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April 25, 2018

Mr. William Wehrum
Assistant Administrator, Office of Air and Radiation
USEPA Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N.W.
Mail Code: 1101A
Washington, DC 20460

Mr. Matthew Leopold
General Counsel
USEPA Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N.W.
Mail Code: 2310A
Washington, DC 20460

Dear Messrs. Wehrum and Leopold:

I write on behalf of the Air Stewardship Coalition ("ASC") to request that the U.S. Environmental Protection Agency ("EPA" or the "Agency") extend by six months the proceeding related to the March 12, 2018 petition submitted by the New York Department of Environmental Conservation (the "NY Petition" or "Petition") under Section 126 of the Clean Air Act (the "CAA").

ASC is an ad hoc group of trade associations and companies that seeks to assist EPA and States in addressing alleged interstate transport issues under the CAA. Our members represent numerous industrial facilities targeted by the NY Petition. These facilities have already undertaken multiple rounds of emissions reductions under other EPA regulations and State Implementation Plans, as well as voluntary emission reduction projects.

Despite these multi-billion dollar prior investments, the NY Petition seeks further reductions in emissions that are unfounded and unprecedented. The Petition requests that EPA compel approximately 350 sources across nine states to impose additional, costly, and unnecessary technologies on their facilities to address nitrogen oxide ("NOx") emissions. The NY Petition claims that NOx emissions from the named sources significantly contribute to or interfere with the state's ability to attain and maintain its compliance with the national ambient air quality standards for ozone in the New York Metropolitan Area and in Chautauqua County, New York.

The CAA grants EPA 60 days to respond to a Section 126 petition, but CAA §307(d)(10) allows EPA to extend this review period by six months when "*necessary* to afford the public and the agency adequate opportunity to carry out the purposes of this subsection." 42 U.S.C. §7607(d)(10) (emphasis added). This statutory provision confers broad authority on EPA to extend the deadline for responding to Section 126 petitions. *See, e.g.*, *Friedman v. FAA*, 841 F.3d 537, 539 (D.C. Cir. 2016) (statute empowering agency to regulate as "necessary" confers "broad authority"); *Trans Union, LLC v. FTC*, 295 F.3d 42, 47 (D.C. Cir. 2002) (same).

An extension here is necessary for two reasons. First, as discussed in more detail in the U.S. Chamber of Commerce's (the "Chamber") recent letter, which we incorporate by reference here, the Petition is unprecedented in its reach and potential impact (over 350 named sources operating in nine states) and is both legally and technically deficient. *See* Letter from Karen A. Harbert, U.S. Chamber of Commerce to William Wehrum, Assistant Administrator, EPA Office of Air & Radiation, and Matthew Leopold, General Counsel, EPA (Apr. 13, 2018).

Second, building on the Chamber's letter, we submit the attached technical declaration of Mr. Ralph E. Morris. Mr. Morris is one of the leading experts in the world on air quality analysis, including air quality modeling. He previously served on the Air Quality Modeling Subcommittee of the Science Advisory Board advising EPA on its air program. As Mr. Morris explains, the scope of the NY Petition and the complex technical issues raised by it necessitate EPA taking the additional time to allow the Agency and interested stakeholders to review and analyze the Petition and the underlying modeling.

For these reasons, ASC requests that EPA extend the deadline to review the Petition by six months. We appreciate your consideration of this request. Please do not hesitate to contact me at 202-736-8853 if you have any questions.

Sincerely,

Justin A. Savage

Encl.: Declaration of Ralph E. Morris

cc: Justin Schwab, Deputy General Counsel, EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

In re – New York State Petition for a Finding Pursuant to Clean Air Act Section 126

DECLARATION OF RALPH E. MORRIS

I, RALPH E. MORRIS, hereby declare and state as follows:

1. I am the Managing Principal for Ramboll Environment and Health (REH) Northern California Offices (San Francisco, Emeryville, Novato and Santa Clara in California, Salt Lake City in Utah and Fort Collins in Colorado). I have been retained by the Air Stewardship Coalition to assist with evaluating the petition submitted by the State of New York (NYS) to the Environmental Protection Agency (EPA) under section 126 of the Clean Air Act (CAA). REH is a 1,500-person environment and health consulting group that is part of Ramboll A/S, an international consulting and engineering firm with 13,000 employees in 300 offices across 35 countries headquartered in Copenhagen, Denmark.

2. I am in the Air Sciences Group in REH where I direct the development and application of advanced air quality models, air quality analysis projects, emissions inventory development, emissions control studies and other air-related studies. I have been involved in the development of numerous air quality models, including the Comprehensive Air Quality Model with extensions (CAMx[1]) photochemical grid model (PGM) used by EPA to analyze ozone transport in the Cross-State Air Pollution Rule (CSAPR[2]). I have over 38 years' experience in air quality consulting, starting in 1979 after receiving my Master's degree in Mathematics from the University of California at Davis. I am an internationally recognized expert in air quality modeling and have served on EPA's ozone and fine particulate guidance workgroups, the Air Quality Modeling Subcommittee of the Science Advisory Board, the Community Modeling and Analysis System External Advisory Committee advising EPA on its Community Multiscale Air Quality (CMAQ) modeling system and the modeling peer-review group for the South Coast Air Quality Management District. An abbreviated copy of my resume is attached.

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[1] http://www.camx.com/home.aspx.
[2] https://www.epa.gov/csapr.

3. My technical work mainly involves developing and applying advanced air quality models. In the 1980s I was project manager for the EPA Five Cities Urban Airshed Model (UAM) Study that demonstrated how to use the UAM PGM for ozone air quality planning, which culminated in the delivery of the UAM to EPA in 1990 as a turn-key model that EPA subsequently designated as the EPA-recommended model for ozone air quality planning in its modeling guidelines (40 CFR Part 51, Appendix W). I then led the development of the variable grid version of the UAM (UAM-V) that the Ozone Transport Assessment Group used to study ozone transport in the eastern United States, which led to EPA's NOx SIP Call, EPA's regional NOx control rulemaking to reduce ozone transport that EPA first proposed in 1997. In the late 1990s, I was one of the leaders in the development of the CAMx PGM that today is one of the most widely used PGMs in the world, including being used by EPA for its ozone transport rulemakings (e.g., CSAPR).

4. On March 12, 2018, NYS submitted a Section 126 Petition to EPA claiming, among other things, that NOx emissions from approximately 350 facilities in 9 upwind states are interfering with the ability of the New York Metropolitan Area (NYMA) and Chautauqua County to attain or maintain the 2008 and 2015 ozone National Ambient Air Quality Standards (NAAQS). NYS relied on regional PGM modeling in its Section 126 Petition. NYS used EPA's CSAPR Update[3] CAMx ozone transport modeling results to identify the 9 upwind states that EPA determined contributed to nonattainment or interfered with maintenance of the 2008 ozone NAAQS at sites in the NYMA and Chautauqua County for the 2017 modeling year. NYS also conducted its own CMAQ modeling for 2017, which NYS claims provides evidence that the combined NOx emissions from the named facilities in each of the 9 states contributed significantly to nonattainment or interfered with maintenance of the 2017 ozone NAAQS at sites in the NYMA and Chautauqua County.

5. My understanding is that, under the CAA, EPA has a statutory duty to respond to the NYS petition within 60 days[4], but may extend the deadline by six months to allow the agency and the public adequate opportunity to review the petition, if necessary.

6. Based on my almost four decades of experience in regional photochemical grid modeling, including over three decades working with EPA's air quality modeling group at the Office of Air Quality Planning and Standards, it is my opinion that EPA should extend the deadline to allow the public additional time to assess fully the data proffered in support of NYS's petition.

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[3] https://www.epa.gov/airmarkets/final-cross-state-air-pollution-rule-update.

[4] https://www.gpo.gov/fdsys/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partA-sec7426.htm.

7. NYS conducted its own regional CMAQ modeling. Evaluating the modeling's accuracy, reliability and appropriateness for supporting NYS's claims would involve assessing NYS's CMAQ modeling database. However, NYS did not provide its CMAQ modeling database to EPA or identify a website in its petition where the CMAQ database can be downloaded, thus severely limiting the time to evaluate the CMAQ modeling, assuming NYS were to make the database available. The transfer of a large CMAQ database and benchmarking on receiving computers to assure the database is operating correctly typically takes at least three to four weeks.

8. If NYS makes its 2017 CMAQ modeling database available, evaluating the emissions and other inputs for appropriateness for assessing ozone contributions from sources in upwind states would require time. Correcting any deficiencies in the NYS 2017 emissions assumptions to conduct an analysis would also require time. For example, the NYS petition 2017 CMAQ modeling used projected 2017 NOx emissions for electrical generating units (EGUs). Because almost actual 2017 NOx emissions data for EGUs are now available from EPA's Clean Air Market Division (CAMD[5]) website, those data should be used instead of the projections. Processing the 2017 EGU NOx emissions data in order to replace the projections in NYS's 2017 CMAQ database could take at least a week or longer.

9. I have recently conducted CMAQ modeling on the same 12 km grid resolution continental U.S. (CONUS2) domain as used by NYS in its petition. Using a high performance Linux computing cluster, the CMAQ simulations in my modeling took an elapsed time of 7.5 hours per simulation day using 20 central processing units (CPUs, also called nodes). Thus, a 4-month ozone season (May-August) simulation would take 900 hours, or 37 days. The CMAQ run time can be reduced by using more CPUs, but there is a limit on the speed-up that can be achieved due to the overhead associated with the domain decomposition used in the CMAQ multi-processing scheme. In the NYS petition CMAQ modeling, NYS conducted 10 CMAQ simulations—a 2017 base case and 9 state-specific NOx emission zero-out cases for each of the 9 upwind states. Even with hundreds of CPUs for each CMAQ simulation, a review would still entail at least 10 CMAQ simulations. These 10 CMAQ simulations could run in parallel using multiple CPUs, but with other computer requirements (e.g., disk space) and labor requirements needed to monitor the simulations, they would still take at least two to three weeks to perform.

10. The NYS petition CMAQ modeling also used a novel procedure for post-processing the 10 CMAQ simulations to determine the significance of the ozone contribution of the NOx emissions from the named sources in each of the 9 states. The NYS petition used an ozone significant contribution metric

[5] https://www.epa.gov/airmarkets.

that differs from what EPA used in its CSAPR modeling. Evaluating how the NYS metric works as well as calculating an ozone contribution metric to be consistent with CSAPR would take at least two weeks.

11. In addition to evaluating and updating NYS's CMAQ significant contribution modeling, time is needed to conduct modeling to use the more fully vetted 2017 CAMx source apportionment modeling platform that EPA used in the CSAPR Update. Estimating the significance of the named sources in each of the 9 states would involve updating emissions, re-processing the emission inputs to tag each of the approximately 350 sources and running a CAMx ozone source apportionment. The emissions updates and processing set up alone could take at least three to four weeks. The CAMx ozone source apportionment run is much more efficient than the NYS petition CMAQ zero-out runs, and the ozone contribution results could be obtained in one CAMx run. The CSAPR Update CAMx source apportionment run took approximately two weeks to complete, with additional time needed for post-processing and analyzing the results. Thus, at least three to four weeks for the emissions updates and processing plus at least two weeks for the CAMx source apportionment run means the minimum elapsed time for this effort would be at least five to six weeks.

12. I also understand that EPA will take public comments and hold a public hearing in connection with its response to the NYS petition. To the extent EPA addresses the NYS petition or responds to public input through modeling or other data analysis, EPA would require additional time and resources.

13. I have also reviewed the "Declaration of Lyle Chinkin[6]" prepared as part of the Connecticut Section 126 Petition[7] where he asserts *"that 60 days is in fact sufficient time for EPA to conduct the air modeling analyses required to respond to Connecticut's petition, assuming staff and computer resources are made available throughout the 60-day time period.[8]"* However, the Connecticut petition only identified a single upwind source (Brunner Island Steam Electric Station in York County, Pennsylvania) as contributing significantly to ozone nonattainment. By contrast, the NYS petition addresses over 350 facilities in 9 states as contributing to ozone nonattainment or interfering with maintenance, and so would require substantially more computer resources and time to address. For these reasons, my opinion is that the statements made within the "Declaration of Lyle Chinkin" in the Connecticut petition are not relevant to the NYS petition.

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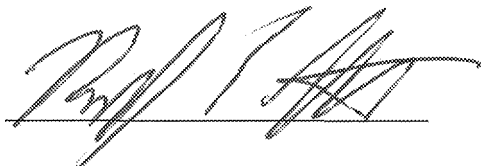
[6] Chinkin Decl., Case 3:17-cv-00796-WWE (filed 11/28/17), ECF No. 40.

[7] https://www.epa.gov/ozone-pollution/connecticut-126-petition.

[8] I am not expressing any opinions regarding the validity of Mr. Chinkin's opinion that 60 days was sufficient time for EPA to respond to the Connecticut petition.

Pursuant to 28 U.S.C. Section 1746, I declare under penalty of perjury that the foregoing is true and correct.



April 25, 2018

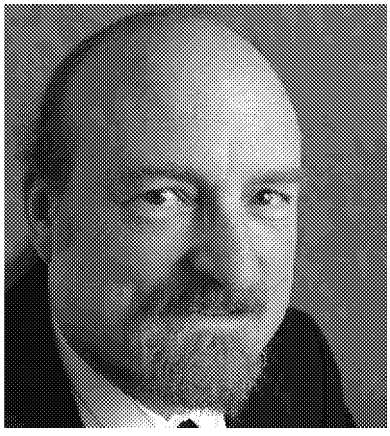
Ralph E. Morris

Date

RALPH E MORRIS

Managing Principal

Ralph E. Morris is the Managing Principal for Ramboll Environmental and Health (REH) San Francisco Bay Area Offices. He is responsible for the business operations for ~100 employees in the four SF Bay Area Offices (San Francisco, Emeryville, Novato and Santa Clara) plus Salt Lake City and Fort Collins. REH is a ~1,500 person environmental and health consulting group that is part of Ramboll that consists of ~13,000 employees in ~300 offices in ~35 countries with headquarters in Copenhagen, Denmark.



Ralph is part of REH's Air Sciences Group where he directs air quality model development and application, air quality data analysis, emission inventory development, control strategy evaluation, and regulatory air issues studies. With over 38 years of air quality consulting experience, Ralph is one of the original developers of many of the photochemical air quality models that are or have been used for regulatory decision making in the United States and around the world, including co-developer of Ramboll's Comprehensive Air Quality Model with extensions (CAMx) as well as the Urban Airshed Model (UAM) and its variable grid version (UAM-V) models. He directed the development of an updated Pollutants in the ATmosphere for Hong Kong (PATH) air quality modeling system for the Hong Kong Environmental Protection Department (HKEPD) and applied it to Southeast Asia to assess regional transport and urban ozone and particulate matter formation. He directed the application of regional particulate matter (PM), ozone and visibility modeling using CMAQ and CAMx photochemical grid models for the southeastern (VISTA/ASIP), western (WRAP) and central (CENRAP) US Regional Planning Organizations (RPOs) for the development of regional haze State Implementation Plans (SIPs). Ralph was an original member of USEPA's ozone and particulate matter modeling guidance workgroups, the CMAS Models-3/CMAQ External Advisory Committee (EAC) and is currently a member of the Scientific Technical Modeling Peer Review Advisory Group (STMPRAG) for the South Coast Air Quality Management District (SCAQMD) offering advice on South Coast (Los Angeles) Air Basin ozone and particulate matter air quality issues. He was also a former member of the Air Quality Modeling Subcommittee of the Science Advisory Board (SAB) advising USEPA on their air program.

CONTACT INFORMATION
Ralph E Morris

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Ramboll
773 San Marin Drive
Suite 2115
Novato, CA 94998
United States of America

Ralph has been assisting U.S. EPA in developing air quality modeling techniques for over 30 years addressing near-source, far-field and photochemical modeling issues. In the 1980s, Ralph was one of the pioneers in modeling air pollution in Los Angeles using one of the first ever PGMs, the Urban Airshed Model (UAM). Ralph managed the EPA Five Cities UAM Study for the United States Environmental Protection Agency (USEPA) that demonstrated the use the UAM PGM for ozone air quality planning culminating in the delivery of the UAM to USEPA in 1990 as a turn-key modeling system with USEPA subsequently designating the UAM as the guideline (Appendix W) model for ozone modeling. Also during the 1980s Ralph was part of the EPRI Plume Model Evaluation study and performed numerous work assignments for EPA evaluating air quality modeling techniques for

Gaussian Plume Models. In the late 1980s and early 1990s, Ralph led the development of the next generation variable grid PGM (UAM-V) that treats urban city and regional transport issues within the same model and was used by the Ozone Transport Assessment Group (OTAG) to define the first regional control strategies designed to reduce the contributions of ozone transport in the eastern U.S. (i.e., NOx SIP Call). Ralph also led the development of ozone and $PM_{2.5}$ State Implemental Plans (SIPs) for numerous cities to allow them to achieve clean air. After joining Ramboll (then ENVIRON International Corporation) in 1994, Ralph was one of the leaders in the development of the CAMx PGM that is being used today around the world for air quality planning, including for USEPA's transport rules. Ralph continues to be one of the leaders in the development of the CAMx model and applies a variety of air quality models (e.g., AERMOD, CALPUFF, CMAQ and CAMx) to address air quality and air quality related values (AQRVs, e.g., visibility and deposition) for numerous types of sources including on-road and non-road mobile, oil and gas, electricity generation, consumer products and refineries, chemical plants and other industrial facilities.

CAREER

1994-Present
Managing Principal
Ramboll (formerly Ramboll Environ and ENVIRON International Corporation), Novato, California, United States

1979-1994
Manager Advanced Modeling Group and Director of Model Development Program
ICF - Systems Applications International, San Rafael, California, United States

1977-1979
Associate Professor
University of California, Davis, California, United States

EDUCATION

1977-1979
MA, Mathematics
University of California, Davis, California, United States

1974-1976
BA, Mathematics
University of California, Berkeley, California, United States

1972-1974
University of California, San Diego, California, United States

EXPERIENCE

Over the last 38 years, Ralph has been involved in thousands of air quality studies. These studies include the assessment of the near-source and far-field impacts of many different types of sources and the development of clean air plans for cities, states and countries so that they attain air quality standards. A few examples for some of Ralph's most recent projects are provided below.

- Navajo Generating Station Environmental Impact Statement. Principal-in-Charge for coordinating portions of the Environmental Impact Statement (EIS) required under the National Environmental Policy Act (NEPA) for the Navajo Generating Station coal-fired power plant and Kayenta Coal Mine Complex in Arizona. Technical services include local and regional air quality modeling and analysis of air monitoring data for criteria and hazardous air pollutants, assessments of human health risk and ecological risk due to atmospheric deposition from the emission sources, and preparation of

Technical Support Documents for the EIS. The NGS EIS was the most comprehensive air quality assessment ever performed under NEPA.

- Allegheny County Annual $PM_{2.5}$ State Implementation Plan. Principal-in-Charge for performing the air quality modeling to define emissions control strategy to demonstrate that Allegheny County (Pittsburgh), Pennsylvania will attain the annual PM2.5 National Ambient Air Quality Standard (NAAQS). Performed 36/12/4/1.30.444 km WRF meteorological modeling for the 2011 year. SMOKE emissions modeling for 2011 and 2021. CAMx regional 36/12 km modeling to provided boundary conditions for mesoscale 4/1.33 km PM source apportionment modeling for 2011 base and 2021 future years. 2021 PM control strategy evaluation.
- Evaluation of USEPA's 2011 National Air Toxics Assessment (NATA). Evaluated and assessed USEA's 2011 NATA modeling approach and results for modeling hundreds of air toxics compounds on a national scale. The 2011 NATA combined CMAQ national modeling results for reactive and non-reactive pollutants at 12 km grid cell resolution with AERMOD local-scale non-reactive modeling results by using the AERMOD results for receptors in the 12 km grid cell in a relative fashion to scale the CMAQ 12 km average concentrations. This unique method of model fusion of the CMAQ and AERMOD modeling results overcomes some of the issues associated with other techniques (e.g., CMAQ zero-out runs) when combining modeling results with disparate formulations.
- Dynamic Evaluation of Ozone Models for the South Coast (Los Angeles) Air Basin (SoCAB). Project Manager for conducting a dynamic evaluation of the CMAQ photochemical grid model in the SoCAB (Los Angeles, California region) using a 2008 and 2012 CMAQ modeling database. The dynamic evaluation compared the CMAQ modeled ozone trends over a long time period (1990-2015) with the observed ozone trends and found the CMAQ model underestuimat6ed the observed rate of ozone reductions over time. Potential reasons for this included the likely underestimation of VOC or overestimation of NOx emissions in the region.
- Denver 2017 Ozone SIP Modeling. For over a decade, Ralph has led the Denver ozone SIP modeling for the 2003, 2008 and ow the 2017 Denver ozone SIPs. For the Denver 2017 ozone SIP modeling we developed 2011 CAMx PGM modeling database using WRF meteorological and SMOKE emissions modeling. This included high-resolution mobile source emissions for the Denver region using link-based activity data from a Transportation Demand Model (TDM) and mobile source emission factors from MOVES2014. Conducted CAMx 2011 base case modeling and model performance evaluation. Projected emission to 20017 and 2023 and conducted emission reduction control strategy modeling to demonstrate attainment of the ozone standard.
- Allegheny County 1-Hour SO_2 State Implementation Plan. Principal-in-Charge for performing the air quality modeling to define emissions control strategy to demonstrate that Allegheny County (Pittsburgh), Pennsylvania will attain the 1-hour SO_2 National Ambient Air Quality Standard (NAAQS). Perform 36/12/4/1.3 km WRF meteorological modeling for multiple years. Conduct model shoot-out using multiple models (e.g., AERMOD, CALPUFF and SCICHEM) and model configurations to determine best performing model for simulating SO_2 and use model to demonstrate attainment of the SO2 NAAQS.
- BLM Environmental Impact Statement and Resource Management Plan for Oklahoma, Texas and Kansas. Principal-in-Charge for preparing the air quality and climate change sections of the Environmental Impact Statement (EIS)/ Resource Management Plan (RMP) for the U.S. Bureau of Land Management (BLM) and Bureau of Indian Affairs (BIA) to guide the management of BLM- and BIA-administered lands in the states of Oklahoma, Texas and Kansas
- Western Air Quality Study (WAQS). Project Manager for WRF meteorological, SMOKE emissions and CMAQ/CAMx air quality modeling of the western U.S. to develop the next generation air quality modeling databases to address ozone, $PM_{2.5}$, visibility and deposition issues in the western U.S.. Develop new 2008, 2011 and 2014 regional modeling platforms and distribute using the Intermountain West Data Warehouse (IWDW). Assess the role of regional transport on ozone, PM and visibility issues in western U.S. states.
- Air Quality Impacts of Off-Shore Oil and Gas Production. Ralph is currently Principal-in-Charge for the air quality modeling portion of two studies for the Bureau of Oceanic Energy Management (BOEM) to estimate the on-shore air quality impacts due to off-shore oil and gas development in the Arctic Sea north of Alaska and the Gulf of Mexico. This multi-year multi-million dollar study

will project future year emissions and air quality impacts and develop emission exception screening thresholds.

- Air Quality Impacts of Fires. Project Manager of studies for the Joint Fire Science Program (JFSP) to assess the contributions of wildfires, prescribed burns and agricultural burning to ozone and PM air quality throughout the USA. Develop fire emission inventories and use the CAMx photochemical grid model source apportionment tool to calculate the contributions of fires to ozone and PM air quality. Results are used to identify exceptional events and assist planners in fire management practices.
- BLM Montana/Dakotas Photochemical Grid Model Modeling Study. Project Manager for the BLM Montana/Dakotas PGM modeling study to assess the air quality and AQRV impacts due to oil and gas development. The Bakken Shale formation in the Montana/Dakotas region is the most rapidly growing oil and gas development area in the U.S. Under this study, Ramboll is developing a comprehensive oil and gas emissions inventory and performing base year 2012/2013 and future year 2032 modeling using the CAMx photochemical grid model.
- Allegheny County 24-Hour $PM_{2.5}$ SIP Modeling. The $PM_{2.5}$ problem in Allegheny County (Pittsburgh), Pennsylvania is due to a combination of regional transport from upwind states and local sources within a river valley complex terrain environment. Ralph Morris led the Allegheny County $PM_{2.5}$ SIP modeling effort that used the CAMx photochemical grid model with a 36 km CONUS, 12 km Midwest, 4 km southeastern Pennsylvania and 0.8 km Allegheny County grid nests to demonstrate the area would achieve the 24-hour $PM_{2.5}$ standard by 2010. CAMx was run on the 36/12/4/0.8 km grids using two-way grid nesting. Local sources were treated using the CAMx subgrid-scale Plume-in-Grid treatment.
- Development of Air Quality Modeling System for Hong Kong. Ralph was Project Manager and led the development of a new air quality modeling system for Hong Kong. The WRF/MM5 meteorological, SMOKE/CONCEPT emissions and CMAQ/CAMx air quality models were set up for a 27/9/3/1 km modeling domain with the 36 km domain covering Asia and the 1 km domain focused on Hong Kong. The modeling system was delivered to the HKEPD as a turn-key system.
- St. Louis Ozone and PM2.5 SIP. Ralph led the air quality modeling efforts for the development of clean air plans for St. Louis, Missouri that were included in the St. Louis ozone and PM2.5 State Implementation Plans (SIPs). He worked with the states of Missouri and Illinois to identify the optimal control plan for the region and performed air quality modeling to demonstrate that St. Louis would achieve the ozone and $PM_{2.5}$ standards.
- Air Quality Assessments in Alberta, Canada. For almost a decade, Ralph Morris has been leading air quality studies for Alberta Environment to address Canada wide standards and Province air quality goals and objectives. These activities have included developing emission inventories for the Alberta oil sands region and urban areas, conducting meteorological modeling and performing air quality modeling using the CMAQ model to address ozone, $PM_{2.5}$, SO_2, NO_2, exposure and deposition issues in the Province.
- Expert Testimony for Air Quality Related Issues. Because of Ralph's vast expertise in air quality issues and in particular air quality modeling, over the last two decades he has served as an expert witness in numerous litigation cases.
  - LG&E Cane Run Class Action Suit: Starting in 2015, Mr. Morris is serving as an expert witness in a case involving nuisance dust deposition from the Louisville Gas and Electric Cane Run coal-fired EGU.
  - Minnesota Power Plant Damage Assessment: During 2015, Ralph performed air quality modeling of the potential damages and costs associated with fossil-fueled power generation in Minnesota and prepared testimony.
  - Mead Westvaco Luke Mill: Expert witness and testify at trial in a case where a Maryland paper mill was accused of violating the Clean Air Act (CAA) and emitting illegal emissions (2012-2016).
  - DTE Energy Monroe: In 2010-2011 Ralph was retained as an expert witness and prepared expert report and attended trial in Detroit for the USDOJ NOV case against then Monroe coal-fired power plant in the Detroit, Michigan region.

- AEP NOV: Ralph was an expert witness for American Electric Power (AEP) from 2003-2006 for a US DOJ NOV case with charges against 9 coal-fired power plants in the Midwestern US.
- Illinois Power/Dynegy Baldwin NOV: Ralph was an expert witness for Illinois Power in the US DOJ Notice of Violation case against the Baldwin Power Plant in Illinois. Ralph prepared expert reports and was deposed on the ozone and PM impacts of the alleged excess emissions including a review and critique of the plaintiffs CALPUFF modeling that found errors and omissions.
- First Energy Sammis: Expert witness for the Sammis coal fired power plant in Ohio NOV case.
- Louisiana Generating Big Cajun 2: Ralph was an expert witness for a USDOJ NOV case against the Big Cajun 2 coal-fired power plant in Baton Rouge, Louisiana during 2012.
- WE Energies Power the Future: In 2004, Ralph performed air quality modeling using CAMx and testified in front of a judge in Madison, WI on the Wisconsin Electric's plans to retire an old and build a new coal fired power plant at the Oak Creek facility. Testimony also included a critical review of CALPUFF modeling performed by the opponents.
- Minnesota Acid Rain Legislation: In the early 1980s Ralph performed modeling and testified in Minneapolis, MN in front of a judge for Northern States Power regarding the impacts of local sources in Minnesota on acid deposition in Minnesota.

- Oil and Gas Environmental Impact Statements. Over the last two decades Ralph has led the air quality modeling component of several oil and gas Environmental Impact Statements (EIS) and Resource Management Plans (RMPs) to assess the air quality, visibility and deposition impact of oil and gas development in Colorado, Kansas, Montana, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah and Wyoming.
- Air Quality Permitting Studies. As part of the permitting process, Ralph has conducted numerous air quality modeling studies to demonstrate that new or modified sources would be compliant with air quality standard and thresholds of concern. Sources evaluated include coal and natural gas powered electricity generation; cement plans and oil and gas production, distribution and refining.
- Air Quality Impacts of Mobile Sources. Ralph has performed numerous studies to assess the air quality impacts of alternative engine technologies and fuels. In the 1980s he modeled the air quality impacts of alternative fuels in five cities for the USEPA. In the 1990s he led the air quality modeling component of the $20M Auto/Oil Program for the automobile manufacturers and oil companies. He also led the assessment of the air quality impacts of hybrid vehicles for a joint study by General Motors and Toyota. More recently he evaluated air quality impacts of passenger vehicles for Toyota and the air quality impacts in California due to the use of biodiesel in on-road and non-road diesel engines.
- Technical Assistance to USEPA. For over three decades, Ralph has provided technical assistance to the USEPA to assist them in implementing their air program and developing the USEPA air quality modeling techniques and guidelines. This assistance included demonstrating modeling techniques for near-source Gaussian plume models and demonstrating how photochemical grid models (PGMs) can be used in ozone air quality planning and delivering the UAM PGM to USEPA in 1990 as a turn-key PGM ozone modeling system. In 2011-2012 Ralph evaluated six long range transport (LRT) models using atmospheric field study tracer tests, evaluated chemical dispersion models using aircraft data and demonstrated how a PGM can be used for single-source modeling that helped EPA formulate their new July 2015 air quality modeling guidelines. More recently he assisted USEPA in updating chemical mechanisms in the CAMx and CMAQ models and implement improved aqueous-chemistry and secondary organic aerosol modules.
- Various Clients. Prior to joining ENVIRON, Ralph worked for over 15 years at Systems Applications International (SAI) in San Rafael (now part of ICF Consulting), California, where he was Director of the Advanced Modeling Program, managed model development activities and air quality modeling and analysis studies. His work at SAI included the development and application of the RPM, UAM, UAM-V and REMSAD modeling systems.

TEACHING EXPERIENCE

1977-1979

Calculus, University of California at Davis

CURRENT MEMBERSHIPS

Air and Waste Management Association (AWMA)
Air Quality Modeling Subcommittee (AQMS) of the Science Advisory Board (SAB)
EPA Fine Particulate Modeling Guidance Workgroup
EPA UAM Guidance Workgroup
Scientific Technical Modeling Peer Review Advisory Group (STMPRAG) for the South Coast Air Quality Management District (SCAQMD) SIP Air Quality Modeling

FORMER MEMBERSHIPS

Air Quality Modeling Subcommittee (AQMS) of the Science Advisory Board (SAB)
EPA Fine Particulate Modeling Guidance Workgroup
EPA UAM Guidance Workgroup