional chemical-by-chemical, facility-by-facility analysis it may be possible to identify neighborhoods that might be burdened with a disproportionate health impact from pollution.

7. The NJDEP should continue to explore currently available and new sources of data for screening categories that may assist in identifying overburdened and vulnerable communities.

Data Collection and Availability

8. The NJDEP should investigate methods to collect data, or coordinate its collection with other agencies and entities.

9. The NJDEP should assist other agencies as needed in better data mining, making data available to the public, and adjusting the scale of the data by collecting and/or assisting in the collection of additional data where and when financially feasible within the confines of the DEP budget and available staffing.

Multi-Pollutant Exposure and Interactions between Chemical and Non-Chemical Stressors

10. The NJDEP should continue to coordinate with the Ozone Research Center (ORC) and other regional organizations on the current and future use of "best science" in regulatory practices concerning control strategies for human exposures to multiple pollutants.

11. The NJDEP could analyze real-time empirical data to develop a consistent definition of pollutant threshold exceedances and devise a time-sensitive approach to reducing air pollution to levels below these thresholds if staffing and resources allow. Pollution data could be collected and analyzed in real time so that threshold exceedances are identified as quickly as possible.

12. Public health data are measures of cumulative impact from such categories as heritable risk factors, personal behaviors, community/social stressors, and environmental and occupational exposures. The NJDEP should continue working toward understanding how these factors interact to produce adverse health outcomes, and how they may influence and indicate a degree of potential vulnerability to added environmental stressors.

13. The NJDEP could support and participate in community-academic partnerships, which can seek answers to focused questions about how non-chemical and chemical stressors interact if staffing and resources allow.

14. The NJDEP could focus its research and studies on exposure reduction, in addition to risk reduction if staffing and resources allow.

15. The NJDEP could monitor other environmental stressors, in addition to air pollutants, that contribute to cumulative health impacts, such as noise, vibration, temperature and other meteorological indicators, radiation, odor, and microbiologic contamination (e.g., spores, pollen counts) if staffing and resources allow.

Community Outreach, Education, and Assistance

16. The NJDEP could assist communities identified through screening as "vulnerable and overburdened" in applying for grant money from the USEPA for cumulative impacts studies and projects if staffing and resources allow.

17. Once screening has identified communities that are vulnerable and overburdened, the NJDEP could increase outreach to these communities if staffing and resources allow.

18. The NJDEP should implement an "Asthma Alert" system in coordination with healthcare providers on days when known asthma triggers such as ozone, particulate matter, and pollen are high. This system should reach overburdened and vulnerable communities in ways that are easily accessible and understandable to those who need it.

Summary of Testimony

Invited Speakers

Bob Martin
Commissioner
New Jersey Department of Environmental Protection

Commissioner Martin opened the public hearing by first acknowledging the timeliness of this topic of cumulative impacts and environmental justice. Understanding, evaluating, and reducing unequal impacts of pollution is a major challenge, and he and the Governor recognize and are very committed to addressing the disproportionate environmental burdens that face primarily low income and minority communities across the state. It is a priority that must be addressed.

The Christie Administration has focused on sources of air pollution from both within and outside of the state; about one-third of the air pollution in New Jersey continues to come from sources outside our borders. In its fight against this pollution, the Administration has filed a 126 petition against the Portland Power Plant, located in Pennsylvania across from Warren County. The USEPA has agreed with the petition and New Jersey's right to protect itself from emitters outside the state. New Jersey also is battling three other western Pennsylvania plants in federal court right now, to force them to put on emission controls. Within the state, New Jersey has adopted tighter rules that will significantly reduce the sulfur content in home heating oil, and has led the nation in our work on that front.

There is still much more to be done. New Jersey air quality still does not meet current health standards for ozone or fine particulates. Cancer risk from diesel-powered vehicles and engines, which disproportionately affect environmental justice communities, is unacceptably high, particularly in urban areas.

The State believes that addressing the sources of cumulative impact, especially diesel, is important. It is important to focus on minimizing emissions from motor vehicles through the vehicle inspection and maintenance program, vehicle and engine retrofits, and reducing engine idling. Vehicle turnover to newer and advanced technology fleets should be accelerated. Vehicle activity--including the number of trips and vehicle miles traveled--should be reduced, especially for trucks.

The Christie Administration already has taken some priority diesel emission reduction actions. As of May 1, 2011, sleeper berth exemptions expire. Trucks will no longer be

able to sit overnight and idle unless they have the newer equipment. Diesel particulate retrofits have been done on school buses and most garbage trucks. There is also an Executive Order for the first phase of a pilot of diesel retrofits for off-road vehicles. The ultimate goal in the future is to get off-road vehicles that are under State contract, for work that is done with the State, to have the proper retrofitted equipment on it, or it must be the newer equipment.

The State continues to work closely with the Port Authority of New York/New Jersey on several programs. The Port Authority's current strategy is to ban all trucks that aren't retrofitted -- pre-1994 trucks are banned this year unless they are retrofitted. All pre-2007 trucks will be banned by 2017 unless they're retrofitted. New Jersey is working very closely with the Port Authority to make sure that the current bans are being enforced. The Port Authority has committed to work with both the community and with the NJDEP. They are also focused on using electric cranes, replacing yard equipment, and investing in clean fuel for ships.

In addition, the NJDEP has decided it is time to revamp its Environmental Justice program, refocus its mission, and get out into local communities more than ever. The role of the two new coordinators for that program, Riche Outlaw and John Gray, is to be out talking to people in the communities, working to understand the issues of concern, and ensuring that a long-term strategy is put in place to make the necessary changes to improve circumstances in overburdened communities.

The NJDEP already has begun focusing on cumulative impacts in the State, with several projects going on in Camden for monitoring and modeling air toxic emissions. In Paterson, NJDEP continues to do air monitoring and expects to have a final report by early next year that provides a long-term read on the air toxic emissions in that community. NJDEP also has been focusing on dry cleaning equipment: New Jersey had the first program in the nation replacing dry cleaning equipment with newer, more efficient equipment that does not use perchloroethylene as a solvent.

Another major effort on this front is the cumulative impact screening method. Commissioner Martin has directed NJDEP staff to continue developing and expanding the cumulative impact model, and to seek additional stakeholder input. This is one of the critical ways to be able to model cumulative impact in the communities and can be a very effective, long-term tool in looking at permitting in those communities for other programs.

With respect to the transformation of the NJDEP, Commissioner Martin acknowledged the need to continue to change how things are done--components of which include looking at how the air program works. Commissioner Martin emphasized decision-making on science, data, facts, and cost benefit analysis where necessary, as well as a focus on outcomes and measuring progress over the long term. The NJDEP also is committed to getting input from stakeholders, recognizing that the people of affected communities, community representatives, and other organizations and businesses, all play

a key role in environmental protection and should have an opportunity to provide input on the direction going forward.

Commissioner Martin thanked the Council and the hearing attendees for their time and effort to help the State get to good answers and effective recommendations to turn from policy to real actions that make real differences in people's lives.

Rachel Morello-Frosch, Ph.D. M.P.H.
Associate Professor
Department of Environmental Science, Policy and Management and School of Public Health, University of California at Berkeley

Rachel Morello-Frosch is an Associate Professor at the University of California at Berkeley. Her testimony was on cumulative impacts assessment and implications for policy when addressing environmental justice. The three main themes of her presentation were synthesizing the science behind environmental justice and cumulative impacts, development of tools for decision-making, and implications for community engagement and action.

The science behind cumulative impacts tells us that disparities in exposures to environmental hazards between racial and socioeconomic groups are significant and are linked to adverse health risks. Air quality overall worsens in areas of segregation. Patterns of inequality are not just attributable to income or land use; social inequality, through both individual and community-level factors, may amplify adverse health effects of environmental hazards. In other words, long-term physiological effects erode the body's resilience against environmental hazards exposures.

In translating this science into a tool for action, an Environmental Justice Screening Methodology (EJSM) was developed in California. Indicators of cumulative impact were developed that reflect research on air pollution, environmental justice, and health, and are transparent and relevant to policy-makers and communities. An EJ screening method such as this one can be applied to multiple uses: local land use planning, regulatory decision-making and enforcement, and community outreach.

Three categories of cumulative impact include proximity to hazards and sensitive land uses, health risk and exposure, and social and health vulnerability. Different data sets, such as land use guidelines, modeling from emissions inventories, epidemiological data, and US Census and state-level data, for each category can be overlaid on a map to bring it all together for an overall cumulative impact score.

Some caveats to the EJSM are that it was developed with specific reference to air quality; new metrics to be added include traffic density, pesticide use, water quality, and climate vulnerability. In addition, this tool performs best with high spatial resolution land use data, which is not available for all areas of the State. This is a screening method, not assessment, so neighborhood monitoring and ground truth verification is still needed.

The EJSM tool provides a way of drilling down regionally and highlighting communities of potential regulatory concern, and identifying communities that are highly exposed and socially vulnerable for action. It is a transparent approach and the metrics use publicly available data that is not too difficult to implement and update. It is also open to modification by sophisticated users.

Community engagement in EJSM development enhances scientific validity and transparency, ensures metric and ranking choices are transparent, and builds trust in the application of it for regulatory, policy, and community purposes. Its use and exposure would lead to a move away from chemical-by-chemical, facility-by-facility analysis toward a cumulative impact approach with neighborhoods as the unit of analysis. Intervention points should include land use planning, industrial and transportation development, and regulatory decision-making. Opportunities for exposure reduction should be enhanced when health effect mechanisms remain unclear.

Paul Mohai, Ph.D
Professor
School of Natural Resources and Environment, University of Michigan

Dr. Mohai's presentation was entitled "Using Combined Air Toxic Concentrations to Discern Patterns of School Absenteeism and Academic Performance". It concerned a study done by the University of Michigan's School of Natural Resources and Environment on the effect of air pollution from industrial sources near Michigan public schools.

The locations of the 3,660 public schools in Michigan in the year 2007 were mapped using Geographic Information Systems (GIS) software. The software was then used to overlay industrial air pollution data from the USEPA's Risk-Screening Environmental Indicator database. Air toxic concentrations in the top tenth percentile were used to locate hot spots for the total of all chemicals, as well as for individual chemicals. Areal apportionment was used to estimate toxic air concentrations from industrial sources within two kilometers of schools.

The top twelve chemicals in areas within two kilometers of schools are diisocyanates, manganese, sulfuric acid, nickel, chlorine, chromium, trimethyl-benzene, hydrochloric acid, molybdenum trioxide, lead, cobalt, and glycol ethers. Identified adverse health effects of these chemicals include developmental, cardiovascular, carcinogenic, respiratory, and neurological.

The study shows that schools in Michigan are disproportionately located in places with high levels of air pollution from industrial sources, and that Michigan's minority students appear to bear the greatest burden. While 44.4 percent of all white students in the State attend schools in the top 10 percent of the most polluted locations, 81.5 percent of all African American students and 62.1 percent of all Hispanic students attend schools in these most polluted zones. In addition 62.2 percent of students in the free lunch program also attend schools in these locations.

In the study, school attendance rates were used to represent health levels, and as a school performance measure, the study used standardized test score results from the 2007 Michigan Educational Assessment Program (MEAP). The study found that schools located in areas with the State's highest industrial air pollution levels had the lowest attendance rates, an indictor of poor health, as well as the highest proportions of students who failed to meet MEAP testing standards, analyses of which indicate a statistically significant link to pollution.

Nearly identical patterns were found when analyzing data from the 2005 National Air Toxics Assessment (NATA), which includes not only major industrial sources, but also both on- and off-road mobile sources. An analysis of respiratory risk ratio shows an even stronger relationship to school-based demographics: with 60.6 percent of all white students, 96.4 percent of all African American students, 76.2 percent of all Hispanic students, and 73.3 percent of students in the free lunch program all attending schools in the top 10 percent of locations with the highest respiratory risk ratio. There is also a correlation between high respiratory risk ratios and both poor MEAP scores and low attendance rates.

Robert Laumbach, MD, MPH, CIH
Assistant Professor
UMDNJ – Robert Wood Johnson Medical School Environmental and Occupational Health Sciences Institute

Dr. Laumbach's presentation was on an upcoming 4-year project developed in partnership with the Robert Wood Johnson Medical School, the Environmental and Occupational Health Sciences Institute (EOHSI), and the Ironbound Community Corporation in Newark, New Jersey on the "Effects of Traffic Pollutants and Stress on Childhood Asthma in an Urban Community".

The objective of this study is to describe one approach to assessing the cumulative impact of chemical and nonchemical stressors – a community-academic partnership to evaluate how chronic psychosocial stress might worsen the effects of traffic air pollutants (TRAPs) on asthma. The study is designed to look specifically at individuals with asthma, and how stress, TRAPs, and diesel exhaust, in particular, affects their health. The focus is on a school in the Ironbound community, located near the Port of Newark/Elizabeth, and adjacent to Routes 1 and 9, and the New Jersey Turnpike. There is heavy diesel truck traffic everywhere; truck pass throughout the neighborhood and they also park and idle on the streets. Newark Airport is also nearby.

Asthma is a recognized problem in the community. Two key factors here, supported by scientific data, are that there is an intuitive connection between air pollution and asthma, and that chronic stress can affect asthma. This study will attempt to answer whether these cumulative impacts (i.e. TRAPs on top of chronic stress) contribute to high asthma rates in the community.

The community has taken some action by doing truck counts. In front of the school a couple of years ago, a truck count showed 144 diesel trucks passing by in one hour around the time children are walking to school. Other data has been collected that measures black carbon, which is a good specific indicator of diesel exhaust, and shows that there is a piece of exposure near the school that is attributable to the trucks.

There are many different types of stressors. Acute stress should be protective in that the stress hormones (cortisol – an anti-inflammatory and epinephrine - a bronchodilator) released during a fight-or-flight situation should open airways. Shortness of breath is a powerful acute stressor. The stress response should help to return the individual to normal during an asthma attack. However, there is some developing evidence that suggests that chronic stress over time down-regulates the acute stress response. Studies have shown that under conditions of constant or repeated stress, people have reduced cortisol levels, and also reduced levels of receptors for cortisol. That may make people more vulnerable to situations where they need an acute stress response. Traffic air pollution can affect by causing increased pulmonary inflammation and decreased pulmonary function, which leads to functional asthma exacerbation.

In the study, 40 children, aged 9-14, who have asthma will be recruited. Their daily asthma status will be intensively monitored, as well as their exposure to black carbon, measured with small 24-hour personal monitors. Small badges will also measure their nitrous oxide levels, another marker of TRAPs exposure. This will be done for up to thirty days with each child.

To determine if chronic stress makes TRAPs even worse, we will also assess chronic psychosocial stress for each child during the previous six-month period using the UCLA Life Stress Interview for Children. Acute stress responses to a standardized stress task, the TRIER Social Stress Test for Children, will also be measured for each child.

The implications of the study hypothesis are that there may be a common pathway by which multiple stressors influence asthma, and it may be relevant to other asthma triggers, not just TRAPs. This may be one way to simplify the multiple stressor-multiple outcome problems.

In conclusion, a community-academic partnership can seek answers to focused questions about how nonchemical and chemical stressors interact, and the answers may ultimately inform cumulative impact assessments.

Tina Fan, Ph.D.
Assistant Professor
UMDNJ – Robert Wood Johnson Medical School, Environmental and Occupational Health Sciences Institute

Dr. Fan's presentation was on "Approaches to Quantifying Community Exposures to Air Toxics". It is a challenge to assess a community's health risk associated exposure to air

pollution. There are large gaps in understanding community exposure to air toxics and cumulative health risks.

Some of these reasons include that there are a variety of sources of air toxics, including small point sources, in a local community, and the spatial variation of air toxics can be large in communities with dense sources of air toxics. In communities located in close proximity to sources of air toxics, many are socio-economically disadvantaged groups, which may be at a greater health risk, but the community-based spatial variation and personal exposure data of air toxics are limited.

Exposure to air toxics and health risks for people living in an area with dense sources of air pollution may be under-estimated based on routine ambient air monitoring data. In addition, current databases may under-represent the time-location pattern for the socioeconomically disadvantaged population, who often live in close proximity to air pollution.

A study done in the village of Waterfront South in Camden, New Jersey illustrates many of the above points. This was a joint effort between the University of Medicine and Dentistry New Jersey, EOHSI, and the NJDEP.

There are mixed sources of air toxics in the Waterfront South neighborhood, including from industrial sources (26 industrial and manufacturing facilities), mobile sources, and urban sources (Philadelphia is approximately eight miles west). The demographics show that many people live under the poverty levels, and many of them are minority groups.

The objectives of this study were to characterized local ambient and personal concentrations of air toxics using measurements and simulations in Waterfront South, to assess the impact of local industrial and mobile sources on measured neighborhood ambient concentrations and personal exposures in Waterfront South and a reference site (Copewood/Davis), to identify the sources of concern, to characterize the time-location patterns of the population living in areas with elevated air pollution levels, and to evaluate the factors that may influence the time-location patterns of the people living in those areas.

The study was designed to take neighborhood ambient and personal measurements from sixty subjects in Waterfront South and forty subjects in Copewood/Davis, during both weekdays and weekends in the winter and summer. Samples of fine particles, volatile organic compounds, carbonyls, and polycyclic aromatic hydrocarbons were taken. Baseline and activity questionnaires and time/activity diaries were maintained, particularly in respect to how much time the subjects spent indoors and outdoors. Saturation sampling was also done to look at spatial variation of the air toxics in the two communities.

The data collected showed that oftentimes the personal levels exceeded the ambient levels of air toxics. For instance, the benzene personal levels were higher than the ambient levels, probably due to local roads that are heavy with traffic. The Camden

subjects also spend significantly more time outdoors than the other general population, so this particular behavior also placed them at a greater risk to exposure to local air pollution. In addition, men and children spent more time outdoors, while older people generally stayed in the house more. This is another indicator of the potential risk for small children.

The study was also able to identify the potential sources that contribute to spatial saturation and hot spots. Most of them were metal processing facilities, but also local roads were a significant contributor.

In summary, the community air monitoring approach can better define the population at high exposure risks, provide accurate data for the estimate of health risks associated with exposure to air toxics, and identify the major air toxics sources of concern and aid in developing effective controlling strategies to reduce community exposure to air toxics. In addition, personal activity has a significant impact on personal exposure to air toxics and associated health risks.

Sastry Isukapalli, Ph.D.
Assistant Professor
UMDNJ – Robert Wood Johnson Medical School, Environmental and Occupational Health Sciences Institute

Dr. Isukapalli's presentation was on "Tools and Approaches for Modeling Human Exposures to Multiple Pollutants". These modeling tools have been developed at the Computational Chemodynamics Laboratory (CCL)/Ozone Research Center (ORC) in the Environmental and Occupational Health Sciences Institute (EOHSI) at Rutgers, the State University of New Jersey.

The ORC/CCL employs a "One-Atmosphere" approach to account for physical/chemical transformations over multiple spatial/temporal scales that couple the dynamics of multiple gases and particulate air pollutants. Air pollution is a multi-pollutant and multi-state problem. This requires computer models that will follow all the basic transport processes, collection of all the data, and simulating the chemicals of all the reactions happening.

Ambient air quality has been gradually but steadily improving in New Jersey, and this is taking place in spite of the increase in factors that could result in higher emission levels, such as vehicle miles traveled per person in New Jersey. However, people are not exposed just to ambient air; they're also exposed to multiple chemicals indoors. Some of these chemicals are interacting with ambient air to produce new products. An example is that ultrafine particles are formed from the interaction of entrained ozone with emissions from household air fresheners and solvents. As such, we cannot look at the whole problem as one pollutant at a time, but we also need to consider the mixture impact.

Understanding health and ecological effects and developing rational/optimal control strategies is complicated by the fact that air pollution is a multiscale problem in terms of

both the environmental and the biological processes involved. The ORC/CCL has developed a comprehensive and extensive new modeling framework called MENTOR (Modeling Environment for Total Risk) for assessing inhalation exposures and doses to co-occurring air pollutants.

It is a process-based framework that follows from the emissions to the health effects in a systematic sequence of steps. Contaminants are released into the environment, where they are transported over large regions and interact with other chemicals. Meanwhile, people are moving from different microenvironments and different locations. They are coming into contact with the chemicals. This has an impact on how much gets into the body, the physiological characteristics, their activity, lifestyle attributes, and impacts how much is absorbed within the body. In addition some chemicals have synergistic health effects and some have antagonistic health effect.

In one example of what steps we use in studying exposures to particulate, we have estimates of the background concentration, and we use enhanced versions of photochemical models, which can also study the multiple air toxics. We take that information with the information on population demographics and socio-economics, and fuse it to obtain what people are really exposed to at different microenvironments within the entire region of study. We couple that with what are the particular activity patterns of individuals and obtain how much they are exposed. In this way we can study how much affect goes into the body. This is done in a statistical manner using a large number of multiple variables that we define based on the demographics and statistical attributes of multiple physiological and socio-economic variables. When we perform these studies for a large number of variables, as we increase the number of samples, it slowly converges towards what would be happening in regards to the real population exposure.

In other examples we can look at the contributions to time spent indoors and outdoors and across different seasons. You can see the patterns in ambient concentrations do not necessarily need to be maintained. The patterns of exposures are impacted not just by concentrations, but also by the makeup of the people, the housing, and so on, within the area.

Using this system, we can study the impact of exposures either by considering the impact of those exposures alone or together, total exposures. This helps us interpret health risks in the context of corresponding health risks arising from indoor contaminants.

We need to look at sources that are not just ambient air quality and exposure concentrations because once the source enters the body, they don't stop interacting with each other. To calculate these things, you need fairly complex physiological and pharmacologic models. Our lab has been focusing on developing some sort of a study for these approximations to these models that can be used by non-specialists without having to run complex models.

We are also using the same approach in modeling the spraying of pesticides from aircraft. We are looking at exposures to the general public and occupational for the cabin crew.

We study the distribution of the contaminants, and follow the same principle of following as they go through different tasks. It helps us to interpret the risks to pesticides being sprayed in the cabin environment with respect to what the general population is exposed to from other media.

We are expanding this for not only contaminants like pesticides, but also looking at how this will be able to explain the risks and exposures of passengers to other chemicals within the cabin environment, such as ozone from the stratosphere being pulled in and reacting in the cabin to produce various VOC's.

In conclusion, by using this integrated model that follows the same principles throughout, any improvements in individual competence will directly benefit all of the pieces together. On the other hand, if you are looking at one chemical at a time, it will take a substantial amount of time to pull these benefits into other scenarios. Instead we do this integrated type modeling.

A range of modeling and analysis tools have been developed at CCL/ORC and are being applied to inhalation and total exposures involving PM, air toxics, bioaerosols, nanoparticles, and multimedia contaminants (pesticides, solvents, heavy metals, etc.) in the ambient air and in confined environments and microenvironments. The "one atmosphere" is evolving into the "one environment" model; "person oriented modeling" is central in this approach. These concepts are slowly being fused into USEPA regulatory tools and practices, and the CCL/ORC aims to keep working closely with the NJDEP and other regional organizations to support current and future use of "best science" in regulatory practices.

Steve Anderson
New Jersey Department of Environmental Protection

Steve Anderson works for the NJDEP and his presentation was on the status of cumulative environmental impact methods development in New Jersey. The NJDEP has been looking at cumulative impacts for a while. It began with the Environmental Equity Rule, in which we looked at a screening model to estimate future impacts, and enhanced public participation in the permit process.

Ensuing Executive Orders established a petition process for communities to self identify, and created the Environmental Justice Advisory Committee (EJAC). An EJAC report and recommendations on cumulative impacts called for the NJDEP to develop a screening tool to identify "vulnerable and burdened" communities to help guide various policies and actions. Subsequently, the NJDEP developed a preliminary geographic information system-based screening tool. This tool has since been posted on the web, presented at a USEPA Symposium in Washington, D.C., approved for the Ironbound Community Corporation to use on a pilot basis as part of grant activities, and presented to the New Jersey Science Advisory Board.

The cumulative impact method is a statewide screening approach that uses simple indicators of multiple environmental hazards to estimate overall "impact" or "burden", and compares relative impacts of different geographic areas. It is a "bias for action", meaning that as the science continues to develop, what can we do in the interim for some of these things to try to make some progress.

The categories of indicators are environmental/exposure, social/vulnerability, and public health. The NJDEP method compares the environmental indicators to the other indicators, but does not combine them as the USEPA and other states have. These other similar methods include the USEPA Justice Strategic Enforcement Assessment Tool (EJSEAT), the Faber "Unequal Exposure" (Massachusetts), and the CalEPA report, "Cumulative Impacts: Building a Scientific Foundation".

An outline of the NJDEP approach is to identify separate "indicators", quantify indicators separately at small geographic scale using GIS, assess options for combining, weighing, or aggregating indicators, "scale up" to larger geographic areas, and analyze/correlate with other variables. The nine current NJDEP indicators are NATA cancer risk data, NATA diesel data, NJDEP benzene estimate, all traffic and truck traffic, density of major regulated sites and known contaminated sites, and density of dry cleaners and junkyards.

The NJDEP method of indicator quantification is to create 100 meter grid rasters using a consistent statewide grid. We calculate a statistical z-score for each indicator and grid, where a z-score equals the value-mean/standard deviation. Outliers are eliminated by assigning a score of 3 to any with a z-score greater than 3, which impacts less than 0.5% of grids.

Two options are used to combine indicators. One is to sum all the z-scores in each grid. This would give a maximum score of 27 (9 indicators times a maximum z-score of 3). This quantifies how all indicators impact one area, and one or tow high indicators can drive the results. Another option is to count each grid with a z-score greater than 1. This would result in a maximum score of 9 (9 indicators times 1 count if z is greater than 1). This option focuses more on higher scores and highlights areas with multiple high indicators. Socio and demographic data is not added, but it is correlated.

Using the hundred meter grid data, we have come up with what an average impact would be to race and income. It shows how an estimate of cumulative impact increases as percent minority on the block goes up. Percent poverty shows the same relationship.

Work still needed includes updates and improvements to existing indicators… for example the NATA 2005 results for diesel particulate. Potential new environmental indicators are also needed (Environmental Public Health Tracking), such as drinking water, ambient water monitoring, soil and groundwater contamination data, radon and radiation, and facility release/emission data. We are working with the NJDHSS on vulnerability and health data, and stakeholder input is also needed.

Jerald Fagliano, Ph.D.
New Jersey Department of Health and Senior Services

Dr. Fagliano's presentation was on "Using Public Health Data to Assess Vulnerability and Cumulative Impacts to Health". We have data in New Jersey on public health. Some of it is difficult to get, or difficult to get at the scale that people want to see it. The key data sets that are relevant to environmental public health include vital events (i.e. births, deaths, infant/fetal deaths), health outcome registries (i.e. cancers, birth defects), administrative data (i.e. in-patient hospitalization and emergency department), and laboratory reports on exposure, such as childhood blood lead. The NJDHSS is trying to make these data sets available to the public as comprehensively as we can.

As part of this effort, we are one of 25 states and New York City working with the Centers for Disease Control (CDC) in Atlanta to put together what is called the Environmental Public Health Tracking (EPHT) network. The resource we're using to display public health information is the State Health Assessment Data (SHAD) system, which includes a custom data query system that allows the public user to ask their own questions about the data, public health indictors, and links to reports. The NJ EPHT program supports and uses NJ SHAD as its data portal.

In the system, we have air and drinking water quality data for New Jersey, environmental quality, human exposure data in terms of lead and carbon monoxide, and a variety of health outcomes, from birth outcomes, death due to various outcomes, cancer, heart attack, hospitalization, and asthma hospitalization. We try to bring all these kinds of measures together.

The indicators are cross categorized, according to a variety of different interest areas. One of them is health disparity priority areas, which is a very big issue in public health, to understand and to document disparities in health status across different demographic factors. These are some of areas for which there are indicators.

We also in our indicators have some maps which show the geographic pattern. An example by county shows two indicators which kind of parallel each other - looking at the percent of births with low birth rate, and children under age five years living in poverty. These show a very similar pattern, with the highest percentages in counties surrounding New Jersey's major cities – Newark, Trenton, and Camden.

Another series of examples indicate for mortality the downward trend in all causes of death, heart disease, cancers, and cerebrovascular diseases, or stroke, over the past decade or so. What is striking is that it is going down in all ethnic groups, but there are still discrepancies between or disparities between the groups that are persistent and not being reduced very much. The highest mortality rates are in African-Americans, the middle are among whites, and the lowest are among the Hispanic population.

Planned improvements to NJ SHAD include dynamic mapping of query output, additional data sets (hospitalization and emergency department, childhood lead exposure, cancer), and a secure portal for access to data at finer geographic and temporal scales.

These types of public health measures can be used as cumulative impact measures within modeling tools such as the one developed by the NJDEP. Public health measures are measures of cumulative impact from heritable risk factors, personal behaviors, community and social stressors, and environmental and occupational exposures. The challenge is in understanding how these factors interact to produce health impacts. For our purposes, they may indicate a degree of potential vulnerability to added environmental stressors.

We are in the process of trying to determine which ones will be the best kinds of indicators to use for vulnerability assessment. There are a variety of different options that we have. We can look at general measures of health, overall mortality, mortality due to heart disease, or cancers. We can look at infant health, infant fetal mortality, and low birth weight. We could also look at more specific measures like childhood lead exposure, or hospitalization or emergency use due to heart attacks or asthma specifically. We could look at cancer incidents overall. We could look at very specific kinds of cancers that may have a relatively strong component due to environmental exposures. And we can also potentially look at things like birth defects.

The problem with some of these outcomes is that they are rare. As such, trying to develop indices that have meaning at a local level and can be integrated into community level assessments is challenging. We are still trying to figure out which measures we would be able to use in a meaningful way and how to use them with respect to the kind of indices that NJDEP is developing.

Ray Werner
Chief, Air Program Branch
United States Environmental Protection Agency Region 2

Ray Werner gave an overview of the USEPA's involvement and investment in cumulative health impact studies. The USEPA has set six criteria pollutant standards. Every five years we review the health research information. There is a long process for coming up with new standards. In July of this year we will announce our decision on a reconsidered ozone standard.

In looking at health effects data, we use something called ISA (Integrated Science Assessments). These are the scientific basis for the national ambient air quality standards. Among the changes we've noticed is that we are starting to look at non-chemical stressors, such as socio-economic status, educational attainment, and reduced access to healthcare, much more than we have in the past in reviewing this health information. ISA's for particulate matter and carbon monoxide have recently been released and can be accessed on the Internet.

In addition, the USEPA recently announced a power plant mercury and air toxics rule. The importance of this, in terms of cumulative impact, is that it would require about a 90 percent reduction in emissions for mercury, which is not typically a problem when you inhale it. It is particularly important to developing neurological systems in unborn babies and pregnant women, because the avenue into the human is not by breathing, but by ingestion. So we are taking actions to look at other pathways for air toxic compounds.

Another recent activity is that we recently released the National Air Toxics Assessment. We look at 187 passage air pollutants and do a cancer and a non-cancer risk estimate for them. This is based upon emissions information, with some of it is calculated, some of it measured, and some of it estimated. We use models to predict the impact. We use the health information we have in terms of exposure and hazard. But if you look at that on a neighborhood scale, you get a good estimate of what the cancer risk is and the category of sources from where this risk might come from.

In the next year or two we are going to release a revised National Air Toxics Assessment using 2008 emissions data, but what we're looking into is something called a National Air Pollutants Assessment, NAPA, instead of NATA. The difference is that when you use this tool, which is Google earth-based, to go to your location and find your cancer and non-cancer risk, we're also going to overlay on that information about the criteria pollutants. This will be to show not only the risks from hazardous air pollutants and the air toxics, but also the criteria groups for which we have health-related standards. It is an attempt to provide more information to more communities and locations on exactly what the state of their health is, and where, in fact, the pollution comes from.

The USEPA sets standards for sources of air toxics, known as the Maximum Available Control Technology (MACT) standards. This is a part of the law where we have identified sources that can emit air toxics. Congress at one point developed the Clean Air Act that had us looking at the health impacts of all of these hazardous air pollutants, and we made no progress. The problem was that there was not enough health information about all of these compounds that we could set standards. In 1990, the law was changed to a list of the hazardous air pollutants with a directive to get rid of 90 percent of emissions. We side stepped the health assessment part because we didn't know how to do it. The 90 percent reduction is if a source is of a certain size and category.

The other requirement was that after those standards are set, go back later and determine that the residual risk of whatever is left coming out of the smoke stack, or emission point, isn't still a hazard. As such, we are in the process of looking at this residual risk for these standards we set for sources. One of the latest developments is that we used to just look at the emissions from that source for which we set a standard. We would only look at that one source. Now, in doing our assessments, we are going to be looking at all the other sources also. That is, again, a shift for more of a broader look at the air quality impacts on health.

There is a cumulative risk screening tool that is now under development with our Office of Science and Research. It is called CFERST (Community Focused Exposure and Risk

Screening Tool). This tool brings estimates of environmental concentrations, human exposure via all routes, and human health risks into the same tool as information about health outcomes, existing health conditions, demographic, economic, and social indicators, and sources of stress on the community. This tool starts to look at some of these other stressors that we know communities are interested in and we should be interested in.

Another recent development is that the USEPA is awarding $7 million to study the effects of pollution exposure and social stressors on communities. These grants are to fund human health risk assessment research. Scientists around the country will study a combination of harmful factors affecting human health, including research on poor and underserved communities with extensive pollution based problems. This groundbreaking research will focus on environments where people are exposed to multiple stressors, such as chemicals, anxiety, and poor nutrition. When these stressors are combined, they can lead to a much higher risk of health issues. I think we can look forward to a number of changes in the future, and, hopefully, that is a direction that I think most of the communities would like to see us go.

Joseph Suchecki
Director, Public Affairs
Engine Manufacturers Association

Joe Suchecki did a presentation on "Emissions and Exposure Reduction Through the Use of New Technology Diesel Engines". Researchers and regulators are just beginning to address cumulative impacts of pollutants. Health effects studies include exposure to mixtures, and researchers then try to apportion measured health effects from individual pollutants. The question is which pollutants may be responsible.

Diesel emissions are a mixture of many air pollutants. Diesel is a source, not a unique pollutant. Diesel emissions cannot be distinguished in the atmosphere, and there is no unique marker for diesel particulate matter (PM). There will always be diesel exhaust, but the composition of the exhaust can be changed. There is no evidence to indicate that diesel PM is any more or less harmful than PM from other sources, and ambient diesel PM levels have decreased significantly over the last decade.

Diesel emissions contribute to ambient air pollution, and the contribution varies widely and is dependent on the source apportionment method used. The industry and regulatory approach is to reduce diesel source emissions, and the result of that is near-zero emissions from New Technology Diesel Engines.

Traditional Diesel Exhaust (TDE) is exhaust from engines utilizing old technologies, including pre-1988 diesel engines sold and in-use prior to the USEPA diesel particulate standards as well as "transitional" 1988-2006 diesel engines, which had progressive improvements in engine design, but was prior to the full-scale implementation of multi-component after-treatment systems. Many hazard assessments and health effects studies have been done on TDE engines. These studies concluded that high levels of diesel

exhaust are likely to increase cancer and non-cancer health effects. The USEPA classified diesel exhaust as a "mobile source air toxic" in 2000, and classified pre-1995 diesel exhaust as "likely to be carcinogenic to humans" in 2002.

When we talk about New Technology Diesel Exhaust (NTDE), which is exhaust from engines using our new technology, we are defining essentially anything after 2007. Everything must meet the USEPA and California Air Resources Board (CARB) 2007 PM and NOx standards. We have fully integrated electronic control systems, oxidation catalysts, and wall-flow diesel particulate filters, and we use ultra low sulfur diesel fuel. All of this applies to both new and retrofitted engines.

NTDE is chemically very different from TDE, and the PM levels in NTDE are more than 100-fold lower than in TDE. NTDE emissions are similar to or lower than compressed natural gas (CNG) or gasoline engines, and the biological effects of TDE in human and animal studies is not observed with NTDE.

We had a study that we are doing with the USEPA and funded partially by the Department of Energy. It is being run by the Health Effects Institute. It is looking at the emissions and health effects from new technology diesel exhaust. It is called the Advanced Collaborative Emissions Study (ACES). The ACES PM and hydrocarbon results indicate that the diesel particulate filters are very efficient. The elements of black carbon used to be a very high percentage, but with the NTDE, it's a very low percentage. Not only are we decreasing the actual amount, but the percentage is also less.

The diesel exhaust is now very similar to gasoline. It's mostly sulfates coming out of the exhaust. Most of the contaminants that are found in TDE, a list of about 40, are essentially not found anymore. In our studies of ACES and other studies, we found that we can't even detect a lot of these compounds that were in there previously. There is essentially an 80 to 100 percent reduction in all the bad things that used to be in diesel exhaust. Other studies show that there is no acute toxicity in animals from NTDE. The ACES work is continuing with short-term animal studies under analysis, and ongoing long-term animal bioassays.

NTDE requires a paradigm shift in views on diesels and air pollution. It provides near-zero emissions of pollutants of concern and that are comparable or better than gasoline and natural gas emissions. There is a greater than 99 percent reduction in PM mass and numbers, and the composition of NTDE PM is almost no black carbon or elemental carbon, almost no solid particles, primarily sulfates, and near-zero levels of other hazardous air pollutants.

Clean diesel is a reality today. State programs that accelerate the transition to NTDE can be useful in reducing ambient pollutant levels and improving air quality throughout the State.

Bruce D. Groves
President
EMILCOTT, Environmental, Health, and Safety Experts
Member of New Jersey American Industrial Hygiene Association

Mr. Groves presentation was on "Measuring and Evaluating Air Pollutants and Other Stressors in Real Time". He spoke about some of the experiences, from a practitioner's standpoint, in conducting integrated real time monitoring using various air detection type equipment and also other environmental type equipment.

In order to improve air quality in high-density areas, we need to focus on local air pollution that creates unhealthy pockets of air pollution that cumulatively impact people who are exposed. This would include sampling at construction and hazardous waste sites. The biggest offender in much of our work is old diesel trucks.

Reducing local air pollution levels requires alternative approaches to evaluate and control exposures. Pollution sources are often numerous, diverse, mobile, episodic, and affected by local meteorological conditions. Real-time integrated sampling and evaluation offers the best approach for environmental assessment. It completely integrates environmental data, focuses on challenging polluted areas, and allows immediate action and observation.

We want to focus on the specific areas. We're seeing that the detectors are becoming smaller, cheaper, and faster, and you have more types of applications. It becomes less expensive to put these detectors out there, so we can focus on a lot of polluted areas, or a lot of different areas of challenge.

Integrated real-time air/environmental monitoring allows us to focus on air sampling of multiple particle sizes - dust (multiple particle size) and total volatile organic compounds (gases and vapors). We can correlate measurements to wind speed and direction. We can also include video, digital imaging, and other environmental data, and provide immediate graphic illustration of integrated data, through use of an Ipad, Smart Phone, or other Internet-based system.

The purpose is to try to reduce the overall pollution levels on the site and create safer neighborhoods. When particulates, vapors, and other measurable contaminants are at threshold, we alert authorized personnel, take prompt action to reduce pollutants, and start automatic analytic sampling as a tie-in to real-time data. We also integrate data from other monitoring, such as noise, vibration, temperature, radiation, odor, and microbiological (spores, bacteria, pollen counts) as part of the integrated systems.

The benefits of real-time monitoring of neighborhood pollutants are that it allows us to identify local pollution sources in real time, identify and measure contributing conditions, and sample specific contaminants when surrogate triggers are at threshold. It is a good measure of the effectiveness and return on investment of controls to reduce pollution. It provides integrated data from all detectors within a single platform and in real time, and provides empirical data to test and better design air quality models and approaches.

Some scientific policy recommendations would be to launch pilot studies of sophisticated integrated real-time data monitoring systems in targeted high-density areas; identify, test, and evaluate detector technology, and focus research in measuring particulate size concentrations as surrogates for improving local air pollution. Some legislative policy recommendations would be to analyze real-time empirical data to develop consistent thresholds and approaches to reduce air pollution; evaluate current practices in measuring air pollution and other environmental stressors at construction and hazardous waste sites; and develop consistent actions and controls when pollutants are at threshold.

Peter Montague, Ph.D.
Environmental Research Foundation

Dr. Montague's presentation was entitled "Cumulative Impacts: The Central Problem of Our Time". Cumulative impacts is an important problem that we all face. In thinking that the biosphere can tolerate an endless series of small environmental insults that result from the pursuit of economic growth, we are destroying it a little at a time. We now know that as benefits grow without limit, and therefore costs grow without limit, it is inevitable that we will, sooner or later, exceed ecosystem limits.

There is abundant evidence that we have already exceeded at least three ecosystem limits: CO2 in the atmosphere, rate of loss of biodiversity, and mobilization of phosphorus and reactive nitrogen. As we exceed ecosystem limits, we are running the risk of destroying the biosphere as a suitable place for human habitation. Therefore, we need to change the way we make decisions.

We need to change the overarching goal of the human enterprise from promoting economic growth to preserving the integrity of the biosphere. In recent years, we have come to rely on quantitative risk assessment and cost-benefit analysis for regulating chemicals, but new information makes it clear that these tools are not adequate to the task. The following is some of this new information:

- Endocrine disruption. Many chemicals can interfere with the endocrine system – a biological signaling system that controls growth, development, metabolism, tissue-function, mood, and behavior.

- Timing of exposure is critical. The effects of exposures in the womb or shortly after birth can vary dramatically depending on the exact timing of exposure.

- Low doses can sometimes be more biologically disruptive than higher doses.

- Perinatal exposures can "program" a person for life, thus determining events that will occur during mid-life, such as cancer or other disease. This indicates that the delay between exposure and effect can sometimes be measured in decades.

- We are exposed constantly to a mixture of chemical toxicants.

- We all carry a body-burden of chemicals and chemical mixtures, including endocrine-disrupting chemicals. We now know that people are constantly exposed to industrial chemicals. As such, they should be pre-market tested for the same reasons and in the same ways that pharmaceuticals are tested.

- Mixtures can be biologically active. We now know that mixtures of chemicals, each present at "insignificant" levels, can combine to produce biologically-significant effects.

- Epigenetics provides a new understanding of inheritable harm. Non-mutagenic chemicals can cause inheritable changes.

Recommendations to the DEP are to focus not on risk reduction but on exposure reduction; eliminate persistent, bioaccumulative chemicals; and based on screening tools, eliminate emission sources from vulnerable and/or impacted communities.

Ana Baptista, Ph.D.
Vice Chair
New Jersey Environmental Justice Advisory Council and
Director, Environmental and Planning Projects, Ironbound Community Corporation

Dr. Baptista's presentation was on "Cumulative Impacts from EJAC to the Ironbound Community of Newark, NJ". There are many communities throughout New Jersey, generally very dense, urban communities, where a large portion of minority and low income people reside very close to multi sources of pollution, including mobile, stationary, industrial, and other kinds. I want you to take the lessons that I present here from Ironbound and really think about them at the State wide level. Although we work very close to the ground in our community, we spend a lot of time dedicated to solutions on multiple levels. At state, regional, and federal levels, and at the local municipal level, because these issues are so complex that they require action at multiple levels.

The Environmental Justice Advisory Council back in 2008 started to prioritize what are the top issues of concern for environmental justice communities throughout the State. We have representatives from communities throughout the State on EJAC. The number one thing that a lot of people identified was cumulative impacts. Time and time again, communities like Ironbound, Camden, other communities, were faced with an onslaught of disproportionate burdens, permitting requests, and siting requests at the local level and state level, for polluting industries. Communities really felt bombarded. They felt like, enough is enough, we have so many pollution sources already. Can't something be done, or at least look at to account for and factor in the already very heavily burdened.

After researching this issue, EJAC released a Cumulative Impacts Report in March of 2009 outlining recommendations specifically to the NJDEP, but we tried to broaden it a little bit to include multiple agencies within the State of New Jersey to look at cumulative impacts. These recommendations and strategies include: identifying vulnerable and burdened communities; adopting requirements for additional analysis in these hot spot areas; reducing or eliminating existing impacts in burdened or vulnerable neighborhoods;

reducing air pollution burden in the state overall; improving technical tools; educating and involving municipal officials; empowering citizens, union members, and workers; and developing and improving programs outside of the NJDEP.

The EJAC is fully supportive of NJDEP's cumulative impacts screening tool and believes that it ultimately needs to be decided how this tool will get implemented in the decision-making structures of the NJDEP. It could be used not just for permitting, which is something the EJ community would like to see, but as an enforcement tool, as a tool to focus resources and target things like Green Acres funding, or look at areas of greater protections.

The Ironbound CARE Cumulative Impacts Project is a grant from the USEPA allowing a two year process to gather information through a stakeholder process, identify issues of concern, and make decisions and prioritize action strategies. The number one environmental issue that both the community and the stakeholders ranked was air pollution. Other issues included an unfair share of waste-related facilities; Brownfields – contaminated land and groundwater; lack of trees, parks, and recreational space; quality of life issues; indoor toxics and air pollution; and workplace health and safety. Vulnerability indicators included public health issues and socioeconomic status.

Next steps and recommendations to the NJDEP include moving ahead with finalizing its cumulative impact tool at the state level and developing implementation policies for permitting and resource allocation; developing policy tools at the local level to promote a cumulative impacts approach in planning and zoning; and implementing action strategies that alleviate cumulative burdens, including PM 2.5 standards, diesel retrofits, Brownfields clean ups, and green spaces. The EJAC recommends and advocates a bias for action approach within the NJDEP that implements short and long term steps that alleviate and ultimately eliminate cumulative impacts.

William J. Schulte, Esq.
Acting Executive Director
Eastern Environmental Law Center

Mr. Schulte presented on the National Environmental Policy Act (NEPA) and how it has already been used in addressing cumulative impacts on Environmental Justice communities. NEPA requires all federal agencies to include an "Environmental Impact Statement" in all reports or recommendations on proposals for legislation and other major federal actions that may significantly affect the quality of the human environment. NEPA is a procedural statute and its aim is to make better and more informed decisions towards preventing or eliminating damage to the environment.

NEPA requires agencies to consider three types of impacts: direct, indirect, and cumulative. NEPA defines cumulative impacts as impacts on the environment which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes the

other actions. Impacts under NEPA are defined to include ecological, aesthetic, historical, cultural, economic, social, or health, whether direct, indirect, or cumulative.

The key themes for addressing cumulative impacts on Environmental Justice communities are to identify the affected population, identify the disproportionately high and adverse effects, and include public participation. One of the limitations to NEPA is that it doesn't contain any substantive requirements. Another limitation to NEPA is that federal agencies are only required to do these cumulative impact analyses when a major federal action is proposed. As a result, when you address proposals when they come up, you don't necessarily take into account all of the other surrounding impacts.

The pro-active "hot spots" approach has been suggested for use in future decision-making. Hot spots are where vulnerable and overburdened communities exist together. Vulnerable populations are those that are more susceptible to the adverse effects because of their circumstances, whether they are age-related circumstances, young, or older, or race-related, income, access to health care, or access to healthy sources of food. Overburdened populations are those that are disproportionately subjected to these multiple stressors. Once these areas are identified, new and modified sources (as well as permit renewals) should be subject to additional analysis and scrutiny. If the cumulative impacts exceed a certain threshold, additional actions may be taken to mitigate them.

In NEPA, the federal government has a tool to make sure that these environmental justice issues are taken into account when going through cumulative impacts analysis. The problem for New Jersey is, New Jersey agencies aren't bound by NEPA, and we do not have a NEPA here in the state.

Several viable models for identifying hot spots that could be utilized by the NJDEP have been developed. One is the Faber and Krieg Model, which combines census data with available environmental data, then tests for income-based and racially-based biases to the geographic distribution of environmentally hazardous sites and facilities. It uses a point system to rank cumulative exposures. This model was utilized in Massachusetts and found that environmentally hazardous sites and facilities are disproportionately located and concentrated in low-income and minority communities.

Another model is the California Air Resources Board (CARB) Wilmington, CA model. The goal of this pilot project is to assess the cumulative impacts of air pollution in the Wilmington area (an Environmental Justice community), which is similar to some New Jersey communities. The first component is to identify all of the pollution sources in the area and develop a tool to make that information available to the public. The second involves the development of a modeling tool (Community Evaluation Tool, or COMET) that enables CARB to evaluate the air pollution cumulative risk within the community. When completed, COMET will be able to evaluate the combined air pollution impacts of facilities, major roadway links, and regional pollution. It will be capable of reporting cumulative air pollution emissions, exposure, and cancer risk.

The project outcomes will include: improved understanding of air quality impacts at the community level; improved understanding of methods to estimate cumulative impacts; development of a community-level cumulative air pollution impact model; and an infrastructure for working with the affected community and local agencies and municipalities.

Henry Rose
Statewide Coordinator
New Jersey Environmental Justice Alliance

When we look at what is going on with cumulative impacts and environmental justice, we realize that with both the USEPA and within New Jersey, there are no standards, guidelines, or definitions, no goals or objectives. We wonder if this is due to mistake or willful neglect, but most likely it is due to "analysis paralysis", or the practice of conducting one study after another.

People know where the communities are. They know what the overburden is. They know what the problems are, and, for the most part, where they are emanating from. This is a moral and ethical issue, an unwillingness to deal with issues of race and class and power in New Jersey. On a regular basis, we know who is dying. We know who has cancer. We know whose communities have higher rates of asthma. We know where high blood pressure is. We don't need to look for this anymore.

The NJDEP has the duty to protect human health and the environment. There has not been one decision, on anything, from the State that says, you can't do this because of environmental justice reasons. You can't do this because this community is already overburdened. You can't do this because the people here are sick enough. This is a willful neglect of human health.

We should first define what an overburdened neighborhood is, then look at what pollutions are already there, and figure out how to ratchet them down. Here is an area that has a problem. We are not going to allow anything in that is going to make it worse. Let's figure out how to put things in, how to bring things in to make it better. If cumulative impacts take place by a lot of small incremental steps, then hopefully we can reverse them by small incremental steps going the other way. It is going to take somebody stepping in to do that.

Dave Pringle
New Jersey Environmental Federation

In Mr. Pringle's presentation, he gave a summary and his thoughts on all of the prior presentations that took place throughout the day. Our role is to turn the science and data in theory that we heard today into action. Take that environmental science through a political science screen, and get real world results.

We know a lot. Cumulative impacts is a big problem. Too much pollution. Major negative consequences to our health and the economy. We also don't know enough, and we'll never know enough. Our collective response to date, recent past and current immediate future plans, are to keep studying things. Take some tentative steps to reduce or decelerate the trend further. Unless and until the science is perfect to determine if and how to reduce cumulative impacts, we're going to err on the side caution by just studying it some more. This status quo is a recipe for disaster.

The current administration is committed to Environmental Justice, as evidenced by Candidate Christie's direct quote in 2009, "Too many communities bear a disproportionate share of the pollution burden, as they do to many others. Too often state decisions are made without keeping that in mind. I will require my administration to develop standards and guidelines and implement them so that cumulative and disproportionate impacts will carry much greater weight in out decisions." In addition, the Commissioner made a statement earlier today here, about not backing away from that, and filling in more detail that we seem to be applying cumulative impacts in our current decision making.

Now we have three new power plants proposed for the Ironbound in Northern Essex County. The State legislature just passed a law subsidizing hundreds of millions of dollars to build them. They might not be as bad as coal plants, but these gas plants, without corresponding offsets, will add to the pollutant loading, making too many New Jerseyans sick, and leading to all those premature deaths and the corresponding increased healthcare costs and lost economic output. That never gets factored into all these cost benefit analyses.

We don't know enough, and we never will, but we do know enough to act now to reduce these impacts. We need to start ensuring that cumulative impacts have a greater weight in decision making. We need a cumulative impacts policy in New Jersey to protect everyone, but especially overburdened environmental justice communities, from pollution. The policies should affect permitting of new facilities and allowing existing pollution to decrease.

Public Speakers

Carrie Sargeant
Heart of Camden

The Heart of Camden is a nonprofit community development corporation based in waterfront south in Camden. Our community, as well as the City of Camden as a whole, are exposed to multiple air pollutants and consequently can be considered an air pollution hot spot. In the one square mile that is the waterfront south neighborhood, relatively high levels of particulate matter have been discerned and associated with at least seven toxic metals. An additional study has identified diesel emissions as a major source of personal exposure of the community. Fugitive dust is also a significant problem. This is all

especially important, considering the race, age, and socioeconomic condition of the majority of our residents, who can be defined as a vulnerable subpopulation.

First, I would like to recognize the current work taking place to address air pollution in our community that has been done collaboratively, among local nonprofit organizations, our local industry, the city, county, state and federal entities. Together we have worked to increase vegetative cover, retrofit vehicles and equipment, improve business practices and industrial practices, and educate residents and industries, and even truck drivers. However, without integration of cumulative impact to inform sound policy, permitting, and regulation, these efforts can and have been significantly undermined.

Our recommendations to the NJDEP include: creating functional urban ecosystems should be a priority and carried out through adopting holistic and adaptive approaches in place of myopic rigid approaches currently employed; cumulative impacts, both additive and synergistic, must be incorporated into the issuing of permits and permit renewals, regulations, and policy; State of the Art Technologies and Best Management Practice should be encouraged and incentivized for all new permits and permit renewals; on- and off-road mobile emission sources should be addressed; overall facility maintenance and operations need to be addressed; and added protection needs to be afforded to vulnerable populations.

Bill O'Sullivan
Director, Division of Air Quality
New Jersey Department of Environmental Protection

Mr. O'Sullivan thanked the Council for another fine hearing and Dr. Nicky Sheats for a wonderful program. It was a good balance of national experts and state experts, and very good representation by the environmental community. Five years ago we did not have that kind of representation from the environmental and environmental justice communities that we have today. He thanked the Council and also recognized Willa Williams, the new Liaison with the Council.

<u>Written Testimony</u>

Jean Public
Citizen

Ms. Public submitted a recommendation to include an earlier posting in the New Jersey Register notifying New Jersey residents of the Clean Air Council's Public Hearing. The notice for this year did not appear in the New Jersey Register until the day prior to the deadline for registering to speak at the hearing, which was not sufficient time for scheduling purposes.

Ms. Public's additional concerns were on open burning. She notes that the NJDEP's Divisions of Fish and Wildlife, Parks, and Green Acres have all burned hundreds of acres in New Jersey without care to air pollution. These actions release mercury from burning

vegetation, as well as fine particulate matter that can cause lung cancer, heart attacks, pneumonia, allergies, asthma, and other severe health impacts on the New Jersey populace. Also, most times the public is given no notice of the Department burning open space.

She asks the Clean Air Council to address the issue and advise what steps they are taking.

Karen Lesto
Citizen

Ms. Lesto submitted a written comment that the changes imposed to the NJDEP's very successful Alternate Workweek Program (AWP) commencing March 12, 2011 have moved us toward the opposite goal of cleaner air. The change in AWP has added thousands of more vehicles onto the roads during the week, increased fuel consumption and emissions, and degraded the air quality from the resulting traffic congestion. She asked the Clean Air Council liaison to address and respond to this.

Andrew Kricun, P.E.
Deputy Executive Director/Chief Engineer
Camden County Municipal Utilities Authority

Mr. Kricun is the Deputy Executive Director and Chief Engineer of the Camden County Municipal Utilities Authority, which operates a treatment plant within 100 yards of a residential community in the Waterfront South neighborhood of Camden City. A solid waste incinerator and several other large industries also operate in close proximity to the residential area, so the cumulative impact of air pollutants on public health is a matter of significant concern to the residents.

Mr. Kricun submitted written testimony urging the Clean Air Council to do its utmost to support regulations to address cumulative air pollution impacts, especially in proximity to residential communities. He believes that these air pollution impacts should be considered in a manner analogous to the way in which cumulative water pollution impacts are considered via the "Total Maximum Daily Load" (TMDL) approach on receiving water bodies. The problems with cumulative impact from air pollution on "receiving communities" should be addressed in the same manner that receiving water bodies are protected from the cumulative impact of water pollution sources.

A significant amount of modeling is required to determine TMDL's in water pollution applications and a similar, or greater effort would be needed to calculate TMDL's for air pollution impacts upon receiving communities. This effort is necessary to protect the public health from cumulative air pollution impacts. However, environmentally stressed communities cannot wait for the development of models to accurately identify the cumulative quantities of air pollutants and then to accurately measure the impact of those pollutants upon their citizens. I recommend that, in parallel with the long term development of accurate modeling, the Clean Air Council and regulatory agencies utilize

good science, and common sense, to develop empirically, and intuitively, temporary cumulative impact ceilings for environmentally stressed communities.

The cumulative impact of air pollutants upon residential neighborhoods is one of the most important environmental concerns of environmental justice communities. This is an extremely important matter that needs to be addressed and improved upon as soon as possible.

Joann Held
Air Toxics Analysis Services

Ms. Held presented written testimony on "Screening Tools for Cumulative Impact Assessment: A Quick Start Method for Evaluating Cumulative Impacts – Now!". She recommends that the NJDEP begin immediately to do some simple assessments while waiting for a fully developed program to get started. Screening tools can be used now to do some preliminary assessments, identify priorities, implement some risk reduction strategies, and get some practical experience that will inform the process of developing more complex review systems.

The following process could be used to begin assessing communities now: pick a few Environmental Justice communities, gather all readily available air emissions data, run this data through the Risk Screening Worksheet, identify pollutants of concern and the sources that emit them, do refined modeling for these sources of concern, finalize a list of priority sources, brainstorm risk reduction strategies and begin to implement them, improve the method based on this experience, and then repeat for the next community.

Additional steps beyond screening that the NJDEP should take that will begin to put processes in place that will be needed to do a good job on the full cumulative impact process when it is ready to be used include: improving the Air Toxics Emission Inventory, and taking the lead and engaging other NJDEP programs, other state agencies, and even municipalities in the discussion and expand beyond the air pathway. The Minnesota Environmental Assessment Worksheet should be considered adapting as a way to identify projects that may be located in an area with a wide array of environmental hazards. The NJDEP might develop a screening tool similar to the Minnesota checklist for use by air, water, land use programs, the NJDOT, municipalities, and others.

Andrea Ferich
Director, Camden Center for Environmental Transformation

Ms. Ferich is a resident of Waterfront South in Camden, NJ. She submitted written testimony asking for consideration for her neighborhood in Camden and all Environmental Justice communities. There is no matter more pressing for public health than the implementation of legislation regarding cumulative air impact.

It has come to be apparent that the issues related to poverty, racism, and violence are greatly influenced by the citing of hazardous waste in their community. They have begun

transforming their problems into resources with the Waterfront South Environmental Network. Environmental Justice has come to mean that nobody has to live with more than their fair share of toxins.

She recently read Joann Held's suggestions for the implementation of cumulative air legislation and could not agree more, act now.

Lacey Swartz
Independent Representative, Sustainable Personal Care Consultant, Miessence

Ms. Swartz sent in a short note asking the Clean Air Council to make the ethical and responsible choices on this issue. Air pollutants should be monitored cumulatively. It is critical to everyone's health.

List of Acronyms

CAC	Clean Air Council
CALEPA	California Environmental Protection Agency
CCL	Computational Chemodynamics Laboratory
EJSM	Environmental Justice Screening Methodology
EOHSI	Environmental and Occupational Health Sciences Institute
GIS	Geographic Information Systems
IRIS	Integrated Risk Information System
MEAP	Michigan Educational Assessment Program
MENTOR	Modeling Environment for Total Risk
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
NJDHSS	New Jersey Department of Health and Senior Services
ORC	Ozone Research Center
SHAD	State Health Assessment Data
TRAPs	Traffic Air Pollutants
UMDNJ	University of Medicine and Dentistry – New Jersey
USEPA	United State Environmental Protection Agency

Clean Air Council Public Hearing History

2010 Vision for the Next Decade: Air Quality and Pollution Control in New Jersey

2009 Electricity Generation Alternatives for New Jersey's Future: What is the Right Mix for Improving Air Quality and Reducing Climate Change?

2008 Improving Air Quality at Our Ports & Airports—Setting an Agenda for a Cleaner Future

2007 Improving Air Quality through Energy Efficiency and Conservation: The Power of Government Policy and an Educated Public

2006 Indoor Air Quality

2005 Air Pollution—Effects on Public Health, Health Care Costs, and Health Insurance Costs

2004 Fine Particulate Matter in the Atmosphere
- Health Impacts in NJ
- Need for Control Measures

2003 Moving Transportation in the Right Direction

2002 Innovative Solutions for Clean Air

2001 Air Quality Needs Beyond 2000

2000 Air Toxics in New Jersey

1999 The Impact of Electric Utility Deregulation on New Jersey's Environment

1998 CLEAN AIR Complying with the Clean Air Act: Status, Problems, Impacts, and Strategies

1997 Particulate Matter: The proposed Standard and How it May Affect NJ

1996 Clearing the Air Communicating with the Public

1995 Strategies for Meeting Clean Air Goals

1994 Air Pollution in NJ: State Appropriations vs. Fees & Fines

1993 Enhanced Automobile Inspection and Maintenance Procedures

1992 Impact on the Public of the New Clean Air Act Requirements

1991 Air Pollution Emergencies

1990 Trucks, Buses, and Cars: Emissions and Inspections

1989 Risk Assessment - The Future of Environmental Quality

1988 The Waste Crisis, Disposal Without Air Pollution

1987 Ozone: New Jersey's Health Dilemma

1986 Indoor Air Pollution

1985 Fifteen Years of Air Pollution Control in NJ: Unanswered Questions

1984 The Effects of Resource Recovery on Air Quality

1983 The Effects of Acid Rain in NJ

1981 How Can NJ Stimulate Car and Van Pooling to Improve Air Quality

1980 (October) Ride Sharing, Car– and Van-Pooling

1979 What Are the Roles of Municipal, County, and Regional Agencies in the New Jersey Air Pollution Program?

1978 How Can NJ meet its Energy Needs While Attaining and Maintaining Air Quality Standards

1977 How Can NJ Grow While Attaining and Maintaining Air Quality Standards?

1976 Should NJ Change its Air Pollution Regulations?

1974 Photochemical Oxidants

1973 Clean Air and Transportation Alternatives to the Automobile and Will the Environmental Impact Statement Serve to Improve Air Quality in NJ?

1972 The Environmental Impact on Air Pollution: The Relationship between Air Quality, Public Health, and Economic Growth in NJ

1971 How Citizens of NJ Can Fight Air Pollution Most Effectively with Recommendations for Action

1970 Status of Air Pollution From Mobile Sources with Recommendations for Further Action

1969 Status of Air Pollution Control in NJ, with Recommendations for Further Actions

Addendum Reflecting a Clean Air Council Dissenting Position

To: Honorable Commissioner Bob Martin

From: Nicky Sheats, Esq., Ph.D., Hearing Chair
John Elston
Howard Geduldig, Esq.
Robert Laumbach, M.D.
Pam Mount
Richard E. Opiekun, Ph.D.
Joseph Spatola, Ph.D.

RE: Addendum Reflecting a Clean Air Council Dissenting Position

The above-listed members of the Clean Air Council (CAC), in response to your request made at the July 13, 2011 CAC meeting for our dissenting position, respectively offer the following addendum:

1. The dissenters recommend that the New Jersey Department of Environmental Protection (Department) conduct robust and transparent stakeholder meetings that result in the development and implementation of a coherent cumulative impacts policy. This policy should be incorporated in the Department's decision-making process, including permitting, in the near future. While we do not oppose continued research into the cumulative impacts of toxic air contaminants on sensitive subpopulations and the general public, we cannot support the recommendation that additional research substitute for the actual development and implementation of a coherent policy. The dissenters find such a recommendation antithetical to good public policy while our citizens, particularly those in communities Of Color and low-income neighborhoods, bear the burden of continuing, and often increasing, threats to public health and welfare.

2. While stationary sources, in the face of strong state regulation and enforcement, have reduced their emissions, some continue to place a toxic load on our publicly-held air resource and further reductions are warranted -- especially in and near neighborhoods already overburdened with pollution. The USEPA study on toxic air contaminants at Paulsboro High School, which is proximate to an operating oil refinery and a manufacturing facility, contains results that according to USEPA "indicate the influence of pollutants of concern that are the focus of EPA actions nationwide." The dissenters believe the USEPA study suggests that risk levels near the school may be high enough, especially when viewed from a cumulative perspective, to warrant the implementation of long-term risk reduction efforts by DEP and USEPA. However, the specific conditions and circumstances at

Paulsboro High School, or any other single location, cannot be representative of local cumulative impacts on communities throughout the state.

3. The dissenters recommend that the Department continue to exercise its leadership in fulfilling its primary mission -- environmental protection. We do not support the narrow contention that the purpose of the Clean Air Council public hearing was merely to review already-implemented federal and state action that could be replicated in New Jersey for recommendation to the Commissioner. However, the dissenters do recommend that New Jersey continue to review measures protective of public health being considered and implemented by other states, the federal government, and the international community. Also, where appropriate and feasible, the Department should continue to move forward to protect public health and welfare, even if other governmental entities are not in a position to act. Others will eventually follow New Jersey's lead and significant positive public health and welfare benefits will accrue to our state in the interim.

4. The statement that a New Jersey cumulative impacts policy implemented prior to a similar federal policy would place our State at a competitive disadvantage, is conjectural. No testimony was taken at the public hearing nor was any evidence reviewed supporting this contention. The dissenters believe that it is at least as likely that a coherent cumulative impacts policy coupled with other environmental measures that result in a healthy environment with livable cities would be a significant component of, and would contribute to, long-term economic growth.

5. The dissenters disagree with the qualification attached to a significant number of recommendations in the report stating that the Department "could [take various beneficial actions] if staffing and resources allow." We believe that it is our responsibility to make sound, viable recommendations, leaving it to the Department to appropriately adjust its resource prioritization as warranted. In response to these recommendations, the robust stakeholder process that is one of the recommendations, and further research-based findings, the redirection of existing resources and/or the provision of additional resources may be indicated.

6. Finally, the dissenters thank the Commissioner for his willingness to hear from us and welcome the opportunity to respond to any further questions that he may have.