ADVISORY COUNCIL ON CLEAN AIR COMPLIANCE ANALYSIS

Air Quality Modeling Subcommittee (AQMS)

Review Background and Charge Questions

February 19, 2010 Meeting

Review Background

Section 812 of the Clean Air Act Amendments of 1990 (CAAA90) requires the Agency to evaluate the impacts of the Clean Air Act on the public health, economy and environment of the United States. The section 812 benefit-cost studies are a unique series of EPA analyses. Unlike routine Regulatory Impact Analyses (RIAs) which focus on the incremental effect of proposed new rules relative to a continually changing, prevailing policy baseline, the 812 studies are intended to evaluate the benefits and costs of the Clean Air Act as a whole relative to a consistent baseline. In addition, Congress expressed its intent that the comprehensiveness of the 812 studies should encourage and enable EPA to develop and continually refine its capabilities in clean air program assessment. Congress' stated objective was to ensure EPA could provide better information on clean air program benefits and costs in support of the next round of Clean Air Act reauthorization, whenever that might occur.

Section 812 also established the Council on Clean Air Compliance Analysis (the Council) to review and advise the Agency on issues of data, methodology, and utility of the required benefit-cost studies. The Council's Air Quality Modeling Subcommittee (AQMS) was formed to review air pollutant emissions estimates, and air quality and exposure modeling that support the health and ecological assessment and economic valuation efforts for the 812 studies.

The subject of the current review is analytical work for the Second Prospective Study of the Benefits and Costs of the Clean Air Act, which incorporates many of the major programs promulgated since the 1999 publication of the First Prospective Study. The Second Prospective Study also applies more up-to-date scientific and economic information and evaluates effects out to the year 2020.

Charge to the Subcommittee

The Clean Air Act Amendments of 1990 charge the Council to review and made recommendations in three areas: (1) data to be used in the analyses, (2) methodologies used in the analyses, and (3) the overall findings of the study and their validity. For the AQMS, the charge questions include the following components:

General Charge. EPA requests that the Council AQMS review the draft of the stand-alone Section 812 Second Prospective Study air quality modeling report. Consistent with the statutory language defining the role of the Council in reviewing the 812 studies—and consistent with the role of the AQMS as advisor to the Council on air quality modeling—EPA respectfully submits the following general charge questions to the AQMS:

1. Does the AQMS support the data choices made by the 812 Project Team for the development of the air quality modeling estimates documented in the draft air quality modeling report? If not, are there alternative data sets that should have been used?

2. Does the AQMS support the methodological choices made for analyzing those data and developing the estimated changes in air quality conditions between the *with-CAAA90* and *without-CAAA90* core scenarios? If not, are there alternative methodologies that should have been used?

3. What advice does the AQMS have for the Council regarding the validity and utility of the estimated changes in air quality conditions between the *with-CAAA90* and *without-CAAA90* core scenarios in the draft air quality modeling report? What specific improvements does the Council AQMS recommend that the 812 Project Team consider, either for the present analysis or as part of a longer term research and development program?

The AQMS has already provided extensive review of the planned methodologies, including data and model selections (Questions 1 and 2). Thus, for the current review, EPA proposes that the Subcommittee focus particularly on Question 3, the validity and utility of the air quality modeling analysis. However, the general charge questions traditionally have been interpreted as an invitation to review and consider rendering advice on any aspect of the analytical design, implementation, and results which may be considered appropriate by the panel chair. In addition, EPA welcomes any information or recommendations from the Council AQMS on strategies for improving future air quality modeling efforts which may be conducted pursuant to broad-scale program assessments such as the Section 812 Second Prospective Study.

Review Documents

The following document is submitted for review and consideration by the Council AQMS during the February 19, 2010 meeting.

1. ICF International, "Second Prospective Analysis of Air Quality in the U.S.: Air Quality Modeling – Draft Report", prepared for James B. DeMocker Office of Policy Analysis and Review, U.S. Environmental Protection Agency, September 30, 2008. *[110 pages]*

In addition to the document submitted for formal review, the Project Team is providing the following additional document to facilitate the Council AQMS review.

2. ICF International, "Evaluation of CMAQ Model Performance for the 812 Prospective II Study", Memorandum from Sharon Douglas and Tom Myers, ICF International to Jim DeMocker, EPA Office of Policy Analysis and Review (OPAR), November 24, 2009. *[32 pages]*

Background on Section 812 Analysis and Review Process

In response to section 812 requirements, EPA has published two studies as Reports to Congress: a Retrospective Study published in November 1997 examining the benefits and costs of the 1970 Clean Air Act and the 1977 Amendments from the period 1970 to 1990, and a First Prospective Study published in October 1999 which evaluated the incremental effects of 1990

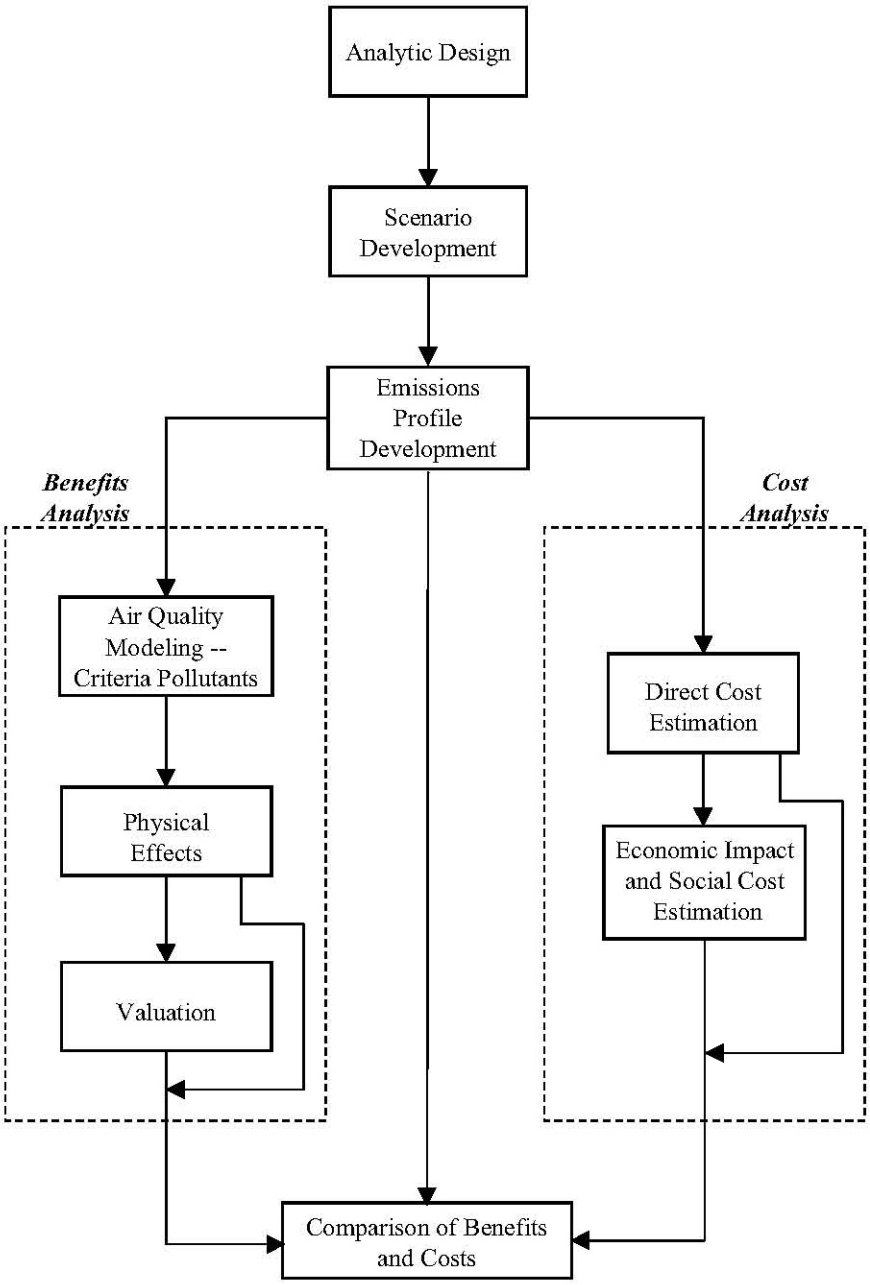
Clean Air Act Amendment programs from 1990 to 2010. Currently, EPA's 812 Project Team is nearing completion of the analytical work for a study which updates and extends the First Prospective Study. This new study, commonly referred to as the Second Prospective Study, is similar in scope and design to the First Prospective Study, but incorporates many of the major programs promulgated since the 1999 publication of the First Prospective, applies more up-to-date scientific and economic information, and evaluates effects out to the year 2020.

A particularly important feature of the section 812 studies is the scope, timing, and quality of outside expert review. Section 812 of the Amendments required EPA to convene a panel of outside experts in a range of relevant disciplines to advise the Administrator on the data chosen for the analysis, the selection of models used to conduct the analysis, and the validity and utility of the resulting estimates of Clean Air Act program benefits and costs. EPA is unaware of any similarly comprehensive assessment of government programs which involves such rigorous *ex ante* review of planned methodologies and *ex post* review of analytical results. The quality of the outside expert reviews conducted throughout the series of studies has immensely improved all three studies, enabling EPA to meet the Congressional objectives of improved EPA analytical capabilities and deeper insights into the effects of Clean Air Act programs.

Organized under the auspices of EPA's Science Advisory Board (SAB), the statutorily-prescribed Advisory Council on Clean Air Act Compliance Analysis (Council) was established in 1991 to provide this multi-disciplinary outside expert review. Subsequently, separate subcommittees were established to advise the parent Council on particular technical aspects of the studies. The Air Quality Modeling Subcommittee (AQMS) was formed to advise the Council on issues of emissions estimation, air quality modeling, and some aspects of exposure modeling. Initially, a single subcommittee was formed to advise the Council on issues associated with estimation of physical effects, including those related to both human health and environmental outcomes. This subcommittee was named the Physical Effects Review Subcommittee (PERS). Later, the name of this subcommittee was changed to the Health and Environmental Effects Subcommittee (HEES), though the disciplinary scope of its review responsibilities remained the same. Eventually, this subcommittee was split into the two separate subcommittees in place today: the Health Effects Subcommittee (HES) responsible for advising the Council on human health effects estimation and the Ecological Effects Subcommittee (EES) responsible for advising the Council on issues associated with estimation of ecological consequences.

To facilitate the *ex ante* review of planned methodologies for the Second Prospective Study, the 812 Project Team published an "analytical blueprint." An initial draft blueprint was developed by the 812 Project Team and submitted for Council, AQMS, HES, and EES review in 2001. Pursuant to the Council's advice, significant revisions were made to the analytical blueprint, and a final version was published in 2003. Following the May 2004 publication of the Council's review of the revised analytical blueprint, the Project Team initiated the analysis.

The core analytical sequence for the Second Prospective Study is summarized in the following exhibit adapted with a slight modification from the May 2003 final analytical blueprint:



This sequence of analytical components is used to estimate the differences in economic, health, and environmental outcomes between two "core scenarios." The first core scenario, which serves as the analytical baseline, is the *"without-CAAA90"* case. This scenario freezes Clean Air Act and related State and local programs at the levels of scope and stringency which prevailed in November 1990 when the 1990 Amendments were passed, while allowing the population and economy to grow. The core scenario which is contrasted with this baseline case is the *"with-CAAA90"* scenario. For the historical years of the study's 1990 to 2020 reference period, the *with-CAAA90* case reflects actual CAAA program implementation. For future years,

the *with-CAAA90* reflects the Project Team's judgment at the time the scenarios were locked regarding the future implementation of Clean Air Act programs. It is the estimates for the incremental change in benefits and costs moving from the *without-CAAA90* case to the *with-CAAA90* case during the 2000, 2010, and 2020 target years which represent the principal analytical outputs of the Second Prospective Study.

In addition to the principal results provided by the core scenarios analysis, a number of supplemental analyses were conducted to provide additional information about Clean Air Act program costs and benefits. These supplemental analyses, which are all complete or nearing completion, include:

1. a Hazardous Air Pollutant (HAP) benefits case study, which focused on evaluating the effect of the 1990 Clean Air Act Amendments on benzene emissions and subsequent exposure and risk changes in the Houston MSA,

2. an ecological effects case study, which focused on estimating changes in Adirondack lake acidification and resulting improvements in ecological service flows, as well as characterizing potential effects on standing timber, and

3. a computerized general equilibrium (CGE) analysis assessing the broader economic consequences of the changes in direct compliance expenditures and, to a limited extent, in population health and productivity resulting from 1990 CAA Amendment programs.

Each major component of the core scenarios analysis and each key supplemental analysis have been, or will soon be, documented in a standalone report. These standalone reports provide detailed descriptions of the methodologies and results for each analytical component, and it is these component-specific reports which have provided the focus for review by the Council and its technical subcommittees. In early 2010, a single integrated report documenting the overall Second Prospective Study will be drafted and submitted to the Council for review.

As of today, the planned methodologies and, in many cases, the results of the core scenario analysis components and the supplemental analyses have been reviewed by the relevant Council panels. A final review meeting by the Health Effects Subcommittee (HES) was held December 15-16, 2009; and final review meetings for each of the others panels are planned for early 2010. Current plans for the timing and key objectives for each of the panel meetings are as follows:

1. **HES.** Review meeting held December 15-16, 2009. Report pending.

    a. Review the draft human health effect primary estimates incorporated in relevant chapters of the draft standalone benefits report.

    b. Review the human health components of the draft standalone uncertainty analysis report.

c. Provide advice to the Council regarding the validity and utility of the draft human health effects estimates and several final analytical choices pertaining to the health effect analysis and uncertainty analysis.

2. **AQMS.** February 19, 2010.

a. Review the final standalone air quality modeling report.

b. Provide advice to the Council regarding the validity and utility of the final estimates of air quality concentration changes.

3. **EES**. 2010-Second Quarter.

a. Review the final updated ecological effects literature review and the ecological effects case study report.

b. Provide advice to the Council regarding the validity and utility of the literature review and ecological effects case study.

4. **Council**. 2010-Third Quarter.

a. Review the draft integrated report documenting all aspects of the Second Prospective Study, taking account of the final advisory recommendations of the technical subcommittees.

November 2010 is the 20th anniversary of the passage of the 1990 Clean Air Act Amendments. EPA has set a goal to complete the Second Prospective Study in time for its results to inform discussions and other activities associated with the 20th anniversary of the Act's most recent amendments.

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