EPA Office of Air and Radiation Office of Transportation and Air Quality (OTAQ)
Science Integration for Decision Making Fact-Finding Interviews
November 19, 2009
Washington, DC

Four members of the SAB Committee on Science Integration for Decision Making interviewed the OTAQ Office Director: Drs. John Balbus and Thomas Wallsten conducted the interviews in person and Drs. Thomas Burke and Thomas Theis participated by phone. Following that meeting, Drs. John Balbus and Thomas Wallsten conducted an interview with OTAQ scientific staff. For each interview, Dr. Vanessa Vu, Director of the SAB Staff Office, provided a brief introduction to the purpose of the interview and the Designated Federal Officer, Dr. Angela Nugent, took notes to develop a summary of the conversation. All interviewees were provided a copy of the committee's Preliminary Study Plan in advance.

Dr. Vu noted in each interview that the purpose of the interview was to help SAB Committee members learn about OTAQ's current and recent experience with science integration supporting EPA decision making so that the SAB can develop advice to support and/or strengthen Agency science integration efforts. Dr. Vu thanked participants for taking time for the interviews.

Interview with Ms. Margo Oge, Director

The committee members asked Ms. Oge to discuss the extent to which science is integrated into OTAQ decision making and the barriers to using science. They asked her to reflect on specific OTAQ decisions and comment on her role, the process for using science, decisions about different levels of analysis needed, and the role of stakeholders and external scientific communities.

Ms. Oge told members that two thirds of OTAQ's 400 employees are scientists or engineers with technical background. She estimated that 40-50% of those employees hold master's or Ph.D. degrees. In her view, OTAQ's effectiveness depends on the talent of engineering, scientific, policy, and legal. The diversity of the staff is also a strength. Staff are often hired from industry EPA regulates and as a result OTAQ includes people who understand specialized technology, e.g., refinery technology engine manufacturing, or lawn mowers.

She then outlined the statutes that provide the mandate for OTAQ's work. OTAQ implements Title 2 of the Clean Air Act, which concerns specific decision criteria for setting standards for mobile sources and their fuels, provides EPA along with discretion in how those criteria are to be used. OTAQ also has been charged with implementing several provisions of the Energy Independence and Security Act (EISA), which includes a mandate for a renewable fuel program. This law provides less flexibility and discretion and the science involved is "very young " especially compared to laws governing regulation of criteria pollutants.

OTAQ's authority to set standards for on-road and nonroad engines springs from the 1990 Clean Air Act Amendments. Those amendments are technology-forcing; the Administrator signs rules and OTAQ implements the programs. In the case of diesel engines, the rule had the goal of

reducing nitrogen oxides by 90%- to 95%; the rule gave the industry 4 to 6 years for implementation of the technologies to achieve these reductions. In the case of the heavy-duty truck rule, the industry challenged implementation in court. The court responded that EPA's engineering assessment explained the technology pathway that will be available to implement the program.

Ms. Oge noted that OTAQ's work involving science had three major parts: mobile source decisions affecting criteria pollutants, decisions under EISA, and work over the past two-to-three years on climate change.

For criteria pollutants, EPA must demonstrate that sources contribute to human health and economics. The first test is a scientific test, and assessment information is developed by OAR's Office of Air Quality Management and Standards. For the diesel decision, her office asked for CASAC review "to get more clarity on the impacts of diesel." The review took five years and CASAC agreed that diesel exhaust is a probable carcinogen. That finding, along with the finding related to the Particulate Matter (PM) National Ambient Air Quality Standard (NAAQS) allowed EPA to move ahead to set stringent regulations. Science for diesel programs was strengthened by external peer review.

A committee member asked how OTAQ handled the link between air pollution exposures and health effects and how OTAQ addressed uncertainties. Ms. Oge responded with an example. OTAQ used assessments of public health and welfare effects from an air quality analysis of truck and bus PM emissions provided by OAQPS. OTAQ then identified technologies to help maximize reductions of PM reductions, such as: requiring catalytic converters for diesel engines and changing diesel fuel to reduce sulfur. OTAQ conducted engineering and cost analyses to determine the sulfur reductions needed in diesel fuels to reduce PM exhaust from catalytic converters by 90%. OTAQ worked on cost estimates with industry experts who understood catalytic converters. The final benefit-cost analysis supporting the diesel rule determined that there were $70 billion in public health benefits and $4 billion in costs. This decision was a prime example of OTAQ's use of science, engineering analysis, and benefit and cost estimates. There is no one simple "recipe" for science supporting a decision; each decision is unique. For the health and welfare assessments, OTAQ relies on the characterization developed by OAQPS.

A member asked whether cost estimates were as open to public comments as health assessments and noted that the cost estimate was prepared with industry input. Ms Oge responded that OTAQ reaches out to all stakeholders. It is important to reach out to everyone likely to be affected by an upcoming decision. OTAQ reaches out to leaders within the automobile industry, including Japanese and German car companies. Trained experts can challenge EPA's analysis. In addition, OTAQ's facilities in Ann Arbor can test emission estimates for cars and SUVs. Such testing can verify whether industry or EPA's cost estimates were accurate.

A member asked about the range in variation in cost estimates from industry sources. Ms. Oge responded that estimates may vary by a factor of two. The Clean Air Act doesn't require benefit-cost analyses. Historically OTAQ regulations have had very high benefit-cost

ratios. Future regulations, such as mandatory retrofits of existing diesel trucks, may involve higher costs, and will involve weight-of-evidence decisions.

Ms. Oge next discussed EISA, which calls for the generation of 36 billion gallons of renewable fuel by 2022, including 15 billion from conventional corn ethanol and the remainder from advanced biofuels. EISA mandates that EPA conduct a lifecycle analysis that includes analysis of indirect land-use impacts for each feedstock to establish a threshold. The lifecycle analysis must determine a 20% increase in greenhouse gas emissions for corn-derived fuels and 50 to 60% for other fuels for the fuel to be used. This analysis was used in the proposal to identify fuels that qualify for the four different renewable fuel standards.

Ms. Oge described the challenges presented by this mandate. Lifecycle greenhouse gas assessment in a regulatory program was required by EISA for the first time. EISA only allowed one year to develop a proposed rule. To meet these challenges, OTAQ examined two different models and used satellite data to support the rulemaking. She acknowledged that indirect land use impacts are significant and very uncertain, because the economics and ecological assessments underlying them are complex. OTAQ has conducted a formal uncertainty analysis for the ongoing renewable fuels program. The office has never conducted such an analysis before; the most sophisticated previous OTAQ uncertainty analysis has involved sensitivity in analysis. EPA plans to finalize its renewable fuel standard rule in January and will bring the lifecycle assessment methodology to the SAB for review.[1]

Within the tight time constraints available for the proposed and final rules, OTAQ sought contractor panel peer review for the lifecycle analysis. The panels were composed of experts from different disciplines and provided "incredibly useful input." Within the mandated timeframe OTAQ needed to largely draw on existing models and data. She noted that some commenters on the proposed rule took issue with EPA's analysis of international lifecycle impacts, but EPA legal experts noted that EISA required the international analyses.

An SAB committee member noted the contrast between controversy over an "over studied" chemical like dioxin and the potentially profound changes related to the renewable fuel standards, which are supported by science that is not well developed. Ms. Oge acknowledged the contrast. The mandate to address renewable fuels came from Congress, which required EPA to use EISA as a tool to address climate change.

Ms. Oge acknowledged that lifecycle analysis for renewable fuels needs research. She then commented on how OTAQ partners with other organizations to strengthen the science base of its activities. OTAQ works actively with the Department of Energy on all fuel-related activities. It is also working intensively with DOT on the next version of vehicle greenhouse gas regulations that will factor in electric cars and hybrids. OTAQ also works closely with the State of California and theirstrong technical staff. She noted that OTAQ sought advice from the National Academies of Science (NAS) on inspection and maintenance and that NAS review influenced EPA's latest mobile source models. OTAQ also seeks information from the Health Effects Institute on emerging issues. Stakeholders also need to be listened to; stakeholder

[1] In a communication subsequent to the interview, OTAQ staff informed the SAB that the Agency plans to bring the document to the National Academy of Sciences, rather than the SAB, for review.

feedback identified that EPA had underestimated particulate matter emissions from diesel engines.

When asked to comment on ORD's contributions to OTAQ's program, Ms. Oge commented that ORD's work on the ozone and PM NAAQS had a huge effect. ORD's testing for near-roadway exposures is also very crucial for nitrogen oxide NAAQS. She would like to see more ORD staff work on broad impacts of biofuels, not just air pollution, but also impacts on water and land use impacts and new types of fuels.

A member asked about how OTAQ evaluated its use of science. Ms. Oge responded that OTAQ's Ann Arbor laboratory provides retrospective evaluation. Testing cars after they've accumulated mileage can be used to verify that vehicles continue to meet emission standards over time.

Interview with OTAQ Staff Scientists

OTAQ Participants:
Mr. Vince Camobreco
Mr. Ken Davidson
Mr. Chad Bailey

An SAB committee member asked how EPA handles stakeholder involvement in the science assessment process, especially how it handles scientific studies brought by outside stakeholders. An EPA scientist responded that for the renewable fuel standard, EPA held a two-day workshop to get public input and then conducted peer review on four different aspects of EPA's lifecycle analysis. The peer review provided helpful expert guidance to identify areas to improve. He noted that OTAQ reaches out to other parts of EPA get help evaluating science provided by outside groups. As a project manager, he filters incoming science and outside comments and identifies issues for managers' attention. Some comments are tested or evaluated with the model.

The staff person commented on the significance of OTAQ's use of a lifecycle model for demonstrating whether renewable fuels have reduced greenhouse gas impacts. He noted that this was the first application of lifecycle analyses for regulatory purposes. He acknowledged many uncertainties related to direct and indirect effects both within the United States and internationally.

In terms of addressing uncertainty bounds, OTAQ focused on sources of major impacts and conducted a sensitivity analysis.

When asked about improvements that would help the integration of science for decision making, he responded that the time constraints associated with the mandate proved challenging for science integration. It would have been helpful for Congress to provide more time for the analytical tasks mandated by EISA. He noted that OTAQ plans to work with the SAB and National Academy of Science on the next iteration of the renewable fuels standard. When asked

whether OTAQ made use of modeling guidance provided by EPA's Council on Regulatory Environmental Models (CREM), he noted that the CREM guidance was useful, but that each rulemaking and analytical approach is unique. For example, the best available models used in the lifecycle analysis were complex and specialized and it made it difficult for the public to replicate.

Although the actual lifecycle analysis was conducted in record time, OTAQ had the benefit of preparation thinking about the lifecycle issue through prior problem formulation activities. In 2005, EPA received public comments related to the indirect effects of biofuel use as part of the Renewable Fuel Standard 1 rulemaking. OTAQ developed an in-house, interdisciplinary team that developed an understanding of the issues through working iteratively and bringing additional experts into the discussion at EPA, and through contracts, grants, and discussions with USDA. EPA staff gained knowledge about lifecycle assessment through workshops and conferences.

Other OTAQ staff agreed that OTAQ scientists stay current in their field by reading ORD assessments, attending professional meetings and workshops, and interacting with review panels. OTAQ scientists and engineers participate in ORD's research planning process and are actively involved with the research planning process at the Health Effects Institute. There is also a coordinating research council for the oil and automobile industries.

OTAQ staff talked briefly about their use of stakeholder science. Work on fuel standards has stakeholders "very plugged" into discussions of technical feasibility. Automobile manufacturers share information about what companies have been doing and react to options. These stakeholder conversations give OTAQ scientists and engineers a "sense of what the industry able to do when it's really stretching."

The staff were asked to reflect on their experiences with science integration generally. One scientist noted that the criteria pollutant program has a relatively well established process of literature review and internal and external review. Those processes promote science integration. He also noted that EPA's rule development process and inter-agency review process encourage EPA to think about science issues and decision making in an integrated way.

Another member responded that OTAQ has fairly well established procedure for rulemaking analyses. Teams include fuel experts, motor vehicles engineers, experts in refining technology, air quality experts, and economists. The teams meet at the start of a rulemaking to map out needed areas of analysis. Everyone listens and information exchange happens almost on a weekly basis.

An OAR staff member noted that decision makers often focus on the technical analyses underlying rules and decision makers take time to understand the technical dimensions of problems. They need to understand the technical issues and related uncertainties -- and who's affected by those uncertainties--before they can make decisions using the "policy construct" (e.g., the margin of safety or benefit-cost ratio) to make a decision. Every decision is multi-factorial and managers need to understand the technical components.