Memorandum

From: Jim DeMocker

To: 812 Prospective II Files

Subject: Scenario Specification

Date: August 3, 2005

The purpose of this Memorandum To The Files is to document and explain the specification of regulatory scenarios for the second 812 prospective study. This memorandum is intended to serve as an addendum to the 812 Analytical Blueprint and as such is a publicly available document.

The scenario specification is summarized herein in two parts. First, the memo provides a short summary of the key elements of all scenarios necessary to complete the main benefit and cost analyses; disaggregation of results by major emissions source category; the air toxics case study; uncertainty analysis of the effect of economic growth projections; and a "high renewable energy" case. Second, the memo provides additional documentation and details on the included rules and modeling approach for the "with Clean Air Act Amendments" scenario.

SCENARIOS NECESSARY TO COMPLETE STUDY OBJECTIVES

Exhibit 1 below provides a summary of scenarios and analytic model runs necessary to complete the main study objectives of the Second Prospective, as outlined in the May 2003 analytical plan and subsequent revisions to the plan in response to SAB advice. The main benefit and cost analysis requires two scenarios: a "with CAAA" scenario control case that reflects expected or likely future measures implemented since 1990 to comply with currently promulgated rules; and a "without CAAA" scenario baseline case that freezes the scope and stringency of emissions controls at their 1990 levels, while allowing for growth in population and economic activity and, therefore, in emissions attributable to economic and population growth.[1] We provide further detail on the construction of the with-CAAA scenario in the next section of this memorandum.[2] The "wedge" in emissions that results between these two scenarios therefore reflects the incremental effect of the CAAA on costs incurred and benefits realized since passage in 1990. The full suite of results, including emissions, modeled air quality outcomes, benefits, and costs, will be estimated in the three target years for the analysis: 2000, 2010, and 2020. In addition, a subset of the full results may be generated for some intervening years; for example, emissions and cost estimates will be generated for 2007 and 2015 for the EGU source sector. Since these off-target years are routinely included in EPA IPM runs, the

[1] Population drivers for the cost side will be based on Census Bureau projections and the same Woods and Poole county-level downscaling approach used for the benefits side health risk calculations. See the Second Prospective Analytical Plan, May 2003, for further details on the Woods and Poole approach.

[2] The without-CAAA scenario also does not impose attainment of NAAQS standards as they existed prior to 1990; the with-CAAA scenario, on the other hand, reflects modeling of full compliance with the most recent PM and ozone NAAQS, to the extent full compliance and the measures required to achieve full compliance can be projected with reasonable confidence.

Project Team will collect these results for possible use in refining the interpolation between target years required to generate NPV results over the study reference period. .

Exhibit 1 **SUMMARY OF SCENARIOS FOR SECTION 812 SECOND PROSPECTIVE**		
Analysis Component	**Incremental Scenarios Needed**	**Notes**
Main (Central) Analysis	1. With CAAA 2. Without CAAA	a. Completion of NAAQS analysis requires some interaction with AQ modelers to estimate emissions shortfalls after Federal/regional rules are applied b. Results will be used as the basis for all post-processed uncertainty estimates (e.g., discount rate); see below for additional scenarios needed to characterize effect of uncertainty in economic growth projections
Disaggregation by Source Category	3. With CAAA absent EGU controls 4. With CAAA absent industrial point source controls 5. With CAAA absent motor vehicle controls 6. With CAAA absent nonroad source controls 7. With CAAA absent area source controls	a. Benefit and cost results derived from comparison of each scenario, in turn, to the with CAAA scenario (#1 above). b. Estimates will be costs avoided and benefits foregone if regulation of that category were not implemented. This approach will yield cost and benefit results that will not necessarily add up to the total costs and benefits across all sectors. c. Will not attempt to make up emissions shortfalls to meet NAAQS. d. All measures in a source category will be "turned off", including Federal, state, and identified local measures.
Air Toxics Case Study	8. With CAAA benzene scenario for Houston-Galveston-Barzoria counties 9. Without CAAA benzene scenario for Houston-Galveston area	a. Consistent with main scenarios, but for a smaller geographic area, single pollutant, and differing methods b. Detailed plans still evolving

Exhibit 1

SUMMARY OF SCENARIOS FOR SECTION 812 SECOND PROSPECTIVE

Analysis Component	Incremental Scenarios Needed	Notes
Uncertainty Analyses - bounded economic growth	10. With CAAA - low growth variant 11. Without CAAA - low growth variant 12. With CAAA - high growth variant 13. Without CAAA - high growth variant	a. Relevant comparisons are between scenarios with same growth driver data (i.e., #10 compared to #11, #12 to #13) b. High and low variants are based on EIA Annual Energy Outlook high and low growth scenarios, which reflect macro-economically integrated population projections. These population projections will be used as the starting point for the health risk benefits estimates as well, replacing the base case Census Bureau projections.
High Renewables Scenario Analysis	14. With CAAA - high renewables variant	a.Comparison would be between scenario #14 and #1 above - results would be marginal effect of DOE's aggressive pursuit of renewables relative to with-CAAA baseline b. Key analytic question is whether high renewables variant has significant effect on NAAQS compliance
Note: The scope of analysis components and descriptions of scenarios reflect Project Team decisions through June 15, 2005.		

One key analytic objective of the Second Prospective is to provide an estimate of benefits and costs disaggregated by major emissions source categories. The five major categories include electric generating units (EGUs); industrial point sources; on-road mobile sources; nonroad mobile sources; and area sources. The proposed scenario design, outlined in the second row of Exhibit 1, addresses the following question: what are the marginal costs avoided and benefits foregone if all post-CAAA90 regulation of a particular source category were not implemented? The design implies that, for each source category, all controls in that category (e.g., Federal rules, state regulations, and any local measures taken to meet rate-of-progress requirements or local NAAQS compliance) will be set to pre-CAAA levels, while all others will remain at post-CAAA levels. The results of the scenario will be compared to the scenario where all source categories are set to post-CAAA levels. The resulting estimates of marginal costs and benefits by source category will not necessarily add up to the total costs and benefits across all sectors from the main analysis - in other words, the proposed approach is not, strictly speaking, a benefit and cost allocation methodology. We believe the proposed approach, however, will provide

more policy-relevant results as the Agency considers further investments in air quality improvements.

The Second Prospective will also include an air toxics case study. The results of the case study are designed to supplement the main analytic results, and therefore the emissions scenarios need to be consistent with the main analysis scenarios. The genesis of the air toxics case study was recognition of the inability to comprehensively characterize benefits of Title III for all pollutants and geographic areas addressed by those rules. The case study approach is being pursued as a way to illustrate the methods that could be applied to estimate benefits of air toxics controls through analysis of a pollutant (benzene) and geographic area (Houston-Galveston-Brazoria) that is relatively data-rich. The scenarios for the air toxics case study are therefore similar conceptually to the main analysis, but reflect greater specificity and higher geographic resolution for implementation of CAAA rules. Note that although the original motivation for the analysis was to provide insight into the benefits and costs of Title III provisions, we will consider all rules under Titles I, II, and III that affect benzene emissions in this area.

Another analytic objective of the Second Prospective is to assess uncertainty, with a particular focus on systematically reflecting uncertainty in the emissions, costs, and air quality modeling steps that are often carried out in a deterministic fashion. One key source of uncertainty that can affect all aspects of the analysis is projections of economic growth. To address this need, we propose to assess scenarios that reflect high and low alternatives to the central case of economic growth. The high and low cases we propose reflect integrated modeling of economic growth, energy demand, and energy prices, all potentially important drivers of the analysis that are also closely inter-related and therefore require an integrated approach. The Project Team's current analytic plans also include analysis of the independent effect of alternative energy price trajectories on costs; those analyses would be conducted as post-processor sensitivity tests, however, and would not necessarily be linked to an overall, integrated scenario.

Finally, the Project Team currently plans to pursue analysis of a "high renewable energy" scenario. The Project Team recently determined that an analytic objective that had been pursued in early drafts of the Analytic Plan, but abandoned because of concerns about feasibility and resource limitations, may now be feasible to assess using a DOE estimate of a greater-than-central-case assumption about the penetration of renewable energy technologies. The results of this scenario, which would reflect both full implementation of the CAAA and high renewable energy penetration, would be compared to the with-CAAA central case to assess the incremental pollution control costs avoided and/or benefits gained if renewable technologies are adopted faster than DOE currently projects. Greater penetration of renewable energy technologies might plausibly reduce the need for local controls to meet NAAQS requirements, reduce control costs in the EGU sector, reduce air pollutant emissions in attainment areas, or have other effects that could affect the central case results. In addition, we expect these results to be useful in assessing uncertainty associated with the future cost and penetration rate of renewables.[3]

[3] Note that we do not propose to generate a without CAAA high renewables variant, for two reasons. First, there does not seem to be a relevant policy question that would be answered by comparison to that scenario. A without CAAA high renewables variant implies both complete removal of all CAAA provisions and higher than expected renewable penetration, which does not coincide with any reasonable or informative policy scenario. Second, a good case can be made that the effect of the CAAA on all our key outcome variables is likely to be much larger than the incremental effect of high renewables penetration through 2020. It

SUMMARY OF WITH-CAAA SCENARIO CONSTRUCTION

The with-CAAA scenario for the Second Prospective will reflect an expansion of the regulatory scope of the CAAA since the time analytic commitments were made for the First Prospective (roughly 1997). A few rules that were under consideration at that time but not finalized, such as the NOx SIP call, now have a much clearer impact. Exhibit 2 below provides a summary of the key recent rulemakings that will be part of the Second Prospective with-CAAA scenario but were not reflected in the estimates of benefits and costs presented in the First Prospective.[4] The general approach we propose to model the cumulative effect of these rules is to identify the most stringent applicable emissions reduction requirement for each relevant emissions source, and then apply that requirement. For the EGU sector, IPM does this as part of its linear programming optimization routine. For all other sectors, Pechan will use its existing emissions inventory estimation tools to complete this work.

The list in Exhibit 2 includes one rule that is currently not finalized, the Clean Air Fine Particle Implementation Rule (CAFPIR). Our overall strategy for modeling the emissions impact of this rule is to conduct the following three tasks:

1. Develop a reasonable forecast of the scope and stringency of Federal measures at a level of detail suitable for the development of national emissions inventories for the 2010 and 2020 target years. These Federal measures are listed in Exhibit 2, and include CAIR, CAMR, and CAVR. There is some uncertainty pertaining to the eventual control requirements pursuant to CAVR because the implementation details of CAVR will be decided by states through visibility protection plans determined by Regional Planning Organizations (RPOs). However, the present analysis adopts the middle of the three projected compliance outcomes incorporated in the recent Regulatory Impact Analysis for CAVR.

2. Assess progress toward ozone and PM2.5 NAAQS compliance at the county/attainment area level as a result of all current, on-the-books CAAA requirements and use the results to establish targets for additional emissions reductions to be achieved by local, state, or regional actions at the county/attainment area level. This task was completed for an initial estimate of 8-hour ozone NAAQS compliance, but to our knowledge has not yet been pursued for PM NAAQS compliance. For PM, we hope to able to complete this work through application of reduced form air quality modeling tools, such as REMSAD-ST or the Response Surface Model (RSM).

3. Identify measures likely to be adopted at the local, state, or regional level to meet the emissions reduction targets.

4. The list in Exhibit 2 also includes modeling of the results of major cases and settlements that have resulted from enforcement of CAAA provisions. In some cases, these negotiated

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therefore seems much more useful to think about a renewables strategy as incremental to the CAAA, rather than as a replacement for CAAA provisions.

[4] The table in Appendix A provides a complete listing of all rules to be included in the with-CAAA scenario, by major emissions source category, including those modeled for the First Prospective, as well as a brief summary of elements of the pre-1990 CAA that define the without-CAAA scenario.

settlements may have resulted in emissions reductions beyond the current stringency of the CAAA requirements, in order to compensate for past noncompliance. Because the outcomes of these enforcement actions were negotiated in full knowledge of the ongoing CAAA requirements, we do not believe it will be feasible to parse the outcomes between pre-1990 and post-1990 requirements. As a result, we do not currently plan to reflect the cases and settlements in the without-CAAA scenario. We do intend to review these cases, however, to determine if there are any readily identifiable components that could inform our modeling of the without-CAAA scenario for the affected emission sources.

Exhibit 2:
New Core Programs for the Second Prospective Analysis
"With-CAAA" Scenario

Title	Description	Promulgation Date*
Clean Air Fine Particle Implementation Rule (CAFPIR)	Would designate those areas where air quality does not meet the revised health-based standards for fine-particulate pollution. This will require states to submit plans for reducing the levels of particulate pollution in areas where the fine-particle standards are not met. State implementation plans due: Feb. 2008. Attainment dates for nonattainment areas: up to Feb. 2010 with extension up to 2015 possible.	Final rule expected in early 2006 See the following for more details: http://www.epa.gov/pmdesignations/documents/120/timeline.htm
Clean Air Interstate Rule (CAIR)	Designed to address problem of power plant pollution that drifts from one state to another. The rule uses a cap and trade system to reduce SO_2 and NOx in eastern states by 70 percent.	March 10, 2005
Clean Air Mercury Rule (CAMR)	Caps mercury emissions from power plants – the largest domestic source of mercury emissions. The final rule adopted a 2-phase market based cap and trade program.	March 15, 2005
Clean Air Visibility Rule (CAVR)	Amends the provisions of the regional haze rule that require BART for industrial facilities emitting PM2.5 and precursors. The amendments include final BART guidelines for states to use in determining affected facilities and specific control requirements.	June 15, 2005

Exhibit 2:
New Core Programs for the Second Prospective Analysis
"With-CAAA" Scenario

Title	Description	Promulgation Date*
NO_x State Implementation Plan (SIP) Call[5]	Requires 19 states and the District of Columbia to submit SIPs providing NOx emission reductions to mitigate ozone transport in the eastern U.S. Assigns a total NOx emissions "budget" for each identified State and encourages the use of an emissions trading program to achieve reductions from large electric generating units and industrial boilers. Required that NOx emission reduction measures be in place by May 1, 2003.[a]	Due to extensive litigation on this action, the requirements of the NOx SIP Call were separated into two phases. Phase I was finalized on October 27, 1998[b] and achieves the majority of the reductions, about 90%, and affects EGUs and non-EGUs. Phase II, which was finalized on April 20, 2004[c], addresses internal combustion engines, non-Acid Rain EGUs (cogens), and cement kilns.[d]
Phase 2 of the Ozone Transport Commission (OTC) NO_x memorandum of understanding	In September 1994, the OTC adopted a memorandum of understanding (MOU) to achieve regional emission reductions of NOx. Phase I included the installation of reasonably available control technology (RACT). In Phases II and III, states committed to developing and adopting regulations that would reduce region-wide NOx emissions in 1999 (Phase II) and further reduce emissions in 2003 (Phase III).[e] The OTC NOx Budget Program ran from 1999 to 2002 and has since been replaced by the NOx SIP Call.[f]	The original OTC MOU was published September 27, 1994.[g] The 1994 MOU has since been replaced by Phase I of the NOx SIP Call in 1998 and Phase II in 2004.
Tier 2 Tailpipe Standards	The new tailpipe standards are set at an average standard of 0.07 grams per mile for nitrogen oxides for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6000 pounds will be phased-in to this standard between 2004 and 2007.[h]	February 10, 2000[i]

[5] The NO_x State Implementation Plan (SIP) Call was not final at the time of the first prospective analysis but was estimated for inclusion in the with-CAAA scenario. The second prospective analysis will consider the final version of this rule in the with-CAAA scenario.

Exhibit 2:
New Core Programs for the Second Prospective Analysis
"With-CAAA" Scenario

Title	Description	Promulgation Date*
Nonroad Diesel Rule	Requires stringent pollution controls on diesel engines used in industries such as construction, agriculture and mining, and slashes sulfur content of diesel fuel. The new standards will cut emissions from nonroad diesel engines by over 90 percent and will reduce sulfur levels of nonroad diesel fuel by 99 percent[j]	June 29, 2004[k]
Heavy Duty Diesel Vehicle Standards	Established a single comprehensive national control program that regulates the heavy-duty vehicle and its fuel as a single system. The new sulfur standards for highway diesel fuel begin to take effect in 2006. The new emissions standards for heavy-duty vehicles begin to take effect in 2007.[l]	January 18, 2001[m]
Tier 2 Gasoline Fuel Sulfur limits	From 2004 to 2006, reduces average sulfur levels in gasoline by 90 percent, from nearly 300 to 30 parts per million. These reductions are needed because sulfur fouls catalytic converters, the units that remove pollutants from auto exhaust.[n]	February 10, 2000[o]
7- and 10-Year Maximum Available Control Technology (MACT) Standards	Technology-based air emission standards authorized by the Clean Air Act of 1990. Each standard regulates a specific source category such as dry cleaners, petroleum refineries, or vegetable oil production.[p] The 7- and 10-year standards refer to the source categories that were required to be regulated by 1997 and 2000, respectively.	A complete list of the 7 and 10-year MACT promulgation dates for different source categories can be found at: http://www.epa.gov/ttn/atw/mactfnl.html
Cases and settlements from Federal enforcement actions under Clean Air Act or CAAA authority	These include NSR enforcement suits against the owners of EGUs as well as other enforcement actions. The cases and settlements may affect both the need for further emissions reductions at the local level and the marginal cost of further reductions in the aggregate; as a result, it is important to include them in the with-CAAA scenario.	Settlement and effective dates vary by affected entities.
Utility emissions caps set by individual states (CT, MA, MO, NH, NC, TX and WI)	Though not federal measures explicitly, these caps are state actions consistent with the 1990 Clean Air Act Amendments which should be reflected in the with-CAAA scenario. We do not currently plan to include them in the without-CAAA scenario, consistent with an approach endorsed by the 812 Council which combines the effects of direct federal measures with state/local actions required to meet CAA standards..	Effective dates vary by state.

Exhibit 2:
New Core Programs for the Second Prospective Analysis
"With-CAAA" Scenario

Title	Description	Promulgation Date*

* Refers to the final rule publication date in the Federal Register unless otherwise noted.

[a] U.S. EPA. "Finding of Significant Contribution and Rulemakings for Certain States in the Ozone Transport Assessment Group Region," accessed at: http://www.epa.gov/ttn/naaqs/ozone/rto/sip/index.html.

[b] U.S. EPA. 1998. *Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone; Final Rule*. Federal Register 63(207): 38958, accessed at: http://www.epa.gov/ttn/oarpg/otag/nfr_1.pdf.

[c] U.S. EPA. *Cap and Trade: Multi-State NOx Programs*, accessed at: http://www.epa.gov/airmarkets/capandtrade/nox.pdf.

[d] U.S. EPA. "NOx State Implementation Plan (SIP) Call for the Mid-Atlantic States," accessed at: http://www.epa.gov/reg3artd/specprog/NOx/sip_call.htm.

[e] U.S. EPA. March 2002. *2001 OTC NOx Budget Program Compliance Report*¸ accessed at: http://www.epa.gov/airmarkets/cmprpt/otc01/01otcrpt.pdf.

[f] U.S. EPA. "Ozone Transport Commission (OTC) NOx Budget Program," accessed at: http://www.epa.gov/airmarkets/otc.

[g] U.S. EPA. November 2001. *NOx Budget Program Quarterly Report Review Process For Determining Final Data*, accessed at: http://www.epa.gov/airmarkets/reporting/otc/closurenbp2001nov.pdf.

[h] U.S. EPA. December 1999. *Regulatory Announcement: EPA's Program for Cleaner Vehicles and Cleaner Gasoline*, accessed at: http://www.epa.gov/otaq/regs/ld-hwy/tier-2/frm/f99051.pdf.

[i] U.S. EPA. 2000. *Control of Air Pollution From New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements; Final Rule*. Federal Register 65(28): 6698, accessed at: http://www.epa.gov/otaq/regs/ld-hwy/tier-2/frm/fr-t2pre.pdf.

[j] U.S. EPA. "Clean Air Nonroad Diesel Rule Summary," accessed at: http://www.epa.gov/otaq/regs/nonroad/equip-hd/2004fr/420f04029.htm.

[k] U.S. EPA. 2004. *Control of Emissions of Air Pollution Fom Nonroad Diesel Engines and Fuel; Final Rule*. Federal Register 69(124): 38958. Accessed at: http://www.epa.gov/otaq/url-fr/fr29jn04.pdf.

[l] U.S. EPA. December 2000. *Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*, accessed at: http://www.epa.gov/otaq/regs/hd2007/frm/f00057.pdf.

[m] U.S. EPA. January 2001. *Control of Air Pollution From New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements; Final Rule*. Federal Register 66(12): 5002, accessed at: http://www.epa.gov/fedrgstr/EPA-AIR/2001/January/Day-18/a01a.pdf

[n] U.S. EPA. December 1999. *EPA's Program for Cleaner Vehicles and Cleaner Gasoline*, accessed at: http://www.epa.gov/otaq/regs/ld-hwy/tier-2/frm/f99051.pdf.

[o] U.S. EPA. 2000. *Control of Air Pollution From New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements; Final Rule*. Federal Register 65(28): 6698, accessed at: http://www.epa.gov/otaq/regs/ld-hwy/tier-2/frm/fr-t2pre.pdf.

[p] U.S. EPA. "Region 8 - Maximum Available Control Technology (MACT)," accessed at: http://www.epa.gov/region08/compliance/mact/mact.html.

Appendix A

Projection Scenario Summary by Major Sector in the Second Prospective

Sector	Without-CAAA	With-CAAA*	
Industrial Point	RACT held at 1990 levels	**NO_x**:	RACT for all NAAs (except NO_x waivers), OTC small NO_x source model rule (where adopted), Cases and settlements, NO_x measures included in ozone SIPs and SIP Call post-2000, Additional measures to meet PM and ozone NAAQS.
		VOC/HAP:	RACT for all NAAs, VOC measures included in ozone SIPs, 2-, 4-, 7-, and 10-year MACT standards, New control technique guidelines (CTGs).
		SO_x:	Cases and settlements, Additional measures to meet revised PM NAAQS.
		NO_x/VOC:	Rate-of-Progress (3 percent per year) requirements (further reductions in VOC), Early action compacts.
Utility	RACT and New Source Review (NSR) held at 1990 levels. 250 ton Prevention of Significant Deterioration (PSD) and New Source Performance Standards (NSPS) held at 1990 levels.	**NO_x**:	RACT and NSR for all non-waived (NO_x waiver) NAAs, SIP Call post -2000, Phase II of the Ozone Transport Commission (OTC) NO_x memorandum of understanding, Title IV Phase I and Phase II limits for all boiler types, 250 ton PSD and NSPS, Clean Air Interstate Rule, Clean Air Mercury Rule, Cases and settlements, Additional measures to meet PM and ozone NAAQS.
		SO_x:	Title IV emission allowance program, Clean Air Interstate Rule, Clean Air Mercury Rule, Cases and settlements, Additional measures to meet revised PM NAAQS.

Appendix A

Projection Scenario Summary by Major Sector in the Second Prospective

Sector	Without-CAAA	With-CAAA*	
Non-road**	Controls (engine standards) held at 1990 levels.	**NO_x**:	Federal Phase I and II compression ignition (CI) and spark ignition (SI) engine standards, Federal locomotive standards, Federal commercial marine vessel standards, Federal recreational marine vessel standards, NO_x measures included in ozone SIPs, Nonroad Diesel Rule.
		VOC/HAP:	Federal Phase I and II spark ignition (SI) engine standards, Federal recreational marine vessel standards, Federal large SI/recreational vehicle engine standards, Federal large SI/evaporative standards, VOC measures included in ozone SIPs.
		CO:	Federal large spark ignition (SI) evaporative standards. Federal Phase I and II spark ignition (SI) engine standards.
		PM:	Federal Phase I and II compression ignition (CI) engine standards, Federal Phase I and II spark ignition (SI) engine standards, Federal locomotive standards, Federal commercial marine vessel standards, Nonroad Diesel Rule.
		SO_x:	Nonroad Diesel Rule, Gasoline fuel sulfur limits.

Appendix A

Projection Scenario Summary by Major Sector in the Second Prospective

Sector	Without-CAAA	With-CAAA*	
Motor Vehicles***	Federal Motor Vehicle Control Program (FMVCP) - engine standards set prior to 1990. Phase 1 Reid vapor pressure (RVP) limits. I/M programs in place by 1990.	**NO_x**:	Tier 1 tailpipe standards (Title II), Tier 2 tailpipe standards, 49-State LEV program (Title I), I/M programs for ozone and CO NAAs (Title I), Federal reformulated gasoline for ozone NAAs (Title I), California LEV (California only) (Title I), California reformulated gasoline (California only) (Title I), NO_x measures included in ozone SIPs, HDDV standards, HDDV defeat device settlements Additional measures to meet PM and ozone NAAQS.
		VOC/HAP:	Tier 1 tailpipe standards (Title II), Tier 2 tailpipe standards, 49-State LEV program (Title I), I/M programs for ozone and CO NAAs (Title I), Phase 2 RVP limits (Title II), Federal reformulated gasoline for ozone NAAs (Title I), California LEV (California only) (Title I), California reformulated gasoline (California only) (Title I), VOC measures included in ozone SIPs, HDDV standards, Enhanced evaporative test procedures, Additional measures to meet PM and ozone NAAQS.
		CO:	49-State LEV program (Title I), I/M programs for CO NAAs (Title I), Tier 2 tailpipe standards, California LEV (California only) (Title I), California reformulated gasoline (California only) (Title I), Oxygenated fuel in CO NAAs (Title I), HDDV standards.
		PM:	HDDV standards, diesel fuel sulfur content limits (Title II) (1993).
		SO_x:	Diesel fuel sulfur content limits (Title II) (1993), HDDV standards and associated diesel fuel sulfur content limits, Gasoline fuel sulfur limits, Tier 2 tailpipe standards, Additional measures to meet new PM NAAQS.

Appendix A

Projection Scenario Summary by Major Sector in the Second Prospective

Sector	Without-CAAA	With-CAAA*	
Area	Controls held at 1990 levels	**NO_x:**	RACT requirements, NO_x measures included in ozone SIPs, Additional measures to meet PM and ozone NAAQS.
		VOC/HAP:	RACT requirements, New CTGs, 2-, 4-, 7-, and 10-year MACT Standards, Onboard vapor recovery (vehicle refueling), Stage II vapor recovery systems, Federal VOC rules for AIM coatings, autobody refinishing, and consumer products, Additional measures to meet PM and ozone NAAQS.
		PM:	$PM_{2.5}$ and PM_{10} NAA controls, VOC measures included in ozone SIPs.
		NO_x/VOC:	Rate-of-Progress (3% per year) requirements (further reductions in VOC), Model rules in OTC States, Early action compacts.

NOTE: *Also includes all Without-CAAA measures.
**The nonroad mobile source standards included in the With-CAAA scenario are based on the standards found within the NONROAD2004 emissions inventory model. Three other nonroad mobile standards, not captured by the NONROAD2004 model, are also included in the With-CAAA scenario: the locomotive standards, commercial marine engine standards, and the large SI/evaporative standards.
***The motor vehicle mobile source standards included in the With-CAAA scenario are based on the standards found within the MOBILE6.2 emissions inventory model. Note that emissions associated with the Final Rule for Cleaner Highway Motorcycles (promulgated in 2004) are not accounted for in the MOBILE6.2 model, and are not included in the With-CAAA scenario.