COMMENTS OF THE UTILITY AIR REGULATORY GROUP

on the

PROPOSED ENDANGERMENT AND CAUSE OR CONTRIBUTE FINDINGS FOR GREENHOUSE GASES UNDER SECTION 202(a) OF THE CLEAN AIR ACT

Docket ID No. EPA-HQ-OAR-2009-0171

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The Utility Air Regulatory Group ("UARG") submits the following comments on the Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act ("Proposed Endangerment Finding"), which the U.S. Environmental Protection Agency ("EPA" or "Agency") published for public comment on April 24, 2009. 74 Fed. Reg. 18886 (April 24, 2009). UARG is a voluntary, not-for-profit group of electric generating companies and organizations and four national trade associations (the Edison Electric Institute, the National Rural Electric Cooperative Association, the American Public Power Association, and the National Mining Association). UARG's purpose is to participate collectively on behalf of its members in EPA's rulemakings and other proceedings under the Clean Air Act ("CAA" or "Act") that affect the interests of electric generators and in litigation arising from those proceedings. UARG members would be significantly affected by any decisions EPA may make concerning the regulation of greenhouse gases ("GHGs") under the existing provisions of the CAA. UARG appreciates the opportunity to comment on the Proposed Endangerment Finding and emphasizes that the issues raised by the potential regulation of GHGs under the Act are critical to its members as well as to the public and the business community generally.

UARG previously submitted extensive comments to EPA on its Advance Notice of Proposed Rulemaking Regarding Regulating Greenhouse Gas Emissions Under the Clean Air

Act ("ANPR"), which the Agency published on July 30, 2008. 73 Fed. Reg. 44354. In the ANPR, EPA sought comment on a broad array of issues relevant to EPA's possible regulation of GHGs under the CAA. In particular, EPA noted that "[t]he potential regulation of greenhouse gases under any portion of the Clean Air Act could result in an unprecedented expansion of EPA authority that would have a profound effect on virtually every sector of the economy and touch every household in the land." *Id.* at 44355/1. In the Proposed Endangerment Finding, EPA specifically requested that commenters "submit to the docket for today's action any comments they want EPA to consider as it makes a decision on this proposed determination." 74 Fed. Reg. at 18893 n.15. As a result, UARG's ANPR comments are attached to the present comments as Attachment A and should be treated as part of these comments. For convenience, UARG's comments are here referred to as "UARG ANPR Comments."

UARG notes that, on June 9, 2009, it submitted, through its counsel, a request for a 60-day extension of the public comment period in this rulemaking. *See* EPA-HQ-OAR-2009-0171-2643 (June 9, 2009) ("UARG Letter"). UARG's letter requested an extension "[b]ecause of the importance of this rulemaking and the complex nature of many of the issues addressed in the Endangerment Proposal and the accompanying Technical Support Document." *Id.* UARG observed that "[t]he additional time would allow commenters to submit more detailed information that should assist EPA in its decision in this important matter." *Id.* UARG added that no deadline or other specific time constraints would preclude an extension:

> [A]s EPA has acknowledged, no legal deadline applies to this rulemaking, and EPA has not announced an intended date for final action. *See, e.g.*, EPA, Spring 2009 Regulatory Agenda, at 44 (May 11, 2009). In addition, the Agency has not yet proposed for public comment any motor vehicle emission standards that would be based on any final findings of endangerment and contribution. Thus, a 60-day extension of the comment period on the Endangerment Proposal would neither interfere with any deadline nor delay any standard-setting.

Id. EPA responded to UARG's letter on June 18, 2009, by denying an extension of any length, despite the absence of any rulemaking deadline or other timing constraint and without addressing UARG's argument on that point. In the following comments, UARG describes what it believes to be the most critical deficiencies in the Proposed Endangerment Finding and in EPA's "Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act" ("TSD"). EPA's unwarranted refusal to extend the comment deadline, however, has limited the ability of UARG (and others) to submit additional comments and other information that would assist in the development of an appropriate outcome in this proceeding.

I. Executive Summary

UARG has great concern about the Proposed Endangerment Finding and the prospect that GHG emissions will be regulated under the CAA. Our comments on the Proposed Endangerment Finding focus on the following key issues:

- **This action is unlawful because the outcome is preordained.** The integrity of this proposed action is compromised by the apparent fact that the President and EPA already have definitively concluded that the Agency must make an affirmative endangerment finding under section 202(a)(1) for GHG emissions to allow implementation of a new national policy announced by the President on May 19, 2009.

- **The asserted legal basis is insufficient.** EPA provides a wholly inadequate explanation and assessment of the key CAA provisions that purportedly authorize and justify the Proposed Endangerment Finding.

- **The scientific and factual basis that EPA has presented for the Proposed Endangerment Finding is inadequate and incomplete.** For example, the Administrator unlawfully defers to the judgment of the Intergovernmental Panel on Climate Change ("IPCC") rather than formulating her own assessment of the facts.

- **The contribution analysis is misdirected.** Among other things, EPA's analysis incorrectly assumes that GHG emissions from all motor vehicles are a suitable surrogate for emissions from new motor vehicles, which are the only vehicles that EPA is potentially authorized to regulate under section 202(a)(1).

- **The Agency has unreasonably failed to consider the full consequences of making an endangerment finding and of regulating new motor vehicle's GHG emissions.** EPA cannot put on blinders and willfully ignore such compelling issues as the potential applicability of the Act's Prevention of Significant Deterioration ("PSD") requirements to GHGs and arguments that may be raised based on a section 202(a)(1) endangerment finding in the context of other CAA provisions, such as sections 108 and 115, that include an endangerment criterion.

As section II of these comments discusses, less than a month after EPA published the Proposed Endangerment Finding, the President on May 19, 2009, announced what the White House called "a new national policy" to "reduc[e] greenhouse gas pollution for all new cars and trucks sold in the United States." White House Press Release, "President Obama Announces National Fuel Efficiency Policy" (May 19, 2009). The President's new national policy requires the promulgation by EPA of GHG emission standards under section 202 of the CAA in conjunction with the establishment by the Department of Transportation ("DOT") of comparable national fuel economy standards for vehicles under the Energy Policy and Conservation Act ("EPCA").

This Presidential announcement effectively set the course for EPA with respect to its decision whether to control GHG emissions from vehicles under section 202. The only real questions left to EPA concern certain details of *how* – but not whether – to control those emissions under section 202. *See generally* EPA and DOT, Notice of Upcoming Joint Rulemaking To Establish Vehicle GHG Emissions and CAFE Standards, 74 Fed. Reg. 24007 (May 22, 2009) ("Joint Rulemaking Notice"). Promulgation by EPA of a final affirmative endangerment finding, of course, is a necessary step for EPA to regulate under section 202 in fulfillment of the President's policy. These circumstances undermine EPA's ability to provide anything remotely approaching an objective consideration of, and legally adequate response to,

rulemaking comments on the Proposed Endangerment Finding that question or rebut the Agency's asserted basis for an affirmative endangerment finding.

Section III of these comments addresses the inadequacy of EPA's rationale for its Proposed Endangerment Finding and its failure to address critical issues concerning the endangerment criterion's purpose of preventing harm. The CAA and its endangerment provisions do not call for "regulation for regulation's sake" but for regulation *where it can be shown to achieve the statutory objective of preventing damage*. As stated in 1977 legislative history quoted by EPA, the effect of the CAA's endangerment criterion is "[t]o emphasize the preventive or precautionary nature of the Act, i.e., to assure that regulatory action can *effectively prevent harm* before it occurs." 74 Fed. Reg. at 18891 n.8 (emphasis added). The Agency inexplicably (and inadequately) attempts to refute this fundamental point in the Proposed Endangerment Finding. In particular, EPA states its disagreement

> with comments that argue the Administrator cannot make a positive endangerment or contribution determination unless the emissions reductions required by the resulting standards would "effectively mitigate" or "fruitfully attack" the impacts underlying the endangerment determination. . . . [S]uch an approach fails to appreciate the holistic approach that Congress adopted in [the] 1977 [amendments to the CAA].

Id. at 18893/1.

EPA does not dispute that the "fruitfully attack" phrase comes directly from the decision of the U.S. Court of Appeals for the District of Columbia Circuit in the seminal case addressing the CAA endangerment criteria, *Ethyl Co. v. EPA*, 541 F.2d 1, 31 n.62 (D.C. Cir. 1976) (*en banc*). Indeed, EPA characterizes *Ethyl* as providing the conceptual foundation for the 1977 statutory amendments to the endangerment provisions that the Agency cites. 74 Fed. Reg. at 18891/2. The point of the "fruitfully attack" language and other quoted passages from *Ethyl*, of course, is that "the preventive or precautionary nature of the CAA" that EPA ostensibly

recognizes in the CAA's endangerment provisions, *id.* at 18891/3 n.8, calls for regulatory action where that action promises to avert the threatened harm. Yet, while failing to provide any meaningful explanation of its "holistic approach" theory, EPA fails to show that the contemplated regulation resulting from its Proposed Endangerment Finding would prevent at least a substantial part of the danger from the global climate change at which the regulation ostensibly is aimed.

As Section IV of these comments discusses, EPA also has failed to address the threshold issue of whether EPA, in making its proposed findings, properly may consider conditions caused largely by emissions from non-U.S. sources that are inherently beyond the scope of U.S. regulatory authority. This failure to address a central issue in the proceeding constitutes a critical procedural flaw. On the merits, EPA lacks authority to base an endangerment and cause or contribute finding on conditions predominantly attributed to non-U.S. sources.

Section V below addresses EPA's discussion of the science. EPA bases the Proposed Endangerment Finding on numerous alleged scientific grounds. The discussion of the science in the Proposed Endangerment Finding, however, is woefully incomplete and the Agency's conclusions are simultaneously overbroad and, at times, impenetrably vague. These shortcomings render the basis for EPA's policy judgments unsound and require significant revisions and enhancements before EPA could proceed in this rulemaking.

Further, EPA bases its proposed scientific judgments on the TSD, which is an inaccurate and inadequate assessment of the current state of climate-related science. This document also would have to be substantially revised if EPA is to proceed further with its proposal to make an endangerment finding. The TSD: (1) reflects fundamentally flawed policy determinations about the relevant information that skew EPA's presentation of the science; (2) relies on sources of

information that do not adequately address the scientific issues relevant under the CAA; (3) contains improper and inaccurate characterizations of the conclusions that can reasonably be drawn from the scientific studies and assessments it cites; and (4) ignores important scientific information that undermines EPA's stated conclusions regarding the negative and positive impacts of climate change, including representations concerning the import of substantial uncertainties in the scientific record. A wide range of flaws identified in these comments on the TSD are reflected in the Proposed Endangerment Finding as well. Moreover, as Section VI of these comments details, the serious shortcomings of the Proposed Endangerment Finding and the TSD constitute violations of the Data Quality Act.

Section VII of the comments discusses elements of EPA's "contribution" analysis under section 202(a)(1) of the Act. That analysis should address the contribution of emissions from the relevant U.S. sources to total worldwide GHG emissions and atmospheric concentrations. Because the stated purpose of this proceeding is to address contributions to what EPA characterizes as air pollution that consists of *global* atmospheric concentrations of certain gases, it makes no sense to assess U.S. emissions of the sources to be regulated in relation to all *U.S.* emissions, with respect to either a single GHG or all six GHGs in the aggregate. Moreover, the relevant emissions to be assessed in the contribution analysis are those from *new* U.S. motor vehicles only, not from all U.S. motor vehicles. The emission percentage that EPA cites (4.3%), 74 Fed. Reg. at 18906/3, reflects emissions from all section 202(a)(1) sources, not emissions from that subset of section 202(a)(1) sources, *i.e.*, new vehicles, that EPA is authorized to regulate. Moreover, EPA should further refine the contribution assessment to address that subset of new section 202(a)(1) sources whose GHG emissions it plans to address through regulation.

Section VIII of the comments discusses implications of this proceeding for the PSD and Title V programs under the Act. As EPA recognized in the ANPR, "if EPA were to regulate greenhouse gas emissions from motor vehicles under the Clean Air Act, then regulation of smaller stationary sources that also emit GHGs – such as apartment buildings, large homes, schools and hospitals – could also be triggered" through the Act's PSD program. 73 Fed. Reg. at 44355/1. The potential for regulation of GHGs under the PSD program presents an enormous challenge for EPA and the nation. Similar challenges would be posed under the Title V program.

Sections IX and X address possible arguments that could arise under two CAA provisions concerning stationary sources -- sections 108 and 115, respectively -- if EPA makes an affirmative endangerment finding for GHGs under section 202(a)(1). Should EPA decide to make final the Proposed Endangerment Finding, that finding would not be dispositive with regard to section 108, which governs the listing of criteria air pollutants. Section 108 contains different language from that in section 202. Unlike section 202(a), sections 108 and 109 of the CAA authorize listing of a pollutant as a criteria air pollutant, and regulation of that pollutant through NAAQS, for the purpose of addressing any endangerment of the public health or welfare that may reasonably be anticipated due to the quantities of the pollutant *in the ambient air*, i.e., the relatively limited portion of the atmosphere to which the general public has access. Thus, before the Agency could list any GHGs as criteria air pollutants under section 108 of the Act, it would have to determine what, if any, effects on U.S. public health or welfare occur due to the presence of GHGs in the ambient air in the United States. The Proposed Endangerment Finding and TSD do not address this matter. Indeed, the absence of information regarding the effects of GHGs on public health and welfare due to their presence in the U.S. ambient air could, in fact, provide at least one reason for the Administrator to conclude that she has no "plans to issue air

quality criteria" for GHGs – which also is a prerequisite for listing under section 108. CAA § 108(a)(1)(C). Likewise, for reasons discussed in Section X below, if the Administrator makes a final endangerment finding in the present proceeding, that finding would not satisfy the requirements of section 115, the Act's provision addressing international pollution.

II. Commenters' Ability To Obtain a Fair Hearing on the Merits of the Endangerment Issue Is Undermined by the President's Announcement of a New "National Policy" that Compels an Affirmative Endangerment Finding Under CAA Section 202(a)(1).

Less than a month after EPA published the Proposed Endangerment Finding, the President on May 19, 2009, announced what the White House called "a new national policy" to "reduc[e] greenhouse gas pollution for all new cars and trucks sold in the United States." White House Office of the Press Secretary, Press Release, "President Obama Announces National Fuel Efficiency Policy" (May 19, 2009). The President's new national policy requires the promulgation by EPA of GHG emission standards under section 202 of the CAA in conjunction with the establishment by DOT of comparable national fuel economy standards for vehicles under EPCA. The White House and Administrator Jackson, who appeared with the President at his announcement of the new policy, presented the decision as the resolution of controversies -- a resolution, brokered by the President and his staff, to which certain "stakeholders" reportedly had agreed after closed-door discussions -- about whether and how to control new motor vehicles' GHG emissions. The White House and the Administrator made the announcement of this "national policy on fuel economy standards and greenhouse gas emissions" in terms that indicate that the Executive Branch deems the present endangerment rulemaking little more than a formality and a final endangerment finding essentially a *fait accompli*:

> This groundbreaking policy delivers on the President's commitment to enact more stringent fuel economy standards and represents an unprecedented collaboration between the Department of Transportation (DOT), the Environmental Protection Agency (EPA), the world's largest auto manufacturers, the United Auto Workers,

> leaders in the environmental community, the State of California, and other state governments.
>
> "*The President brought all stakeholders to the table and came up with a plan* to help the auto industry, safeguard consumers, and protect human health and the environment for all Americans," said EPA Administrator Lisa P. Jackson. "*A supposedly 'unsolvable' problem was solved* by unprecedented partnerships. As a result, we will keep Americans healthier, cut tons of pollution from the air we breathe, and make a lasting down payment on cutting our greenhouse gas emissions."

Id. (emphases added). The President himself referred to "this rule" -- "this new national standard" -- as an accomplished fact; he stated, for example, that "the Department of Transportation and EPA *will* adopt the same rule."[1] The White House Office of the Press Secretary, "Remarks by the President on National Fuel Efficiency Standards," Rose Garden, May 19, 2009 (emphasis added).

In short, the President's Rose Garden announcement -- a major news event that commanded front-page headlines and led television news programs throughout the country -- establishes a new national policy that *requires* EPA to adopt section 202 GHG standards. Thus, the outcome of the present proceeding appears to be preordained and therefore, necessarily, the merits of the endangerment issue to be prejudged.

Whatever the arguments may be for this new national policy, its announcement by the President effectively sets the course for EPA with respect to its decision whether to control GHG

[1] The fact that, as the President stated, DOT "will" adopt "the same rule" as EPA will adopt makes EPA's prospective section 202 emission standards -- and its section 202(a)(1) endangerment finding -- unnecessary to the achievement of the GHG emission reductions that would be based on that finding. As discussed in section III of these comments, this fact undermines any claim that the Proposed Endangerment Finding is grounded in the preventative principle on which section 202(a)(1) is based. In other words, even assuming that the emission reductions that would occur under the contemplated section 202 standards would prevent any appreciable part of the endangerment EPA proposes to find (an implausible assumption that EPA has not even attempted to support), those emission reductions would, due to the DOT standards, occur even in the absence of any section 202 regulation.

emissions from vehicles under section 202. In essence, the only real questions left to EPA concern certain details of *how* -- but not whether -- to regulate those emissions under section 202. *See generally* Joint Rulemaking Notice, 74 Fed. Reg. 24007 (discussing details of ways to structure section 202 standards in conjunction with fuel efficiency standards). Promulgation by EPA of a final affirmative endangerment finding, of course, is a necessary step for EPA to take in order to regulate under section 202 in fulfillment of the President's policy. These circumstances seriously undermine EPA's ability to provide anything remotely approaching an objective consideration of, and a legally adequate response to, rulemaking comments that question or rebut the Agency's asserted basis for an affirmative endangerment finding.[2]

III. EPA's Stated Rationale Regarding the Statutory Framework and Legal Basis for an Affirmative Endangerment Finding Is Inadequate and Fails To Address Critical Issues Concerning the Endangerment Criterion's Preventative Purpose.

Given the volume and range of comments that EPA received on legal issues raised by the ANPR,[3] and given the enormous importance of the present proposal, UARG expected a much more substantial treatment by EPA of the legal issues implicated by the Proposed Endangerment Finding than appears in the proposed rule. Perhaps the limited nature of EPA's discussion of relevant legal issues here is explained by its implicit reliance on the ANPR to supplement EPA's present statement of basis for purposes of public notice. *See* 74 Fed. Reg. at 18893 n.15. EPA has, however, only attempted "to respond to a few key [ANPR] comments related to the test that

[2] *See* 74 Fed. Reg. at 18889 n.4 (applying the procedural requirements of CAA section 307(d) to this proceeding). If EPA now believes, notwithstanding the President's directive that the Agency regulate GHG emissions under section 202, that it can provide fully objective consideration, on the merits, of all comments in this proceeding, the Agency should explain the basis for that belief in a supplemental notice of proposed rulemaking.

[3] As noted above, UARG includes here its comments on the ANPR, filing them in this rulemaking docket for EPA's review and response.

some stakeholders believe guides the Administrator when undertaking an endangerment analysis and cause or contribute evaluation." *Id.* EPA's attempted response is not only limited but also inadequate in key respects.

EPA expresses its disagreement with ANPR comments, presumably including UARG's (*see* UARG ANPR Comments at 32-33), that address the preventative, or precautionary, test established by CAA provisions such as section 202(a)(1). EPA states its disagreement

> with comments that argue the Administrator cannot make a positive endangerment or contribution determination unless the emissions reductions required by the resulting standards would "effectively mitigate" or "fruitfully attack" the impacts underlying the endangerment determination. . . . [S]uch an approach fails to appreciate the holistic approach that Congress adopted in [the] 1977 [amendments to the CAA].

Id. at 18893/1.

Yet EPA does not dispute that the "fruitfully attack" phrase quoted in UARG's ANPR comments comes directly from the decision of the U.S. Court of Appeals for the District of Columbia Circuit in the seminal case addressing the CAA endangerment criteria, *Ethyl Co. v. EPA*, 541 F.2d 1, 31 n.62 (D.C. Cir. 1976) (*en banc*). Indeed, EPA characterizes the *Ethyl* decision as providing the conceptual foundation for the 1977 statutory amendments to the endangerment provisions that the Agency cites. 74 Fed. Reg. at 18891/2. The point of the "fruitfully attack" language and other quoted passages from *Ethyl*, of course, is that "the preventive or precautionary nature of the CAA" that EPA ostensibly recognizes in the CAA's endangerment provisions, *id.* at 18891/3 & n.8, calls for regulatory action where that action promises to avert the threatened harm. *See also id.* at 18890/2 (statutory purpose is to "prevent harm"); *id.* at 18890/3 (same); *id.* at 18891/1 (same). In other words, the CAA and its endangerment provisions do not call for "regulation for regulation's sake" but for regulation *where it can be shown to achieve the statutory objective of preventing damage*. As stated in

1977 legislative history quoted by EPA here, the effect of the CAA's endangerment criterion is "[t]o emphasize the preventive or precautionary nature of the Act, i.e., to assure that regulatory action can *effectively prevent harm* before it occurs." *Id.* at 18891 n.8 (emphasis added).

EPA never explains what it means by the "holistic approach" that it says Congress adopted in the 1977 CAA amendments and how that supposed approach should apply here; it says little more on that point than that Congress directed EPA to "consider the whole picture."[4] *Id.* at 18893/2. Instead, EPA sets up a strawman: The Agency implies that commenters such as UARG suggest that regulatory action under the endangerment criterion can be justified only if that action "*alone* can *solve* the problem." *Id.* (emphases added). As EPA characterizes this putative "all or nothing" position, commenters' "various narrow approaches to the endangerment and cause or contribute criteria . . . would preclude the Administrator from making a positive finding for any complex pollution problem that cannot be solved by one regulatory action alone." *Id.* But that does not represent at all the view advanced in UARG's comments. To the contrary, as explained in its ANPR comments (included here as Attachment A), UARG observes that the facts that justified "endangerment" regulation in *Ethyl* illustrate the principle that must guide EPA here:

> In the case of the lead in motor vehicle fuels addressed in *Ethyl*, . . . there were strong reasons for EPA to believe that regulation of the lead in fuels would prevent *at least a substantial part of the danger* to public health posed by human exposure to that air pollutant. *See, e.g., Ethyl*, 541 F.2d at 31 (The Administrator "determined that absorption of lead automobile emissions, when added to all other human exposure to lead, raises the body lead burden to a level that will endanger health. He realized that lead automobile emissions were, far and away, the most readily reduced significant source of environmental lead.").

[4] Resort to the dictionary is of limited help here. *See, e.g.*, Funk & Wagnalls Standard College Dictionary (1977) (defining "holism" as "[t]he theory that a material object, especially a living organism, has a reality other and greater than the sum of its constituent parts").

UARG ANPR Comments at 32 (emphasis added). It was for this reason that the *Ethyl* court said the emission control regulation that would be based on EPA's endangerment finding can "fruitfully … attack" -- not necessarily *solve* by itself, but meaningfully and substantially reduce -- the environmental and public health danger at hand. *See, e.g.*, *Ethyl*, 541 F.2d at 8, 9 ("lead particulate emissions from gasoline engines [i.e., the emissions that would be regulated] account for approximately 90 percent of the lead in our air"; these "easily . . . controllable" emissions "can be simply eliminated by removing lead from gasoline").

Thus, it is not a valid defense of the Proposed Endangerment Finding for EPA to make the (presumably) undisputed point that no single section 202 GHG emission standard (and no other individual CAA emission standard) can, on its own, "solve" global climate change or "solve" the array of problems EPA says are associated with that global change. 74 Fed. Reg. at 18893/2. The CAA does not necessarily set the bar so high. But EPA here has fallen short of a much lower hurdle that it must clear to produce a defensible rationale for an affirmative endangerment finding: It has failed to show -- indeed, it has failed even to attempt to show -- that the contemplated regulation resulting from such a finding would prevent at least a substantial part of the danger from the global climate change at which the regulation ostensibly is aimed.[5]

Given the importance of this issue in administration of the CAA's endangerment provisions, if EPA believes that a basis exists to conclude that regulation of GHG emissions from

[5] EPA acknowledges in the Proposed Endangerment Finding that, in applying the endangerment and contribution criteria in section 202(a)(1), it is appropriate to consider whether meaningful emission reductions would occur as a result of making a finding under that provision. *See, e.g.*, 74 Fed. Reg. at 18908/1 (citing the asserted availability of "valuable reductions" in methane emission levels as a "primary" reason that methane emissions should be the subject of a section 202(a)(1) finding).

new U.S. motor vehicles would meaningfully reduce the endangerment it proposes to find, then EPA should publish for public comment a supplemental notice providing that basis. Any assessment of this issue, however, would have to take into account the degree of contribution to the asserted endangerment that section 202 regulation actually would address. In that regard, EPA would need to begin by refining its "contribution" analysis in the Proposed Endangerment Finding to address issues such as those described below.

In the Proposed Endangerment Finding, EPA presents information on the contribution to total GHG emissions[6] of "all of the section 202(a) source categories," meaning passenger cars, light-duty trucks, motorcycles, buses, and medium/heavy-duty trucks. *Id.* at 18905/3. EPA has failed to present information, however, on the part of the contribution that is attributable to the statutorily covered sources, *i.e.*, the contribution of emissions from that portion of "the section 202(a) source categories" that constitutes "new" motor vehicles within those source categories. CAA § 202(a)(1). Section 202(a)(1) plainly gives EPA no authority to impose additional emission control regulations on, or to make an endangerment finding concerning, existing vehicles. Thus, for example, the maximum degree of any global climate change endangerment that might be removed or prevented by section 202(a)(1) standards would be far less than that represented by the 4.3% of global GHG emissions that EPA attributes to all section 202(a) sources, both existing and new. *See* 74 Fed. Reg. at 18906/3.

Moreover, since publication of the Proposed Endangerment Finding, EPA has explained that only a subset of even the new-source subcategory of section 202(a) sources would in fact be

[6] As discussed in section VII below, the contribution to total emissions must be assessed in terms of contribution to total *global* emissions, not in terms of contribution to total U.S. emissions. That is because any global climate change endangerment found by EPA would result, in the aggregate, from global atmospheric concentrations of GHGs, which are influenced in an undifferentiated way by emissions from all sources of all types in all parts of the world.

regulated under section 202(a) as a result of a final endangerment finding. In the May 22 Joint Rulemaking Notice, EPA states that it intends, based on its anticipated section 202(a)(1) endangerment finding, to propose GHG emission standards under section 202(a) for "passenger cars, light-duty trucks, and medium-duty passenger vehicles (light-duty vehicles) built in model years 2012 through 2016." 74 Fed. Reg. at 24007/3. Thus, the subcategory of new section 202(a) sources that EPA is targeting for regulation includes some, but not all, types of U.S. vehicles built in five specified model years but excludes certain classes of "section 202(a) source categories" altogether, including motorcycles, buses, and medium/heavy-duty trucks. *Compare* 74 Fed. Reg. at 18905/3 (listing, in the Proposed Endangerment Finding, "Section 202(a) source categories") *with* 74 Fed. Reg. at 24007/3 (describing, in the Joint Rulemaking Notice, the section 202(a) source categories EPA plans to regulate under section 202(a)). From the information EPA has presented, it is unclear what portion of a projected 4.3% total contribution to GHG emissions can be attributed to new U.S. "passenger cars, light-duty trucks, and medium-duty passenger vehicles (light-duty vehicles) built in model years 2012 through 2016" -- as opposed to the far larger collection of sources, including existing motor vehicles of all sorts and new medium- and heavy-duty trucks, buses, and motorcycles, that EPA's Proposed Endangerment Finding characterizes as the "section 202(a) source categories." 74 Fed. Reg. at 18905/3. Thus, the 4.3% contribution percentage cited by EPA greatly overstates the contribution to total GHG atmospheric concentrations that section 202(a) regulation would address.

Furthermore, even if one determined what part of the asserted 4.3% contribution reflects emissions from the limited subset of section 202(a) sources that EPA plans to regulate, that lower amount would still be far higher than the emissions that would be *controlled* by the section

202(a) regulation -- which is the legally relevant portion of the emissions. EPA's section 202(a) emission standards obviously will not eliminate anything remotely approaching all GHG emissions from the subset of vehicles that are regulated under those standards.

EPA intends to adopt a "generally linear phase-in from [model year] 2012 through to model year 2016," leading to an average limit of 250 grams of carbon dioxide ("CO_2") per mile in the last of those five model years. 74 Fed. Reg. at 24008/3. Given this phase-in approach, emissions from regulated vehicles built in the earlier years will have higher CO_2 emissions than those built in the later years. EPA's planned approach involves a gradual reduction from what might be considered an emission baseline of 325.5 grams per mile in model year 2011. *See* 74 Fed. Reg. 14196, 14412/2 (Mar. 30, 2009) (final fuel economy standards for model year 2011 passenger cars and light trucks). That amounts to approximately an eventual 23% reduction in the emission rate, phased in slowly over a period of six model years and, of course, still leaving 77% of the baseline emissions. The ability of the Proposed Endangerment Finding to prevent or reduce asserted harms should be evaluated in respect to the emission reduction actually contemplated, which is far less than all emissions from the subcategories of new sources to be regulated.

In evaluating the potential of the section 202(a) regulations to prevent or reduce the asserted endangerment, moreover, EPA would need to address the fact that individual consumers, businesses, and other vehicle purchasers can be expected to continue to operate existing vehicles to a greater extent than would otherwise be the case in order to avoid or defer paying the increased prices for new vehicles that will have to be manufactured, at greater cost, to meet more demanding emission and fuel economy standards. As a result of the expected emission and fuel economy standards, "EPA estimates an average increased cost of about $1,300

per vehicle in 2016 compared to today's vehicles." EPA Office of Transportation and Air Quality, "Regulatory Announcement: EPA Will Propose Historic Greenhouse Gas Emissions Standards for Light-Duty Vehicles," at 1, EPA-420-F-09-028 (May 2009). Although EPA believes fuel savings over time would offset the higher cost, *see id.* at 1-2, it is unclear that that fact, even if correct, would overcome vehicle purchasers' reluctance to pay -- or, in many cases, their inability to afford -- a higher upfront vehicle price. The disincentive of higher vehicle prices, and the resulting retention of existing vehicles that are not subject to GHG emission controls and are less fuel efficient, would further limit the emission reductions that would result from EPA's promulgation of a final endangerment finding. *See, e.g.*, Elizabeth Shogren, "Environmentalists Say Obama's Auto Plan Is a Start," National Public Radio Transcript (May 20, 2009) ("NPR Transcript") ("Some experts say Obama's proposal would drive up the cost of new cars -- by $1,300, according to the White House -- and make people more likely to hold on to their old cars. 'Those older cars tend to be of lower fuel efficiency and significantly more polluting, so there's a counterproductive effect,' says Robert Stavins, director of Harvard University's environmental economics program."); *see also* National Research Council, *Effectiveness and Impact of Corporate Fuel Economy (CAFE) Standards*, National Academy Press (2002) (finding increased fuel efficiency leads to additional driving, which increases vehicle emissions, and substantially adds to traffic-related mortality).

Moreover, any assumption that overall GHG emission reductions will result from any shift that might occur to vehicles with lower GHG emissions per mile rests on the implausible premise that total vehicle miles traveled will not increase due to consumers' recognition of the per-mile fuel-cost reduction that the White House argues will offset higher vehicle prices. National Public Radio ("NPR") reports that Harvard Professor Robert N. Stavins "points to

another shortcoming of the fuel economy [and the tandem GHG] standards. 'Once you've bought the car, it doesn't provide an incentive to drive it any less,' he says. 'In fact, by increasing fuel efficiency, it actually provides an incentive to use the car more because it lowers the operating cost.'" NPR Transcript. Similarly, according to NPR, David Friedman, the Research Director of the Union of Concerned Scientists' Clean Vehicles Program and a supporter of the President's plan to impose GHG vehicle emission controls, "concedes that total greenhouse gas pollution from vehicles might not be any less 10 years from now because of more motorists on the road driving more miles." *Id.*

The factors described above call into question any conclusion that EPA might make that an affirmative endangerment finding and resulting section 202(a) standards would have any appreciable effect, let alone a substantial effect, in preventing or reducing any danger from global climate change. Yet these factors are among those that EPA fails to examine in the Proposed Endangerment Finding. If EPA intends to proceed with this rulemaking, it must assess these factors objectively, and not merely to support a predetermined regulatory outcome, and must then provide a discussion of them in a supplemental proposal for public review and comment.

EPA, however, may already have concluded that making final the Proposed Endangerment Finding would, in fact, have no meaningful effect in preventing or reducing any endangerment from the section 202(a) sources that it intends to regulate. For example, in an interview broadcast on May 20, 2009, the day after announcement of the President's new national policy, Administrator Jackson said, referring to the planned section 202(a) standards,

that "[t]his action alone -- I don't want to mislead anyone -- is *not going to change global temperatures*."[7] *Id.* (emphasis added).

Even if section 202(a) standards would produce emission reductions that would meaningfully reduce the threat EPA would purport to address through a final endangerment finding, the Agency's Proposed Endangerment Finding fails to address questions concerning whether some (or all) of such emission reductions would occur anyway. One of the central tenets of the new national policy announced on May 19 is that EPA and DOT will establish "a harmonized and consistent" set of regulations for vehicle GHG emissions and fuel efficiency, leading to "a single light-duty national fleet that would satisfy all requirements under both programs." 74 Fed. Reg. at 24007/3; *see also id.* at 24009/3 (stating the program's goal of "providing regulatory compatibility that allows auto manufacturers to build a single national light-duty fleet that would comply with both the GHG and the CAFE standards"). Accordingly, there is no reason to believe that section 202(a) regulation -- or the accompanying EPA endangerment finding -- is needed to accomplish any emission reductions that the coordinated program may yield. For all practical purposes, any such reductions will occur due to the CAFE standards even in the absence of any EPA action under section 202(a) of the CAA. Thus, the Proposed Endangerment Finding is not necessary -- even if it were otherwise justified -- because any contribution to global atmospheric concentrations of GHGs that would be addressed by section 202(a) standards will be addressed outside the CAA, by DOT under EPCA.

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[7] Administrator Jackson is not alone in espousing that view. For instance, Professor Ken Caldeira, a climate scientist at Stanford University's School of Earth Sciences and the Carnegie Institution's Department of Global Ecology, was quoted by NPR as saying that "'[t]hese [emission] cuts are important as an act of political leadership, but *these cuts in themselves will not produce any significant climate effect.*'" NPR Transcript (emphasis added).

In sum, EPA's Proposed Endangerment Finding provides no basis for concluding that the purpose of the section 202(a)(1) endangerment criterion would be served by making a final endangerment finding. Accordingly, if the Agency intends to proceed to final affirmative action on the Proposed Endangerment Finding, it would, at a minimum, first have to prepare and publish a supplemental notice for public comment that explains what, if any, basis exists for a final endangerment finding in light of the preventative purpose of the section 202(a)(1) criterion.

IV. EPA Must Address the Fundamental Threshold Issue of Whether EPA May Properly Consider Conditions Caused Largely by Emissions from Outside the United States in Making Endangerment and Contribution Findings Under the CAA.

EPA has failed to address one of the most fundamental threshold legal issues underlying the Proposed Endangerment Finding -- whether the Agency may consider air emissions and the resulting air pollution from sources outside the sovereign authority of the United States in making endangerment and contribution findings that establish legally binding obligations for the Agency and entities under the CAA. This is a question of first impression that EPA has not answered (indeed, has not had to answer) in making any previous CAA endangerment finding. As a procedural matter, EPA's failure to address this key legal issue is a fatal flaw in the proposal because it obviously is a question of central relevance to the outcome of this action and the public has been deprived of the right to understand EPA's views on the issue and to provide meaningful comments in the context of an Agency articulation of its position.

On the substance of this issue, it is clear that EPA does not have authority under the Act to establish domestic rights and legally binding obligations based on environmental conditions that are largely attributed to foreign nations and entities that are under the authority of such nations (and outside the authority and jurisdiction of EPA and the CAA). To construe the CAA otherwise would create the anomalous result that the bulk of the emissions that would cause mandatory emissions controls to be prescribed under the CAA would not (and could not) be

subject to those controls because the emissions emanate from foreign sources – which, of course, is the very situation presented by GHG emissions and their potential effect on the global climate. Just as CAA requirements cannot be enforced against foreign sources of air pollution, domestic obligations under the CAA cannot be caused by foreign emissions that are outside CAA jurisdiction.

V. EPA's "Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act" Cannot Support a Finding of Endangerment.

EPA bases the Proposed Endangerment Finding on numerous alleged scientific grounds. EPA's discussion of the science in the Proposed Endangerment Finding, however, is woefully incomplete, and EPA's conclusions related to the available scientific evidence are both overbroad and, at times, impenetrably vague. Given these shortcomings, EPA has not provided an adequate basis for an affirmative endangerment finding.

The Administrator bases her proposed scientific judgments on the TSD, which EPA staff prepared and is itself an inaccurate and inadequate assessment of the current state of climate-related science. This document would require substantial revision before the Administrator could rely on it for reaching endangerment-related policy conclusions.

The TSD: (1) reflects fundamentally flawed policy determinations about the relevant information, determinations that skew EPA's presentation of the science; (2) relies on sources of information that do not adequately address the scientific issues relevant under the CAA; (3) contains improper and inaccurate characterizations of the conclusions that can reasonably be drawn from the scientific studies and assessments it cites; and (4) ignores important scientific information that undermines EPA's stated conclusions regarding the negative and positive impacts of climate change, including representations concerning the import of substantial

uncertainties in the scientific record. The various flaws identified in the following comments on the TSD are reflected in the Proposed Endangerment Finding as well.

A. The TSD Reflects Fundamentally Flawed Policy Determinations About the Information Relevant to an Endangerment Assessment that Skew EPA's Presentation of and Conclusions Regarding the Science.

EPA states that the TSD's purpose is "to provide scientific and technical information for an endangerment analysis regarding greenhouse gas (GHG) emissions from new motor vehicles and engines under section 202(a) of the Clean Air Act." TSD at 1. The scientific and technical information provided in the document, however, is wholly inadequate to support an affirmative endangerment finding under the provisions of the Act. This failing results from numerous problems detailed in these comments. Some of these flaws stem from unscientific policy determinations that, in turn, improperly influence the scope of the information considered in the document. These determinations distort EPA's analysis, resulting in an assessment that is biased in favor of a positive endangerment determination. Accordingly, the Administrator's proposed finding is likewise improper, as it is based on incomplete and inaccurate science. Fundamental flaws in the TSD and Proposed Endangerment Finding include: (1) exclusion of information relevant to adaptation; and (2) failure to distinguish between GHG- and non-GHG-related climate effects.

1. Exclusion of Adaptation Considerations

Both the TSD and the Proposed Endangerment Finding reflect a proposed conclusion that consideration of the effects of adaptation are not appropriate in conducting an endangerment analysis. The TSD, for instance, states:

> Adaptation to climate change is a key focus area of the climate change research community. This document, however, does not focus on adaptation because adaptation is essentially a response to any known and/or perceived risks due to climate change. Likewise, mitigation measures to reduce GHGs, which could also reduce long-term risks, are not addressed. The purpose of this document is to

> review the effects of climate change and not to assess any speculative policy or societal response to climate change. Adaptation will be mentioned to the extent that the impacts projections themselves contain some embedded assumptions about future adaptation.

Id. at 2.

Thus, the Agency has determined, as a matter of policy, to exclude "a key focus area of the climate change research community" because it is essentially only a response to climate change.[8] *Id.* EPA's position on this issue is illogical and internally inconsistent. Almost every impact assessed in the TSD is a response to climate change. Animal migrations, additional expenditures for energy infrastructure, and even changes in air pollution levels are, at their most basic levels, responses to changing climate. Moreover, it is simply unsupportable for EPA to assert that adaptation is irrelevant to determining whether endangerment exists or will exist. Unless one made an assumption (which would be without foundation) that all changes are negative -- and EPA says it has made no such assumption[9] -- the fundamental inquiry of an endangerment analysis concerns the type and extent of harm that are believed likely to occur. This inquiry cannot proceed in the absence of an examination of the likely impacts of climate change, a matter that simply cannot be engaged rationally if the role of adaptation is ignored. In

[8] EPA's posited reasons for distinguishing between "acceptable" and "unacceptable" fields of scientific inquiry are particularly unconvincing given that the IPCC deemed it appropriate to devote an entire Working Group Report to adaptation and mitigation, wholly ignored in the TSD, even as EPA relies almost exclusively on the *other* IPCC Working Group Reports for the bulk of its analysis. Moreover, in a remarkable example of analytical selectivity, EPA states in the Proposed Endangerment Finding that "the IPCC North American chapter … *on … adaptation* and vulnerability covers the U.S. and Canada (not Mexico) and … the general findings in that chapter (drawn from many individual studies for the U.S.) *are indeed applicable to U.S. conditions*." 74 Fed. Reg. at 18894/2 (emphases added).

[9] *See, e.g.*, *id.* at 18904/1 ("The Administrator's proposed endangerment finding is based on weighing the scientific evidence, considering the uncertainties, and balancing any benefits to human health, society, and the environment that may also occur.").

fact, EPA seems to admit this in its statement that "[a]daptation will be mentioned *to the extent that the impacts projections themselves contain some embedded assumptions* about future adaptation."[10] *Id.* (emphasis added). It is irrational and unscientific for EPA to consider a factor it acknowledges is relevant only when others, on which the Agency relies, have embedded assumptions about this factor in their projections. If adaptation is relevant in that context, it is equally relevant where EPA itself must perform the assessment.

Further, adaptation assessment is central to the statutory requirements governing EPA's endangerment inquiry and is not some peripheral or minor consideration that the Agency may reasonably disregard. Indeed, the TSD quotes a significant conclusion of the U.S. Climate Change Science Program ("CCSP") indicating that "[t]he United States is *certainly capable of adapting to the collective impacts of climate change*." *Id.* at 69 (quoting CCSP (2008b) (emphasis added)). This conclusion illustrates the fact that adaptation alone could avert what might otherwise constitute endangerment in a hypothetical world in which adaptation does not occur. EPA's decision to exclude adaptation considerations from its endangerment assessment

[10] Indeed, in a number of instances, the TSD states that adaptation *is* a crucial factor in determining whether and when negative impacts, and thus (potentially) endangerment, will occur. *See, e.g.*, TSD at 69 ("In the absence of effective adaptation, these [mortality and morbidity] effects are likely to increase with climate change. Depending on progress in health care and access, infrastructure, and technology, climate change could increase the risk of heat wave deaths, respiratory illness through exposure to aeroallergens and ozone … and certain diseases.") (internal citations omitted); *id.* at 70 ("Estimates of heat-related mortality attributable to climate change are *reduced but not eliminated when assumptions about acclimatization and adaptation are included* in models…. In other words, non-climatic factors related to demographics will have a significant influence on future heat-related mortality.") (emphasis added); *id.* at 141 ("Current scientific information does not provide sufficient information to assess how effective current and future adaptation options will be at reducing vulnerability to the impacts of climate change."); *id.* at 142 ("More adaptation will be required to reduce vulnerability to climate change. Additional adaptation can potentially reduce, but is never expected to completely eliminate[,] vulnerability to current and future climate change.") (internal citations omitted); *id.* ("A portfolio of adaptation and mitigation measures can diminish the risks associated with climate change.").

is, in essence, an arbitrary and unsupportable policy preference for an imagined scenario over reasonable scientific projections of actual future conditions. EPA should, therefore, reverse its decision to exclude these considerations from the endangerment assessment. Moreover, at the very least, it is inappropriate for EPA to omit assessment of adaptation from its analysis of climate change impacts in the TSD. *See id.* at 2 ("This document, however, does not focus on adaptation because adaptation is essentially a response to any known and/or perceived risks due to climate change."). A technical support document in this context should present all of the information that may be relevant to the question whether public health and welfare will be endangered without prejudging what scientific information will be used in making the ultimate policy decision. *See id.* at 1 ("This document itself does not convey any judgment or conclusions regarding the two steps of the endangerment finding, as these decisions are ultimately left to the Administrator.").

The Proposed Endangerment Finding itself reflects the TSD's mistaken approach. *See* 74 Fed. Reg. at 18894/2-3 ("[C]limate policy or societal responses to any known or perceived risks and impacts to public health or welfare, which may or may not be implemented in the future—whether through planned adaptation or greenhouse gas mitigation measures—were not explicitly assessed in the endangerment analysis."). EPA says it decided against assessing adaptation because

> the purpose of the endangerment analysis is to assess the risks posed to public health and welfare, rather than to estimate how various adaptation and greenhouse gas mitigation policies may ameliorate or exacerbate any endangerment that exists. Indeed, the presumed need for adaptation and greenhouse gas mitigation to occur to avoid, lessen or delay the risks and impacts associated with human-induced climate change *presupposes that there is endangerment to public health or welfare*.

Id. at 18894/3 (emphasis added).

EPA's facile rationale that adaptation necessarily presupposes endangerment and thus should be excluded from assessment cannot withstand scrutiny. Adaptation to changing circumstances occurs constantly in the natural and human environment as a response to any number of conditions, as we have known since the time of Darwin, and certainly not all of those circumstances have constituted an "endangerment to public health or welfare." The Administrator's additional argument that she "would not consider, for example, the availability of asthma medication in determining whether criteria air pollutants endanger public health," *id.*, while factually accurate, is not a relevant analogy to adaptation in the context of climate change. The availability of medication to treat the symptoms of a lung function response, and the need to medicate to prevent them, is not comparable to evolutionary responses in natural ecosystems or to changes in human behavior that may prevent welfare or indirect health impacts from ever occurring at all. Indeed, in a variety of other settings, EPA has promulgated regulations and implemented policies to encourage adaptive responses to what might have otherwise developed into adverse public health and welfare impacts.[11] Further, the Administrator's rationale is flatly inconsistent with her consideration of "embedded . . . assumptions" regarding adaptation in specific instances. *See id.*

In sum, EPA fails to provide a reasoned analysis for excluding any assessment of adaptation effects. The Agency's notion that the existence of adaptation "presupposes"

[11] For instance, EPA's guidance related to its Air Quality Index recommends that individuals refrain from strenuous activities when air pollution reaches certain levels in order to avoid public health risks. *See* AirNow Partner Agencies, *TV Weather -Air Quality Guide for Particle Pollution-Air Quality Index (AQI) At-A-Glance Messages*, available at http://airnow.gov/index.cfm?action=tvweather.ataglance. Similarly, EPA's Sunwise Program recommends a variety of behavioral responses to limit or avoid public health risks associated with sun exposure, including limiting time spent outdoors and use of sunscreen. *See* EPA, *Sun Exposure: What You Can Do to Protect Yourself*, available at http://www.epa.gov/radtown/sun-exposure.html#protect_yourself.

endangerment is unsupported and suggests instead that it is EPA itself that is engaging in presupposition. EPA should analyze the science, not make assumptions that arbitrarily truncate its analysis in order to reach preordained conclusions.

2. Commingling GHG Effects and Non-GHG Effects

The Proposed Endangerment Finding includes statements that indicate that EPA is relying on effects of climate change in general. For instance, EPA says "the analysis was not restricted to only those climate and public health or welfare effects which may be attributable solely to greenhouse gas emissions from section 202(a) sources under the Act." *Id.* at 18894/2. In addition to examining sources of GHG emissions that cannot be regulated under section 202(a), the Administrator states:

> There are other greenhouse gases and aerosols that have warming (and cooling) effects but are not being included in the proposed definition of air pollution. These include water vapor, chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, tropospheric ozone (O_3), black carbon, and other short-lived precursor gases. For each of these substances, there are different scientific and policy reasons why these substances are not being included in the proposed definition of air pollution for purposes of section 202(a).

Id. at 18896/3-18897/1.

The effects of these various causes of radiative forcing are not relevant to the question of whether the six GHGs EPA addressed in the Proposed Endangerment Finding endanger public health or welfare. Nevertheless, although EPA notes that the "water vapor feedback mechanism in response to human-induced warming [is included] in all modeling scenarios of future climate change," it fails to explain the extent to which these other causes of radiative forcing are included in the modeling results on which EPA relies. *Id.* at 18897/1, 18898/1.

Examination of the TSD reveals that EPA improperly commingles the effects on climate of the six GHGs for which it proposes to find endangerment with the effects of all other sources of climate change, both anthropogenic and biogenic. Accordingly, the TSD's analysis is wholly

unsuitable for the task of assessing endangerment for the group of GHGs that is the subject of this action. The Administrator's proposed judgments based on the TSD are, therefore, inherently inaccurate.

This fundamental flaw in the TSD is illustrated by many of the document's specific descriptions of its purpose and content. For instance, EPA states that the TSD is intended to serve as an assessment of the

> extent to which observed climate change can be attributed to anthropogenic GHG emissions. . . . The term "climate change" in this document *generally* refers to climate change induced by human activities, *including activities that emit GHGs*. Future projections of climate change, based *primarily* on future scenarios of anthropogenic GHG emissions, are shown for the global and national scale.

TSD at 1 (emphases added).

As this quotation demonstrates, at the outset of its endangerment analysis, EPA simultaneously claims that it is assessing climate change associated with anthropogenic GHG emissions and that it is also addressing, in an unspecified manner, climate change that is not related to anthropogenic GHG emissions (or to GHG emissions of any sort). Further, as the Proposed Endangerment Finding does, the TSD describes the climate-related effects of changes in tropospheric ozone, anthropogenic emissions of aerosols, increases in stratospheric and tropospheric water vapor, changes in land cover, and changes in solar irradiance -- none of which are related to GHG emissions.[12] *Id.* at 20-22.

Addressing the impacts that may result from climate change *in general* is not a proper purpose of the TSD, and information on these impacts fails to support an endangerment finding. The proper purpose of the document is to assess whether anthropogenic emissions of the six

[12] Indeed, the Proposed Endangerment Finding makes clear that it is not seeking to regulate other sources of radiative forcing apart from the six GHGs. 74 Fed. Reg. at 18896/3-18898/1.

GHGs themselves contribute to an endangerment of public health or welfare. The TSD's failure to limit the scope of its assessment to the effects of anthropogenic emissions of the six GHGs makes it impossible to determine from that document whether the effects described, and any asserted endangerment, result from anthropogenic emissions of the six GHGs or some combination of those emissions and other possible causes (*e.g.*, anthropogenic emissions of other substances, biogenic emissions of GHGs or other substances, non-anthropogenic processes of various kinds such as natural climate variability, and human activities that do not involve emissions, such as land-cover practices). This hopelessly confounded analysis therefore cannot serve as a basis for an endangerment finding. Consequently, if it is to proceed further in this rulemaking, EPA must revise this document to address only those effects that are relevant to the proposed endangerment finding.

B. The TSD and the Proposed Endangerment Finding Rely on Sources of Scientific Information that Do Not Adequately Address the Issues Relevant Under the CAA.

The TSD and the Proposed Endangerment Finding rely on a number of sources of scientific information as the basis for their analysis and proposed conclusions regarding asserted public health and welfare endangerment from GHG-related climate change. Careful review of both the TSD and the Proposed Endangerment Finding indicates that EPA has relied almost exclusively on the IPCC's Fourth Assessment Report and the Synthesis and Assessment Products prepared by the CCSP. *See id.* at ES-1 ("The conclusions here and the information throughout this document are primarily drawn from the assessment reports of the Intergovernmental Panel on Climate Change and the U.S. Climate Change Science Program."). Nearly wholesale reliance on the IPCC and CCSP assessments is not consistent with EPA's duties under the law or with sound scientific practice. EPA must conduct its own assessment of the science and cannot avoid this obligation for the sake of convenience.

Reliance on the IPCC is particularly problematic, as UARG explains in its comments on the Draft TSD released in conjunction with EPA's ANPR. In those comments, UARG explains that the IPCC Fourth Assessment Report does not contain the specific assessment of U.S. effects that would be required to support an endangerment finding. Instead, the IPCC Assessments are devoted primarily to global effects and global emissions. Further, UARG's ANPR comments argue that EPA's adoption of the IPCC's regional analysis of North American effects, including projections of changes in temperature, precipitation, and sea level rise, is improper; analysis of such effects cannot substitute for a U.S.-specific analysis, particularly in light of the fact that the IPCC analysis and EPA's discussion of that analysis fail to distinguish adequately between U.S. and Canadian effects. None of these shortcomings have been remedied, and EPA's altered rationale for continuing to rely on the IPCC analysis is as insufficient as its original rationale.

On the one hand, EPA has removed a reference to the opinions of two IPCC authors who stated that the "major conclusions" of the North American chapter "all apply to the United States" and that the topics and impacts discussed are "relevant to *at least some* locations in the United States." Draft TSD, Doc. ID EPA-HQ-OAR-2008-0318-0082 at 63 (June 21, 2008) (emphasis added). Removal of this attempted justification is appropriate because those opinions were in no way dispositive, the exact meaning of the referenced statements was unclear, and reliance on the opinions of two individuals was inconsistent with the principles governing the IPCC's work.

Yet EPA now argues that the results of the North American assessment apply to the United States because "the IPCC North American chapter (of the Working Group II volume) on impacts, adaptation and vulnerability covers the U.S. and Canada (not Mexico) and . . . the general findings in that chapter (drawn from many individual studies for the U.S.) are indeed

applicable to U.S. conditions." 74 Fed. Reg. at 18894/2. Certain statements within the North American chapter may indeed apply to the United States; it would be remarkable if the IPCC had wholly ignored the United States. EPA fails, however, to address the critical issue, which is adequate delineation between U.S. and non-U.S. impacts, even though the Agency acknowledges that "the IPCC Working Group II report . . . may not provide as much regional detail within the U.S. as did the 2000 report, Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change (NAST, 2000)." TSD at 5.

The problems with reliance on the IPCC, however, extend beyond issues of the level of geographic detail. For instance, in describing the effects of climate change on -- in a section of the TSD titled "U.S. Precipitation" -- EPA cites the IPCC as the basis for its conclusions regarding changes to precipitation levels *in Canada*. *Id.* at 59; *see also id.* at 60 (discussing sea level rise in Canada under the heading "U.S. Sea Level Rise"). In the same section, and despite the Administrator's assurances to the contrary, the TSD describes decreases in precipitation that may occur *in Mexico*. *Id.* at 59 ("more than 90% of the models project[] drying in northern and particularly western Mexico"). It should be obvious that Canadian and Mexican impacts are not U.S. impacts and do not belong in sections of the TSD that purport to address the effects of climate change in the United States. Moreover, this sort of confusion raises substantial questions about all of the TSD's analyses. When EPA cites effects in "western North America," based on IPCC analysis, to which nation is the Agency referring? Indeed, given that the Agency blatantly describes non-U.S. impacts in sections that are ostensibly intended to address the U.S., there is no reason to assume that EPA has not made similar, though perhaps more subtle, errors elsewhere. In short, the IPCC by and large does not provide U.S.-specific information, and EPA

has not successfully extrapolated such information from the IPCC material. Reliance on the IPCC's conclusions, therefore, is misplaced.

In addition, the IPCC Assessment Reports are not prepared in accordance with U.S. standards for scientific assessments. The IPCC is governed by its own official "Principles Governing IPCC Work," *available at* http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf. These Principles emphasize that approval of the contents of IPCC Assessment Reports is obtained on the basis of consensus among IPCC member governments. *Id.* at 2. EPA's TSD is subject not only to the CAA's principles but also to the Data Quality Act ("DQA"), as discussed further in section VI of these comments, and to guidelines establishing standards for the quality, objectivity, integrity, and utility of information disseminated by federal agencies. Pub. L. No. 106-554, § 515; 67 Fed. Reg. 8452 (Feb. 22, 2002). Adopting scientific conclusions of a body not subject to these United States statutory requirements and principles -- and "generalizing" such conclusions to make them stand for propositions they were not designed to support -- undercut EPA's claim that it has complied with the DQA's requirements. Indeed, EPA itself highlights this issue when it describes the process for approving IPCC Assessment Reports and the DQA procedures used during review and approval of U.S. CCSP Synthesis and Assessment Products. *See* TSD at 3. Accordingly, EPA cannot continue to rely in this proceeding on the IPCC information and conclusions in the absence of an independent assessment by the Agency and establishment and application of transparent procedures to ensure compliance with U.S. standards.

There are additional reasons why EPA's heavy reliance on IPCC documents, as well as CCSP reports, is improper. As EPA acknowledges, "scientific research is very active in many areas addressed in [the TSD] (e.g. aerosol effects on climate, climate feedbacks such as water

vapor, and internal and external climate forcing mechanisms) as well as for some emerging issues (e.g. ocean acidification, and climate change effects on water quality)." *Id.* at 6-7. The Agency acknowledges that it received numerous comments on the draft TSD registering concern that the IPCC Fourth Assessment Report was "not current enough." 74 Fed. Reg. at 18894/2. EPA has attempted to rectify this problem by including references to additional CCSP reports published since release of the draft TSD. *Id.* EPA thus acknowledges the importance of including the most recent scientific studies available. Unaccountably, however, EPA in most instances still fails to incorporate the results of important, peer-reviewed studies, studies of the same sort and caliber as those assessed by the IPCC and CCSP.[13] The Agency cannot escape its obligation to review the current state of the science by suggesting that IPCC and CCSP reports are more valid than an independent Agency review would be, based on the broad assertion that those bodies have "assessed numerous individual studies in order to draw general conclusions about the state of science." TSD at 5. Moreover, it is hardly dispositive that the IPCC and CCSP findings may be characterized as relatively "recent," that they "have been reviewed and formally accepted by, commissioned by, or in some cases authored by, U.S. government agencies and individual government scientists," or that "in many cases, they reflect and convey the consensus conclusions of expert authors." *Id.* On an issue to which it ascribes such importance, EPA surely is capable of undertaking an analysis of its own that will address the current science in a responsible way.

[13] Likewise, EPA's assertion that "[e]ven with more recent information available, the IPCC Fourth Assessment Report remains a standard reference, essentially serving as the benchmark against which new findings over the next few years will be compared," is not a valid reason for EPA to continue to fail -- or refuse -- to make such comparisons in this proceeding. 74 Fed. Reg. at 18894/2.

Indeed, it is remarkable that, despite having had before it for months numerous comments on the ANPR alerting it to the need for independent Agency analysis to support any endangerment finding it may seek to make, EPA has flatly refused to conduct such an analysis. EPA's position that it need not bother here, on such a momentous issue, with any independent scientific analysis -- the sort of scientific analysis EPA traditionally, and routinely, undertakes under the CAA when, for example, it reviews NAAQS -- is astonishing and plainly indefensible. It can be explained only by an Agency view that EPA "knows what the answer is" and need not investigate the facts. That is not an acceptable way for the Agency to discharge its responsibilities under the Act.

That the IPCC and CCSP reports were prepared under conditions and for reasons substantially different from those related to an assessment of possible endangerment to U.S. public health and welfare in contemplation of regulation under the CAA reinforces the conclusion that EPA's wholesale reliance on these reports is improper. As EPA notes, the

> IPCC has established rules and procedures for producing its assessment reports. Report outlines are *agreed to by government representatives in consultation with the IPCC bureau*. Lead authors are *nominated by governments* and are selected by the respective IPCC Working Groups on the basis of their scientific credentials and with *due consideration for broad geographic representation*. . . . Drafts prepared by the authors are subject to two rounds of review; the second round includes *government review*. For the IPCC Working Group I report, over 30,000 written comments were submitted by over 650 *individual experts, governments and international organization*s. . . . Each Summary for Policymakers is *approved line-by-line, and the underlying chapters are then accepted, by government delegations in formal plenary sessions*.

Id. at 3 (emphases added).

Thus, the IPCC Assessment development process is marked by pervasive intergovernmental negotiations, including negotiations between the United States and other governments and among many non-U.S. governments, and by the influence of various forces that

would have no sway in an independent analysis conducted by a U.S. government agency. In other words, as illustrated by *EPA's own description, in the TSD, of IPCC processes*, IPCC products are at least as much a product of international diplomacy as they are of scientific inquiry.

With regard to the CCSP Synthesis and Assessment Products, EPA notes that "[d]ifferent agencies have been designated the lead for different [synthesis and assessment products ("SAPs")]; EPA is the designated lead for three of the six SAPs addressing impacts and adaptation." *Id*. Accordingly, very few of the CCSP products have been developed consistent with EPA's policies governing the preparation of influential scientific analyses or with the Agency's particular expertise brought fully to bear.

Further, the development of these products is governed by the U.S. Global Change Research Act of 1990 ("GCRA"), which establishes standards for the preparation of scientific assessments that are wholly divorced from EPA's obligations under the CAA. 15 U.S.C. §§ 2921-2961. The primary purpose of the GCRA is the establishment and coordination of a national Global Change Research Program implemented by numerous federal agencies and overseen by the National Science and Technology Council, a cabinet-level entity chaired by the President and his Science Advisor. *Id.* §§ 2932, 2933; Executive Order 12881. The CCSP Reports were prepared to satisfy the requirements of section 106 of the GCRA, which calls for an integrative evaluation of the federal government's Global Change Research Program. 15 U.S.C. § 2936. This assessment is then used in the evaluation and refinement of the overall research program as new research areas are identified and funding priorities are established. *Id.* §§ 2934, 2935. EPA's analysis of endangerment under the CAA is wholly unrelated to

evaluation and coordination of federal research programs and should be properly focused on the state of climate-related scientific understanding, whether publicly or privately conducted.

Indeed, EPA tacitly acknowledges the flaws in its approach when it discusses its chosen method of assessing the science related to ozone. Specifically, EPA states that it has "just recently completed and published an assessment of the literature on the effect of climate change on air quality (EPA, 2009). Therefore, because EPA evaluated the literature itself in the preparation of that assessment, EPA does cite some individual studies it reviewed in its summary of this topic in Section 8." TSD at 6. Thus, with respect to ozone, EPA has itself evaluated the relevant studies, not simply adopted the conclusions of others.[14] This approach allows the Agency to incorporate the most recent science and to decide for itself what is and is not relevant to an endangerment analysis. Moreover, although UARG does not necessarily agree with EPA's statements on the ozone issue, the Agency's discussion of that issue shows that it is capable of discharging its analytical responsibilities under the Act rather than outsourcing the job to other domestic and international entities that do not operate under, and are not bound by, the standards of the CAA and U.S. administrative law.

In sum, the analysis and conclusions of the IPCC, as contained in its Fourth Assessment Report, are the primary basis for many of EPA's proposed conclusions, including its most important determinations as to purported climate change-related effects in the United States. This is an inappropriate use of this information. Most of the IPCC conclusions concern global

[14] In many cases, EPA simply reports IPCC and CCSP conclusions with respect to projected effects and the likelihood of the effects' occurrence. *See, e.g.*, 74 Fed. Reg. at 18888/2 & n.2 (indicating that the IPCC believes the heating effects caused by GHGs are the likely cause of most observed global warming and that the IPCC believes this conclusion is characterized by 90 to 99 percent confidence levels). As discussed above, EPA is obligated to provide its own judgments on these matters.

effects and emissions, information that, as used by EPA here, clouds the state of scientific knowledge with respect to whether GHG emissions from new U.S. motor vehicles will endanger U.S. public health or welfare. Further, adoption of the IPCC's North America conclusions as generally applicable to the United States is not scientifically justifiable. It is unclear precisely which effects cited in the TSD are relevant to the United States, and EPA's failure to provide any additional analysis of this issue renders its conclusions unreliable. Further, the reports of both the IPCC and the CCSP fail to analyze the most recent relevant science and convey biases and irrelevant information that skew an assessment of the endangerment issue under the CAA. EPA may not proceed in this rulemaking on the basis of borrowed analyses that do not reflect the Administrator's independent exercise of her statutory responsibilities.

C. Conclusions in the Proposed Endangerment Finding Are Unclear and Must Be Revised.

The Proposed Endangerment Finding contains a number of statements whose meanings are unclear. Given the importance of the issues addressed in this proposal, it is necessary that conclusions reached by the Administrator be clearly stated, precise, and accurate. This section of these comments identifies a number of statements in the Proposed Endangerment Finding that require greater explanation.

The Administrator states that the "atmospheric concentrations of greenhouse gases endanger public health and welfare within the meaning of Section 202(a) of the Clean Air Act. She proposes to make this finding specifically with respect to six greenhouse gases that together constitute the root of the climate change problem. . . ." 74 Fed. Reg. at 18886/1. Precisely what EPA means by the "root" cause requires explanation; EPA gives none. As the Administrator notes elsewhere, several factors other than anthropogenic emissions of the six EPA-targeted GHGs are believed to be sources of radiative forcing and climate change, and recent science

indicates that some of these other factors may play a substantial role indeed.[15] Similarly, the Proposed Endangerment Finding states that "*most* of the observed global and continental warming can be attributed to this anthropogenic rise in greenhouse gases." *Id*. at 18898/2 (emphasis added). EPA cannot support an endangerment finding with such vague assertions. Some greater degree of scientific precision is required.

Elsewhere in the Proposed Endangerment Finding, the Administrator states that "[i]t is [her] judgment that the total body of scientific evidence compellingly supports a positive endangerment finding for both public health and welfare." *Id.* at 18888/1. The Administrator adds that she "reached this judgment by considering both observed and projected future effects, and by considering the full range of risks and impacts to public health and welfare occurring within the U.S., which by itself warrants this judgment." *Id.* Although this may, in fact, be the Administrator's judgment, the Proposed Endangerment Finding must set out in significantly more detail which of the various effects the Administrator views to be adverse, which she believes are beneficial, and which may be neutral or characterized by such significant uncertainties as to frustrate development of an informed judgment as to their adversity or beneficence. Further, she must explain her specific assessment of the risks associated with each effect on which she bases any finding of endangerment. Instead, EPA states evasively that "[b]eneficial effects can coexist with harmful effects, and it is not necessary to reach a firm

[15] A recent study, for instance, demonstrates that global climate models consistently underestimate the percentage of climate forcing that is attributable to black carbon, a non-GHG. Further, this study found that a number of impacts associated with black carbon, including reduction of sea ice and snow albedo, dwarf similar effects that had been attributed to CO_2. Ramanthan and Carmichael, *Global and Regional Climate Changes Due to Black Carbon*, 1 NATURE GEOSCIENCE 221-27 (Apr. 2008).

conclusion, for particular domains and sectors, about the net result in order to reach an overall conclusion in favor of endangerment." *Id*. at 18903/1.

Similarly, EPA states that it "believes . . . that serious risks and potential impacts to public health and welfare have been clearly identified, even if they cannot always be quantified with confidence."[16] *Id.* at 18904/1. EPA may believe these things, but the Proposed Endangerment Finding fails to demonstrate that any of them is true. Indeed, EPA notes that

> when exercising her judgment the Administrator balances the likelihood and severity of effects. This balance involves a sliding scale; on one end the severity of the effects may be significant, but the likelihood low, while on the other end the severity may be less significant, but the likelihood high. Under either scenario, the Administrator is permitted to find endangerment.

Id. at 18890/2. There is, however, no indication in the Proposed Endangerment Finding that EPA has conducted this sort of balancing and assessment of severity and likelihood. The Proposed Endangerment Finding should explain EPA's conclusions as to each of these factors for every climate-related effect that EPA evaluates. The current approach taken is insufficiently transparent and fails to provide an adequate scientific basis for the Proposed Endangerment Finding.

The Administrator's further descriptions of various effects similarly fail to fulfill the obligation to explain clearly the Agency's rationale for an endangerment finding. In many cases, the Administrator simply quotes findings of other entities, such as the IPCC, articulating nothing about her own judgments as to the accuracy of the descriptions, or the projections of the

[16] EPA also states that the Proposed Endangerment Finding "is based on weighing the scientific evidence, considering the uncertainties, and balancing any benefits to human health, society and the environment that may also occur." 74 Fed. Reg. at 18904/1. The Proposed Endangerment Finding does not, however, demonstrate or describe EPA's attempt to weigh evidence, consider uncertainties, or balance positive and negative impacts. All relevant details of any such assessment and rationale are completely missing.

probability, of the climate change-related effects that others have identified. *See, e.g.*, *id.* at 18888/2, 18896/2-3; *see also id.* at 18899/1-2 (providing a similar description of CCSP conclusions without providing any indication as to EPA's assessment of these conclusions). For instance, in discussing international effects, EPA does nothing more than recite IPCC conclusions. *Id.* at 18903/2. Myriad questions remain unanswered: Does the Administrator agree with these assessments? Has she examined the basis for the IPCC's conclusions? Has she examined relevant new science? Or are these statements simply information that the Administrator has considered but not fully adopted as accurate? These sorts of statements need to be placed in context. Likewise, EPA states:

> Warming of the climate system is now unequivocal, as is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Global mean surface temperatures have risen by 0.74°C (1.3°F) over the last 100 years. Eight of the ten warmest years on record have occurred since 2001.

Id. at 18896/2. This statement, as with the one noted above, simply raises additional questions. Does the Administrator view these changes as wholly negative? Has EPA evaluated positive effects of such changes? Until greater explanation is given for these types of assertions and conclusions, the overall import of these statements is unclear.

In sum, the Proposed Endangerment Finding does not adequately explain the basis for the Administrator's proposed conclusion that anthropogenic emissions of six GHGs cause or contribute to air pollution that endangers the public health and welfare. For example, specific effects are not clearly identified by EPA as either positive or negative (or neutral). EPA also does not clearly express its determinations on many issues, instead uncritically quoting or citing conclusions of others. Thus, the Proposed Endangerment Finding does not provide a sufficient basis for proceeding to a final finding of endangerment under section 202(a) of the CAA.

D. Scientific Conclusions Stated in the TSD and Relied on by the Administrator Are Incorrect.

The TSD fails to take into account a number of recent scientific studies that present serious challenges to many of the specific conclusions stated in the document and that undermine certain key assumptions adopted in the IPCC and CCSP reports on which EPA relies. Accordingly, conclusions stated by EPA in the Proposed Endangerment Finding do not rest on a sound foundation.

The following section describes material from IPCC and CCSP reports on which EPA has chosen to rely, argues that additional sources should be assessed and included, and highlights major recent findings of significance to any endangerment analysis.

The TSD itself has an elaborate and complicated system of organization. It begins by discussing GHG emissions and atmospheric concentrations. It then describes observed climate change effects, such as temperature changes, precipitation changes, sea level changes, ocean acidification, changes in physical and biological systems, and extreme event impacts. The TSD then addresses attribution of observed climate change to anthropogenic GHG emissions. Next, it addresses projected GHG concentrations and future climate change effects, including emissions scenarios, changes in temperature, precipitation, sea level rise, ocean acidity, snow and ice, extreme events, and air pollution. Finally, the TSD assesses the impact that these various effects are projected to have on public health and welfare interests, including human health, air quality, food production and agriculture, forestry, water resources, sea level and coastal areas, energy, infrastructure, settlements, and ecosystems and wildlife, as well as international impacts. The Administrator's assessment in the Proposed Endangerment Finding is less detailed and addresses only certain of these issues.

The comments on the following pages reflect the TSD's basic structure and address the scientific infirmities that afflict that document's sections in order, adding references to the Proposed Endangerment Finding where relevant. It should be noted at the outset, however, that certain of the flaws identified in one section of the TSD are relevant to conclusions presented elsewhere in the document. Deficiencies in the TSD's assessment of climate models or in its analysis of temperature trends, for instance, undermine all of the TSD's stated conclusions derived from those models' projections of future temperatures. Similarly, inaccuracies in descriptions of effects such as sea level rise or extreme events influence the TSD's and the Proposed Endangerment Finding's conclusions with respect to nearly all of the health and welfare impact assessments. These overarching issues are noted throughout these comments.

Additional problems result from the TSD's structure. In particular, the document discusses the science addressing attempted attribution of potentially climate-related impacts to GHG emissions separately from its assessment of the severity and potential adversity of those impacts. In effect, this results in an assessment of health and welfare impacts that ignores uncertainties and conflicting evidence by relegating all such discussion to earlier chapters that do not themselves address issues (such as severity, adversity, or beneficial effects) that may be ultimately determinative of the endangerment question. The Agency's approach produces a misleading and inaccurate set of conclusions on questions of fundamental significance to the Agency's endangerment inquiry. A result is overstatement of the certainty that various projected effects will occur.

1. GHG Emissions

The TSD describes both current and projected U.S. and global anthropogenic GHG emissions. The accuracy of this information is critical because it forms the basis for linking specific effects of climate change to current and future GHG concentrations. Inaccuracies will

distort assessment of risks. In almost every case, inaccuracies and flaws in EPA's assessment of the science in this area lead to overstatement of risks. Correcting these inaccuracies is crucial, as it is clear that EPA has based the proposed endangerment and cause or contribute findings on this information. *See* 74 Fed. Reg. at 18886/1-3 (stating that emissions levels of six GHGs are part of the basis for the proposed endangerment and cause or contribute findings).

First, the TSD relies on EPA's annual Inventory of U.S. Greenhouse Gas Emissions and Sinks ("U.S. Inventory") for information regarding the primary GHGs of interest and indicates that this information is used to project effects of climate change. TSD at 1. As UARG notes in its comments on the draft TSD, the U.S. Inventory does not account for emissions and sinks resulting from land use changes and the forestry sector. This is important given the significance of U.S. land use changes and the TSD's statement that, in the United States, the forestry sector is "a significant net sink, while in some developing countries it is a significant net source of emissions." *Id.* at 10. EPA describes the nature of U.S. sinks excluded from the inventory as follows:

> Removals of carbon through land use, land-use change and forestry activities are not included in Figure 2.2, but are significant; net sequestration is estimated to be 883.7 $TgCO_2eq$ in 2006, offsetting 12.5% of total emissions (EPA, 2008).

Id.

As noted in the above-quoted language, however, the TSD does not include this information in the primary Figure stating the purported level of U.S. GHG emissions. Likewise, it ignores these important sinks in various other descriptions of U.S. emission levels. *See, e.g.*, *id.* at 12 ("Excluding land use, land-use change, and forestry, U.S. emissions were 19% of the total year 2005 global emissions."). While the TSD notes in passing the nature and significance of U.S. sinks, it fails to incorporate this information properly in all relevant sections of the TSD,

including the key Figures, which EPA can be expected to use in its decisionmaking. Exclusion of this information results in a bias toward a finding that U.S. emissions contribute to endangerment. This problem is exacerbated by the fact that EPA's global emissions estimates may indeed include other countries' forestry-related emissions and sinks, thereby skewing the Agency's assessment of the relative importance of U.S. emissions. The significant deficiencies in EPA's analysis include its failure to clarify what sources and sinks, both in the U.S. and internationally, are taken into account in its endangerment assessment and, in particular, its failure to represent fully and accurately U.S. carbon sinks.

Similarly, the TSD does not accurately reflect the state of scientific knowledge of emissions of specific GHGs. For instance, regarding hydrofluorocarbons ("HFCs"), perfluorocarbons ("PFCs"), and sulfur hexafluoride ("SF_6"), the TSD states:

> Concentrations of many of these gases have increased by large factors (between 1.3 and 4.3) between 1998 and 2005. Their total radiative forcing in 2005 was +0.017 [±0.002] W^{m-2} and is rapidly increasing by roughly 10% per year. These gases are almost entirely anthropogenic in origin (Forster et al., 2007).
>
> Industrial fluorinated gases . . . have relatively low atmospheric concentrations. Concentrations of many of these gases have increased by large factors (between 1.3 and 4.3) between 1998 and 2005.

Id. at 15. The TSD cites the IPCC for these conclusions but misrepresents the conclusions reached in the Fourth Assessment Report. The IPCC states that these fluorinated gases come from "anthropogenic *and natural* sources." IPCC Working Group I, Ch II at 145, Forster, P. et al., 2007 (emphasis added). Perhaps more significant, the above-quoted passage in the TSD implies that emissions of these gases are "rapidly increasing," even though the IPCC Working Group I report on which EPA relies says that emissions of some of them have decreased or remained at relatively constant levels over the past 10 to 20 years. TSD at 15, *see also id.* at ES-1; IPCC Working Group I, Ch. II at 145, Forster, P. et al., 2007 (describing decreases in

fluorinated gases). Further, as the IPCC notes, concentration levels of some PFCs have not been updated "since 1997." IPCC Working Group I, Ch II at 145, Forster, P. et al., 2007. EPA cannot overlook these important discrepancies. An endangerment determination must be based on a thorough assessment of all relevant facts, not on an oversimplified summary of the relevant information. Information on decreasing or stabilized emission levels in particular may warrant against a finding of endangerment and should be prominently reported, not hidden or muddled in confusing and internally contradictory statements.

Similar misrepresentations exist with respect to the TSD's discussion of methane concentrations. The TSD states, for instance, that the global atmospheric concentration of methane ("CH_4") has "increased by 149% since pre-industrial levels (through 2007)." TSD at ES-1. Elsewhere, the TSD notes that global CH_4 growth rates "declined between the early 1990s and mid-2000s" and further notes that concentrations grew between 2006 and 2007, "the first year-to-year increase since 1998." *Id.* at 14. These conclusions are based primarily on the findings of the IPCC, which states that since the 1990s the emissions growth rate for CH_4 has been "close to zero" and "below zero in 2001, 2004, and 2005," the most recent years for which the IPCC examined emissions and concentration data. IPCC Working Group I, Ch II at 140, 143, Forster, P. et al., 2007. As the IPCC notes, the result of these reductions is that what EPA believes is the second largest source of GHG radiative forcing (at least among the six GHGs targeted by the proposed EPA finding) has been significantly reduced. EPA fails to incorporate this significant information in any meaningful way in its analysis or to explain its relevance. EPA does note that the reasons for the single recent year of increase "are not yet known" and admits that the overall "decrease in the atmospheric CH_4 growth rate and the implications for future changes in its atmospheric burden are not well-understood." TSD at 14. EPA does not,

however, explain how these uncertainties or the general trend toward lower CH_4 atmospheric concentrations affect its analysis of endangerment. The TSD cannot provide a basis for an endangerment finding without an adequate explanation of this matter.

The TSD also fails to address CO_2 emissions adequately. It notes in passing that there is "year-to-year variability" in the annual CO_2 concentration growth rate and that the growth rate is characterized by uncertainty estimated at 0.11 ppm/yr. *Id.* at 13 & n.9. The Agency fails to describe the implications of this variability and the related uncertainty. Does this have, for instance, any effect on attributing current observations to CO_2 emission levels? Does it have any relevance to projecting future CO_2 concentrations? EPA must explain the import of these facts and how they relate to its endangerment analysis. In addition, the TSD inaccurately reports that "[t]he present atmospheric concentration of CO_2 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores (Jansen et al., 2007)." *Id.* at 13. It cites Chapter 2 of the IPCC's Working Group I Report for this conclusion. This information, however, does not appear in that chapter, and any basis that may exist for this statement is unclear.[17]

Further, the TSD misleadingly describes certain CO_2-related effects that, while theoretically possible, are in no way likely to occur under any projected emissions scenario. Specifically, the document states that "[c]arbon dioxide concentrations above 5% may be dangerous for vegetation and as concentrations approach 20%, CO_2 becomes phytotoxic. Carbon

[17] A similarly inaccurate citation to the IPCC appears on page 14 of the TSD with respect to methane concentrations. Further, the TSD states that "[i]ce core data show that the present atmospheric concentration of N_2O is higher than ever measured in the ice core record of the past 650,000 years (Jansen et al., 2007)." TSD at 15. This information does not appear in the IPCC Assessment that the TSD cites as its source. Indeed, the cited chapter of the IPCC report indicates that ice core data for N_2O cover only 2,000 years. *See* IPCC Working Group I, Ch II at 143, Forster, P. et al., 2007.

dioxide can cause death of plants through 'root anoxia', together with low oxygen concentration (IPCC, 2005)." *Id.* at 17. The Agency fails to mention, however, that these concentrations and these particular effects have been observed in, and are relevant to, only those areas that are exposed to massively high CO_2 concentrations, such as those that result from large volcanic eruptions. Indeed, the IPCC report cited in the TSD for this proposition addresses the risk of this particular type of harm in the context of hypothetical massive CO_2 releases. IPCC, Special Report on Carbon Dioxide Capture and Storage at 248 (2005). The TSD instead implies that such effects could somehow result from atmospheric concentrations and other anthropogenic emissions in a manner that is plainly inconsistent with the information contained in the cited source for this statement. TSD at 17. The TSD's misrepresentation on this issue is not only troubling but ironic, given that increased CO_2 concentrations that may occur at more modest levels in the atmosphere generally are very likely to have positive effects on plant growth and health, as described below in these comments.

In addition, in discussing projected future emissions scenarios, the TSD states that "[a]ll future GHG emission scenarios described in this section assume no new explicit GHG mitigation policies -- neither in the U.S. nor in other countries -- beyond those which were already enacted at the time the scenarios were developed." *Id.* at 45. With regard to the scenarios developed by the CCSP and presented in the TSD, EPA further notes that "[t]he CCSP scenarios, because they were developed more recently than the IPCC SRES [Special Report on Emissions Scenarios] scenarios, do account for the implementation of the Kyoto Protocol for participating countries, but no explicit GHG mitigation policies beyond the Kyoto Protocol." *Id.* at 47. Elsewhere, the TSD states that "mitigation measures to reduce GHGs, which could also reduce long-term risks, are not addressed. The purpose of this document is to review the effects of climate change and

not to assess any speculative policy or societal response to climate change." *Id.* at 2. Further, "it is the Administrator's position that the purpose of the endangerment analysis is to assess the risks posed to public health and welfare, rather than to estimate how various . . . greenhouse gas mitigation policies may ameliorate or exacerbate any endangerment that exists." 74 Fed. Reg. at 18894/3. Even assuming for the sake of argument that it is appropriate to exclude "speculative" mitigation measures from EPA's assessment of endangerment, it is indefensible to exclude existing and virtually certain mitigation measures from that assessment. Emission reductions that are planned or expected in foreign nations and at the federal, regional, state, and local levels in the United States should not be excluded from EPA's projections simply because they are not in all cases guaranteed. Indeed, nothing addressed in the TSD is absolutely *certain* to occur; the Agency should attempt to base its projections on what is most likely to occur, not on arbitrary rules designed to evade difficult questions. EPA is willing to speculate as to large GHG emission increases; purposeful exclusion of likely mitigation measures is arbitrary and reflects a significant lack of balance in EPA's analytical approach.

Finally, EPA notes in passing that there are considerable uncertainties associated with future GHG emissions projections. TSD at 48 ("The broad ranges of EMF-21 emissions projections in Figure 6.3, especially for N_2O and the F-gases, illustrate the uncertainties in projecting these future emissions, which is generally consistent with the range found in SRES."). Further, the TSD states:

> Scenarios are story lines regarding *possible* futures. These storylines are designed to be internally consistent in their assumptions regarding population and economic growth, implementation of policies, technology change and adoption, and other factors that will influence emissions. *Scenarios are not projections of the future*, but are used to illustrate how the future might look if a given set of events occurred and policies [are] implemented.

Id. at 45 (emphases added).

Because these scenarios are "not projections of the future," EPA does not assign probabilities to specific outcomes. On the one hand, because of the significant uncertainties inherent in such an endeavor, it is perhaps understandable that EPA would avoid undertaking this task. On the other hand, however, the Agency fails to address or resolve the fundamental problems that its approach creates. The bulk of the TSD describes possible effects associated with these projected scenarios, thereby implying that these effects will in fact occur in the future. Further, the Administrator proposes to base her endangerment and cause or contribute findings on these projected effects. 74 Fed. Reg. at 18898/2 ("Based on the total weight of evidence, … it is the Administrator's judgment that current *and projected* levels of the mix of the six greenhouse gases endanger the public health and welfare of current and future generations. The Administrator's proposed endangerment finding is based on the entire range of observed risks *and potential* harms to public health and welfare.") (emphases added). The scientific basis for reaching endangerment and cause or contribute findings is not adequately established due to the serious limitations on the Agency's assessment of the substantial uncertainties associated with these issues. EPA would have to describe the relative probabilities of various future emissions projections before it could determine that the projected effects of those emissions endanger public health or welfare.

2. Observed and Projected Effects of GHG Concentrations

a. Temperature Trends and Modeling

The science addressing temperature trends and their historical record has overarching and significant implications, similar to those related to projections of future GHG concentrations, for all of the various health and welfare impacts that EPA assesses in the TSD and Proposed Endangerment Finding. First, with regard to observed temperature trends, providing accurate

information can guard against unfounded attribution of various phenomena to climate change. The TSD, however, does not assess adequately current temperature trends and often engages in broad generalizations while failing to explain the import of various conclusions and facts that are presented.

> For instance, the Proposed Endangerment Finding states:
>
> 2005–2007 were exceptionally warm years (among the top 10 warmest on record), while 2008 was slightly warmer than average (the 39th warmest year on record), 0.2 °F (0.1 °C) above the 20th century (1901–2000) mean.
>
> The last ten 5-year periods (2004–2008, 2003–2007, 2002–2006, 2001–2005, 2000–2004, 1999–2003, 1998–2002, 1997–2001, 1996–2000, and 1995–1999), were the warmest 5-year periods in the 114 years of national records, demonstrating the anomalous warmth of the last 15 years.

Id. at 18899/1; *see also* TSD at 27. Neither the Proposed Endangerment Finding nor the TSD, however, provides any insight into the significance of these facts. The TSD notes that 2008 was significantly cooler than recent preceding years but that it "tied with 2001 as the eighth warmest year on record for the Earth." TSD at 24. The TSD also notes that "1998 and 2005 remain the two warmest years on record." *Id*. Further, EPA reports without comment that the addition of data from 2006 through 2008 to temperature trend analysis performed by the IPCC alters trends "from + 0.11°C to + 0.15°C per decade compared to the estimate of + 0.12°C to + 0.19°C per decade given in IPCC (2007a)." *Id.* at 25. It may be arguable that year-to-year variation does not significantly alter overall trends and that the years selected and five-year bins that EPA has reported are in some way significantly revealing as to overall temperature trends. Yet EPA neither attempts to make such arguments nor to explain the significance and reliability of the data it includes in the TSD and the Proposed Endangerment Finding. Similarly, EPA offers no discussion of uncertainties related to the relevance of this information or a description of the role that inter-annual variability may play in assessing the robustness of any trends. Accurate

representation of this information is crucial, especially given that, as EPA points out, a variety of short-term factors -- such as radiative forcing resulting from solar-modulated cosmic ray ionization, surface albedo changes, water vapor, and black carbon -- are likely to play a significant role in temperature changes and do so over short timescales. *Id.* at 22.

These same problems are also evident in EPA's discussion of warming trends over various geographic regions. For instance, the TSD states:

> Between 1901 and 2005, warming is statistically significant over most of the world's surface with the exception of an area south of Greenland and three smaller regions over the southeastern U.S. and parts of Bolivia and the Congo basin. The lack of significant warming at about 20% of the locations, and the enhanced warming in other places, is likely to be a result of changes in atmospheric circulation.

Id. at 24; *see also id.* at 28 ("Regional data . . . indicate warming has occurred throughout most of the U.S., with all but three of the eleven climate regions showing an increase of more than 1ºF since 1901 through 2006 (NOAA, 2007). . . . [T]he greatest temperature increase occurred in Alaska (3.3°F per century). The Southeast *shows essentially no trend over the entire period*, but has warmed since 1979.") (emphasis added).

EPA states that 20 percent of the globe, including portions of the United States, has shown no statistically significant warming, but suggests that this anomaly is not compelling and should be ignored. But EPA does not assess the uncertainties in its hypothesis or discuss any evidence that may support or refute its conclusions. Likewise, EPA provides no discussion of the basis for its conclusion that "statistically significant" warming has occurred or the relative confidence it has in that conclusion.

Similar vagueness plagues EPA's general comparisons of recent temperatures to temperatures in the past. EPA states, for instance, that "global mean surface temperature was higher during the last few decades of the 20th century than during any comparable period during

the preceding four centuries." *Id.* at 26. Yet the Agency also notes that "[l]arge-scale surface temperature reconstructions . . . yield a generally consistent picture of temperature trends during the preceding millennium, including relatively warm conditions centered around A.D. 1000 (identified by some as the "Medieval Warm Period") and a relatively cold period (or "Little Ice Age") centered around 1700." *Id*. The Medieval Warm Period, of course, falls outside the four-century period EPA selectively identifies as the baseline period for comparing historic temperatures to those in recent decades. This sort of general and imprecise discussion is not a sufficient basis on which to evaluate the endangerment question.

Another instance of selective and misleading timescale choice is found in EPA's use of the year 1750 as the pre-industrial base point from which subsequent radiative forcing, *i.e.*, warming or cooling effects, is measured. *See, e.g.*, *id.* at ES-2, 19, 22, 31; 74 Fed. Reg. at 18896/2. The IPCC, which the Agency cites for this information, indicates that in the period between the years 1600 and 1800, CO_2 mixing ratios actually dropped by 5 to 10 ppm and that using 1750 as the pre-industrial index "may slightly overestimate the RF [radiative forcing], as the changes in the mixing ratios of CO_2, CH_4 and N_2O after the end of this naturally cooler period may not be solely attributable to anthropogenic emissions." IPCC Working Group I, Ch II at 140, Forster, P. et al., 2007. EPA fails to acknowledge this important caveat.

While relying on vaguely stated conclusions regarding observed temperature trends, the TSD further suffers from failure to evaluate thoroughly the implications of errors and flaws in the historical climate record. This information, for instance, is crucial for evaluating the reliability of climate change-related modeling results, which are compared to climate records to assess their ability to replicate accurately past climatic conditions. Moreover, the temperature record is used as an input in climate models and thus influences how those models perform and

the projections they generate. A number of studies address flaws of this sort. EPA largely ignores them. Similarly, the TSD notes that "[s]urface temperature is calculated by processing data from thousands of world-wide observation sites on land and sea. Parts of the globe have no data, although data coverage has improved with time. The long-term mean temperatures are calculated by interpolating within areas with no measurements using the collected data available." TSD at 22. This is significant information noting shortcomings in the available data. Yet, while the TSD notes that other issues may result in biases or inaccuracies (only to reject the biases and inaccuracies as inconsequential), it fails even to mention, let alone analyze, the possible distortions introduced by interpolation of temperature data. The TSD also does not explain in any useful detail what parts of the globe continue to lack data, and it likewise presents no meaningful assessment of the nature of the data improvements that EPA believes have occurred. These yawning gaps in EPA's analysis almost inevitably heighten uncertainty and introduce further bias to the endangerment assessment, but, again, EPA is silent on such matters.

Further, additional studies have uncovered significant flaws in the temperature record -- flaws EPA wholly ignores. Regarding ocean temperatures, one study recently uncovered previously undocumented biases that have resulted in significant overestimation of long-term temperature changes in the global ocean. Gouretski and Koltermann, *How Much is the Ocean Really Warming?*, 34 GEOPHYSICAL RESEARCH LETTERS L01610 (2007). The significance of the ocean temperature record was recently reinforced by the investigations of Keenlyside et al., *Advancing Decadal-Scale Climate Prediction in the North Atlantic Sector*, 45 NATURE 84-88 (May 2008), which found that use of more accurate sea surface temperatures resulted in global surface temperature projections that, over the next several decades, would fall within natural climate variability. Similarly, a number of recent studies have uncovered comparable flaws,

uncertainties, and biases in the multi-decadal surface air temperature record. Thompson et al., *A Large Discontinuity in the Mid-Twentieth Century in Observed Global-Mean Surface Temperature*, 453 NATURE 646-49 (May 29, 2008); Pielke et al., *Unresolved Issues With the Assessment of Multidecadal Global Land Surface Temperature Trends*, 112 J. OF GEOPHYSICAL RESEARCH D24508 (Dec. 29, 2007); Pielke et al., *Documentation of Uncertainties and Biases Associated with Surface Temperature Measurement Sites for Climate Change Assessment*, AMERICAN METEOROLOGICAL SOCIETY 913-28 (June 2007); Lin et al., *An Examination of 1997-2007 Surface Layer Temperature Trends at Two Heights in Oklahoma*, 34 GEOPHYSICAL RESEARCH LETTERS L24705 (Dec. 22, 2007). These findings require reanalysis of modeling results previously relied on by the IPCC and the other synthesis reports cited by EPA, as they are likely to have substantial effects on climate projections. Such reanalysis could, in turn, fundamentally alter projections with respect to all other purported climate change-related impacts. Findings of this sort demonstrate the need for EPA to perform its own comprehensive literature search and scientific assessment.

Other studies, unrelated to discrepancies and flaws in the temperature record, also indicate that similarly pervasive inaccuracies may affect past climate modeling projections and that considerable reanalysis would be required before EPA could reasonably use those projections in this proceeding. For instance, Spencer, R.W., and W.D. Braswell, *Potential Biases in Feedback Diagnosis from Observational Data: A Simple Model Demonstration*, 21 J. OF CLIMATE 5624-28 (Nov. 2008), determined that previous estimates of the sensitivity of the climate system based on satellite data were biased toward the high side due to the neglect of natural cloud variability. This study found that failure to account for natural, chaotic cloud variability, a problem that continues to plague climate modeling, will always project a climate

system that appears more sensitive than it really is. Another recent study, Ramanthan and Carmichael, *Global and Regional Climate Changes Due to Black Carbon*, 1 NATURE GEOSCIENCE 221-27 (Apr. 2008), demonstrates that global climate models underestimate the percentage of climate forcing that is attributable to black carbon, a non-GHG. Accordingly, climate models that instead attribute this forcing to GHGs are necessarily inaccurate and their results require reassessment.

The TSD chooses to ignore these very real issues. It cites the IPCC for the conclusion that:

> Biases may exist in surface temperatures due to changes in station exposure and instrumentation over land, or changes in measurement techniques by ships and buoys in the ocean. It is likely that these biases are largely random and therefore cancel out over large regions such as the globe or tropics (Wigley et al., 2006). Likewise, urban heat island effects are real but local, and have not biased the large-scale trends (Trenberth et al., 2007).

TSD at 22.

The findings of the studies described above, however, constitute direct challenges to IPCC conclusions and those that EPA cites as reasons for ignoring potential biases resulting from temperature-record flaws. It is inappropriate and internally inconsistent for EPA to continue to disregard the most current scientific findings on historical temperature records in favor of outdated IPCC conclusions even as the Agency updates IPCC conclusions with temperature data for the most recent years. The new information described above requires reconsideration of those modeling results that attributed various changes to GHG emissions where significant variables were ignored or where other factors may have been the primary causes of climate effects. These issues go directly to the asserted basis for the Proposed Endangerment Finding.

Finally, in addition to the problems that temperature data and similar issues pose for climate and climate impact projections, significant weaknesses are inherent in the design of the

climate models used to generate the information presented in the TSD and relied on by EPA in the Proposed Endangerment Finding. EPA fails to address these issues, and misleadingly describes climate change models as "well-tested," characterized by "a foundation in accepted physical principles," and possessing the "ability to reproduce observed features of current climate and past climate changes." *Id.* at 39. These assertions are overbroad and ignore critical shortcomings in modeling capabilities. As stated in a 2008 CCSP Report, current models contain "a number of systematic biases," their strengths and weaknesses "vary substantially" from model to model, and "several important aspects of the climate system present especially severe challenges to the goal of simulation." CCSP, *Climate Models: An Assessment of Strengths and Limitations* at 1 (July 2008). This report goes on to characterize in significant detail a variety of uncertainties and problems presented by current models. The TSD addresses none of those uncertainties and problems. Moreover, in the few instances in which the TSD mentions model inconsistencies or uncertainties, it explains them away as "under investigation" -- leaving their implications unaddressed, even while tacitly, if perhaps inadvertently, conceding that model results are not now in a state in which EPA could rely on them for a regulatory determination such as an endangerment finding. *See, e.g.*, TSD at 41.

In sum, the TSD's discussion of temperature trends is generally vague and simplistic and fails to grapple with the most pressing questions with anything like an adequate level of detail. Moreover, a number of recent studies raise serious questions about the reliability of the temperature record data used in the modeling studies on which EPA relies. The Agency ignores this information without providing any reason for its omission. Finally, the models themselves are known to suffer from a variety of weaknesses; these, too, are ignored by EPA, which persists

in misrepresenting their reliability. Accordingly, the information EPA cites is inadequate to support the Proposed Endangerment Finding.

b. Precipitation

The TSD and the Proposed Endangerment Finding make a number of claims regarding the likely effects of climate change on precipitation globally and in the United States. Regarding observed precipitation trends, the Administrator concludes that "[o]ver the contiguous U.S., total annual precipitation increased at an average rate of 6.5 percent over the period 1901–2006." 74 Fed. Reg. at 18899/1. Further, EPA states that "[g]lobal mean precipitation is expected to increase with global warming." *Id*. at 18900/1. The Agency also notes "substantial spatial and seasonal variations" in projected precipitation. *Id*. The TSD provides additional detail on expected precipitation effects. *See, e.g.*, TSD at 29-30 (explaining U.S. regional increases in observed precipitation). The TSD also states that most of the United States will experience a "widespread increase in annual precipitation" except the southwest, which models indicate will experience drying. *Id.* at 59.

Several problems undermine EPA's presentation of the science related to precipitation effects of climate change. First, the TSD states in a number of sections that "[i]t is likely that there have been increases in the number of heavy precipitation events (e.g., 95th percentile) within many land regions, even in those where there has been a reduction in total precipitation amount, consistent with a warming climate and observed significant increasing amounts of water vapor in the atmosphere." *Id.* at 29; *see also id.* at ES-2, 36. The TSD mischaracterizes this as an "observation" of current climate change impacts on precipitation events. This is a guess, not an observation. Elsewhere, EPA says that such increases have been reported, without specifying where or at what frequency, while casually noting that "only a few regions have sufficient data to assess such trends reliably (Trenberth et al., 2007)." *Id.* at 36.

More broadly troubling is the lack of any significant description of the uncertainties associated with EPA's projections in the TSD sections directly addressing precipitation. These problems are substantial and critical to a proper evaluation of whether endangerment will result from these projected climate change effects. The CCSP's assessment of model strengths and weaknesses states clearly that projections of precipitation in some cases remain "problematic" (especially at the regional scale). *See id.* at 52-53. Likewise, the CCSP has concluded that "[t]here is no clear evidence to date of [an effect of] human-induced global climate change on North American precipitation amounts." *See id.* at 43 (citing Clark et al., Abrupt Climate Change, Executive Summary 7-18, A Report of the U.S. Climate Change Science Program and the Subcommittee on Global Change Research 2008)); *see also id.* at ES-3 ("clearly attributing specific regional changes in climate to emissions of greenhouse gases from human activities is difficult, especially for precipitation"). This statement reflects the weaknesses of the relevant models. Yet the Administrator's conclusions in the Proposed Endangerment Finding completely disregard these findings, and the TSD itself downplays them without justification. These problems must be addressed and their implications examined if EPA chooses to rely on this information. As EPA notes, "[c]hanges in precipitation patterns will play a large role in determining the net impacts of climate change *at the national and sub-national scales*, *where uncertainties about precipitation changes remain very large*." *Id.* at 84 (emphasis added). It is plainly unacceptable for EPA to ignore these substantial uncertainties.

c. Sea Level Rise and Sea Ice

The Proposed Endangerment Finding states that "[w]arming of the climate system is now unequivocal, as is evident from observations of … rising global average sea level." 74 Fed. Reg. at 18896/2. Further, the Administrator concludes that "[t]here is strong evidence that global sea level gradually rose in the 20th century and is currently rising at an increased rate." *Id.* at

18898/3; *see also* TSD at 30. EPA then states additional and increasingly speculative conclusions. For instance, the Administrator cites IPCC conclusions that sea level will, by the end of this century, be between 0.18 and 0.59 meters higher than in 1990 and that rapid ice loss through various ice sheet flow processes could increase the rate of sea level rise. 74 Fed. Reg. at 18900/2. Further, the Administrator concludes that "[w]hile understanding of these ice sheet processes is incomplete, their inclusion in models would likely lead to increased sea-level projections for the end of the 21st century." *Id*. Regardless, the Administrator concludes that "the rate of change will increase in the future, exacerbating the impacts of progressive inundation, storm-surge flooding, and shoreline erosion." *Id*. at 18902/3. These conclusions closely mirror statements in the TSD.

These conclusions are not supported by the available science. Indeed, as EPA notes, sea level changes are due in significant part to factors other than GHG emissions and climate change, such as land subsidence. *Id.* at 18899/1. The TSD, on occasion, makes this concession as well, *see, e.g.*, TSD at 60, although it regularly downplays the role of land subsidence, suggesting -- without showing -- that it does not have significant effects or that its role in sea level change should somehow be counted towards a finding of endangerment from GHG emissions. *See, e.g.*, *id.* at 30 ("Two major processes lead to changes in global mean sea level on decadal and longer time scales: i) thermal expansion, and ii) the exchange of water between oceans and other reservoirs (glaciers and ice caps, ice sheets, and other land water reservoirs)."). Moreover, as the TSD acknowledges, "[v]ertical land motion from geologic processes may decrease (uplift) or increase (subsidence) the relative sea level rise at any site." *Id.* at 60. Accordingly, reassessment of EPA's conclusions on sea-level rise would be necessary before EPA could use them to support an endangerment finding.

There is also a considerable amount of science suggesting that the Administrator's conclusions regarding the potential for sea level to rise at an increasing rate over time is incorrect. Indeed, the TSD itself notes that "[i]t is unclear whether the faster rate [of sea level rise] for 1993 to 2003 is a reflection of short-term variability or an increase in the longer-term trend (Bindoff et al., 2007)." *Id.* at 30. Further, recent studies ignored by the TSD also contradict EPA's assessment. One study indicates that ice sheets are less susceptible to climate change-related loss of mass than has previously been suggested. In particular, this study reported that ice sheets can adjust to what some assumed to be feedback mechanisms thought to cause accelerated melting, thus indicating that abrupt melting from increased ice flow is unlikely. *See* Van de Wal et al., *Large and Rapid Melt-Induced Velocity Changes in the Ablation Zone of the Greenland Ice Sheet*, 321 SCIENCE 111-13 (July 4, 2008). An additional study indicates that ocean temperatures have not risen in response to anthropogenic climate change and that any increase in ocean temperature is regional in nature and the result of natural variability. Lozier et al., *The Spatial Pattern and Mechanisms of Heat-Content Change in the North Atlantic*, 319 SCIENCE 800-03 (Feb. 8, 2008). The TSD and the Proposed Endangerment Finding, however, omit any discussion of these recent studies and assert that ocean warming associated with climate change is unequivocal and that it is and will continue to contribute to sea level rise.

Similarly, the TSD and the Proposed Endangerment Finding rely on outdated projections of future sea level rise. The most recent study assessing sea level rise modeling results concludes that previous estimates, including those calculated by the IPCC, are roughly double currently supportable sea level rise expectations. Bamber, et al., *Reassessment of the Potential Sea-Level Rise from a Collapse of the West Antarctic Ice Sheet*, 324 SCIENCE 901-03 (May

2009). Again, this raises substantial questions as to a number of the TSD's assertions and requires reconsideration of the additional impacts EPA attributes to ice sheet loss.

d. Ocean Acidification

The Proposed Endangerment Finding states that "[o]cean acidification is projected to continue, resulting in the reduced biological production of marine calcifiers, including corals." 74 Fed. Reg. at 18902/3. This conclusion is remarkable given the paucity of information in the TSD on this issue, which receives less than a page of analysis in that document. *See* TSD at 31, 57. Indeed, the TSD characterizes ocean acidification as an "emerging issue[]" that investigators are only beginning to examine. *Id.* at 6. Despite its scant analysis, the TSD suggests future CO_2 emissions will be absorbed by the oceans, "thereby reducing calcification rates of organisms who [sic] rely on the minerals for development." *Id.* at 57. The evidence adduced for these effects is meager, while the abundant uncertainties are wholly ignored. Further, for the reasons discussed above, considerable uncertainties greatly limit EPA's ability to rely on projections of future emissions scenarios, and EPA does not even attempt to assign probabilities to various potential outcomes. Accordingly, no legitimate basis exists for EPA's assertions that ocean acidification will occur and result in the level of impacts it projects.

e. Physical and Biological Systems

The TSD addresses the science examining whether climate change affects a variety of ecosystem components. For example, regarding water resources, the TSD states that drought conditions are becoming more severe in some regions, increased runoff and streamflow are resulting from glacier melt and snowmelt, lakes and rivers are experiencing increased temperatures, and rivers are experiencing increased discharge. *Id.* at 33. The TSD acknowledges, however, that "[s]ome local trends in reduced groundwater and lake levels have been reported, but studies have been unable to separate the effects of variations in temperature

and precipitation from the effects of human interventions such as groundwater management (Rosenzweig et al., 2007)." *Id.*

Regarding each of the ecosystem issues that the TSD discusses, EPA must provide significantly more detail for any reasonable analysis of endangerment to be possible. For instance, the TSD states that drought may occur in "other areas" or in "some regions" with "no clear trends for North America as a whole." *Id.* at 28, 33, 37. Thus, it is unclear from the science assessed in the TSD where and how any drought-related effects may occur. Further, the TSD states that "most of the continental United States experienced reductions in drought severity and duration over the 20th century" and that drought in the western United States has been attributed to "multidecadal fluctuations." *Id.* at 37. Accordingly, it appears that drought conditions can be attributed to causes other than climate change, contradicting the conclusions asserted in the TSD and the Proposed Endangerment Finding. Further, given that projections of drought are necessarily based on modeling of temperature increases and precipitation, which, as demonstrated above, are subject to significant reliability problems, EPA's conclusions as to that asserted effect are especially questionable. Similarly, the TSD's discussion of streamflow and runoff is abbreviated and provides no explanation of the evidence available, uncertainties associated with that evidence, or any significant regional detail. Finally, the TSD's discussion of river discharge is, again, cursory at best. Moreover, the TSD entirely ignores scientific evidence demonstrating that, while climate-related changes in precipitation theoretically could affect river discharge, few rivers have experienced any significant changes in the current period, and any changes that might occur in the future are much more likely to be caused (or overwhelmed) by factors unrelated to climate change, such as damming and irrigation. Milliman et al., *Climatic and Anthropogenic Factors Affecting River Discharge to the Global Ocean, 1951-2000*, 62

GLOBAL & PLANETARY CHANGE 187-94 (2008). It is impossible to base an endangerment finding on such a perfunctory, incomplete, and scientifically unsupported discussion.

The TSD also states that biological systems are being affected by changing climate. It points to range shifts for flora and fauna, changes in biodiversity, changes in phenology and breeding, and hibernation patterns and attributes them to climate change. TSD at 34. The TSD notes that changes observed in marine species are more difficult to attribute to climate change due to "other stresses (*e.g.* over fishing and pollution)." *Id.*

Regarding these effects, the TSD says that different species will have different capacities for adapting to changes (even as it refuses to analyze the effects of adaptation) and that such changes will result in "alter[ed] ecosystem structure, function, and services." *Id.* at ES-6. The TSD also notes that evidence for local disappearance of species is "limited." *Id.* at 34. Thus, EPA concedes that even local disappearances, which are not necessarily tied to extinctions or even to problems, are not well-supported. Suggesting that mass extinctions or severe ecological consequences could result based on this evidence is completely unfounded. Thus, the TSD fails to provide any objective measure of the consistency or strength of the available scientific evidence for this particular type of asserted effect. Moreover, it provides little information that could serve as guidance to the Administrator in determining to what extent such an effect is adverse or "endangering." Indeed, although the Administrator cites this potential effect in the Proposed Endangerment Finding, she offers no explanation of how or whether these effects negatively impact public health or welfare. *See* 74 Fed. Reg. at 18903/1. In fact, new scientific evidence indicates climate change is much less likely than some observers previously thought to result in an influx of invasive species or in biodiversity losses. For instance, one recent scientific analysis determines that animal diseases previously thought to have been exacerbated by

changing climatic conditions are in fact unrelated to climate. Lips et al., *Riding the Wave: Reconciling the Roles of Disease and Climate Change in Amphibian Declines*, 6 PLOS BIOLOGY 441-54 (Mar. 2008) (finding that amphibian declines due to disease increases are not related to climate change).

Other recent evidence indicates that previously common assumptions regarding potential species-level impacts of changing temperatures, and distribution of those impacts, suffer from serious inaccuracies. Particularly important is the recent finding that species impacts will likely be greatest in the tropics, largely outside of the United States, and that species in higher latitudes are far more resilient to climate change. Deutsch et al., *Impacts of Climate Warming on Terrestrial Ectotherms Across Latitude*, 105 PNAS no. 18 (May 6, 2008). Similarly, a study recently published in the *Proceedings of the National Academy of Sciences* concluded that the introduction of invasive plant species to new ecosystems does not necessarily result in significant species loss or harm, as is often argued. Sax and Gaines, *Species Invasions and Extinction: The Future of Native Biodiversity on Islands*, 105 PNAS 11490-97 (Aug. 12, 2008). Similarly, a 2009 study concludes that climate change will in fact result in range contractions for five widespread and dominant invasive plant species, and that climate change will present an opportunity to restore native species in areas that today pose a considerable challenge for land managers. Bradley, et al., *Climate Change and Plant Invasions: Restoration Opportunities Ahead?*, GLOBAL CHANGE BIOLOGY (2009). The science presented in the TSD regarding this issue is accordingly an insufficient basis for an endangerment finding.

The TSD also discusses the effects of elevated CO_2 levels on plant growth and species diversity. It notes that "[c]arbon dioxide can have stimulatory or fertilization effect[s] on plant growth." TSD at 17. Indeed, it cites the IPCC conclusion that "at ambient CO_2 concentrations

of 550 ppm (approximately double the concentration from pre-industrial times) crop yields increase under unstressed conditions by 10-25% for C3 crops, and by 0-10% for C4 crops." *Id*. Yet, without explaining its reasoning, EPA dismisses this potential benefit of GHG emissions as "small." *Id*. Inconsistently, EPA uses no similar qualifiers for any remotely comparable percentage impact that might arguably point to *adverse* effects. *See, e.g.*, *id.* at 62 (tropical storms), 77 (pollutant concentration episodes), 92 (forest fire risks), 92 (tree line movement), 94 (streamflow change), 105 (cooling and heating changes).

Further, the TSD distorts the relevant science in this area by suggesting that ambient CO_2 levels could result in "noticeable die-off" due to root anoxia, but fails to explain that this effect will not occur as a result of any projected CO_2 concentration likely to occur and that it in fact has been observed only where CO_2 makes up 20 to 95 percent of soil gas, such as is found in areas exposed to volcanic activity. *Id.* at 17. This information thus is irrelevant and misleading.

Finally, the TSD tries to downplay the benefits associated with CO_2 fertilization by suggesting it will reduce the quality of animal livestock forage, with more nutritious grasses being replaced by a less nutritious variety. This assertion is unfounded and, again, misleading. The TSD itself acknowledges that "the exact effects on both types of grasses and their nutritional quality still need[] to be determined." *Id.* at 87. The overt bias in EPA's characterizations and its attempt to minimize benefits reflect an unacceptable approach to questions of scientific evidence underpinning any endangerment finding.

f. Extreme Events

EPA cites several categories of extreme events and their purportedly increased potential as a basis for the Proposed Endangerment Finding. For instance, the Agency says that "[w]idespread changes in extreme temperatures have been observed in the last 50 years." 74 Fed. Reg. at 18898/3. EPA also quotes the CCSP's conclusions:

> Many extremes and their associated impacts are now changing. For example, in recent decades most of North America has been experiencing more unusually hot days and nights, fewer unusually cold days and nights, and fewer frost days. Heavy downpours have become more frequent and intense. Droughts are becoming more severe in some regions, though there are no clear trends for North America as a whole. The power and frequency of Atlantic hurricanes have increased substantially in recent decades, though North American mainland land-falling hurricanes do not appear to have increased over the past century. Outside the tropics, storm tracks are shifting northward and the strongest storms are becoming even stronger.

Id. at 18899/2. At the same time, EPA notes that there are "key uncertainties" related to how "the frequency of hurricanes and other extreme weather events may change in a changing climate." *Id*. at 18903/3.

The TSD further discusses the science related to observed and projected extreme events and their association, if any, with climate change and GHG emissions. The TSD states that "[c]old days, cold nights, and frost have become less frequent, while hot days, hot nights, and heat waves have become more frequent (IPCC, 2007d)." TSD at 36; *see also id.* at 61-62. Yet the TSD fails to provide any additional information on the significance of these changes or whether they might have overall positive or negative consequences.

Moreover, the TSD states that "[i]t is likely that there have been increases in the number of heavy precipitation events" -- even though it acknowledges the absence of data to substantiate that claim. *Id.* at 36, 62. This bald speculation is not scientifically justifiable and has no place in a document intended to support a finding on the endangerment issue.

Regarding drought, the TSD contradicts the conclusion stated by the Administrator. The TSD explains that "most of the continental United States experienced reductions in drought severity and duration over the 20th century. However, there is *some indication* of increased drought severity and duration in the western and southwestern United States." *Id.* at 37 (emphasis added); *see also id.* at 62 (discussing drought under various emissions scenarios).

Other statements in the TSD are equally at odds with the Administrator's statement in the Proposed Endangerment Finding. *See, e.g.*, *id.* at 64 (citing IPCC conclusion that "it is not clear if the present drying [in the United States] is outside the range of natural variability and linked to anthropogenic causes").

Similarly, regarding tropical cyclones and hurricanes, both of which the Administrator relies on in the Proposed Endangerment Finding, EPA candidly states that "there is no clear trend in the annual numbers of tropical cyclones" due to a "large suite of problems with the historical record of tropical cyclone activity." *Id.* at 36, 62. Further, a recent study ignored by EPA indicates hurricanes are likely to be substantially *rarer* events under projected climate change. Knutson et al., *Simulated Reduction in Atlantic Hurricane Frequency Under Twenty-First-Century Warming Conditions*, 1 NATURE GEOSCIENCE, 359-64 (2008).

Finally, the TSD states that extreme sea levels may increase. TSD at 36, 62. This briefly stated finding fails to elaborate on any of the relevant studies, discussed above, that undercut projections of increases in both the rate and amount of sea level increases, and it does not so much as mention any of the numerous uncertainties underlying these observations and projections.

Thus, each of the extreme event categories described in the TSD and cited in the Proposed Endangerment Finding are reviewed by EPA in only the most superficial way. Moreover, the TSD itself contradicts the Administrator's stated conclusions. In any event, a far more meaningful assessment of the underlying science would be required to determine whether this information could support an endangerment finding; EPA's desire to reach a predetermined outcome does not allow it to avoid a thorough vetting of uncertainties and relevant new information.

g. "Abrupt" Climate Change

The Proposed Endangerment Finding is vague with respect to precisely how "abrupt climate change" considerations factor into EPA's proposed action. The Administrator does state, however, that "[i]f the harm [of a particular purported climate change-induced effect] would be catastrophic, the Administrator is permitted to find endangerment even if the likelihood is small." 74 Fed. Reg. at 18890/2. Likewise, in discussing abrupt climate change specifically, the Administrator states:

> Even if the probability of extremely high-impact events may be small, the existence of such high impact events, and the potential for other currently unknown catastrophic impacts that could plausibly result from record-high atmospheric greenhouse gas levels, substantially bolsters the case for an endangerment finding with respect to greenhouse gases.

Id. at 18903/3.

The TSD's discussion of the science evaluating abrupt climate change concedes that investigation of that matter is "in its infancy." *See, e.g.*, TSD at 57 (evidence for rapid variations in glacial outflow is based on models that are "in their infancy"). Indeed, EPA makes no assessment of the possibility of abrupt climate change impacts on various health and welfare interests simply because, as it acknowledges, potential abrupt climate change implications "cannot be predicted with confidence, particularly for specific regions." *Id.* at 63. The Agency's complete failure to do anything other than note the possibility that abrupt climate change may occur, and its decision to refrain from examining any impacts to public health and welfare, make the Administrator's reference to "the existence of such high impact events" and her statement that such hypothesized "events" "*substantially bolster[]* the case for an endangerment finding," 74 Fed. Reg. at 18903/3 (emphasis added), completely implausible. As EPA has acknowledged, Congress barred EPA from basing its assessments and projections on a "crystal ball inquiry." 73

Fed. Reg. at 44422/3 (quoting legislative history of 1977 CAA amendments); *see* UARG ANPR Comments at 23.

The TSD suggests abrupt climate change might be triggered by any number of occurrences *unrelated to GHG emissions*. These include changes in Earth's orbit, a brightening or dimming of the sun, and emissions of climate-altering particles. TSD at 63. Further, as the TSD notes, the fact that "[s]cientific data show that abrupt changes in the climate at the regional scale have occurred throughout history and are characteristic of the Earth's climate system" illustrates the point that any abrupt climate change that may occur would not necessarily be the product of GHG emissions. *Id*.

In sum, this issue is riddled with uncertainties, as EPA acknowledges, and EPA's discussion of it consists of little more than speculation. The Agency fails to assess the propensity of any abrupt climate change to impact public health and welfare interests, and it suggests that various factors unrelated to GHGs may be the likely cause of any abrupt change, should it occur. The discussion of this issue in the TSD and the Proposed Endangerment Finding simply does not provide a basis for an endangerment finding.

h. Ozone and Air Pollution

The Proposed Endangerment Finding concludes that "[i]ncreases in regional ozone pollution in the U.S. relative to ozone levels without climate change are expected due to higher temperatures and a modification of meteorological factors. Increases in regional ozone pollution increase the risks of respiratory infection, aggravation of asthma, and premature death." 74 Fed. Reg. at 18901/2. Further, the Administrator concludes that climate change will exacerbate the

"[s]ubstantial challenges [that] remain with respect to achieving the air quality protection promised by the NAAQS for ozone."[18] *Id.* at 18901/3.

The TSD supposedly provides the foundation for the Administrator's conclusions. The TSD, however, is replete with inaccuracies and overstatements and does not in fact support the Administrator's conclusions on this issue. For instance, it concludes that "[t]here is now consistent evidence from models and observations that 21st-century climate change will worsen summertime surface ozone in polluted regions of North America compared to a future with no climate change (Jacob and Winner, 2009)." TSD at 75. The TSD notes briefly that the relevant modeling studies "found some regions of the country where simulated increases in cloud cover, and hence decreases in the amount of sunlight reaching the surface, partially counteracted the effects of warming temperatures on ozone concentrations in these regions, to go along with the many regions where the effects of temperature and cloud cover reinforced each other in producing O_3 increases." *Id.* at 76. Similarly, it notes that climate change "can be expected to influence the concentration and distribution of air pollutants through a variety of direct and indirect processes, including the modification of biogenic emissions, the change of chemical reaction rates, wash-out of pollutants by precipitation, and modification of weather patterns that influence pollutant buildup." *Id.* at 75. Again, some of the suggested effects are positive; some

[18] It is noteworthy that, in the Proposed Endangerment Finding, the Administrator does not cite any purported effects of climate change on particulate matter ("PM") levels. The TSD makes clear, however, that the limited science that is available on that point suggests that "PM generally *decreases* as a result of simulated climate change, due to increased atmospheric humidity and increased precipitation." TSD at 79 (emphasis added). It is therefore appropriate that EPA not rely on PM effects as a basis for proposing to find endangerment. On the other hand, if EPA were to proceed to a final endangerment finding, it would have to first address the potential health benefits from possible climate change-related PM reductions.

are negative. In addition, the TSD describes substantial uncertainties that attend the modeling of ozone-related impacts:

- "Relative to the other greenhouse gases, there is less confidence in reproducing the changes in ozone associated with large changes in emissions or climate, and in the simulation of observed long-term trends in ozone concentrations over the 20th century (Forster et al., 2007)." *Id.* at 15.

- "More frequent occurrences of stagnant air events in urban or industrial areas could enhance the intensity of air pollution events, although the importance of these effects is not yet well quantified (Denman et al., 2007)." *Id.* at 76.

These weakly stated acknowledgements that climate change will result in some ozone decreases and that specific posited effects are uncertain are still insufficiently reflective of the actual scientific record, which undermines EPA's reliance here on any supposed increase in ozone. EPA's own *Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Preliminary Synthesis of Climate Change Impacts on Ground-Level Ozone*, EPA/600/R-07/094F (April 2009) ("Ozone Assessment"), indicates that there are significant regions of the United States that are indeed likely to see ozone decreases associated with climate change; that reductions in ozone precursor emissions likely will overwhelm any increases that may result from climate change; and that, ultimately, the science in this area is riddled with uncertainties with respect to ozone (and PM). Moreover, EPA makes clear in its Ozone Assessment that scientific analysis of these issues and the development of models that might project climate-related ozone changes are only now in the most preliminary of phases. Astonishingly, the TSD and the Proposed Endangerment Finding omit any reference to these facts, even though they were publicly reported by the Agency itself in the very month in which it issued the Proposed Endangerment Finding. EPA's approach here of ignoring or distorting scientific assessments, including even its own contemporaneous report, is arbitrary and indefensible.

3. Effects on Public Health and Welfare

As explained above, EPA's assessment of climate change effects is divided into two primary sections, one addressing GHGs and their relation to climate change and phenomena that may be related to climate change (*e.g.*, changes in temperature and precipitation, sea level rise, and extreme events), and another examining the impact these phenomena could have on various public health and welfare interests. This part of UARG's comments focuses on EPA's evaluation of climate change impacts on: (1) human health; (2) air quality; (3) food production and agriculture; (4) forestry; (5) water resources; (6) sea level rise and coastal areas; (7) energy, infrastructure, and settlements; (8) ecosystems and wildlife; and (9) international impacts. As described in section V.A.2, *supra*, numerous flaws undermine the analysis and underlying data relied on by EPA in the TSD and the Proposed Endangerment Finding with respect to direct effects of GHGs on climate changes. Similar problems also undermine the Agency's conclusions with respect to the specific public health and welfare effects that may be related to those changes.

a. Human Health

Among the most clearly unsupported parts of the Proposed Endangerment Finding is that which addresses asserted effects on public health. EPA properly acknowledges that GHG emissions are not likely to have any direct effect on public health. 74 Fed. Reg. at 18902/1; TSD at 157 ("Greenhouse gases, at both current and projected atmospheric concentrations, are not expected to pose exposure risks on human respiratory systems (i.e., breathing/inhalation)."). EPA asserts, however, that "effects which may flow from a welfare effect," i.e., indirect health effects that may result from climate change, should be treated as public health threats regardless of their welfare-based cause. 74 Fed. Reg. at 18902/1. While any episode of mortality or morbidity resulting from any proximate cause is by definition a health impact, EPA has failed to

grasp the legal significance of this issue under the CAA. Indeed, the Agency fails even to note the fact that CAA regulation to protect against exclusively *indirect* health impacts is unprecedented. Further, the Agency does not even attempt to answer whether Congress intended that EPA regulate emissions under the CAA based on indirect health impacts of what otherwise constitute welfare effects. There are, for instance, statements in the legislative history of the CAA indicating that only direct health effects fall within the regulatory authority granted in the Act. *See, e.g.*, H.R. Rep. No. 95-294 at 51 (1977) ("[T]he Committee intends to require the Administrator to consider all sources of the contaminant which contribute to air pollution and to consider all sources of exposure to the contaminant -- food, water, air, etc. -- in determining health risks."); S. Rep. No. 91-1196 at 7 (1970) ("The protection of the public health and welfare requires definitive knowledge of the causal relationships *between exposure to air pollution agents* -- singly or in combinations -- and health or welfare under varying environmental conditions.") (emphasis added). The Agency cannot avoid these fundamental legal questions. It must address them directly.

Perhaps even more important, EPA fails even to begin to address one of the most fundamental problems with its fatally deficient proposal: The Administrator's acknowledged inability to make any conclusion as to whether the current or projected climate change phenomena that EPA describes has (or will have), on balance, a negative or a positive effect on human mortality and morbidity. As the Administrator observes:

> [W]arming temperatures may bring about some health benefits. Both *extremely cold days* and extremely hot days *are dangerous to human health*. But *at least in the short run, modest temperature increases may produce health benefits in the U.S.* (and elsewhere). Although *the IPCC projects reduced human mortality from cold exposure through 2100*, it is currently *difficult to ascertain the balance between increased heat-related mortality and decreased cold-related mortality*. With respect to health, different regions will be affected in different ways. *The*

> *Administrator does not believe that it is now possible to quantify the various [human health] effects [including effects on human mortality].*

74 Fed. Reg. at 18901/2 (emphases added). Thus:

- EPA acknowledges that extremely cold weather -- which would be *reduced* under the projections of climate change on which EPA relies -- results in increased human mortality;

- The IPCC, which EPA treats as authoritative, "projects reduced human mortality from cold exposure" due to projected climate change over at least the next nine decades, until at least the end of this century (a period EPA apparently views as "the short run"); and

- The Administrator has concluded that, at least at the present time, it is "not . . . possible" to determine whether projected climate change will, on balance, result in more or less human mortality.

In addition, EPA's assessment of the science, in its TSD, states forthrightly that "[i]t is not clear whether reduced mortality from cold will be greater or less than increased heat-related mortality in the U.S. due to climate change (Gamble et al., 2008)." TSD at 70. Thus, EPA concludes, "additional research is needed" to understand the mortality question. *Id.* at 71.

Nevertheless, in the face of this profound scientific uncertainty on this most important of public health or welfare effects, the Administrator concludes that it is "reasonable" to determine that public health is endangered. 74 Fed. Reg. at 18901/2. EPA cites no precedent, and UARG is aware of none, for this extraordinary result. *Cf. Massachusetts v. EPA*, 549 U.S. 497, 534 (2007) ("If the scientific uncertainty is so profound that it precludes EPA from making a reasoned judgment as to whether" the endangerment criterion is met, "EPA must say so."). EPA is utterly silent on its rationale for proposing to find endangerment notwithstanding what it characterizes as unresolvable uncertainty as to which way the balance of human mortality (and morbidity) may fall. EPA likewise fails to address the corollary fundamental question of how, in light of the admitted possibility that net weather-related human mortality would decline under

projected climate change, the Agency could find endangerment of *non-human-health* "welfare" interests and, on that basis, regulate emissions it believes contribute to that climate change.

Moreover, EPA's specific statements regarding asserted human health impacts of climate change are unjustified or inadequately supported. EPA states, for instance, that, based on the IPCC Fourth Assessment Report, "risks to public health will be more severe in 20 years than in ten years, more severe in 30 years than in 20 years, more severe in 40 years than in 30 years, and so forth," even while acknowledging that "[t]here is disagreement about whether and when increases in adverse effects will be linear or nonlinear." 74 Fed. Reg. at 18901/1. Regardless of this uncertainty, however, the Administrator "believe[s] that existing evidence supports a finding that there are current adverse effects. This evidence also supports a finding that these effects will become more serious over the next several decades, in some cases out to 2100." *Id*.; *see also id*. at 18901/2 ("The Administrator simply means to recognize, with the scientific community, that concentrations of greenhouse gases endanger public health through a wide range of pathways.").

In addition to these general conclusions, the Administrator makes special note of several potential pathways for human health effects to result from climate change. Addressing the relationship between temperatures and human mortality and morbidity, EPA states that "unusually hot days and nights and heat waves have become more frequent in the U.S. [and] are projected to intensify . . . with likely increases in mortality and morbidity." *Id*. Yet, as noted above, the Administrator "acknowledges that warming temperatures may bring about some health benefits" and that "at least in the short run, modest temperature increases may produce health benefits in the U.S. (and elsewhere)." *Id.* Despite this and the fact that the Administrator cannot "quantify the various effects," she concludes that "[b]ecause the risks from unusually hot days and nights, and from heat waves, are very serious, it is reasonable to find on balance that

these risks support a finding that public health is endangered even if it is also possible that modest temperature increases will have some beneficial health effects." *Id*.

EPA's rationale for this proposed conclusion that heat-related effects on human health suffice to support an endangerment finding is inconsistent with the available science. Indeed, the Agency's reasoning in the Proposed Endangerment Finding is undermined by statements in its own TSD. For example, as noted above, the TSD states that "[i]t is not clear whether reduced mortality from cold will be greater or less than increased heat-related mortality in the U.S. due to climate change (Gamble et al., 2008)." Moreover, the TSD explains that "[h]eat exposures vary widely, and current studies do not quantify the years of life lost due to high temperatures. Estimates of heat-related mortality attributable to climate change are reduced but not eliminated when assumptions about acclimatization and adaptation are included in models." TSD at 70. The TSD adds that "additional research is needed":

> [M]ortality patterns in U.S. cities are relatively insensitive to temperature variability. . . . Given the paucity of recent literature on the subject and the challenges in estimating and projecting weather-related mortality, IPCC concludes additional research is needed to understand how the balance of heat- and cold-related deaths might change globally under different climate scenarios (Confalonieri et al, 2007).

Id. at 71. Indeed, the uncertainty surrounding this issue is heightened in light of the significant questions related to modeling and temperature trends in particular, as noted in other sections of these comments, that also undermine EPA's conclusions.

Further, the Agency's selective citation to, and discussion of, the various effects that have examined this issue reveal significant biases that distort the presentation of the available evidence. First, EPA has removed from the TSD, without explanation or justification, reference to "several studies that indicate decreases in winter mortality may be greater than increases in summer mortality in some temperate counties under climate change," despite including this

information in an earlier draft. *Compare* Draft TSD, Doc. ID EPA-HQ-OAR-2008-0318-0082 at 66 (June 21, 2008) *with* TSD at 71. Moreover, despite a direct request from the Office of Management and Budget in a document summarizing the results of an interagency review proceeding,[19] EPA has refused to incorporate an assessment of a 2007 study by Deschenes and Moretti that demonstrates that extremely cold days are more dangerous to human health than extremely hot days. It appears that EPA has determined that it will not address the science that would tend to demonstrate a net health benefit related to mortality and temperature changes, even though such an analysis is crucial to answering questions that are central to a proper endangerment analysis.

The Administrator also points to health effects that may stem from a climate change-related "increase in the spread of several food and water-borne pathogens (e.g., Salmonella, Vibrio) among susceptible populations." 74 Fed. Reg. at 18901/3. She states that the "primary climate-related factors that affect these pathogens include temperature, precipitation, extreme weather events, and shifts in their ecological regimes." *Id*. If the TSD's contents are any indication, however, EPA has invested few resources in analyzing the effects of these climate-related factors on disease pathogens. Although it reports IPCC conclusions that disease may become more prevalent, *see, e.g.*, TSD at 69, 71, it provides no analysis of uncertainties and probabilities or any quantitative assessment of likely impacts-- even while observing that disease and health impacts related to drought are "likely to be experienced in developing countries and not directly in the U.S.," further weighing against any endangerment determination based on health factors. *Id.* at 72.

[19] Office of Management and Budget, Summary of Interagency Review Proceedings Document, EPA-HQ-2009-1071-01241 at 3.

In addition, the Administrator asserts that:

> Climate change, including the direct changes in carbon dioxide concentrations themselves, could impact the production, distribution, dispersion and allergenicity of aeroallergens and the growth and distribution of weeds, grasses and trees that produce them. These changes in aeroallergens and subsequent human exposures could affect the prevalence and severity of allergy symptoms.

74 Fed. Reg. at 18901/3. At the same time, however, the Administrator acknowledges that "the scientific literature does not provide definitive data or conclusions on how climate change might impact aeroallergens and subsequently the prevalence of allergenic illnesses in the U.S." *Id.* Interestingly, while mentioning this potential effect, the Administrator avoids saying that it is a basis for the Proposed Endangerment Finding -- and for good reason. The TSD notes the lack of scientific evidence linking increases in aeroallergens to human health impacts. TSD at 74. In fact, this type of uncertainty is comparable to the uncertainty that characterizes the other human health effects that the Administrator relies on for the Proposed Endangerment Finding. Therefore, just as it is inappropriate to rely on speculative climate-related effects on aeroallergens, insufficient scientific information exists to justify a finding that GHG emissions endanger public health.

Finally, it is important to emphasize that the TSD includes numerous, more general statements that raise further doubts as to the adequacy of a basis for concluding that public health will be adversely affected by climate change. For instance, the TSD states that "[h]uman system responses to climate change are *more difficult to identify* and isolate due to the larger role that non-climate factors play (e.g., management practices in agriculture and forestry, and *adaptation responses to protect human health against adverse climatic conditions*) (Rosenzweig et al., 2007)." *Id.* at 44 (emphasis added). EPA fails even to attempt to address these complications in the TSD or in the Proposed Endangerment Finding.

b. Ozone and Air Quality

Regarding the air quality effects of climate change and their potential to impact public health and welfare, the Administrator concludes:

> Increases in regional ozone pollution in the U.S. relative to ozone levels without climate change *are expected* due to higher temperatures and a modification of meteorological factors. Increases in regional ozone pollution *increase the risks of respiratory infection, aggravation of asthma, and premature death*. EPA does have in place National Ambient Air Quality Standards (NAAQS) for ozone, which are premised on the harmfulness of ozone to public health and welfare. These standards and their accompanying regulatory regime have helped to reduce the dangers from ozone in the U.S. Substantial challenges remain with respect to achieving the air quality protection promised by the NAAQS for ozone. These challenges will be exacerbated by climate change.

74 Fed. Reg. at 18901/2-3 (emphases added).

Thus, according to the Administrator, ozone levels will be higher than might otherwise be the case if no climate change were to occur. Moreover, this might require additional efforts of some unspecified sort to maintain compliance with existing CAA regulatory standards that are requisite to protect public health and welfare. Although the Administrator's proposed findings touch on issues related to endangerment under the CAA, they demonstrate that the standard for making a positive determination has not been satisfied. Indeed, the Administrator does not claim that climate change will result in an inability to comply with existing regulations that protect public health and welfare from ozone pollution, only that continued protection might require increased efforts. EPA has not shown that this is a basis for an endangerment finding.

Finally, as noted above, EPA's TSD statements contradict the Agency findings reached two months ago in its Ozone Assessment. The TSD summarizes that report's findings repeatedly in a misleading and incomplete manner. EPA cannot rationally proceed to an endangerment finding on the basis of a TSD that is inconsistent with its own contemporaneous report.

c. Food Production and Agriculture

EPA states a number of proposed conclusions related to asserted impacts of climate change on food production and agriculture. It notes, for instance, that "[c]limate changes are very likely already affecting U.S. water resources, agriculture, land resources, and biodiversity as a result of climate variability and change." *Id*. at 18899/1. The Agency notes that there will be aggregate benefits for agriculture in the early decades of this century with increased yields of approximately 5 to 20 percent, even while asserting that "as temperature rises, these crops will increasingly begin to experience failure, especially if climate variability increases and precipitation lessens or becomes more variable." *Id*. at 18902/2-3. EPA also proposes to conclude that "[h]igher temperatures will very likely reduce livestock production during the summer season, but these losses will very likely be partially offset by warmer temperatures during the winter season." *Id*. at 18902/3. Despite the benefits concededly associated with climate change for this sector, the Administrator states that ultimately the existence of these benefits "is not inconsistent with a judgment that greenhouse gases in the atmosphere endanger welfare. Beneficial effects can coexist with harmful effects, and it is not necessary to reach a firm conclusion, for particular domains and sectors, about the net result in order to reach an overall conclusion in favor of endangerment." *Id*. at 18903/1.

Given these statements, it is not entirely clear whether EPA is proposing to determine that effects on food production and agriculture support or do not support its purported basis for finding endangerment. It is possible to read the Administrator's findings as indicating that she believes the positive effects will ultimately be outweighed by the negative effects; on the other hand, her statements may be interpreted to mean that the overall beneficial effects of climate change for this sector are outweighed by negative effects on other health and welfare interests. The Administrator's conclusions do not appear to be consistent with the conclusions of the U.S.

Department of Agriculture, as expressed in a recent CCSP report, *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*, SAP 4.3 (May 2008). In that report, the Department of Agriculture concludes that most crops for which there are data will experience net productivity gains, despite certain projected negative impacts resulting from temperature increases, precipitation changes, and increased pest and disease activity. *Id.* at 59, 70-71.

The Agency must provide clarity on these issues. In an opinion later modified and then reversed on other grounds, the U.S. Court of Appeals for the D.C. Circuit held that the CAA requires EPA to consider both adverse and beneficent health effects of pollutants and to assess "net" health impacts. *American Trucking Ass'ns, Inc. v. EPA*, 175 F.3d 1027, 1053 (D.C. Cir. 1999). As in the *American Trucking* case, EPA must determine likely net health impacts before it can reasonably conclude that GHG emissions pose a risk to public health. Yet, this is precisely what EPA has failed to do in the Proposed Endangerment Finding.

Regardless of EPA's analysis, the evidence presented by EPA regarding these issues indicates substantial beneficial effects that should not be downplayed or disregarded, as the Agency appears to be doing. Further, it bears repeating that many of the Agency's conclusions related to the negative impacts that climate change might have on this sector require revision after a reassessment of the science addressing the direct effects of GHG emissions on climate change factors, such as precipitation, drought, extreme events, and temperature projections.

Further, the section of the TSD addressing these issues appears to exhibit significant bias. It fails even to attempt to quantify the relative impacts of positive and negative effects except in those instances where the Agency can find an argument that minimizes benefits. *See, e.g.*, TSD at 84 (discussing and downplaying positive benefits of direct CO_2 exposure); *id.* at 85-86

(suggesting that extreme events may offset any benefits of moderate climate change). This bias calls into question the remainder of this section's analysis.

Similarly, speculation in this section of the TSD undermines its reliability. Specifically, the TSD asserts that elevated CO_2 levels can reduce livestock feed's nutritional value by leading to a decrease in C4 grasses and an increase in C3 grasses. It also states, however, that "the exact effects on both types of grasses and their nutritional quality still need[] to be determined." *Id.* at 87. EPA thus contradicts its own prediction of negative effects by its acknowledgement that the matter remains undetermined.

Furthermore, the TSD states in general, outside of the section addressing these impacts, that "[h]uman system responses to climate change are more difficult to identify and isolate due to the larger role that non-climate factors play (e.g., *management practices in agriculture* and forestry, and adaptation responses to protect human health against adverse climatic conditions) (Rosenzweig et al., 2007)." *Id.* at 44 (emphasis added). The TSD fails, however, to address these difficult uncertainties in its actual analysis of agricultural effects. Indeed, it is unclear whether any of these considerations factored into EPA's assessment of this area of the science. Accordingly, the Proposed Endangerment Finding and the TSD fail to present a persuasive case in support of endangerment based on agriculture and food production impacts.

d. Forestry

The Administrator's ultimate position on whether forestry impacts support or do not support her proposed endangerment finding is unclear. 74 Fed. Reg. 18903/1 ("The Administrator acknowledges that as for human health, so too for welfare: moderate temperature increases may have some benefits, particularly for . . . forestry over the short term. . . . This possibility is not inconsistent with a judgment that greenhouse gases in the atmosphere endanger welfare. Beneficial effects can coexist with harmful effects, and it is not necessary to reach a

firm conclusion, for particular domains and sectors, about the net result in order to reach an overall conclusion in favor of endangerment."). The Administrator reports that both negative and positive effects on forestry are expected:

> Climate change has very likely increased the size and number of forest fires, insect outbreaks, and tree mortality in the interior west, the Southwest, and Alaska, and will continue to do so. . . . IPCC reported that overall forest growth for North America as a whole will likely increase modestly (10–20 percent) as a result of extended growing seasons and elevated CO_2 over the next century, but with important spatial and temporal variation.

Id. at 18902/2-3. The Administrator also cites tropospheric ozone increases as negatively impacting forest growth. *Id*. The conclusions contained in the TSD by and large mirror the Administrator's proposed findings, discussing such issues as increased forest growth, increased wildfires and drought, more frequent insect and disease outbreaks, more severe extreme event disruptions, and reduced biodiversity resulting from the spread of invasive species.

Again, EPA's projections are subject to serious question due to the Agency's failure to reassess previous modeling results in light of new scientific studies, as discussed above. Further, projections of invasive species impacts should be reexamined in light of recent studies, discussed further in section V.D.2.e above, indicating that climate change will have considerably less of an impact in this regard. *See* Sax and Gaines; Bradley et al.

It is also important to note that the Administrator's discussion of this issue ignores several other climate change-related sources of forest growth benefits. The TSD states:

> Forest productivity gains may result through: (i) the direct stimulatory CO_2 fertilization effect (although the magnitude of this effect remains uncertain over the long term and can be curtailed by other changing factors); (ii) warming in cold climates, given concomitant precipitation increases to compensate for possibly increasing water vapor pressure deficits; and (iii) precipitation increases under water limited conditions (Fischlin et al., 2007).

TSD at 90. Thus, it appears that the Administrator's statements on this issue fail to account for the full range of positive influences.

The Administrator also ignores a singular benefit of increased forest growth: the correlated increase in CO_2 sinks. The TSD states that "North American forests will absorb more CO_2 and might retain more carbon as atmospheric CO_2 increases." *Id*. Neglecting these complex interactions skews the analysis of endangerment from GHG emissions and likewise feeds into what most likely are inaccurate projections of future GHG concentrations. EPA fails to address this important issue.

Additionally, the section of the TSD addressing forest impacts indulges in speculation in the face of multiple uncertainties. For instance, the TSD cites as evidence for current climate change impacts that "[g]rowth is slowing in areas subject to drought." *Id.* It is not at all established that this drought was caused by climate change or GHG emissions. Elsewhere, the document suggests that wildfires will pose the largest threat to forests over time. It notes, however, that wildfires and other extreme events are "not well represented in models" even as it suggests that wildfires will increase by as much as 10 percent. *Id.* at 92; *see also id.* at 93 (noting that insect and pathogen outbreaks modeling also remains limited). Given that wildfires (and similar events) cannot be accurately modeled, it is unclear how the TSD arrives, or could arrive, at such a specific projection. Indeed, a recent scientific study ignored by EPA has found that past climate change has not been directly linked to increases in wildfires, that a variety of other factors are instead more closely related to increases in wildfire events, and that climate interactions with other factors can override any influence of climate change on wildfire events. Higuera, et al., *Vegetation Mediated the Impacts of Postglacial Climate Change on Fire Regimes in the South-Central Brooks Range, Alaska*, 79 ECOLOGICAL MONOGRAPHS 201-19 (2009). For

instance, the TSD states that forest productivity impacts due to climate change are "difficult to separate . . . from other potentially influencing factors, particularly because these interactions vary by location." TSD at 89. This, however, is precisely the sort of information needed in any rational evaluation of the potential for endangerment, and the Agency's suggestion that these impacts result from climate is speculative and wholly unsupportable.

Finally, this section of the Endangerment TSD suggests that changing forestry conditions in the United States might place it at a competitive disadvantage with other nations that will experience more positive effects from climate change. The document does not, however, attempt to analyze this issue at any useful level of detail. Further, no other sections of the TSD address the international competitiveness issue. If, as seems probable, the United States is likely to be placed at a competitive *advantage* to other nations as a result of other effects of climate change, those possible benefits to the United States should equally be reflected in the document. Failure to address this matter even-handedly contributes to the bias exhibited by EPA's analysis.

e. Water Resources

Regarding water resources, the Administrator proposes to find that "[c]limate change will likely further constrain already over-allocated water resources in some sections of the U.S., increasing competition among agricultural, municipal, industrial, and ecological uses." 74 Fed. Reg. 18902/2-3. She notes that "current water management practices in the U.S. are generally advanced, particularly in the West," *id.* at 18902/3, but concludes that "climate change increasingly creates conditions well outside of historical observations," *id.*, and that drought "is expected to increase in the western U.S., where water availability to meet demands for agricultural and municipal water needs is already limited," *id.* at 18900/1. In addition, the Administrator proposes to find that lower water levels in lakes and rivers "are likely to exacerbate challenges relating to water quality, navigation, recreation, hydropower generation,

water transfers, and binational relationships," *id*., that "[h]igher water temperatures, increased precipitation intensity, and longer periods of low flows can exacerbate many forms of water pollution," *id*., and that "[r]ising sea levels could lead to salt water intrusion of coastal ground aquifers, which would further reduce freshwater availability for municipal and agricultural use among coastal communities that depend on these aquifers," *id*. at 18900/1-2.

As with the other public health and welfare issues addressed in these comments, the Administrator's conclusions and the TSD passages addressing water resources require reassessment in light of new scientific findings. Moreover, although the TSD notes potential negative impacts on water quality and supply from population increases, TSD at 94, and states that water shortages will be influenced by "changes in withdrawals (reflecting development, demand, and availability of other sources)," *id.* at 96, these influences are independent of climate change and cannot properly be considered in assessing endangerment. Their inclusion further undermines the document's usefulness as support for any endangerment finding.

Similarly, scientific clarity is compromised by this TSD section's treatment of various uncertainties and its tendency to engage in speculation. Specifically, the document acknowledges that data on existing groundwater supplies are "limited," yet, in the face of this lack of information, EPA proceeds to reach a number of conclusions about purported groundwater impacts. *Id*. Additionally, this section of the document argues that extreme weather events will negatively affect water resources by allowing salt water intrusion into fresh groundwater, increasing water pollution levels and negatively affecting water supplies. The TSD fails to note, however, that modeling of extreme events is plagued by significant uncertainties, as discussed above, even though this information is included in other sections.

Finally, this section of the TSD fails to acknowledge and quantify clear beneficial effects even as it describes asserted negative effects associated with the source of the benefits. The TSD, for instance, notes that certain water bodies will likely experience increased navigability as a result of climate change, but the document fails to quantify this benefit or to compare its relative value to decreases in navigability elsewhere. *Id.* at 99. Similarly, other sections of the TSD specifically note the sophisticated water treatment infrastructure and regulatory structures in place in the United States. *See, e.g.*, *id.* at 73. Yet this key section, which is supposed to assess potential impacts on water resources, fails to address how climate change impacts would be moderated through implementation of existing laws, such as the Safe Drinking Water Act and the Clean Water Act. Given that EPA is charged with implementing these laws, EPA would need to evaluate whether they will effectively avoid all or portions of any projected negative impacts.

f. Sea Level Rise and Coastal Areas

The Proposed Endangerment Finding contains a number statements related to sea level rise and coastal areas:

> Coastal communities and habitats will be increasingly stressed by climate change impacts interacting with development and pollution. Sea level is rising along much of the U.S. coast, and the rate of change will increase in the future, exacerbating the impacts of progressive inundation, storm-surge flooding, and shoreline erosion. Coastal aquifers and estuaries are vulnerable to salt water intrusion due to rising sea levels, which could compromise water sources used for municipal drinking water, agricultural crops, and other human uses. Storm impacts are likely to be more severe, especially along the Gulf and Atlantic coasts. Salt marshes, other coastal habitats, and dependent species are threatened by sea-level rise, fixed structures blocking landward migration, and changes in vegetation. Population growth and rising value of infrastructure in coastal areas increases vulnerability to climate variability and future climate change.

74 Fed. Reg. at 18902/3.

Thus, the Administrator proposes to reach a number of highly problematic conclusions with respect to coastal impacts. As stated above, the severity and rate of sea level rise is significantly overestimated in the EPA's scientific assessment. This means that related impacts, such as flooding, shoreline erosion, and salt water intrusion, are also overstated.

The TSD section addressing sea level rise and coastal areas also includes discussion of various impacts on and problems facing coastal areas that are not necessarily linked to climate change or even to sea level rise. *See, e.g.*, TSD at 100 (discussing coastal areas stressed by development and pollution), 101 (discussing 'coastal squeeze' and its effects on wetlands), 101 (discussing erosion in the Great Lakes, where sea level rise "is not a concern"). Moreover, as the TSD indicates, "[a]lthough climate change is impacting coastal systems, non-climate human impacts *have been more damaging over the past century*." *Id.* at 100-01 (emphasis added).

Thus, it appears that the evidence EPA presents related to coastal impacts due to climate change is significantly overstated to the extent these other effects are not effectively distinguished from climate change-related impacts. These issues are improper for inclusion in an assessment of possible endangerment from GHGs.

g. Energy, Infrastructure, and Settlements

The Administrator proposes to conclude that "[c]limate change is likely to affect U.S. energy use (e.g., heating and cooling requirements), and energy production (e.g., effects on hydropower), physical infrastructures and institutional infrastructures. Climate change will likely interact with and possibly exacerbate ongoing environmental change and environmental pressures in settlements, particularly in Alaska where indigenous communities are facing major environmental changes from sea ice loss and coastal erosion that threaten traditional ways of life." 74 Fed. Reg. at 18902/3-18903/1.

These statements in the Proposed Endangerment Finding are exceptionally vague. It is completely unclear from those statements whether EPA views the effects it describes as positive or negative; indeed, it is unclear exactly what the effects may be at all. The TSD section describing these effects provides somewhat more detail on the relevant science but is flawed in the ways identified below (and also fails to meet the overarching need, discussed above, for the PSD to reassess projections of climate change and its effects based on new scientific studies).

This section of the TSD engages in speculation that is unsupported by the science and overstates the likely impact of climate change. For instance, the document acknowledges that industries and settlements "have become resilient to" variability in climate conditions but follows up this statement by suggesting that variability caused by climate change will be greater than the capacity to adapt. TSD at 105. In the absence of evidence, this assertion is unwarranted. Similarly, the TSD notes that "it is not possible to attribute the occurrence of any singular [sic] hurricane to climate change," yet it engages in an indirect but speculative attempt to make such an attribution when it suggests that energy-related impacts caused by Hurricanes Ivan, Katrina, and Rita are "indicator[s] of the kinds of impacts that could manifest as a result of climate change (CCSP, 2007a)." *Id.* at 107. Moreover, as demonstrated above, projections of hurricanes and other extreme events are subject to greater uncertainties than the TSD generally acknowledges.

This section of the TSD also unjustifiably favors study results that suggest impacts will be significant over those that predict the opposite. This is especially problematic in the document's discussion of energy use for heating and cooling. The weight of the evidence on this issue indicates that overall energy use will not increase substantially because increases and decreases will generally net out. *Id.* at 105. The TSD acknowledges that changes in energy

consumption will vary region to region and that overall effects on energy consumption are not clear. *Id.* ("Generally speaking, the net effects of climate change in the U.S. on total energy demand are projected to amount to between perhaps a 5% increase and decrease in demand per 1ºC in warming in buildings. Existing studies do not agree on whether there would be a net increase or decrease in energy consumption with changed climate because a variety of methodologies have been used (CCSP, 2007a)."). Despite these uncertainties, the TSD improperly emphasizes one study that predicts a significant increase in electricity demand requiring substantial investment in new generation. EPA gives no reason for singling out this one study for deference. Indeed, EPA apparently has not evaluated this study itself and only refers to a CCSP synthesis report that apparently cites it. *Id.* at 106. Where one study is -- without explanation -- given special weight, it is an especially egregious error to fail to assess it with reasonable clarity. EPA also fails to justify its decision to deemphasize the greater body of science on this issue.

Similar problems undermine the TSD's assessment of asserted climate change-related impacts on transportation resources and human settlements. As with energy production, the TSD states that these resources will primarily be affected by "weather and climate extremes, such as very hot days; intense precipitation events; intense hurricanes; drought; and rising sea levels, coupled with storm surges and land subsidence." *Id.* at 109; *see also id.* at 111. First, land subsidence plainly is not a climate change-related influence. More broadly, any asserted impacts that EPA tries to trace to climate change effects would have to be reassessed based on the flaws described above in EPA's analysis of those effects. Further, this section of the TSD acknowledges that adaptive capacity is a significant factor in determining the severity of impacts to human settlements. *Id.* at 111. Because the Agency improperly omits analysis of adaptation

from its assessment of endangerment, however, the TSD's conclusion with respect to these effects is incomplete and inaccurate.

h. Ecosystems and Wildlife

The Administrator proposes to find that "changes in climate will cause some species to shift north and to higher elevations and fundamentally rearrange U.S. ecosystems. Differential capacities to adapt to range shifts and constraints from development, habitat fragmentation, invasive species, and broken ecological connections will alter ecosystem structure, composition, function, and services." 74 Fed. Reg. at 18903/1. In addition to the overarching concerns resulting from the need for reanalysis of earlier modeling results, these conclusions and the TSD's analysis of these issues are marked by several specific shortcomings.

A number of problems with EPA's analysis of ecosystem and wildlife impacts have led to misguided conclusions in the Proposed Endangerment Finding. First, the TSD describes possible effects on plant phenology, such as the onset of greenness and leaf senescence. TSD at 113. EPA offers no basis, however, for judging whether these effects are positive, negative, or neutral. The same is true with respect to similar life-cycle issues for animal species. *See id.* at 114. EPA speculates that these changes "may shift out of sync, causing species to become decoupled from their resource requirements." *Id*. It further speculates that "the decline of long-distance migratory birds in the United States may originate in mistiming of breeding and food abundance due to differences in phenological shifts in response to climate change (Scott et al., 2008)." *Id.* EPA provides no assessment of the evidence supporting these assertions, which appear to be mere guesses. These unsupported "effects" are not a basis for an affirmative endangerment finding. Similarly, the TSD states that there will be increases in global likelihood of species extinctions and that 20 to 30 percent of species globally will be at risk. *Id.* at 117. The document notes, however, that such risk varies regionally and includes percentages as low as 1

percent, *id.*, and EPA again fails to identify the risk levels applicable in the United States, a failing that makes this information useless in a CAA endangerment assessment.

The TSD also describes potential range shifts for various plant and animal species. It states that "[m]igrating to higher elevations with more suitable temperatures can be an effective strategy for species if habitat connectivity exists and other biotic and abiotic conditions are appropriate." *Id.* at 114. The TSD further states, however, that "many organisms cannot shift their ranges fast enough to keep up with the current pace of climate change (Fischlin et al., 2007)." *Id.* This statement suggests that adaptive capacities are limited and will result in species loss. That some (but not all) species will have migration as an option for adaptation does not however, support a conclusion that species will be unable to adapt in other ways. Similarly, the TSD describes a number of ecosystem changes that may occur in certain regions and localities in the United States. *Id.* (discussing frog breeding in upstate New York), 115 (discussing changes in marine mammal and pelagic fish populations in the Southeastern Bering Sea). Again, EPA provides no basis for concluding whether these effects will actually be negative. Indeed, reference to changes at specific locations overlooks the potential for offsetting changes in other regions and localities. EPA cannot conclude that ecosystem changes will result in overall negative effects without thoroughly examining ecosystem changes throughout the nation. Further, the Agency must acknowledge and explain the significant limitations in regional-scale modeling and the implications of these limitations for EPA's conclusions.

Regarding marine organisms and ecosystems, the TSD states that "human impacts such as overfishing, pollution, and the introduction of invasive species" negatively affect these resources and may exacerbate any problems that result from climate change. These effects, however, will occur regardless of whether climate change results in any additional impacts to

marine organisms and ecosystems, and they are therefore inappropriate considerations in an assessment of possible endangerment from GHG emissions. *Id.* at 114.

The TSD also projects that climate change will result in decreased biodiversity. The science in this area is particularly uncertain, however, and even the studies EPA cites indicate that there may be long-term positive developments in species richness. *Id.* at 117, 118 (noting lack of information regarding numerous species). Further, as noted above, recent studies indicate that biodiversity impacts and invasive species propagation will be limited. In addition, the document cites the IPCC for the conclusion that ocean acidification will result in declines in carbonate-based marine organisms, such as corals, due to reduced aragonite needed for biocalcification. *Id.* at 114. The IPCC, however, concluded with only medium confidence that that increased CO_2 levels in conjunction with climate change *could* have negative impacts on these same marine organisms. Working Group II Ch. IV at 213, 234, Fischlin A. et al., 2007. The TSD improperly fails to reflect accurately the uncertainties and limitations embedded in its source material.

4. International Impacts

As noted above, the TSD devotes substantial space to discussion of global emissions and global effects of climate change, often commingling discussion of these effects with discussion of U.S. impacts in a manner that prevents accurate assessment of the effects of climate change on U.S. resources alone. Beyond this, the Administrator and the TSD both address international impacts separately from U.S. effects. The Administrator states that her proposed endangerment finding is warranted based only on the health and welfare effects projected to occur in the United States. She further states: "In addition, the scientific evidence concerning risks and impacts occurring outside the U.S., including risks and impacts that can affect people in the U.S., provides further support for this finding." 74 Fed. Reg. at 18888/1.

The analysis of international issues presented in the TSD is wholly unscientific and cannot provide any support for an endangerment finding. In general, the TSD discusses potential effects of climate change in other nations, focusing particularly on areas EPA characterizes as vulnerable, including Africa, Asia, Latin America, Polar Regions, and Small Islands. It asserts that climate change will affect the health of people, food production, and water resources in these regions and could influence international trade. TSD at 125-28. Although scientific evidence exists on potential impacts of climate change in foreign nations, these impacts are not directly relevant to an endangerment assessment. Moreover, EPA's attempt to tie foreign effects to the United States by noting the potential international trade effects of climate change fails because, as EPA concedes, "[t]here is currently a lack of information about how these potential impacts in other regions of the world may influence international trade and migration patterns." *Id.* at 125.

The TSD likewise fails to establish that foreign impacts will affect U.S. interests in other ways. Again, EPA suggests vaguely that foreign climate change impacts "may have consequences that transcend national boundaries that raise concerns for the U.S." *Id.* at 2. The only "evidence" of additional transcendental consequences to which EPA can point, however, is derived from non-scientific sources that are inherently speculative. The TSD cites, for instance, a Defense Department report concluding that climate change could potentially destabilize global geopolitics. *Id.* at 123. The TSD also cites a report suggesting that opening Arctic sea routes could raise questions about sovereignty rights in the Arctic. *Id.* Moreover, it cites a report detailing the opinions of 12 retired generals and admirals regarding possible threats climate change could pose to national security. *Id.* at 124. Resort to this unscientific, speculative grab-bag reflects EPA's unjustifiable attempt to expand the scope of its endangerment assessment to encompass issues that are not shown to impact U.S. public health and welfare. Indeed, the TSD

notes that neither the IPCC nor the CCSP -- on which EPA otherwise heavily relies -- has "explicitly addressed these issues." *Id.* at 6.

VI. The Proposed Endangerment Finding and the TSD Fail To Comply with the Data Quality Act.

When President Obama appointed Administrator Jackson to lead EPA, she pledged that all of EPA's efforts would be "rooted in three fundamental values: science-based policies and programs, adherence to the rule of law, and overwhelming transparency."[20] In a memorandum to EPA staff issued shortly after her Senate confirmation, Administrator Jackson explained these three values further, expressing the importance of "rigorous adherence to the best available science," observing that, while policy judgments are required for the proper implementation of law, "policy decisions should not be disguised as scientific findings," and reminding Agency staff that "[p]ublic trust in the Agency demands . . . that we fully disclose the information that forms the bases for our decisions."[21] More recently, in EPA's Semiannual Regulatory Agenda, she reiterated EPA's commitment to these three principles.[22]

Sadly, in the Proposed Endangerment Finding and its accompanying TSD, EPA has missed an opportunity to put these principles into practice. Indeed, EPA here falls far short of the Administrator's stated goals. And, more significant from a legal standpoint, EPA has violated the DQA,[23] the guidelines set forth by the Office of Management and Budget to

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[20] Statement by Administrator-designate Lisa Jackson (Jan. 23, 2009), *available at* http://yosemite.epa.gov/opa/admpress.nsf/0/2297C12A9F4773D285257547006497D4.

[21] Memo to EPA Employees from Administrator Lisa P. Jackson (Jan. 23, 2009), *available at* http://www.epa.gov/administrator/memotoemployees.html.

[22] 74 Fed. Reg. 21992, 21993/1 (May 11, 2009).

[23] Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub. L. No. 106-554, § 515 (Dec. 21, 2001), 114 Stat. 2763.

implement the DQA ("OMB Guidelines"),[24] and EPA's own DQA guidelines ("EPA Guidelines").[25]

The DQA and the OMB Guidelines require federal agencies, including EPA, to issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of all information disseminated by the agency and establishing administrative procedures allowing affected parties to request and obtain correction of any disseminated information that fails to comply with those guidelines. EPA has published guidelines that closely track the language in the OMB Guidelines.

The OMB and EPA Guidelines define dissemination of information as any distribution of information to the public that is initiated or sponsored by the agency,[26] including distribution of information prepared by a party outside the agency in a manner that suggests the agency intends to endorse or agree with that information.[27] The term "quality" broadly encompasses the standards of objectivity, utility, and integrity.[28] The standard of objectivity refers to information that is "presented in an accurate, clear, complete and unbiased manner."[29] The standard of utility refers to "the usefulness of the information to its intended users, including the public."[30] The

[24] 67 Fed. Reg. 8452 (Feb. 22, 2002).

[25] U.S. EPA Office of Environmental Information, "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency," EPA/260R-02-008 (Oct. 2002).

[26] 67 Fed. Reg. at 8460/2-3; EPA Guidelines at 15.

[27] EPA Guidelines at 16; *see also* 67 Fed. Reg. at 8454/1.

[28] 67 Fed. Reg. at 8459/2; EPA Guidelines at 15.

[29] 67 Fed. Reg. at 8459/3; EPA Guidelines at 15.

[30] 67 Fed. Reg. at 8459/2; *see also* EPA Guidelines at 15.

standard of integrity refers to the security of the information, meaning its protection from unauthorized access or revision.[31]

In compliance with the OMB Guidelines, the EPA Guidelines impose heightened standards for the quality of "influential information," which is defined as information that the Agency anticipates "will have or does have a clear and substantial impact . . . on important public policies or private sector decisions."[32] Influential information is to be disseminated with a higher-than-usual degree of transparency with respect to: "(1) the source of the data used, (2) the various assumptions employed, (3) the analytic methods applied, and (4) the statistical procedures employed," in order to "facilitate the reproducibility of such information by qualified third parties, to an acceptable degree of imprecision."[33] Among the classes of information deemed "influential" by EPA is information that is "disseminated in support of top Agency actions," such as rules, substantive notices, and policy documents.[34] Undoubtedly, the Proposed Endangerment Finding and the TSD on which it relies fall into this category, as these documents would form the basis for the unprecedented regulation of GHG emissions under the CAA. In addition, as described further below, the EPA Guidelines impose special requirements for the quality of science used in risk assessments.

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[31] 67 Fed. Reg. at 8460/2; EPA Guidelines at 15.

[32] EPA Guidelines at 19.

[33] *Id.* at 20-21.

[34] *Id.* at 20.

Despite assurances from EPA to the contrary,[35] it is clear that the TSD on which the Proposed Endangerment Finding is based fails to comply with OMB and EPA Guidelines for dissemination of influential information. Specifically, as described in the sections below, EPA has failed to comply with the requirements that it: (1) undertake an independent external peer review of the TSD; (2) provide information that is reproducible; and (3) use only the best available science. In accordance with the procedures set out in the EPA Guidelines,[36] UARG respectfully submits a Request for Correction of information in the TSD with respect to each of these three issues and reserves its right to file a Request for Reconsideration of any refusal by the Agency to make corrections or any inadequate correction by the Agency, pursuant to section 8.6 of the EPA Guidelines.[37] UARG has an interest in ensuring that the TSD, which forms the basis for the Proposed Endangerment Finding, is accurate. A final endangerment finding by EPA would raise issues concerning requirements for stationary sources, including electric generating units such as those operated by UARG members, under the CAA. UARG members will benefit from ensuring that any finding by EPA with regard to the question of endangerment rests on sound scientific principles.

[35] Both the TSD and the Proposed Endangerment Finding state that the information in the TSD complies with the EPA Guidelines. TSD at 4; 74 Fed. Reg. at 18894/1.

[36] *See* EPA Guidelines at 30-33. Section 8.5 of the EPA Guidelines states that any Request for Correction of disseminated information for which a public comment period is provided should be addressed using the public comment process. *See id.* at 32.

[37] *Id.* at 34.

A. Inadequate Peer Review

EPA requires independent external peer review in accordance with EPA's Peer Review Handbook (the "Handbook")[38] of influential information such as that in the Proposed Endangerment Finding and the TSD.[39] The Handbook explains that peer reviewers are to be individuals or organizations "who are independent of those who performed the work" to be reviewed[40] and who are unbiased and do not "have a material stake in the outcome of the peer review."[41] It explains further that "EPA should always make every effort to use peer reviewers who do not have any conflict of interest or an appearance of a lack of impartiality, and who are completely independent."[42] Although many qualified experts were available to serve as reviewers of the TSD, EPA chose external reviewers who were likely in favor of the conclusions stated in the Proposed Endangerment Finding.

All 12 reviewers for the TSD are scientists employed by the federal government. One is an EPA scientist. Each of the reviewers is closely affiliated with the CCSP and has openly and publicly articulated his or her belief that GHGs create dangers for public health and welfare. Seven of the 12 reviewers authored studies that are cited in the TSD; several of those studies are cited extensively and relied on by the TSD.

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[38] U.S. EPA Science Policy Council, "U.S. Environmental Protection Agency Peer Review Handbook" (3d ed.), EPA/100/B-06/002 (May 2006).

[39] EPA Guidelines at 11; EPA Peer Review Policy, available at http://www.epa.gov/OSA/spc/2peerrev.htm.

[40] Handbook at 12.

[41] *Id.* at 13.

[42] *Id.* at 60.

Thus, none of the reviewers chosen by EPA could be expected to provide a critical, independent, and objective peer review of the TSD. EPA's failure to subject the TSD to independent external peer review violates the DQA and the EPA Guidelines. Therefore, UARG's first Request for Correction is a request that EPA submit the TSD to independent external peer review pursuant to the Handbook, as required by the EPA Guidelines.

B. Lack of Transparency

As described above, the EPA Guidelines set especially strict requirements for transparency when the Agency disseminates influential information such as that in the TSD and the Proposed Endangerment Finding. The purpose of this heightened level of transparency is to allow for reproducibility by qualified members of the public.[43] The OMB Guidelines explain in greater detail that agency guidelines are to "require sufficient transparency about data and methods that an independent reanalysis could be undertaken by a qualified member of the public . . . [whether] agency analysis [is] of data from a single study . . . [or] combine[s] information from multiple studies."[44] The OMB Guidelines explain, and the EPA Guidelines acknowledge, that agencies may deviate from this requirement only in cases where a "compelling interest," such as "privacy, trade secrets [or] intellectual property," requires that transparency be limited.[45] In cases where transparency is limited by a compelling interest, the agency is required to "apply especially rigorous robustness checks to analytic results and document what checks were undertaken."[46] The OMB Guidelines state that in every case, agency guidelines are to require

[43] EPA Guidelines at 20-21.

[44] 67 Fed. Reg. at 8460/1.

[45] *Id.*; EPA Guidelines at 21.

[46] 67 Fed. Reg. at 8460/1; *see also* EPA Guidelines at 21.

"disclosure of the specific data sources that have been used and the specific quantitative methods and assumptions that have been employed."[47] EPA has failed to fulfill these transparency requirements in the TSD and the Proposed Endangerment Finding.

EPA has not provided access or reference to any raw data or to any data source and has not described the methods and assumptions it used to analyze the information it relied on for the conclusions in the Proposed Endangerment Finding. This is likely due, at least in part, to EPA's heavy reliance on reports by the CCSP and the IPCC. Over two-thirds of the citations in the TSD are to reports published by or in connection with one of these groups or the National Research Council, and only a small fraction of the remaining one-third are references to independent studies or journal articles. Most of the remaining references are to reports or online statistical compilations by EPA and other federal agencies. EPA explains in the Proposed Endangerment Finding that it chose to rely on reports by the IPCC and the CCSP "rather than conducting a new assessment of the scientific literature" and that it views the IPCC in particular as a "benchmark" against which it plans to judge future research and findings.[48] Transparency is, therefore, limited by EPA's decision to adopt the reports of the IPCC and the CCSP instead of developing its own position based on independent scientific research.

Yet, neither the TSD nor the Proposed Endangerment Finding describes any type of checks undertaken by EPA to evaluate the scientific data on which the IPCC and CCSP reports were based, or indicates whether EPA reviewed or even had access to those underlying data. The TSD says that IPCC reports are based "*mainly* on peer reviewed and published

[47] 67 Fed. Reg. at 8460/1.

[48] 74 Fed. Reg. at 18894/1.

scientific/technical literature" and that they are subject to expert and governmental review.[49] the TSD also says that CCSP reports are subject to expert, interagency, and public review and that final reports issued by CCSP comply with the DQA.[50] EPA's explanations are aimed at indicating that, in EPA's view, the information in the IPCC and CCSP reports are reliable; they do *not* indicate that EPA has reviewed or assessed the accuracy of the data underlying those reports. In fact, EPA states in the TSD that it chose to rely on these reports in part because the reports "have assessed numerous individual studies in order to draw general conclusions about the state of science."[51] This statement implicitly acknowledges that EPA relied on IPCC and CCSP assessments without reviewing the underlying data.

Finally, documents such as the IPCC reports must satisfy DQA requirements if they are endorsed or relied on by EPA. The IPCC is not required, however, to comply with the DQA, and EPA has not shown that the IPCC's information quality processes are equivalent to DQA requirements. In fact, as discussed above, a review of IPCC policy and procedures reveals that preparation of IPCC reports is a highly bureaucratic political process aimed at forming governmental policies on climate change in the context of international negotiation. IPCC was formed for the purpose of providing policymakers with "an objective source of information about the causes of climate change, its potential environmental and socio-economic consequences and the adaptation and mitigation options to respond to it."[52] Lead authors for

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[49] TSD at 3, Box 1.1 (emphasis added).

[50] *Id.*

[51] *Id.* at 5.

[52] *See* "About IPCC" on the IPCC website at http://www.ipcc.ch/about/index.htm.

IPCC reports are chosen from lists supplied by governments and participating organizations.[53] Drafts of the reports are reviewed by governments and experts selected by governments.[54] Moreover, IPCC reports examine *global* effects of GHGs, and are not focused on conditions in the United States.[55]

EPA's reliance on IPCC reports and its failure either to provide access to the data and methods used to form its conclusions, or to perform and document the rigorous reliability check required in cases where transparency is limited, violate the DQA, the OMB Guidelines, and the EPA Guidelines. UARG's second Request for Correction is that EPA: (1) provide all of the information on which EPA relied in the TSD and the Proposed Endangerment Finding, along with an explanation of the methods and assumptions used to analyze that information; (2) describe each compelling interest that precluded EPA from disclosing any of the information that it withheld; and (3) fully document the rigorous robustness check undertaken to assess any information that it has withheld.

C. Failure To Use Best Available Science

As mentioned above, the EPA Guidelines place special requirements on influential scientific information used in human health, safety, or environmental risk assessments. For these assessments, EPA adapted the information quality principles set forth in the Safe Drinking Water

[53] Procedures for the Preparation, Review, Acceptance, Adoption, Approval and Publication of IPCC Reports (App. A to the Principles Governing IPCC Work) § 4.2.2, available at http://www.ipcc-wg2.gov/AR5/extremes-sr/extremes_documents/ipcc-principles-appendix-a.pdf (hereinafter "IPCC Procedures").

[54] *Id.* § 4.2.4.

[55] *See* section V.B.

Act Amendments of 1996.[56] These requirements state that the influential information must be "accurate, reliable and unbiased" and must employ "the best available science and supporting studies" and "data collected by accepted methods or best available methods."[57] In addition, the presentation of the influential information must specify each of the following: (1) each population affected by each risk assessed; (2) the expected risk for each affected population; (3) each appropriate upper- or lower-bound estimate of risk; (4) each significant uncertainty identified by the risk assessment and studies that may assist in resolving the uncertainty; and (5) peer-reviewed studies "that support, are directly relevant to, or fail to support" any risk assessment and methodologies used to reconcile any inconsistencies in the scientific data.[58]

As described in greater detail in section V of these comments, the science that EPA used for the TSD and the Proposed Endangerment Finding fails to meet these requirements. For example, the TSD ignores information relevant to adaptation and fails to distinguish among climate effects.[59] Such omissions and other shortcomings reduce the accuracy of the science that is presented and result in an exaggerated assessment of risk. The TSD relies on reports by the CCSP and the IPCC, which fail to address adequately issues relevant to conditions in the United States and under the CAA.[60] This is a clear failure to employ the best available science. The Proposed Endangerment Finding fails to explain adequately the basis for the Administrator's

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[56] Safe Drinking Water Act Amendments of 1996, Pub. L. No. 104-182, 110 Stat. 1613 (Aug. 6, 1996).

[57] EPA Guidelines at 21-22.

[58] *Id.* at 22-23.

[59] *See* section V.A.

[60] *See* section V.B.

conclusion regarding the effects of GHG emissions on public health and welfare[61] and fails to consider a number of recent studies that contradict or challenge EPA's conclusions in the Proposed Endangerment Finding.[62] These deficiencies constitute a violation of the requirements regarding presentation of influential information established by the EPA Guidelines. Therefore, UARG's third Request for Correction is that EPA amend the TSD and the Proposed Endangerment Finding to reflect reliance on the best available science, specifically resolving the scientific shortcomings noted in this paragraph and discussed in section V of these comments.

VII. EPA Has Not Presented a Proper Contribution Analysis for Public Comment.

As noted above, any "contribution" analysis under section 202(a)(1) of the Act should address the contribution of emissions from the relevant U.S. sources to total worldwide GHG emissions and atmospheric concentrations. Because the stated purpose of this proceeding is to address contributions to what EPA characterizes as air pollution that consists of *global* atmospheric concentrations of certain gases, it makes no sense to assess U.S. emissions of the sources to be regulated in relation to all *U.S.* emissions, with respect to either a single GHG or all six GHGs in the aggregate.

Moreover, the relevant emissions to be assessed in the contribution analysis are those from *new* U.S. motor vehicles only, not from all U.S. motor vehicles. The emission percentage that EPA cites (4.3%) reflects emissions from all section 202(a)(1) sources, not emissions from that subset of section 202(a)(1) sources, *i.e.*, new vehicles, that EPA is authorized to regulate. Moreover, EPA should further refine the contribution assessment to address those categories of new section 202(a)(1) sources whose GHG emissions it plans to address through regulation.

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[61] *See* section V.C.

[62] *See* section V.D.

Thus, for the reasons discussed in section II of these comments, the contribution assessment should address new U.S. section 202(a)(1) vehicles to be manufactured in model years 2012 through 2016, other than motorcycles, buses, and heavy- and medium-duty trucks.

Finally, EPA properly acknowledges that "any finding of a 'contribution' requires some threshold to be met; a truly trivial or *de minimis* 'contribution' might not count as such." 74 Fed. Reg. at 18892/2-3. EPA says that it "need not determine at this time the circumstances in which emissions would be trivial or de minimis and would not warrant a finding of contribution." *Id.* at n.14. Yet EPA also states that, where "[m]ethane emissions from Section 202(a) source categories were *less than 0.01 percent* of total global greenhouse gas emissions in 2005" (and where, of course, the methane emissions from only the *new* section 202(a) sources in categories that EPA actually would regulate would constitute an even smaller percentage of that total), EPA would deem even that vanishingly small portion of emissions to "contribute" within the meaning of section 202(a)(1). EPA's implicit determination that a share of total emissions of less than one one-hundredth of one percent is not "trivial or *de minimis*" is, on its face, inconsistent with EPA's suggestion that it would apply a de minimis exception under section 202(a)(1). More fundamentally, that determination reflects an incoherent and internally inconsistent approach by EPA in this proceeding to the question of what constitutes a statutorily cognizable "contribution."

VIII. If EPA Decides To Promulgate Final Motor Vehicle GHG Rules, Regulation of Many Previously Unregulated Sources Will Result.

If EPA makes the Proposed Endangerment Finding final, this action would affect more than the new motor vehicles whose GHG emissions EPA would be required to regulate under section 202(a) of the Act. As EPA recognized in the ANPR, "if EPA were to regulate greenhouse gas emissions from motor vehicles under the Clean Air Act, then regulation of

smaller stationary sources that also emit GHGs – such as apartment buildings, large homes, schools and hospitals – could also be triggered" through the Act's PSD program. 73 Fed. Reg. at 44355/1. The potential for regulation of GHGs under the PSD program presents an enormous challenge for EPA and the nation.

In examining whether GHGs endanger public health and welfare, EPA should recognize that a healthy economy and the ability to provide good jobs with fair wages is absolutely the most critical item in assuring the protection of our nation's health and welfare. In assessing whether to find that GHGs endanger public health and welfare, EPA should consider the regulatory consequences of such a decision, including the negative impact on the nation's economy that could result from regulation of GHGs through the PSD program and the Title V program. The imposition of these programs on all sectors of the nation's economy, which may very well be required if EPA makes final the Proposed Endangerment Finding, may very well create economic gridlock where commerce cannot implement the normal, routine changes needed to respond to growth or changes in demand. Such economic gridlock will adversely affect public health and welfare.

The CAA requires owners and operators of major stationary sources of air pollution to obtain construction permits before building or modifying those sources. Although PSD primarily applies to criteria air pollutants for which a NAAQS has been established, PSD can also apply to CAA-regulated pollutants for which there is no NAAQS. If EPA decides to propose and promulgate a rule establishing limits on emissions of GHGs from motor vehicles, which it will have to do if it decides to make the Proposed Endangerment Finding final, that finding could result in PSD permits needing to provide that GHG emissions from PSD sources are limited by any applicable "best available control technology" ("BACT").

Under the PSD program, a PSD permit is required for the construction or modification of any major stationary source that emits or has the potential to emit 250 tons per year of a regulated pollutant (or 100 tons per year for a source in a specifically listed category, including large fossil fuel-fired steam electric plants). Because many sources emit CO_2, EPA noted in the ANPR that "many types of new small fuel-combusting equipment could become newly subject to the PSD program if CO_2 becomes a regulated . . . pollutant." *Id.* at 44498/3. Additionally, for sources already considered major sources, such as fossil fuel-fired power plants, regulation of CO_2 likely would create the risk that many more changes could arguably be deemed major modifications. *See id.* at 44499/1. As an example, EPA notes that a hypothetical 500-megawatt electric utility boiler that burns bituminous coal and that is well-controlled for traditional air pollutants can emit more than 580 tons per hour of CO_2. *Id.* At such a source, any change that otherwise qualifies as a modification under applicable NSR regulations and that results in just 10 additional minutes of utilization over the course of a year could, at least in theory, result in a 100-ton-per-year increase and thus could potentially trigger PSD requirements. *See id.*

In the ANPR, EPA estimated that approximately 200-300 PSD permits are issued nationally each year for construction of new sources and major modifications at existing sources. If CO_2 were to become a regulated pollutant, which will eventually occur if EPA finalizes the Proposed Endangerment Finding, EPA estimated that the number of PSD permits required each year would increase by more than a factor of 10 (*i.e.*, to more than 2000 to 3000 permits each year). *Id.* at 44499/1-2. UARG believes, however, that this is actually an underestimate because EPA failed to account for a source's potential to emit year-round but instead based the estimate on actual emissions. As EPA acknowledged in the ANPR, if year-round operation is assumed as the basis for estimating sources' potential to emit, the actual number of PSD permits required

"would likely be an order of magnitude higher." *Id.* at 44504/2. EPA's sole reliance on actual emissions is misplaced, as EPA's rules make clear that a source's potential to emit applies in the case of new construction and for modifications where the existing facility has not begun normal operations. 40 C.F.R. § 52.21(b)(21).

In the ANPR, EPA also stated its belief that PSD program requirements become applicable on the effective date of the first regulation requiring GHG control under the Act. 73 Fed. Reg. at 44500/1. UARG notes that exactly when a regulation becomes "effective" can vary depending on the CAA provision at issue. For example, section 202(a)(2) of the Act specifies that any section 202(a)(1) emission standard for new motor vehicles "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."

Any CAA regulation of a GHG for the first time would have to be coordinated carefully with a lawful and appropriate approach to PSD permitting, and EPA should consider the effects of regulation under the PSD program when it considers the Proposed Endangerment Finding and possible regulation of GHGs under the Act. In the ANPR, EPA stated that this type of coordination would be "necessary to minimize confusion on the part of sources, permitting authorities, and the public, to provide for as effective a transition as possible, and to ensure that the strategies intended to avoid problems can be in place in time to prevent those problems." *Id.* at 44510/1. Given the importance of the issue, EPA should consider carefully not only the nature but also the timing of any regulation of GHGs under the CAA if it decides to finalize the Proposed Endangerment Finding. At the same time, EPA will be required to engage questions concerning whether, given the nature and scope of the impacts on the PSD program that would

result from GHG regulation under emission control provisions of the Act such as section 202(a), Congress intended any such GHG regulation to occur at all.

In the ANPR, EPA discussed the possibility of some alternatives, under which, it suggests, it might be possible to mitigate the impact of PSD regulation on a variety of sources. *Id.* at 44503/2. To the extent EPA believes it can propose alternatives to ease this regulatory burden, it would have to provide in any notice of proposed rulemaking a complete and adequate explanation of the authority it believes it has to accomplish this and of how its action on this matter would not conflict with positions previously taken by the Agency or the courts. Although some environmental groups have suggested that EPA may have broad administrative or regulatory flexibility to mitigate or even avoid these burdensome effects, these statements conflict with past statements made by those groups. For example, in the past, environmental organizations and others have argued that EPA cannot issue general permits for PSD and that BACT determinations must be made on a case-by-case basis. *See, e.g.*, Statement of David Hawkins, Natural Resources Defense Council ("NRDC") (stating that proposed utility BACT presumption for NOx emissions from modified electric utility steam generating units (proposed at 56 Fed. Reg. 27630, 27638 (June 14, 1991)) had "no legal basis" because "[t]he Act specifies that BACT control decisions must be made on a case-by-case basis"); Statement of Congressman Henry A. Waxman (stating, with regard to the same proposed utility BACT presumption, that "[i]t is highly unusual -- if not illegal -- for EPA to set a federal BACT presumption"). Thus, EPA would need to explain, in any proposed rulemaking addressing possible alternatives to mitigate the effect the PSD program could have if GHGs become regulated pollutants under the CAA, why those prior arguments are incorrect and why contrary views now expressed by certain representatives of those groups can be relied on with assurance. *See, e.g.*, Massachusetts v. EPA

Part II: Implications of the Supreme Court Decision: Hearing Before the House Select Committee on Energy Independence and Global Warming, 110th Cong. (Mar. 13, 2008), Testimony of David Bookbinder, Chief Climate Counsel, Sierra Club, at 9 ("Bookbinder Testimony") (arguing that a "possibility" to avoid the PSD problem would be to "allow[] for coverage of all sources below an individual permitting level (again, possibly 5-10,000 [tons per year]) to be covered by a general permit"). In addition, UARG notes that the thresholds for PSD applicability are written directly into the statute itself. If EPA decides to increase these thresholds to ensure that PSD applies only to "large" sources, it will need to justify its legal authority to take that step without express congressional approval.

If EPA finalizes the Proposed Endangerment Finding, it is not only the PSD program that could lead to the potential regulation of numerous small stationary sources that are currently unregulated. Regulating GHGs, as will occur if the Proposed Endangerment Finding is finalized, could result in numerous sources needing to obtain operating permits under Title V of the Act. If EPA regulates GHG emissions under the Act, this could trigger a requirement that any source that emits at least 100 tons per year of one of those GHGs, including CO_2, would need to apply for a Title V permit within one year of becoming subject to Title V requirements. The Title V permit for that source would include not only any applicable requirements for the GHGs but also requirements that apply to other pollutants such as generally applicable opacity limitations that exist in several state implementation plans.

In the ANPR, EPA noted that the Title V permit program would bring in even more sources than the PSD program would because the 100-ton-per-year cutoff applies to all source categories, not only to categories specifically listed in the CAA. 73 Fed. Reg. at 44511/1. EPA estimated that more than 550,000 sources would require Title V permits if EPA regulates GHGs

under the CAA. Currently, there are approximately 15,000-16,000 Title V sources. *Id.* at 44511/1-2. EPA also expressed concern that Title V permits might have to be continually reopened as any GHG regulation takes effect under the Act. In the ANPR, EPA observed that there would be relatively little benefit from regulating these small sources because of the expected unavailability of add-on emission control devices at such sources and their relatively small emissions. *Id.* at 44512/2. Although UARG agrees that there may well be little demonstrable benefit from regulating these small sources, it notes that Congress enacted the requirements of the Title V operating permit in the Act, and EPA is bound to follow the directives of Congress. As with the PSD program, EPA described several alternatives in the ANPR that it suggested might address the burden of the Title V program in the GHG context. *Id.* at 44512/3-44513/1. Yet EPA has thus far failed to address the legal barriers that could prevent EPA from implementing such alternatives.

With respect to both PSD and Title V, EPA would need, in any notice of proposed rulemaking for GHG regulation under the CAA -- including a notice of proposed rulemaking for new motor vehicle GHG emission standards under section 202(a) -- to address the specific basis for any authority it believes it may have to mitigate the dramatic and disruptive effects on these programs' nature and scope that could result from any decision to finalize the Proposed Endangerment Finding.

IX. A Final Endangerment Finding with Respect to GHGs Under Section 202(a) of the CAA Would Not Satisfy the Prerequisites for Listing GHGs as Criteria Air Pollutants Under Section 108 of the Act.

Section 108(a)(1) of the CAA specifies three prerequisites for the listing of an air pollutant to be regulated by NAAQS. Specifically, this section provides that EPA:

> [S]hall from time to time . . . list . . . each air pollutant –

> (A) emissions of which, in [the Administrator's] judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare;
>
> (B) the presence of which in the ambient air results from numerous or diverse mobile or stationary sources; and
>
> (C) for which air quality criteria had not been issued before the date of enactment of the Clean Air Amendments of 1970, but for which [the Administrator] plans to issue air quality criteria under this section.

CAA § 108(a)(1).

Should EPA make final the Proposed Endangerment Finding, that finding would not be at all dispositive with regard to section 108. Section 108 and its companion provision, section 109, contain different language from that in section 202. Sections 108 and 109 of the CAA authorize listing of a pollutant as a criteria air pollutant, and regulation of that pollutant through NAAQS, for the purpose of addressing any endangerment of the public health or welfare that may reasonably be anticipated due to the quantities of the pollutant *in the ambient air*, which is the relatively limited portion of the atmosphere to which the general public has access. *Id.* § 108(a)(2) ("Air quality criteria for an air pollutant [listed under section 108] shall accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from *the presence of such pollutant in the ambient air*, in varying *quantities*.") (emphases added); *id.* § 109(b)(2) (secondary NAAQS for a section 108-listed air pollutant must be set at the level "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant *in the ambient air*") (emphasis added); 40 C.F.R. § 50.1(e) ("Ambient air means that portion of the atmosphere, external to buildings, to which the general public has access."); *Train*

v. NRDC, 421 U.S. 60, 65 (1975) ("ambient air" is "the statute's term for the outdoor air used by the general public").

Even if EPA finalizes the Proposed Endangerment Finding, before the Agency could list any GHGs as criteria air pollutants under section 108 of the Act, it would have to examine and determine what, if any, effect on U.S. public health or welfare is caused by the presence of GHGs *in the ambient air* in the United States. The Proposed Endangerment Finding and the accompanying TSD do not address this matter, and it is far from clear, for example, that GHGs in the amount in which they are present in the ambient air in the United States could reasonably be anticipated to endanger public health or welfare. The lack of information regarding any effects of GHGs on public health and welfare due to their presence in the U.S. ambient air could, in fact, be among a number of factors that would lead the Administrator to conclude that she has no "plans to issue air quality criteria" for GHGs -- the third prerequisite for listing under section 108.

To use the third prerequisite in this (or any other) fashion, however, EPA might need to address whether and to what extent that prerequisite gives EPA discretion not to list a pollutant if the Agency has in fact made an affirmative endangerment finding for that pollutant. Although EPA noted in the ANPR that the third prerequisite "could provide EPA discretion to decide whether to list those pollutants [i.e., GHGs] under section 108 for purposes of regulating them via the NAAQS," 73 Fed. Reg. at 44477/2, in the 1970s, NRDC successfully argued to a federal district court in a CAA citizen suit that this language deprived EPA of any discretion to decline to list and regulate a pollutant under sections 108 and 109 where the Agency had conceded that the endangerment criterion (and section 108(a)(1)(B)'s "numerous or diverse mobile or stationary sources" criterion) was satisfied for that pollutant. That litigation culminated in the

decision of the U.S. Court of Appeals for the Second Circuit in *NRDC v. Train*, 545 F.2d 320 (2d Cir. 1976), that EPA *must* list and regulate a pollutant under sections 108 and 109 when it has made an endangerment finding for that pollutant, notwithstanding the "plans to issue air quality criteria" provision in section 108(a)(1)(C). EPA correctly noted the existence of this case in the ANPR and suggested that, because it was decided before the Supreme Court's decision in *Chevron v. NRDC*, 467 U.S. 837 (1984), the Agency may well have an argument that its original interpretation of the statute should now be accorded deference. 73 Fed. Reg. at 44477 n.229. In addition, the Second Circuit issued its decision before the development of case law, including case law in that circuit, on the narrowly circumscribed limits of citizen suit jurisdiction under the CAA and the scope of EPA "nondiscretionary duties" under the Act.[63]

The argument that the third criterion does *not* provide EPA with discretion regarding whether to list an air pollutant for which it has made an endangerment finding was advanced as recently as 2003, when three states (Connecticut, Maine, and Massachusetts) premised a citizen suit against the Administrator on the Second Circuit's 1976 decision. *Massachusetts v. Horinko*, No. 3:03-CV-984 (D. Conn. filed June 4, 2003) (dismissed without prejudice by plaintiffs on September 3, 2003, in light of EPA's denial of the rulemaking petition that led to *Massachusetts v. EPA*). More recently, national environmental group representatives have suggested that the "plans to issue air quality criteria" clause *does* give EPA discretion not to list and regulate, but they did not explain their legal rationale for abandoning the position advanced by NRDC and adopted by two courts over three decades ago. *See, e.g.*, *Strengths and Weaknesses of Regulating Greenhouse Gas Emissions Using Existing Clean Air Act Authorities: Hearing*

[63] EPA's discretion under section 108 extends not only to substantive determinations but also to the timing of any listing. CAA § 108(a)(1) (authorizing EPA, where the listing prerequisites are satisfied, to revise the list of criteria pollutants "from time to time").

Before the House Energy and Commerce Subcommittee on Energy and Air Quality, 110th Cong. (Apr. 10, 2008), Testimony of Lisa Heinzerling, Professor of Law, Georgetown University Law Center, at 6 (noting that the third prerequisite "may provide the Administrator somewhat more wiggle room in deciding whether to issue a NAAQS for a greenhouse gas, even after an endangerment finding"); Bookbinder Testimony at 9 (noting that the third prerequisite "appears to contemplate some discretion on EPA's part in whether to establish a NAAQS"). UARG believes that, for many reasons, the argument for EPA discretion under section 108(a)(1)(C) is compelling, but in any event, EPA would need to state clearly and comprehensively its view of the matter -- specifically including its interpretation of the current effect of *NRDC v. Train* -- before it proceeds with any proposed rule that addresses, or that arguably could give rise to, regulation of GHGs under section 108 and 109.

X. A Final Endangerment Finding for GHGs Under Section 202(a) of the CAA Would Not Satisfy the Criteria Necessary To Take Any Action Under Section 115 of the Act.

Section 115 of the CAA authorizes the Administrator to require states to establish emission control requirements where the Administrator "has reason to believe that any air pollutant or pollutants emitted in the United States cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country." If EPA makes a final endangerment finding in the present proceeding, that finding would not satisfy the requirements of section 115. Before taking any steps to regulate under section 115, EPA would need to examine a wide range of issues, including not only issues concerning possible endangerment of public health or welfare in a specific foreign country but also whether the foreign nation in question gives the United States reciprocal rights (a prerequisite to any section 115 regulation under section 115(c)) and whether required revisions to state implementation plans resulting from any EPA determination under section 115 would "prevent or eliminate the

endangerment" (a criterion under section 115(b)). EPA also would have to show that it has "sufficient evidence correlating the endangerment to sources of pollution within a particular State," a criterion that EPA and the courts have drawn from section 115. *Her Majesty the Queen in Right of Ontario v. EPA*, 912 F.2d 1525, 1533 (D.C. Cir. 1990).

XI. Conclusion

UARG appreciates the opportunity to submit these comments on the Proposed Endangerment Finding. For the reasons discussed above, EPA's proposal is seriously flawed and does not provide a basis for the Agency to make an endangerment or "cause or contribute" finding with respect to GHGs under section 202(a)(1) of the CAA.

Attachment A

COMMENTS OF THE UTILITY AIR REGULATORY GROUP

on the

ADVANCE NOTICE OF PROPOSED RULEMAKING REGARDING REGULATING GREENHOUSE GAS EMISSIONS UNDER THE CLEAN AIR ACT

Docket ID No. EPA-HQ-OAR-2008-0318

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November 28, 2008

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Docket ID No. EPA-HQ-OAR-2008-0318

November 28, 2008

The Utility Air Regulatory Group ("UARG") offers the following comments on the Advance Notice of Proposed Rulemaking Regarding Regulating Greenhouse Gas Emissions Under the Clean Air Act ("ANPR"), which the U.S. Environmental Protection Agency ("EPA" or "Agency") published for public comment on July 30, 2008.[1] UARG is a voluntary, nonprofit group of electric generating companies and organizations and four national trade associations (the Edison Electric Institute, the National Rural Electric Cooperative Association, the American Public Power Association, and the National Mining Association). UARG's purpose is to participate collectively on behalf of its members in EPA's rulemakings and other proceedings under the Clean Air Act ("CAA" or "Act") that affect the interests of electric generators and in litigation arising from those proceedings. UARG members would be significantly affected by any decisions EPA may make on issues raised in the ANPR concerning possible regulation of greenhouse gases ("GHGs") under the existing provisions of the CAA. UARG appreciates the opportunity to comment on the ANPR and notes that the issues raised in the ANPR are critical to its members as well as to a broader group of industry parties, commercial interests, and the public.

[1] 73 Fed. Reg. 44354 (July 30, 2008).

I. Introduction and General Issues for EPA To Consider in Any Future Proposed Rulemaking on GHGs Under the CAA

At the outset, UARG recognizes that the issue of whether and how to regulate emissions of GHGs, including carbon dioxide ("CO_2"), under the current provisions of the CAA is controversial and needs to be considered in the broadest context, given the dramatic impacts such regulation may have on other CAA regulatory programs and on the economy. As EPA Administrator Johnson himself accurately states in the preface to the ANPR, "[o]ne point is clear: [t]he potential regulation of greenhouse gases under any portion of the Clean Air Act could result in an unprecedented expansion of EPA authority that would have a profound effect on virtually every sector of the economy and touch every household in the land." 73 Fed. Reg. at 44355/1. UARG also underscores and agrees with Administrator Johnson's assertion that the CAA is

> ill-suited for the task of regulating global greenhouse gases. Based on the analysis to date, pursuing this course of action would inevitably result in a very complicated, time-consuming and, likely, convoluted set of regulations. These rules would largely pre-empt or overlay existing programs that help control greenhouse gas emissions and would be relatively ineffective at reducing greenhouse gas concentrations given the potentially damaging effect on jobs and the U.S. economy.

Id. at 44355/2-3.[2]

This concern is shared by the numerous federal agencies whose comments are appended to the ANPR. Indeed, most of the issues raised in the ANPR, including the scope of regulation

[2] Even the staff draft portion of the ANPR observes that "[i]n light of the CAA's interconnections and other issues explored in this notice, EPA does not believe that all aspects of the Act are well designed for establishing the kind of comprehensive GHG regulatory program that could most efficiently achieve the GHG emission reductions that may be needed over the next several decades." 73 Fed. Reg. at 44397/2-3. UARG does not believe that any of the current CAA provisions discussed in the ANPR provide an appropriate vehicle for GHG regulation, particularly of the electric power sector, for the many reasons stated below.

and how to minimize and fairly allocate costs imposed by any regulatory program, are critical issues for Congress to consider as its discussions on potential GHG regulation progress. UARG believes the best role that the ANPR can play is not in future regulation of GHG emissions under the "ill-suited" existing provisions of the CAA but in assisting Congress in considering a possible legislative program to address climate change by providing necessary information on key aspects of any such program.[3] Indeed, the ANPR lists some of the most important principles for such legislation: (1) addressing GHG emissions in a manner that does not further harm the economy; (2) encouraging technological development; and (3) recognizing the threat of competitive disadvantage if other countries with significant emissions fail to control their emissions. *Id.* at 44397/1-2. The current CAA cannot adequately satisfy these three principles and thus is an inappropriate vehicle to address climate change meaningfully.

Curtailing economic costs is perhaps the most significant issue to consider in response to the ANPR. Since the ANPR was released in July 2008 in the midst of an already sluggish economy, the nation has faced a significant and worrisome economic downturn of uncertain duration. Most sectors of the economy are facing difficult financial and operating conditions. It is simply not appropriate to institute a regulatory program at this time that would impose even higher energy costs on American businesses and consumers.

UARG fully understands and appreciates EPA's efforts to "shape an overall approach for potentially addressing GHG emissions under the CAA as part of a broader set of actions to address GHG emissions taken by Congress, EPA, other federal departments and agencies, state

[3] The separate comments on the ANPR of the American Public Power Association, the Edison Electric Institute, and the National Rural Electric Cooperative Association, all of which are UARG members, explain the reasons for Congress to enact comprehensive legislation to address GHG emissions.

and local governments, the private sector, and the international community." *Id.* at 44400/2. UARG recognizes that the electric power sector plays an important role in national GHG emissions, but any regulation of that sector would need to be considered as part of a broader program that takes into account the full scope of national and international sources of GHG emissions, existing and soon-to-be-established state and regional programs, and the need to spread economic costs and regulatory burdens across a wide spectrum of sources. Any regulation of GHGs under the various provisions of the existing CAA must also recognize regulatory effects on other CAA programs, including the prevention of significant deterioration ("PSD") and Title V programs, and how those effects would impact the electric power and other sectors. UARG therefore supports EPA's decision to review the potential for GHG regulation as part of a set of broader domestic and international decisions and programs.

UARG also stresses that the Supreme Court's decision in *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007), does not mandate that EPA regulate GHGs under the CAA or do so within a specific period. EPA retains considerable discretion as to whether to make an endangerment finding under CAA § 202(a)(1), and if it does decide to make such a finding, the Agency has discretion over the timing of such a finding and when and how to take any subsequent regulatory steps. In *Massachusetts*, the Supreme Court determined that the Act's definition of "air pollutant" in section 302(g) encompasses "all airborne compounds of whatever stripe," including GHGs. *Id.* at 1460. Having concluded that GHGs can be "air pollutants" under the CAA, however, the Court then explained that EPA has authority to regulate GHGs under CAA section 202(a)(1) only "[i]f EPA makes a finding of endangerment" under that provision. *Id*. at 1462. Although the Court rejected the specific rationale offered by EPA for denying a petition to regulate GHGs from new motor vehicles as unrelated to the scope of the relevant statutory text, it

emphasized the limited nature of its decision: "We need not and do not reach the question whether on remand EPA must make an endangerment finding, or whether policy concerns can inform EPA's actions in the event that it makes such a finding." *Id.* at 1463. Rather, discretion remains with the Agency regarding whether and how to make a determination as to endangerment, as long as EPA provides a "reasoned justification" for its decision and its "reasons for action or inaction" are "grounded . . . in the statute." *Id.* Moreover, the Court recognized that even if EPA does make an affirmative endangerment finding, it would "no doubt [have] significant latitude as to the manner, timing, [and] content" of its regulations and "coordination of [those] regulations with those of other agencies." *Id.* at 1462.

Thus, the Agency maintains considerable discretion as to whether to make an endangerment finding under section 202(a)(1).[4] Even if EPA were to find endangerment, it would retain discretion to determine when and how to regulate. Moreover, the regulatory authority reviewed by the Supreme Court pertains only to new motor vehicles and engines under Title II. Nothing in *Massachusetts* establishes any requirements for regulating stationary sources of GHGs. Therefore, EPA is under no legal obligation to regulate GHGs from stationary sources as a result of the Supreme Court's decision, and can -- and should -- take time to consider carefully whether to do so in the context of the many legal and policy issues raised by the ANPR and by the comments of UARG and other parties on the ANPR.

Overall, UARG believes that the many issues set forth in the ANPR, on balance, demonstrate the problems inherent in any attempt to regulate GHGs under the existing provisions of the CAA and in analyzing the economic effects of such regulation. UARG believes that EPA

[4] The Agency is also under no obligation to make an endangerment finding under section 202(a)(1) by a date certain. *See Massachusetts v. EPA*, No. 03-1361 (D.C. Cir. June 26, 2008) (denying petition for writ of mandamus).

understates the problems when it says in the ANPR that the "large temporal and spatial scales of the climate change challenge introduce regulatory issues beyond those typically presented for most traditional air pollutants." 73 Fed. Reg. at 44401/2. The unique characteristics of this challenge (e.g., longer atmospheric lifetimes of the gases, uniform mixing of the gases in the global atmosphere, and cumulative impacts from past, present, and future emissions) create many uncertainties over long time frames and across national boundaries, thereby increasing the complexity of any attempt to design an effective and comprehensive long-term regulatory strategy. *Id.* at 44400-01. Further, these characteristics make GHGs a poor fit, at best, for the statutory endangerment tests in several of the CAA provisions discussed in the ANPR, which were enacted to address conventional pollutants and their localized, specific, and direct public health and welfare impacts.

The data reported by EPA for emissions per sector show that GHG emissions in the United States are spread out over a number of sectors. Even within one sector, there may be a diversity of types and sizes of sources. If EPA should decide to regulate GHGs under the existing provisions of the CAA, it would have to consider carefully how to allocate the burden and costs of such regulation fairly among and within these sectors, as well as to account for the significant global emissions that will occur notwithstanding the imposition of any CAA regulatory requirements.

The development of new technologies will be key to the ability to reduce GHG emissions from all sectors of the economy. But while there may be existing technologies that can be employed in the short term as identified in the ANPR, such as improved plant efficiencies, fuel switching, nuclear power, and renewable power, each of these technologies currently faces obstacles to widespread deployment or limits to the impact it may have. The ANPR's discussion

of these technologies is quite generalized, so it is difficult to comment more specifically on how EPA could or would require implementation of these technologies through the existing CAA. In any future proposed rulemaking on GHG regulation, EPA would need to analyze why such technologies are not already widely being used to reduce GHG emissions in the relevant sectors and whether regulation through existing CAA provisions would overcome obstacles to their implementation.

As to possible future technologies, EPA has not provided an adequate basis on which the public may comment meaningfully on how they could be applied under existing CAA provisions. As will be described later, the current CAA tends to constrain the use of unproven or speculative technologies, so the existing Act may not be useful for achieving the technological innovations that may be necessary for significant GHG reductions. Section VI.C. of these comments provides more detailed information on technologies for electric generating plants and carbon capture and sequestration ("CCS").[5] UARG supports appropriate federal efforts to fund the development and deployment of technology necessary to reduce GHG emissions.

As will be discussed in more detail in section VI.C., EPA should be mindful that controls needed to reduce emissions of conventional pollutants, such as sulfur dioxide ("SO_2") and nitrogen oxides ("NOx"), and new control technologies such as CCS can require large amounts of energy and decrease plant efficiencies, leading to increased GHG emissions. Moreover, EPA should consider to what extent improvements in existing plants to increase efficiencies and reduce GHG emissions may implicate New Source Review ("NSR") concerns.

A meaningful discussion of the effects of possible GHG control programs on non-air environmental media must await a more specific description of such programs. Nevertheless,

[5] CCS is also commonly referred to as carbon capture and storage.

EPA correctly observes in the ANPR (73 Fed. Reg. at 44407-08) that certain types of potential programs and technologies may have effects on other environmental media -- as well as on the cost to implement, and the ability to comply with, statutory and regulatory requirements governing those other media. Thus, for example, the potential use of CCS technology raises a number of issues that currently are being considered in the context of a proposed rulemaking under the Safe Drinking Water Act's Underground Injection Control program. *See* 73 Fed. Reg. 43492 (July 25, 2008). Similarly, other possible future or emerging emission reduction technologies may implicate issues concerning water use and availability (particularly for facilities in arid areas) and waste disposal. EPA should carefully consider impacts on other media -- and on compliance with other environmental laws and regulations -- if it develops a proposed rule for GHG emission control requirements under existing provisions of the CAA.

UARG agrees that the policy and economic considerations set forth in the ANPR (73 Fed. Reg. at 44409) are among those EPA should strongly consider in determining whether GHG regulation is appropriate and warranted under existing CAA provisions. As to market-oriented approaches under the CAA (*id.* at 44409-12), EPA discusses several options in the ANPR with regard to instituting cap-and-trade and other market-based mechanisms under the Act's existing provisions.[6] In general, however, if EPA were to promulgate both source-specific or sector-based "command and control" programs (e.g., PSD) *and* market-based programs, any cost savings from market-based programs could be greatly reduced or eliminated by countervailing additional costs to satisfy the command-and-control requirements. *Id.* at 44411-12.

[6] EPA correctly notes that, should it decide to establish a carbon tax or fee (or a provision that approximates a tax or fee) for any category or categories of sources, it would need to consider whether it has authority to do so under the relevant provisions of the CAA. 73 Fed. Reg. at 44411/1-2.

As to the choice between economy-wide and sector-based regulatory approaches (*id.* at 44411-13), UARG strongly believes that any regulatory program should cover the broadest spectrum of sources and not single out any one sector simply because more information about that sector is available. In general, should EPA decide to propose regulations to control GHG emissions under the CAA, it should do so through programs that lower the costs of emission controls and spread those costs fairly across all contributing sources and sectors, while also recognizing the limits of such programs. These limits include the legal and practical limitations imposed by the CAA itself and the past (and continuing) opposition to such programs by environmental organizations and some states.

EPA raises a number of other program design issues very generically. These are important to consider in any proposed regulatory program, such as the reasons to differentiate between new and existing sources (which generally have shorter useful lives and require more costly retrofits), emissions leakage, and international competitiveness. *Id.* at 44413-14. Those issues are discussed, where relevant, in later sections of these comments in regard to specific CAA sections.

EPA identifies several overarching analytical challenges for economic analysis of any potential GHG regulation under existing CAA provisions, including long time horizons and the need to analyze costs and benefits over those horizons; the uncertainty inherent in those analyses; international considerations; how to value domestic and international marginal benefits; estimating energy security benefits; how to assess interactions with other, non-climate policies such as reduction of traditional air pollutants; and integrating economic and non-economic considerations. *Id.* at 44414-16. UARG agrees that these are all key issues that further demonstrate the complexity of any attempt to adapt and apply CAA-based analyses developed

for conventional pollutants to an entirely new and different type of emissions. EPA should ensure that its policy choices associated with any GHG emission controls that it may propose are informed by and address these analytical challenges as well as other important policy, legal, and ethical questions. *See id.* at 44417/1-2. The CAA, as it currently exists, with provisions intended to address conventional pollutants in far less complex scenarios, simply does not provide the most appropriate context for undertaking this challenge.[7]

II. UARG Agrees With the Concerns Expressed by Numerous Federal Agencies Regarding Possible Regulation of GHGs Under the CAA.

UARG believes it is very significant and telling that the main federal agencies and Executive Branch offices with expertise in scientific, environmental, economic, and commercial matters -- the Office of Information and Regulatory Affairs ("OIRA"), which is part of the Office of Management and Budget ("OMB"); the Council of Economic Advisers ("CEA"); the Office of Science Technology and Policy ("OSTP"); the Council on Environmental Quality ("CEQ"); the Department of Agriculture ("USDA"); the Department of Commerce ("Commerce"); the Department of Transportation ("DOT"); the Department of Energy ("DOE"); and the Office of Advocacy, Small Business Administration ("SBA") -- so strongly disagree with the ANPR that their comments were appended in whole to the document. This is not simply a matter, as some

[7] EPA further recognizes that determining an acceptable level of climate change involves important value judgments and acknowledges that "[i]t is not the purpose of this ANPR to make any judgment regarding what an appropriate stabilization goal may be." *Id.* at 44401/2. But if EPA were to decide to propose to regulate GHG emissions under existing provisions of the CAA, it would have to make such judgments to balance costs and benefits, determine the goals of any proposed regulations, and assess the effectiveness of any proposed regulations in meeting these goals. For example, how stringent would GHG reductions or limitations need to be on a sectoral or national level in response to any endangerment determination? How would EPA determine an appropriate reduction goal or limitation for a sector or group of sectors, given the past, present, future, and international contributions to climate change, and the inability to attribute specific risks to global concentrations? These and other issues make developing any proposed CAA regulatory approaches a particular challenge.

may claim, of the Bush Administration's disinclination to establish GHG regulations under the existing CAA. Rather, it shows that there is fundamental disagreement by the most relevant federal agencies that GHG regulation under existing CAA provisions is prudent, practical, or even fully authorized. UARG agrees with the salient concerns of these agencies and with the central principles underlying those concerns, including:

- **The ill-suited nature of the CAA for GHG regulation, particularly given the complexity of the issues involved in any such regulation.** This concern is universally shared by the commenting agencies as well as Administrator Johnson. *Id.* at 44359. For example, Administrator Dudley of OIRA calls the ANPR a "deeply flawed and unsuitable vehicle for reducing greenhouse gas emissions." *Id.* at 44356.
- **Impacts that regulation of CO_2 may have on a wide range of CAA programs, particularly the PSD and Title V programs.** EPA correctly identifies the concern that any regulation of GHGs under one part of the CAA may affect other parts and require regulation of many new sources through these programs. That concern is shared collectively by the commenting agencies, which recognize the tremendous burdens that such regulation would place on U.S. businesses and the public. In this regard, DOE observes that regulation of GHGs would significantly increase the costs associated with the operation of power plants and industrial sources, as well as the direct energy use for commercial and residential users, including many sources of GHGs not currently regulated. *Id.* at 44366/2. CEQ states that EPA should conduct "a much more complete technical, institutional, and economic analysis of the far reaching consequences that will arise from the automatic application of existing regulations that would occur in the event EPA makes an endangerment finding" and subsequently regulates CO_2. *Id.* at 44388.

- **Economic costs and burdens of a regulatory program and the degree to which such regulation would intrude into the operations and activities of sources, many of which were previously unregulated.** Commerce focuses on the costs that CAA regulation of GHGs would impose on workers, consumers, and producers, including the high costs of compliance with multiple state regulations, reliance on technologies that are not yet viable, and the impacts on a large number of small businesses and nonprofit organizations that have not been regulated under the CAA as sources in the past but now would be subject to costly, lengthy PSD and Title V permitting procedures. *Id.* at 44371-76. SBA also expresses serious concerns with the negative impacts such regulation would have on small entities by subjecting large numbers of firms to costly and burdensome new requirements. *Id.* at 44390-96. CEA and OSTP similarly warn that regulation would be inordinately burdensome, especially for previously unregulated small sources. *Id.* at 44383. *See infra* at sections VI.E. and VI.F.
- **The lack of state, regional, or national environmental benefits, and concerns about harm to U.S. industry competitiveness.** CEA and OSTP warn that CAA regulation would create cumbersome sets of rules and restrictions that would be excessive and disproportionate at the state and facility levels and might not even meet the purported environmental goals. In particular, CEA and OSTP note that health and welfare impacts cannot be quantified to the standards required by the CAA and that no credible framework exists to give assurance that a target can be met. *Id.* at 44380-84. Commerce also identifies problems in labor cost and competition issues, *id.* at 44371-76, and CEQ states that leakage and global emissions may offset any benefits the U.S. might otherwise obtain from reductions under CAA regulation, *id.* at 44385-89.

- **Perceived weaknesses and uncertainties in the legal analysis of regulatory options.** OIRA expresses concern about EPA's "untested legal propositions" for purported "flexible" interpretations of the CAA and "untested legal theories" to suggest that some CAA provisions could be adapted to provide economic incentives to reduce GHGs (e.g., establishing a nationwide cap-and-trade program). *Id.* at 44357-58. Collectively, USDA, Commerce, DOT, and DOE note that EPA's theories are uncertain and subject to challenge. *Id.* at 44360. Indeed, although EPA asserts authority to regulate GHGs under a wide scope of provisions of the Act, it then seeks comment on whether it in fact has such authority when it specifically discusses those provisions in the ANPR.
- **Disagreements over assumptions as to costs of technologies and availability of those technologies to control and reduce emissions.** Whether regulatory controls on GHGs will be effective and affordable depends to a great extent on availability of suitable technologies to achieve those controls, but it is not at all clear that the ANPR's review of technology is realistic in all situations. OIRA warns that the ANPR "could result in the piecemeal application of command-and-control regulation -- based on EPA staff determinations of the availability and suitability of a wide range of technology -- covering both U.S. manufacturing activity and a broad range of commercial and household activities to an extent well beyond the scope of current regulation." *Id.* at 44357. Commerce reiterates that regulation would be costly if it relies on technologies that are not viable. *Id.* at 44371-76.
- **Duplication of existing laws and regulatory programs.** CEA and OSTP, as well as the other commenting agencies, express their concerns that GHG regulation under the CAA would, to a significant extent, duplicate existing programs and authorities, especially concerning mobile sources and fuel economy. *Id.* at 44361-64, 44383. CEQ believes more

generally that the ANPR ignores how new regulations would duplicate or contradict numerous mandates, incentives, partnerships, and federal and state legislation, as well as some of EPA's own programs, including mandates under the Energy Independence and Security Act of 2007 ("EISA"), Pub. L. No. 110-140, 121 Stat. 1492 (2007), actions taken under the Montreal Protocol such as accelerated phase-out of hydrochlorofluorocarbons, state renewable portfolio standards, programs under the Energy Policy Act of 2005, and DOE and EPA voluntary GHG emission reduction partnerships. 73 Fed. Reg. at 44386-87.

The Chair of the CEQ best sums up many of the collective concerns of the commenting agencies[8] when he states that the ANPR

> does not provide a full and meaningful discussion of the broader policy and economic context in which it is considering, in the event of an endangerment finding, triggering the prospect of essentially automatic and immediate regulation over a vast range of community and business activity and an equally vast range of potential discretionary regulations with respect to the same and additional activities.

Id. at 44385. EPA should not propose any finding of endangerment or any regulation under the existing CAA without providing such a discussion and a comprehensive analysis of the many significant economic, technical, institutional, environmental, scientific, regulatory, legal, and policy issues that would be implicated by such regulation. *See id.* at 44388.

[8] In addition to the regulatory, legal, and policy concerns raised by these agencies, OSTP raises a number of important issues concerning the significant complexities and uncertainties associated with anthropogenic climate change that distinguish GHGs from traditionally regulated pollutants and increase the technical difficulty of any regulation of those gases under the existing provisions of the CAA. 73 Fed. Reg. at 44379-81. CEQ comments that EPA should take additional comment on OSTP's remarks and observations as to the current and future capability of science with respect to predictions and projections on a national, regional, and local scale. *Id.* at 44387. UARG agrees that EPA must carefully consider these issues.

III. In Any Future Proposed Rulemaking Regarding Regulation of GHGs Under the CAA, EPA Should Specifically Address the Special Needs and Perspectives of the Electric Generating Sector.

UARG agrees with the comment of DOE that the ANPR shows little understanding of how GHG emissions regulation under existing CAA provisions would affect U.S. energy security and economic security needs. These important matters are barely noted in the ANPR. *Id.* at 44371. These concerns are particularly acute for the electric generating industry for a number of reasons, and EPA should take the sector's special perspectives into account as the Agency determines whether and how to propose regulation of GHGs under the current provisions of the CAA.

First, the sector may be seen as a particularly tempting target for GHG regulation because more is known about electric generating facilities' emissions and emission controls than about emissions from and emission controls at many other industries. This is because utilities report their CO_2 emissions to EPA, these facilities are already subject to strict emission controls and standards for conventional pollutants, and much of the public attention has focused on reducing GHG emissions from this sector. Hence, all of the concerns identified above by the commenting federal agencies are magnified for the electric generating sector to the extent that sector is at risk of bearing a disproportionate and unfair burden under a GHG regulatory program.

There are many sources of GHGs in the United States. According to the ANPR, the electric power sector was responsible for 33.7% of all U.S. GHG emissions in 2006, while the transportation sector emitted 28%. The remaining U.S. GHG emissions in 2006 came from the industrial sector (19%), the residential and commercial sectors (4.8% and 5.6% respectively), and the agriculture sector (6.4%). *Id.* at 44402-03. Thus, although the electric power sector is a significant source of U.S. GHG emissions, it is far from being the only source, and any CAA regulations must take into account the other sectors and allocate the burden of regulation

appropriately. Moreover, concern about climate change arises from *global* concentrations of GHG emissions, caused by *global* emissions. Any CAA regulation must reflect the fact that U.S. emissions, while a significant source of GHG emissions worldwide, are not the only large contributor.[9] Even if U.S. emissions were reduced significantly, GHG concentrations would continue to grow on a global basis. The U.S. electric power sector should not shoulder a disproportionate burden in addressing GHG emissions when significant emissions also occur from other domestic sources and other countries.

Further, the electric power sector itself is made up of diverse types of sources, and any regulatory program must take into account their differences -- and the difference in control technologies that may be available to them. In addition, as stated *infra* in section VI.C., CCS technology is far from being commercially available for power plants. If EPA decides to regulate GHGs under the CAA, increasing efficiencies may be the only -- albeit limited -- achievable method in the short term of reducing GHG emissions at existing and new plants, and cost-effective applications differ based on the age and size of the plant.

A critical issue for EPA to consider is the reliability of the electric power grid. The North American Electric Reliability Corporation ("NERC"), which has regulatory authority over the operations of the electricity grid under federal law, has expressed serious concerns about the effect regulation of GHGs may have on electricity reliability in the United States. In a recent report, NERC identified several key reliability issues associated with climate change issues that EPA should consider in any future regulation of GHGs under the CAA. NERC, *Special Report:*

[9] For example, GHG emissions from China now exceed U.S. GHG emissions. International Energy Agency, *CO_2 Emissions from Fuel Combustion 1971-2005* (2007). The Netherlands Environmental Assessment Agency was the first organization to conclude that Chinese GHG emissions exceeded U.S. emissions in 2006. *See* http://www.mnp.nl/en/dossiers/Climatechange/moreinfo/Chinanowno1inCO2emissionsUSAinsecondposition.html.

Electric Industry Concerns on the Reliability Impacts of Climate Change Initiatives (Nov. 2008) ("NERC Special Report"), *available at* http://www.nerc.com/files/2008-Climate-Initiatives-Report.pdf. Rick Sergel, President and CEO of NERC, commented that:

> We are concerned that, when viewed from a continent-wide perspective, current climate initiatives do not adequately address key reliability objectives, particularly the need for a strong and robust transmission system. . . . As we consider our energy future, it becomes increasingly clear that our success in reducing carbon emissions and realizing energy independence will hinge on our ability to provide reliable, clean . . . electricity where and when it is needed.

Press Release, NERC, Climate Policy Critical to Grid Reliability (Nov. 10, 2008), *available at* http://www.nerc.com/news_pr.php?npr=198.

In particular, the NERC Special Report noted that broad-scale fuel switching from coal to natural gas in response to GHG regulation would jeopardize electric reliability. Retirements of coal-fired power plants over a short timeline in response to GHG regulation could result in the loss of generation needed to support the integrity of the bulk power system and thus severely harm reliability, especially in those regions that depend heavily on coal for fuel. Also, the broad-scale replacement and relocation of generating plants from current coal sites to sites that would be suitable for new or expanded natural gas-fired generation would require significant upgrades to existing transmission infrastructure. NERC Special Report at 6-10. NERC notes that "[t]he timelines established for CO2 reductions will be one of the driving factors determining the extent to which this fuel-switching occurs and any resulting impacts to reliability." *Id.* at 6.

Another important consideration is that existing transmission infrastructure is insufficient to deliver electricity from new "cleaner" sources of power to the grid. The existing electricity transmission network cannot reliably deliver power from new sources of renewable power to demand centers. As states attempt to deliver "clean energy" over already heavily-loaded transmission lines to meet renewable portfolio standard requirements, the transmission system

will need to be expanded to meet these new requirements. *Id.* at 11-14. As NERC notes, "[t]he ability to reduce the carbon emissions of the electric sector hinges on having a robust transmission system," and the "[e]xisting transmission infrastructure is inadequate to reliably integrate new renewable sources to demand centers." *Id.* at 11.

Because of the vital importance of electric reliability to national security and to the nation generally, EPA needs to consider carefully how any proposed regulation of GHGs under the CAA may affect the reliability of the electricity generation, transmission, and distribution system in this country.

IV. Before EPA Could Present a Reasoned Basis for Any Future Proposed Endangerment Finding, the Agency Would Need To Address a Range of Issues Requiring Substantial Further Development.

Section V of the ANPR summarizes EPA's "work to date on an endangerment analysis in response to the Supreme Court's decision in *Massachusetts v. EPA*." 73 Fed. Reg. at 44421/2. This section includes three main parts: (1) a fairly brief description of what EPA views as the legal framework for an endangerment determination; (2) a summary of information and issues bearing on such a determination; and (3) a discussion of how EPA might determine whether emissions of GHGs from motor vehicles or fuels cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare. As discussed below, this section of the ANPR raises a range of issues that require substantial further development before EPA could present a reasoned basis for any proposed endangerment finding.

Before EPA could make and publish a final endangerment finding that could be the basis for regulation, EPA would have to provide public notice of -- and solicit, consider, and respond to public comment on -- a specific proposed endangerment finding. *See Thomas v. New York*, 802 F.2d 1443, 1447 (D.C. Cir. 1986); *Nat'l Asphalt Pavement Ass'n v. Train*, 539 F.2d 775, 779 n.2 (D.C. Cir. 1976). The ANPR of course does not provide public notice of any proposed

endangerment finding. The following comments provide UARG's views on the issues that EPA would have to address before it could provide effective public notice of any determination that emissions of GHGs from new U.S. motor vehicles (or any other sources) under the Act cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare.

A. The Effect of *Massachusetts v. EPA*

Scattered passages in the ANPR provide only a limited discussion of the Supreme Court's decision in *Massachusetts v. EPA*. *See id.* at 44398/1-2, 44418/3, 44421/2. Some aspects of this discussion appear to be incomplete and internally inconsistent. For example, the ANPR at one point states that "[t]he Supreme Court's decision in *Massachusetts v. EPA* requires EPA to address whether GHG emissions from new motor vehicles meet the endangerment test of CAA section 202(a)(1)." *Id.* at 44418/3. This statement could be read as suggesting that EPA believes it has an obligation to determine whether or not that endangerment test is met. Elsewhere in the ANPR, EPA recognizes that scientific uncertainty is a legitimate factor in determining how to respond to the petition for rulemaking and may "'preclude[] EPA from making a reasoned judgment as to whether greenhouse gases contribute to global warming.'" *Id.* at 44398/1 (quoting *Massachusetts*, 127 S. Ct. at 1463); *see also id.* at 44421/2. Yet the ANPR fails to explain that the references in the Court's opinion to "contribution to global warming" are a shorthand reference to the statutory test of contribution to air pollution that may reasonably be anticipated to endanger public health or welfare. *See, e.g.*, *Strengths and Weaknesses of Regulating Greenhouse Gas Emissions Using Existing Clean Air Act Authorities: Hearing Before the House Energy and Commerce Subcommittee on Energy and Air Quality*, 110th Cong. (Apr. 10, 2008), Testimony of Robert J. Meyers, Principal Deputy Assistant Administrator for

Air and Radiation, EPA, at 3 (characterizing the Court's reference to scientific uncertainty as relevant to "making a reasoned judgment on such an endangerment determination").

Moreover, although the ANPR observes that the Court did not "dictat[e] EPA's action on remand" or "decid[e] whether EPA must find there is endangerment," 73 Fed. Reg. at 44398/2, the ANPR provides no clear description of the limited nature of the Court's holding -- that, for example, EPA on remand need not make any finding regarding endangerment[10] and need not confine its consideration of factors to scientific uncertainty as long as those factors relate to the language of the statute. The Court found EPA's decision to deny the rulemaking petition to be arbitrary because its explanation for its denial "rest[ed] on reasoning divorced from the statutory text," 127 S. Ct. at 1462, and was unsupported by "reasoned explanation" that is "ground[ed] . . . in the statute," *id.* at 1463. Section 202(a)(1), the Court held, "condition[s] the exercise of EPA's authority on its formation of a 'judgment,'" and "that judgment must relate to whether an air pollutant 'cause[s], or contribute[s] to, air pollution which may reasonably be anticipated to endanger public health or welfare.'" *Id.* at 1462 (quoting CAA § 202(a)(1)). Thus, under the Court's opinion, EPA's responsibility is to make a judgment, in response to the rulemaking petition, that does not "ignore" the text of section 202(a)(1), that "exercise[s] discretion within defined statutory limits," *id.*, and that is supported by a "reasoned explanation," *id.* at 1463.

Furthermore, certain statements in the ANPR's limited discussion of *Massachusetts* do not fully or consistently reflect the Court's description of EPA's authority. For example, one part of the ANPR says, without any apparent qualification, that "[i]f the Administrator makes a positive endangerment determination for GHG emissions from new motor vehicles, he must

[10] *See* 127 S. Ct. at 1463 ("We need not and do not reach the question whether on remand EPA must make an endangerment finding. . . .").

regulate those GHG emissions under section 202(a)." 73 Fed. Reg. at 44418/3. Yet a separate passage acknowledges the Court's statement that its holding does not address whether EPA on remand may take into account "policy concerns" that might "inform EPA's actions in the event that it makes such a finding." 127 S. Ct. at 1463, *quoted in* 73 Fed. Reg. at 44398/2. And, as that passage also notes, the Court made clear that EPA "has significant latitude as to the manner, timing, [and] content" of any regulations that it does adopt "and coordination of [those] regulations with those of other agencies." 127 S. Ct. at 1462, *quoted in* 73 Fed. Reg. at 44398/2. Thus, to the extent EPA proceeds with a notice of proposed rulemaking, it will be essential for it to provide the public with a discussion of *Massachusetts* that reflects in a consistent way (1) the limited nature of the Court's holding[11] and (2) the Court's recognition of EPA's substantial discretion as to (a) the timing and manner of any regulations that may accompany or follow an affirmative endangerment finding and (b) coordination of its regulatory determinations and actions with those of other agencies, such as the Department of Transportation -- as to which, the Court noted, EPA is to seek to "avoid inconsistency" in implementing statutory obligations. 127 S. Ct. at 1462.

In addition, in developing any such notice, EPA should relate the holdings in *Massachusetts* to the specific issues EPA would have to engage before it could propose an endangerment finding with respect to GHG emissions from new U.S. motor vehicles (or other sources). Some of these issues are discussed below.

[11] For example, EPA in any notice of proposed rulemaking should explain its view of what would constitute a "reasonable explanation as to why it cannot or will not exercise its discretion" to determine whether new U.S. motor vehicle emissions meet the endangerment standard. 127 S. Ct. at 1462.

B. The Endangerment Test

1. The Legal Framework and Decision-Making Criteria

Nothing in section 202(a)(1) (or any other provision of the Act) refers to, or suggests EPA may treat, global climate change as endangerment *per se*, apart from specifically identifiable physical effects on public health or welfare in the United States that may result from emissions of GHGs in the amounts in which they occur from new U.S. motor vehicles (or any other relevant source category). Thus, the relevant issues for EPA's exercise of judgment under section 202(a)(1) include whether emissions from new U.S. motor vehicles of the GHGs identified in the petition for rulemaking "cause[], or contribute[] to, air pollution which may reasonably be anticipated to endanger public health or welfare" and whether existing scientific information is "sufficient" to allow EPA to come to a conclusion on that question. *Id.* at 1462-63. As noted above, EPA has discretion to exercise its judgment on remand consistent with the statutory criteria, and the Court did not prejudge the outcome of EPA's consideration of the section 202(a)(1) endangerment criterion.

The ANPR describes what it characterizes as the two-part nature of the endangerment test: "First, the Administrator must decide if, in his judgment, air pollution may reasonably be anticipated to endanger public health or welfare. Second, the Administrator must decide whether, in his judgment, emissions of any air pollutant from new motor vehicles or engines cause or contribute to this air pollution." 73 Fed. Reg. at 44421/3. The ANPR then discusses the legislative history of the endangerment criterion in section 202(a)(1) and similar criteria in other parts of the Act, and in particular the legislative history of the 1977 amendments to the Act, which in part reflected the D.C. Circuit's decision in *Ethyl Corp. v. EPA*, 541 F.2d 1 (D.C. Cir. 1976). *Id.* at 44422/2-3. EPA observes that the court in that case was confronted with an argument that EPA's regulation of lead in gasoline under section 211 of the Act was inconsistent

with the statutory standard in effect at that time, which established a "will endanger" test for regulation under that section. Rejecting an industry challenge to the regulation, the court held, among other things, that section 211 did not require proof of actual harm as a prerequisite to regulation and that Congress intended the statute to be preventative or precautionary in nature. In addition, it indicated that EPA has authority to consider the cumulative effects of exposure to lead from numerous sources, not only lead from the motor vehicle fuels being considered for regulation.

The ANPR also notes that the legislative history of the 1977 amendments reflected the view that the statute's call for the Administrator to exercise "judgment" in applying the endangerment test pertains both to the "cause or contribute" analysis and to the "may reasonably be anticipated to endanger" language. And that legislative history makes clear that EPA's "projections, assessments and estimates must be reasonable, and cannot be based on a 'crystal ball inquiry.'" *Id.* at 44422/3. The legislative history thus reflects congressional intent to use the statutory phrase "may reasonably be anticipated" to "build[] upon the precautionary and preventative goals already provided in the use of the term 'endanger.'" *Id.* EPA adds that, based on the legislative history:

> [T]he phrase "cause or contribute" ensures that all sources of the contaminant which contribute to air pollution be considered in the endangerment analysis (e.g., not a single source or category of sources). It is also intended to require the Administrator to consider all sources of exposure to a pollutant (e.g., food, water, air) when determining risk.

Id.

The ANPR notes that the legislative history does not fully explain what EPA should consider when making an endangerment finding:

> [I]t is not clear … what constitutes a sufficient "contribution" for purposes of making a finding. The CAA does not define the concept "cause or contribute" and instead requires that the Administrator exercise his judgment when

> determining whether emissions of air pollutants cause or contribute to air pollution. As a result, the Administrator has the discretion to interpret "cause or contribute" in a reasonable manner when applying it to the circumstances before him.

Id. EPA points out, however, that in *Ethyl*, the court observed that, even where EPA takes into account "cumulative impact," "'emissions must make more than a minimal contribution to total exposure in order to justify regulation.'" *Id.* at 44423/2 (citing *Ethyl*, 541 F.2d at 31 n.62).

Although EPA is correct that it has some discretion in applying the endangerment test, it will be important for the Agency, in any notice of proposed rulemaking, to provide its proposed interpretation of how that test should be construed in the context of the specific source categories being considered for regulation. For example, with respect to the "contribution" question, EPA must address specifically how it will determine whether emissions of one or more GHGs considered individually -- or, alternatively, various possible combinations of GHGs -- from motor vehicles and motor vehicle fuels can properly be determined to "cause or contribute" to "air pollution." *Id.* at 44428/1-3. EPA must also discuss how it will define the "total" emissions to which EPA would compare the relevant source or source category's emissions. In this regard, given the global nature of the "air pollution" at issue, EPA would need to consider, as the denominator in a "contribution ratio," total global atmospheric concentrations of the GHG or GHGs whose emissions would be addressed through any regulatory action. *See id.* This approach would be consonant with EPA's recognition, noted above, that "all sources of the contaminant which contribute to air pollution [must] be considered in the endangerment analysis." *Id.* at 44422/3.

In discussing possible "contribution" levels, the ANPR notes potentially applicable percentages, such as 1.2 percent of total emissions. *Id.* at 44423/1-2 (citing *Bluewater Network v. EPA*, 370 F.3d 1, 15 (D.C. Cir. 2004)). The ANPR's discussion of this issue, however, is

limited and superficial, and EPA should recognize that its discretion in defining "contribution" is far from unbounded and must be exercised in light of its own previous determinations under the CAA.

EPA should, for example, analyze the applicability of its discussion of contribution percentages in the context of the CAA's "best available retrofit technology" ("BART") program for regional haze. The Act's BART provision -- which, like section 202(a)(1)'s endangerment language, was added by Congress in the 1977 CAA Amendments -- uses "contribution" language similar to that in section 202(a)(1). *See* CAA § 169A(b)(2)(A) (BART applies to a source in certain specified categories of major stationary sources if it "may reasonably be anticipated to cause or contribute [*not* "significantly" contribute] to *any* impairment of visibility" in any mandatory federal Class I area (emphasis added)). In its Guidelines for implementing this requirement, EPA describes an appropriate test for any "contribution" -- not "significant contribution" -- as that amount of emissions that makes a difference in visibility that is humanly perceptible in the real world (a perceptibility "threshold" that EPA estimates as no smaller than a 5 percent change in light extinction). 70 Fed. Reg. 39104, 39119-20 & n.28 (July 6, 2005). The point here is not that 5 percent is necessarily the "right" contribution percentage for assessing GHG emissions or global climate change. Rather, the point is that EPA should consider and discuss what amount of additional GHG emission reduction from new U.S. motor vehicles (beyond emission levels that would result from existing requirements) would produce a humanly perceptible difference in specifically identified adverse public health or welfare effects in the U.S. In doing so, EPA also should bear in mind its admonition in its BART Guidelines that it would be "inappropriate[] [to] create a 'contribution to contribution' test" by "aggregat[ing] the

… effects of multiple sources and compar[ing] their collective effects against [the] contribution threshold." *Id.* at 39121 n.34.

2. Application of the Endangerment Test to the "Air Pollution" at Issue

Section V of the ANPR also discusses certain issues bearing on a determination of the relevant "air pollution," including a description of GHGs and other anthropogenic factors that may affect global climate. This part then includes a very limited summary of scientific information that is more fully discussed in the draft Technical Support Document on the Endangerment Analysis ("Draft Endangerment TSD").[12]

Among other things, for example, the ANPR states that "climatic changes" associated with increases in "global temperatures" include "change in precipitation patterns, rise in sea levels, and changes in the frequency and intensity of extreme weather events." 73 Fed. Reg. at 44423/3. Yet, EPA notes, "[t]he scientific literature that assesses the potential risks and end-point impacts of climate change … does not assess these impacts on a gas-by-gas basis," *id.* at 44424/1, thus making it particularly difficult to assess adequately whether and to what extent endangerment is posed by atmospheric concentrations of a single gas, such as CO_2. EPA also states that climatic changes result from GHG concentrations in the atmosphere "as well as other natural and anthropogenic factors that influence the Earth's energy balance," *id.*, further complicating the endangerment analysis. Although EPA says that it "is considering defining the 'air pollution' related to GHGs as the elevated combined current and projected atmospheric concentration of the six GHGs," *id.*, one effect of that approach would be to reduce the likelihood that any category of sources of any of those GHGs could be deemed to make a

[12] UARG's comments on the Draft Endangerment TSD are presented in Section V of these comments.

humanly perceptible contribution to the "air pollution," so defined. This is particularly so given EPA's recognition that climatic changes that may be associated with GHG emissions or GHG atmospheric concentrations are in part attributable to "other natural and anthropogenic factors that influence the Earth's energy balance" as well as to "GHGs and aerosols" other than the six "primary" GHGs. *Id.*; *see id.* at 44424/1-44425/2 (discussing other GHGs). If EPA develops a notice of proposed rulemaking, it will need to discuss the relative contributions of these other factors and the implications of such contributions on the basis for and nature of any endangerment finding with respect to a source category's emissions of any of the six primary gases, such as CO_2.

In discussing "observed global effects," EPA notes, among other things, that current "ambient"[13] GHG concentrations "remain well below published thresholds for any direct adverse health effects, such as respiratory or toxic effects." *Id.* at 44425/2. Likewise, EPA notes that projected concentrations "remain well below published thresholds for any direct adverse health effects, such as respiration or toxic effects." *Id.* at 44426/2. EPA says, however, that "[w]arming of the [global] climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level," and that "[m]ost of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations." *Id.* at 44425/3. In other words, EPA says, "the warming cannot be explained by natural variability *alone*." *Id.* (emphasis added). EPA then refers

[13] EPA's use of the word "ambient" reflects the need under the CAA to evaluate any possible endangerment of public health or welfare with respect to the presence of an air pollutant *in the* "*ambient air*," i.e., the portion of the atmosphere to which the general public has access. This point is discussed in greater detail in other parts of these comments.

generally to various *global* effects that it believes are associated with climate change, including precipitation changes, global sea level, and extreme temperatures. *Id.*

EPA also refers to temperature increases, extreme temperatures, sea level rise, and precipitation increases as "observed" effects in the U.S. *Id.* at 44426/1. A significant issue briefly mentioned in the discussion of projected U.S. effects is mortality -- obviously the most significant possible public health effect -- due to temperature changes; EPA says "[i]t is currently not possible to quantify the balance between decreased cold-related deaths and increased heat-related deaths attributable to climate change over time." *Id.* at 44426/3. The balance of possible benefits and detriments to U.S. agricultural and forest productivity is also discussed. *Id.* at 44427/1.

This part of Section V concludes with a discussion of endangerment in the context of GHG-related "air pollution." EPA says:

> The scientific record shows there is compelling and robust evidence that observed climate change can be attributed to the heating effect caused by global anthropogenic GHG emissions. . . . Some degree of future warming is now unavoidable given the current buildup of atmospheric concentrations of GHGs, as the result of past and present GHG emissions. Based on the scientific evidence, it is reasonable to conclude that future climate change will result from current and future emissions of GHGs.

Id. at 44427/2. EPA says that "all regions of the U.S. will be affected in some way," although "[t]here is a wide range in the magnitude of the[] estimated impacts," and "[t]here [is] more confidence in the occurrence of some effects and less confidence in the occurrence of others." *Id.* at 44427/2-3. Regarding possible public health effects, the ANPR says: "[T]here are indirect human health risks (e.g., heat-related mortality, exacerbated air quality, extreme events) and benefits (e.g., less cold-related mortality) that occur due to climate change. We seek comment on how these human health impacts should be characterized under the CAA for purposes of an endangerment analysis." *Id.* at 44427/3. EPA adds that:

> Some elements of human health, society and the environment may benefit from climate change (e.g., short-term increases in agricultural yields, less cold-related mortality). We seek comment on how the potential for some benefits should be viewed against the full weight of evidence showing numerous risks and the potential for adverse impacts.

Id. EPA states that information in the ANPR and the Draft Endangerment TSD "points towards the robust conclusion that expected rates of climate change (driven by past, present, and plausible future GHG emissions) pose a number of serious risks to the U.S., even if the exact nature of the risks is difficult to quantify with confidence." *Id.* at 44428/1. EPA then solicits "comment on whether, in light of the precautionary nature of the statutory language, the Administrator needs to find that current levels of GHG concentrations endanger public health or welfare now." *Id.* EPA concludes by inviting "comment on all issues relevant to making an endangerment finding, including the scientific basis supporting a finding that there is or is not endangerment under the CAA, as well as the potential scope of the finding (i.e., public health, welfare, or both)." *Id.*

Although UARG presents its detailed comments on these issues in Section V (addressing the Draft Endangerment TSD), it offers the following general comments here.

First, in determining an appropriate response to the petition for rulemaking at issue in *Massachusetts*, EPA must consider the broad effects that regulation of new U.S. motor vehicles' emissions may have on public health or welfare. For example, any regulation of motor vehicle GHG emissions under section 202 (or almost any other regulation of any other source sector's GHG emissions under the existing CAA) presumably would trigger PSD regulation of emissions of the relevant gases. That in turn could have profoundly damaging effects on the U.S. economy, which in turn could harm public health or welfare to a degree that would offset any benefit from such motor vehicle regulation. In addition, PSD or other broadly applicable regulation of GHG emissions under the existing CAA could accelerate the flight of industry to other countries,

especially developing countries that are unlikely to control their sources' GHG emissions and are unlikely to control associated conventional-pollutant emissions to the same extent as the U.S. does. (Indeed, global GHG emission levels are rising only, or primarily, because of developing countries' increasing emissions; emissions from developed countries such as the U.S. have largely stabilized.) Given the global nature of GHG concentrations in the atmosphere, and effects that may be attributable to those concentrations, the result might be a net detriment to U.S. public health or welfare. These collateral effects of possible motor vehicle regulation at least must be considered before EPA could rationally proceed with a proposed endangerment finding and proposed regulation of GHG emissions under section 202. It will be particularly important to consider these potentially damaging collateral effects in the context of not only the available information regarding potential risks of adverse effects of climate change but also the possible health and welfare benefits from climate change as identified in the ANPR (e.g., reductions in cold-weather-related mortality and increased agricultural productivity and forest growth).

Second, as the above comments illustrate, if EPA prepares a notice of proposed rulemaking, it must focus not on "global effects" but on evidence specifically of "U.S. effects." EPA's mandate is not to protect public health or welfare on a global scale but only in the United States. Thus, notwithstanding EPA's discussion in the ANPR of "global effects," EPA must clearly recognize that any basis that may exist for an endangerment finding is limited to U.S. effects only. As UARG's comments on the Draft Endangerment TSD note in greater detail, very little information exists on U.S. effects on which EPA could base a finding of endangerment of public health or welfare.

Third, a focus on a balanced assessment of potential adverse and beneficial effects is essential to any rational determination concerning endangerment. The ANPR implicitly recognizes the need for such an assessment by referring to information on increased agricultural yields and lower cold-weather-related mortality. Instructive in this regard is *American Trucking Ass'ns v. EPA*, 175 F.3d 1027, 1051-53 (D.C. Cir.), *modified on reh'g on other grounds*, 195 F.3d 4 (D.C. Cir. 1999), *rev'd in part and remanded on other grounds*, *Whitman v. American Trucking Ass'ns*, 531 U.S. 457 (2001), in which the D.C. Circuit held that "EPA must consider positive identifiable effects of a pollutant's presence in the ambient air in formulating air quality criteria under § 108 and NAAQS under § 109," *id.* at 1052. Although this decision did not specifically address the criteria for making endangerment determinations, it would be unreasonable for EPA to make a finding of endangerment with respect to a given pollutant without evaluating and weighing the potentially beneficent effects of that "pollutant's presence" in the portion of the atmosphere that is relevant to an assessment of that pollutant's potentially negative effects. Moreover, EPA would have to assess and compare the pollutant's public health effects, including non-adverse U.S. health effects such as reductions in cold-weather deaths, with any effects the pollutant may have on public welfare in the U.S.

Fourth, with respect to "contribution," an important factor in any endangerment analysis for new U.S. motor vehicles is the extent, if any, to which endangerment may be posed by that portion of motor vehicle GHG emissions that is *not* controlled, and will not be controlled, under existing provisions of law, including the Energy Policy and Conservation Act, 42 U.S.C. §§ 6201, et seq., (with its Corporate Average Fuel Economy ("CAFÉ") program) and the EISA, which includes amendments to CAFÉ that will have the effect of further reducing vehicles' CO_2 emissions. EPA should take into account the contribution of *only that portion of the emissions*

that will remain after application of existing emission control requirements. *See, e.g.*, 73 Fed. Reg. at 44388. Indeed, with new U.S. motor vehicles' GHG emissions (and U.S. GHG emissions more generally) becoming a steadily smaller share of global emissions and atmospheric concentrations, it is unclear what basis EPA would have for concluding that any global-climate-related risks of adverse effects on U.S. public health or welfare would *not* occur even in the absence of those U.S. emissions. In any event, if EPA were to base any endangerment finding on projected future effects (a concept discussed in the ANPR), it would need to consider evidence that new U.S. motor vehicles' emissions (and other U.S. emissions) have but a small, and diminishing, effect on global atmospheric concentrations.

Finally, as a related matter, the purpose of the CAA endangerment test, as reflected in *Ethyl* and in the legislative history to which EPA refers, is to be *preventative* regarding dangers that may be posed by air pollutant emissions and concentrations. In other words, under CAA endangerment criteria, the purpose of regulation is to prevent or avert dangers to the public health or welfare. Accordingly, *if EPA proposes any endangerment finding for, or any regulation of, GHG emissions from motor vehicles or other sources under the CAA, it must first evaluate to what extent the risk to the U.S. public health or welfare would actually be averted as a result of that regulation.* In the case of the lead in motor vehicle fuels addressed in *Ethyl*, for example, there were strong reasons for EPA to believe that regulation of the lead in fuels would prevent at least a substantial part of the danger to public health posed by human exposure to that air pollutant. *See, e.g.*, *Ethyl*, 541 F.2d at 31 (The Administrator "determined that absorption of lead automobile emissions, when added to all other human exposure to lead, raises the body lead burden to a level that will endanger health. He realized that lead automobile emissions were, far and away, the most readily reduced significant source of environmental lead."). Thus, the Court

observed, "the lead exposure problem can *fruitfully be attacked* through control of lead additives" in motor vehicle fuels. *Id.* at 31 n.62 (emphasis added).

Before proceeding with any proposed endangerment finding or regulation, therefore, EPA would need first to analyze what concrete public health or welfare danger in the United States would be averted by regulation that would control or reduce GHG emissions from new U.S. motor vehicles, above and beyond the emission controls or reductions that would occur because of other statutory and regulatory requirements such as CAFÉ and EISA requirements. EPA then would need to determine that -- even in the face of large and ever-growing non-U.S. emissions of GHGs that are making steadily increasing contributions to the global pool of the asserted danger-causing pollutants -- the U.S. health or welfare danger could "*fruitfully* be attacked" through control of these U.S. emissions alone. *Id.* (emphasis added). In light of existing and rapidly growing levels of GHG emissions from other countries, and the large and increasing percentage of global GHG atmospheric concentrations attributable to those countries' emissions, it is highly questionable whether CAA regulation of new U.S. motor vehicles' emissions (or emissions from any other U.S. source category) could avert any danger EPA might determine is associated with emissions of GHGs.

V. The Draft Endangerment TSD Does Not Provide a Sufficient Basis for Making Any Possible Future Endangerment Determination with Regard to GHGs Under the CAA.

In addition to the portions of the ANPR that describe EPA's preliminary conceptualization of potential GHG regulatory approaches, EPA has also released and requested comment on several draft Technical Support Documents, including one outlining the Agency's preliminary endangerment analysis for GHG emissions (the "Draft Endangerment TSD"). UARG submits the following comments on EPA's Draft Endangerment TSD.

The introduction to the Draft Endangerment TSD indicates that the document: (1) assesses the extent to which climate change can be attributed to human activities; (2) examines a range of specific and quantifiable vulnerabilities, risks, and impacts due to GHGs and climate change; and (3) explores known or expected benefits of elevated GHG concentrations in the atmosphere or of climate change. Its focus, EPA states, is primarily on the United States. Draft Endangerment TSD at 1. As described below, however, the Draft Endangerment TSD addresses these three topics in only the most cursory manner. The analysis contained in the Draft Endangerment TSD is woefully insufficient as a potential basis for making any endangerment determinations under the CAA.

Briefly, the document: (1) improperly defines the scope of GHG-related science relevant to an endangerment finding, rendering the information it presents fundamentally ill-suited to the task of supporting any endangerment determination; (2) relies on sources of information that do not adequately address the scientific issues relevant under the CAA; (3) contains improper and inaccurate characterizations of the conclusions that can reasonably be drawn from the scientific studies and assessments it cites; (4) fails to address the import of recent scientific studies that undercut the conclusions stated in the Draft Endangerment TSD; (5) fails to address adequately the numerous uncertainties present in the current science; and (6) exhibits bias in its failure to address all relevant issues fully, including the potential for positive effects associated with climate change. The flaws identified in the remainder of this section of UARG's comments represent serious problems with the Agency's preliminary endangerment analysis. Unless these deficiencies and inadequacies are addressed, the Agency will lack a sufficient scientific basis on which to propose any determination as to whether GHG emissions from any source cause or

contribute to air pollution that may reasonably be anticipated to endanger public health or welfare.

A. The Draft Endangerment TSD Has Improperly Defined the Scope of Relevant GHG-Related Science, Rendering It Unfit for Use in Assessing Endangerment.

EPA states that the purpose of the Draft Endangerment TSD is "to provide scientific and technical support for an endangerment analysis regarding greenhouse gas (GHG) emissions under the Clean Air Act." Draft Endangerment TSD at 1. The scientific and technical information provided in the document, however, is wholly inadequate to support an endangerment finding under the provisions of the Act. This failing results, in part, from a lack of clarity in the document as to the scope of its analysis and a persistent lack of precision in the identification and analysis of relevant information. By mixing relevant and irrelevant facts in a manner that makes it impossible to distinguish between those effects that are relevant and those that are not, the Draft Endangerment TSD fails to serve its intended purpose as a source of information to be used to assess endangerment.

First, the Draft Endangerment TSD states that it is an assessment of the

> extent to which observed climate change can be attributed to anthropogenic GHG emissions. . . . The term "climate change" in this document *generally* refers to climate change induced by human activities, including activities that emit GHGs. Future projections of climate change, based *primarily* on future scenarios of anthropogenic GHG emissions, are shown for the global and national scale.

Id. (emphasis added).

As this quotation demonstrates, at the outset of its preliminary endangerment analysis, EPA is simultaneously claiming that it is assessing anthropogenic-induced climate change and that it is also addressing, in an unspecified manner, climate change that is not related to anthropogenic emissions or to GHG emissions of any sort. In further illustration of this point, the Draft Endangerment TSD describes the climate-related effects of changes in tropospheric

ozone, anthropogenic emissions of aerosols, increases in stratospheric and tropospheric water vapor, changes in land cover, and changes in solar irradiance -- none of which are related to emissions of the GHGs that the ANPR addresses. *See, e.g.*, *id.* at 20-21.

Addressing the impacts that may result from climate change in general is not the purpose of the Draft Endangerment TSD, and this information does not provide support for any potential endangerment finding. Rather, the purpose of this document is to assess whether anthropogenic GHG emissions themselves endanger public health or welfare. This lack of clarity, reflected throughout the document, as to the scope of climate effects that are the subject of this analysis makes it impossible to determine whether the effects described and any potential endangerment are the result of anthropogenic emissions of GHGs or some combination of anthropogenic and biogenic emissions of GHGs and the climate-related effects that do not result from human activities or from GHG emissions. Because it is impossible to determine based on the analysis contained in the Draft Endangerment TSD what precisely might be the ultimate source of any putative endangerment, the document cannot serve as a basis for an endangerment finding under the CAA. EPA must revise this document, if it is to serve as the basis for any finding as to endangerment, to address only those effects that are relevant to such a finding as defined by the standards in the CAA.

Further, the CAA standards governing endangerment require more from EPA than clarification as to whether the Draft Endangerment TSD examines anthropogenic, biogenic, or non-GHG-based climate change. EPA also must specify whether it intends the Draft Endangerment TSD to serve as supportive analysis for endangerment determinations under all relevant CAA authorities, a subset of such authorities, or only one particular CAA provision. Indeed, EPA's intentions for this document and how it is to be used are remarkably opaque.

EPA never expressly states its intentions in this regard; however, in one telling section of the Draft Endangerment TSD, the Agency states that "[t]hese radiative forcing values are the result of *global* changes in atmospheric concentrations of GHGs … and other factors, and *are therefore not the result of U.S. transportation emissions in isolation*." Draft Endangerment TSD at 19 (first emphasis in original; second emphasis added). It is unclear if this statement implies that other sections of the Draft Endangerment TSD are intended to reflect only purported transportation-related global changes, if the document is intended for use only in analysis of endangerment potential from transportation-related emissions while still addressing other sources of emissions, or if its scope is even broader.

This lack of clarity creates a host of problems. As EPA has itself acknowledged in the body of the ANPR, each section of the CAA requiring an endangerment finding prior to regulation contains its own unique standard for reaching such a determination. 73 Fed. Reg. at 44418-19. The Draft Endangerment TSD fails to specify which of the various impacts it identifies, or what portion of such impacts, can be attributed to emissions from each source category. Indeed, it does not even attempt to describe the extent to which such an analysis is even possible given the state of current scientific knowledge. This is precisely the sort of scientific information that will be required to conduct an endangerment analysis under the various CAA provisions EPA proposes as potential GHG regulatory authorities in the ANPR.

In addition, the scope of the Draft Endangerment TSD is inadequately defined with respect to global and U.S. emissions and the effects that can be attributed to each. Because EPA has the authority only to regulate U.S. emissions, its endangerment analysis must provide a basis for determining the extent, if any, to which U.S. emissions result in endangerment. The Draft Endangerment TSD fails to do so. Instead, it addresses all observed and potential future climate

change caused by *global* emissions, and devotes a considerable portion of its discussion to global climate change-related effects, without providing any explanation as to how those emissions or effects should or should not factor into an endangerment analysis. *See, e.g.*, Draft Endangerment TSD at 27-28 (global precipitation), 29-30 (global sea level rise), 31-33 (changes in global physical and biological systems), 34-35 (global extreme events). Accordingly, the current Draft Endangerment TSD is written in a manner that makes it impossible to determine whether the effects it describes are associated with U.S. or global emissions and whether regulation of U.S. sources will have anything more than a negligible effect on the various impacts identified in the document. Moreover, the Agency acknowledges in the Draft Endangerment TSD that EPA tracks U.S. emissions through the development of the official U.S. GHG inventory, underscoring the potential to analyze only those effects that are associated with U.S. emissions. *Id*. at 8. Accordingly, an analysis of those effects that can be attributed solely to U.S. emissions may be possible, and EPA should, at the least, describe the relevance of such an assessment to the standards for determining whether endangerment exists. Failure to provide this information leaves a gaping hole in EPA's preliminary endangerment analysis and again renders the document insufficient to support any endangerment determination.

Finally, the Draft Endangerment TSD addresses climate change-related effects that are wholly unrelated to U.S. impacts. Specifically, the Draft Endangerment TSD discusses potential effects of climate change in other nations, focusing particularly on regions, such as Africa, Asia, and Latin America. It asserts that climate change will affect the health of people and impact food production and water resources in these regions and could influence international trade. *Id.* at 113. The document fails to establish, however, that such effects have any relevance to U.S. public health and welfare, suggesting only that they "may have consequences that transcend

national boundaries that raise concerns for the U.S." *Id.* at 1. Tellingly, the Draft Endangerment TSD provides no scientific data by which to assess such scenarios. This speculative approach unjustifiably expands the scope of the issues that should be considered during an endangerment assessment to include issues that have not been shown to affect U.S. public health and welfare. Further, even where the document does address U.S. (or North American) effects, it frequently intersperses additional discussion of global impacts, often failing to differentiate between the two. *See, e.g.*, *id.* at 41. By incorporating such substantial discussion of global impacts that are not tied to U.S. resources, the Draft Endangerment TSD does more to confuse a potential assessment of endangerment than it does to illuminate it.

In sum, EPA has failed to define the scope and purpose of the analysis contained in the Draft Endangerment TSD. Instead, the document unhelpfully commingles information regarding: (1) anthropogenic, biogenic and non-GHG-related climate change effects; (2) various sources of emissions without defining which purported effects may be associated with each source category; (3) global and U.S. emissions without differentiating between the effects that can be attributed to each category; and (4) global effects that have not been shown to have any relevance to U.S. public health or welfare. Because this information is presented in composite, without any meaningful attempt to distinguish emissions and effects that are relevant to the United States, it is impossible, based on the Draft Endangerment TSD, to determine whether any endangerment finding is justified.

B. The Draft Endangerment TSD Relies on Scientific Information that Is Inadequate To Assess Whether Endangerment to U.S. Public Health or Welfare Exists.

The Draft Endangerment TSD states that it relies on a number of sources of scientific information as the basis for its analysis of potential endangerment from GHG-related climate change. Draft Endangerment TSD at 4 (stating that the document relies primarily on the Fourth

Assessment Report of the Intergovernmental Panel on Climate Change ("IPCC"), synthesis and assessment products of the U.S. Climate Change Science Program ("CCSP") completed and publicly released to date, National Research Council ("NRC") reports, and the EPA annual report on U.S. GHG emission inventories). Upon reviewing the document, however, it is clear that EPA has relied most extensively, and in many cases exclusively, upon the analysis contained in the IPCC's Fourth Assessment Report. *See, e.g.*, *id.* at 11-14 (discussing historic and current GHG emissions); *id* at 19 (discussing radiative forcing values). Such overwhelming emphasis on the IPCC's summary of scientific knowledge is misplaced for a number of reasons.

First, EPA must more effectively acknowledge and address a critical limitation of the information contained in the IPCC Assessment Report. None of the reports issued by the IPCC addresses U.S.-specific effects in isolation as would be necessary to support an endangerment finding under the CAA. Instead, the IPCC Assessments are devoted primarily to global effects and global emissions. Further, EPA has adopted the IPCC's regional analysis of North American impacts, including projections for changes in temperature, precipitation, and sea level rise, reasoning that such effects "can be generalized for the U.S." *Id.* at 53. Such an approach is at best questionable, and, as EPA acknowledges, not always consistent with the science. For instance, the Draft Endangerment TSD states "[t]his document relies heavily on the North America chapter of the IPCC Working Group II report, though this chapter may not provide as much regional detail within the U.S. as did the 2000 report, *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change* (NAST, 2000)." *Id.* at 5. The implications of the limited U.S.-specific discussions are apparent in the analysis of specific scientific issues. For instance, the Draft Endangerment TSD simultaneously cites the IPCC's discussion of the effects of abrupt climate change even while acknowledging that U.S.

effects "cannot be predicted with confidence." *Id.* at 58-60. There is no scientific justification for discussing North American impacts that are not relevant to the United States, and the Draft Endangerment TSD's presentation of this information makes it impossible to determine whether consideration of North American impacts have played any role whatsoever in EPA's decisions as to what effects to address and what effects to exclude, if any. Similarly, the conclusions that the Draft Endangerment TSD adopts from the IPCC are frequently so vague as to lose almost all meaning when viewed from a U.S. endangerment analysis perspective. For instance, the document adopts the following IPCC North American conclusions:

> For the period 1955-2005, the greatest warming occurred in Alaska and north-western Canada, with substantial warming in the continental interior and modest warming in the south-eastern U.S. and eastern Canada.
>
> Spring and winter show the greatest changes in temperature and daily minimum (night-time) temperatures have warmed more than daily maximum (daytime) temperatures.

Id. at 27.

Although some U.S.-specific information appears in these conclusions, it is difficult to determine which effects apply to the United States, which apply primarily to Canada, and which apply only to non-U.S. resources. In the context of an endangerment analysis, such imprecision is wholly unacceptable.

The problems stemming from this imprecision are not, moreover, rectified by EPA's chosen method for validating the use of IPCC North America conclusions as a proxy for U.S.-specific information. EPA relies on the conclusion of two IPCC Assessment Report authors (Christopher Field and Linda Mortsch) as proof that extrapolation from North American conclusions to the United States is appropriate. These authors state that the "major conclusions" of the North America chapter "all apply to the United States" and that the topics and impacts discussed are "relevant to *at least some* locations in the United States." *Id.* at 63 (emphasis

added). This statement only begs further critical questions. *Which* conclusions are "major"? *Which* conclusions apply to *which* U.S. locations? And which conclusions are inapposite? The Draft Endangerment TSD does not answer these questions. Further, validation of the North America conclusions by two authors is entirely inconsistent with the procedures governing IPCC work, as discussed below, and is questionable scientifically and not justified adequately by EPA. Given that the Draft Endangerment TSD "rel[ies] heavily on the North America chapter of the IPCC Working Group II volume of the Fourth Assessment Report" for all of its conclusions regarding purported U.S. impacts, the document fails to present the type of relevant and reliable information that would be needed to support any endangerment finding. *Id.*

Finally, in addition to the scientific imprecision introduced into the endangerment analysis process by the draft's adoption of general North America IPCC analysis as a proxy for scientific information specific to the United States, it is also important to note that the IPCC Assessment Report is not itself prepared in accordance with U.S. standards for scientific assessments. The IPCC is governed by its own "Principles Governing IPCC Work," *available at* http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles.pdf. These Principles emphasize that approval of the contents of IPCC Assessments is to be determined on the basis of consensus among IPCC member governments. Principles Governing IPCC Work at 2. In addition to the statutory principles established in the CAA, EPA's Draft Endangerment TSD is subject to the Information Quality Act and its guidelines establishing standards for the quality, objectivity, integrity, and utility of information disseminated by federal agencies. Pub. L. No. 106-554 § 515; 67 Fed. Reg. 8452 (Feb. 22, 2002). Adopting scientific conclusions of a body not subject to these U.S.-law requirements and "generalizing" such conclusions to stand for propositions that were not intended by their originator raise substantial questions as to whether the requirements of

the Information Quality Act are being met. Indeed, EPA highlights this issue itself when describing the process for approving the IPCC Assessment Report and the Information Quality Act procedures used during the review and approval of CCSP Synthesis and Assessment Products. *See* Draft Endangerment TSD at 3. Thus, before the information in the Draft Endangerment TSD could be used as the basis for any finding on endangerment, EPA would have to ensure that it independently concurs with the conclusions presented in the IPCC's Assessment Report, would have to address the possible consequences of the IPCC's procedures with respect to the conclusions reached by that body, and would have to demonstrate that it has complied with the Information Quality Act and its associated guidelines.

In sum, the analysis and conclusions of the IPCC, as contained in its Fourth Assessment Report, is the primary basis for many of the Draft Endangerment TSD's conclusions, including its most important determinations as to climate change-related effects in the United States. This is an inappropriate use of this information. Most of the IPCC conclusions concern global effects and emissions, information that serves only to cloud the state of scientific knowledge with respect to whether U.S. GHG emissions are associated with endangerment to U.S. public health or welfare. Further, adoption of the IPCC's North America conclusions as generally applicable to the United States is not scientifically justifiable. It is unclear precisely which effects cited in the Draft Endangerment TSD are in fact relevant to the United States, and EPA's failure to provide any additional analysis of this issue makes the Draft Endangerment TSD's conclusions unreliable. Further, EPA's justification for adopting the North America conclusions for the United States is inadequate, inconsistent with IPCC principles, and inconsistent with standards governing the preparation of scientific reports for use in U.S. federal agency decision-making. Finally, the Agency is obligated by the Information Quality Act and good scientific practice to

review for itself the conclusions of the IPCC and to conduct its own analysis of the issues addressed by that body before adopting its conclusions. Continuing with the Draft Endangerment TSD's current approach runs the considerable risk that an endangerment finding will be based on information that is not relevant and not appropriate for use under the CAA.

C. The Draft Endangerment TSD Mischaracterizes the Conclusions of the IPCC on Which It Relies.

In addition to the significant problems associated with the Draft Endangerment TSD's heavy reliance on the Assessment Report of the IPCC, there are a number of instances where it appears EPA has misinterpreted information in the Assessment Report or failed to explain why it has adopted a viewpoint seemingly at odds with the conclusions reached by the IPCC.

As a preliminary matter, it should be noted that the Draft Endangerment TSD's system of citation is insufficient and unnecessarily complicates external review of the document. In particular, the Draft Endangerment TSD indicates that Box 1.2 "provides guidance for the reader about how this document references different chapters of the IPCC reports." Box 1.2 is missing from the document. *See* Draft Endangerment TSD at 4. Further, the document's citation method is ill-suited to the sources on which it relies most heavily. The IPCC Assessments and similar synthesis reports, which compile the results of numerous individual studies and span hundreds of pages, should be cited with greater specificity. Inclusion of individual page numbers and more thorough efforts to document the sources for specific assertions would greatly enhance the usefulness of the Draft Endangerment TSD and aid public review. Given the heavy emphasis this document places on these long-form assessments, a modified and more transparent system of citation would be a considerable improvement.

The Draft Endangerment TSD also contains a number of statements that are inconsistent with the information contained in the sources it cites as support for various conclusions. For

instance, the document states that "[t]he atmospheric concentration of CO_2 in 2005 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores." Draft Endangerment TSD at 12. It cites Chapter 2 of the IPCC's Working Group I Report for this conclusion. This information, however, does not appear in that chapter, and EPA's basis for this statement is unclear. A similar quotation regarding the ice core record for methane concentrations appears on page 13 of the Draft Endangerment TSD, and it likewise is not supported by the information contained in the cited IPCC report. Another technical flaw is contained in the Draft Endangerment TSD's statement that "[i]ce core data show that the atmospheric concentration of N_2O varied by less than about 10 ppb for 11,500 years before the onset of the industrial period." *Id.* at 13. This information does not appear in the IPCC Assessment chapter cited as the source of these data. Indeed, the cited chapter indicates only that ice core data for N_2O go back 2000 years. *See* IPCC Working Group I, Ch. 2 at 143, Forster, P. et al., 2007, *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf.

Similarly, the Draft Endangerment TSD contains some very basic scientific inaccuracies that are contradicted by information in the IPCC's Assessment. For instance, the document states that hydrofluorocarbons ("HFCs"), perfluorocarbons ("PFCs"), and sulfur hexafluoride ("SF_6") are "entirely anthropogenic in origin." Draft Endangerment TSD at 14. The IPCC, however, notes that these fluorinated gases come from "anthropogenic and natural sources." IPCC Working Group I, Ch. 2 at 145, Forster, P. et al., 2007. Perhaps more significantly, the Draft Endangerment TSD also states that these gases are "increasing rapidly," a statement that misrepresents the findings of the IPCC. Draft Endangerment TSD at 14. Indeed, certain of these gases have decreased or remained at relatively constant levels for the most recent 10 to 20 years

and, as the IPCC notes, concentration levels for some PFCs have not been updated "since 1997." IPCC Working Group I, Ch. 2 at 145, Forster, P. et al., 2007.

In addition to instances where the information contained in the Draft Endangerment TSD does not appear in the source it cites for that information, there are equally problematic occurrences of misinterpretation of IPCC conclusions and instances where significant caveats expressed by the original source are not reflected in EPA's statements. For instance, the Draft Endangerment TSD regularly uses the year 1750 as the pre-industrial baseline year from which subsequent radiative forcing, i.e., warming or cooling effects, is measured. *See, e.g.*, Draft Endangerment TSD at ES-1, 13, 19-21. The IPCC, which the Agency cites for this information, indicates, however, that in the period between the years 1600 and 1800, CO_2 mixing ratios actually dropped by 5 to 10 ppm and that using 1750 as the pre-industrial index "may slightly overestimate the RF [radiative forcing], as the changes in the mixing ratios of CO_2, CH_4 and N_2O after the end of this naturally cooler period may not be solely attributable to anthropogenic emissions." IPCC Working Group I, Ch. 2 at 140, Forster, P. et al., 2007. EPA must include significant caveats regarding the nature of the scientific information that it incorporates in its analysis or else risk misrepresenting critical facts. Further, it must explain the significance of such caveats.

Similar misrepresentations exist with respect to the Draft Endangerment TSD's discussion of methane concentrations. The document notes in passing that methane concentration growth rates have "declined since the early 1990s," but it fails to explain fully the import of these declines. *See* Draft Endangerment TSD at 13. Significantly, this information is again provided in the very section of the IPCC Assessment cited by the Agency as its source for this information. First, the IPCC Assessment indicates that since the 1990s, the emissions

growth rate for methane has been "close to zero" and "less than zero in 2001, 2004, and 2005," the most recent years for which the IPCC examined emissions and concentration data. IPCC Working Group I, Ch. 2 at 142, Forster, P. et al., 2007. As the IPCC notes, the result of these reductions is that the estimated second largest source of GHG radiative forcing has been significantly reduced. The Draft Endangerment TSD, on the other hand, concludes instead in general and misleading terms that "[m]ethane concentrations have also risen substantially." Draft Endangerment TSD at 13. This is an inappropriate misreading of the IPCC conclusions.

Additionally, the Draft Endangerment TSD fails to include important facts noted by the IPCC when discussing CO_2-related impacts, and its omissions create the impression that anthropogenic CO_2 emissions will result in negative effects that are almost certain not to occur. In relevant part, the document states that "[c]arbon dioxide concentrations above 5% may be dangerous for vegetation and as concentration[s] approach 20%, CO_2 becomes phytotoxic. Carbon dioxide can cause death of plants through 'root anoxia', together with low oxygen concentration (IPCC, 2005)." *Id.* at 17. The document fails to explain adequately, however, that these concentrations and these particular effects have been observed only in, and are relevant only for, areas that are exposed to massive CO_2 concentrations such as those that result from large volcanic eruptions. Indeed, the IPCC report cited by the Draft Endangerment TSD for this information addresses the risk of this particular type of harm in the context of hypothetical massive CO_2 releases from carbon sequestration storage areas. IPCC, Special Report on Carbon Dioxide Capture and Storage at 248 (2005), *available at* http://www.ipcc.ch/pdf/special-reports/srccs/srccs_wholereport.pdf. The TSD misleadingly implies that such effects could somehow result from atmospheric concentrations and other anthropogenic emissions -- an implication that

is plainly inconsistent with the information contained in its cited source for this statement. Draft Endangerment TSD at 17.

The Draft Endangerment TSD also ignores salient IPCC conclusions regarding the positive effects of increased CO_2 concentrations and minimizes the positive effects it does address in a manner not supported by the information contained in the IPCC Assessment. For instance, the Draft Endangerment TSD acknowledges that crop yields may be positively affected by increased CO_2 concentrations but characterizes such benefits as "small" even though there is no similar minimization of positive crop yield effects contained in the IPCC's analysis. Further, the Draft Endangerment TSD wholly ignores the potential positive impacts associated with increased forest productivity even though the IPCC discusses these benefits in significant detail. *Compare id.* at 16-17, *with* IPCC Working Group II, Ch. 5 at 282, Easterling W. et al., 2007, *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter5.pdf.

It is also important to note that the IPCC's Assessments are composed of numerous and lengthy individual chapters written by multiple authors and often cover overlapping material. Unsurprisingly, this has resulted in a number of internal inconsistencies in the IPCC's conclusions. EPA should strive to identify these inconsistencies and to ensure that its Draft Endangerment TSD reflects the best overall summary of the state of the science. To the contrary, the Draft Endangerment TSD appears to take advantage improperly of the IPCC's internal inconsistencies to present the most aggressive possible interpretation of that body's statements. For instance, in describing the effects of enhanced CO_2 levels on ocean biota, one IPCC chapter states that "[i]ncreasing ocean acidity due to increasing atmospheric concentrations of CO_2 … is *very likely* to reduce biocalcification of marine organisms such as corals (Hughes et al., 2003; Feely et al., 2004)" (emphasis added). This chapter goes on to state, however, that the

"limited number of studies available makes it difficult to assess confidence" levels for this conclusion. A separate IPCC chapter comes to a strikingly different conclusion, finding with "medium confidence levels" that increased CO_2 levels in conjunction with climate change *could* have negative impacts on these same marine organisms. *Compare* Working Group II Ch. 19 Schneider S. H. et al., 2007, *with* Working Group II Ch. 4 at 213, 234, Fischlin A. et al., 2007, *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter19.pdf; http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter4.pdf. Instead of addressing these inconsistencies or even selecting (and supporting) one conclusion over the other, the Draft Endangerment TSD combines the statements contained in these two chapters and eschews all discussion of uncertainties and limitations to conclude that ocean acidification "will" result in harm to carbonate-based marine species. Draft Endangerment TSD at 17.

Finally, the Draft Endangerment TSD includes many statements for which it provides no citation at all. For instance, the document asserts that elevated CO_2 levels could reduce the quality and nutritional value of animal forage grasses without identifying any basis for this assertion. *Id.*

In sum, the Draft Endangerment TSD contains a number of factual assertions that are not supported by the materials it cites. Certain of these instances result from discrepancies between the statements made by EPA and those contained in the Assessment Report of the IPCC. Others are the result of EPA's mischaracterization of IPCC statements and its exclusion of relevant additional information. Finally, there are problems resulting from simple lack of citations for or clarity regarding the source of EPA's information. These flaws must be redressed if the science is to be presented in an unbiased and complete manner. EPA should undertake a thorough

review of the Draft Endangerment TSD and the reports it cites to ensure that these problems are rectified.

D. Recent Individual Studies Undercut Conclusions Contained in EPA's Draft Endangerment TSD and the Reports on Which It Relies.

The Draft Endangerment TSD fails to take into account several more recent scientific studies that pose serious challenges to a number of the document's statements and that undermine certain key assumptions that have been relied on in the scientific literature that the document reviews. This section of the comments describes the source material EPA has chosen to rely on, observes that additional sources should be included, and highlights major recent findings of significance to any endangerment analysis.

As stated above, the Draft Endangerment TSD relies almost exclusively on the Fourth Assessment Report of the IPCC for the vast majority of its factual assertions and conclusions. In addition, the Draft Endangerment TSD states that it "relies most heavily on existing, and in most cases very recent, synthesis reports of climate change science and potential impacts, which have gone through their own peer-review processes including review by the U.S. Government." Draft Endangerment TSD at 4. EPA states that it is appropriate to rely on these reports because:

> [T]hey 1) are very recent and represent the current state of knowledge on climate change science, vulnerabilities and potential impacts; 2) have assessed numerous individual studies in order to draw general conclusions about the state of science; 3) have been reviewed and formally accepted by, commissioned by, or in some cases authored by, U.S. government agencies and individual government scientists and provide EPA with assurances that this material has been well vetted by both the climate change research community and by the U.S. government; and 4) in many cases, they reflect and convey the consensus conclusions of expert authors.

Id. Further, EPA states that the Draft Endangerment TSD also "often cites those individual studies that tended to be very influential in the more general findings of IPCC, CCSP [sic];

however, every effort is made to make it clear when an individual reference was incorporated into one of the broader assessments." *Id.* at 5-6.

Thus, it does not appear that EPA has engaged in a literature review in an attempt to identify all of the most recent relevant studies addressing the issue of climate change and its projected effects. EPA states that a critical factor in selecting these synthesis reports as the basis for the Agency's preliminary endangerment analysis is the conclusion that they "represent the current state of knowledge on climate change." *Id.* at 4. A number of EPA's identified "core reference documents" were released within the last two years, although five of the fifteen documents were released between 2001 and 2006. *Id*. Further, these reports are themselves necessarily based on studies that predate them and, given the rapidly evolving nature of climate science, could easily now be considered obsolete. Moreover, given that research into climate change-related impacts is in its infancy, it is especially important that EPA, in drafting an analysis of such impacts, include the most up-to-date information available. *See* Eli Kintisch, "Climate Change: Impacts Research Seen As Next Climate Frontier," *Science* Vol. 322. no. 5899 at 182-83 (Oct. 10, 2008). Moreover, EPA appears to acknowledge the importance of discussing the results of important individual studies even where they have been addressed in larger synthesis reports, even though the Draft Endangerment TSD rarely discusses such studies. It follows that it is at least as important to address those studies that have been released after the preparation of these synthesis reports and to assess whether they alter or undermine any of those reports' underlying assumptions or conclusions.

The studies described below all undercut or otherwise significantly revise information presented in the Draft Endangerment TSD. They illustrate the importance to the document's

reliability of a comprehensive review of the scientific developments that have occurred since the release of the synthesis reports on which EPA relies.

First, it is particularly noteworthy that the Draft Endangerment TSD identifies climate change as a projected source of future increases in ozone and particulate matter concentrations with potential negative human health impacts. Draft Endangerment TSD at 60, 70-75. The information contained in the Draft Endangerment TSD regarding these supposed impacts is strikingly different from and less nuanced than EPA's own recently released analysis of these same issues. *See* EPA, Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Preliminary Synthesis of Climate Change Impacts on Ground-Level Ozone, EPA/600/R-07/094 (March 2008) ("Assessment Report"). That EPA analysis indicates that some regions of the United States are likely to experience ozone *decreases* associated with climate change (*see, e.g.*, *id.* at xvii, 3-7, 3-17), that reductions in ozone precursor emissions will likely overwhelm any increases that may result from climate change (*id.* at 4-4), and that ultimately the science in this area is riddled with uncertainties with respect to ozone and particulate matter (*see, e.g.*, *id.* at 1-10, 1-11). EPA should ensure that the Draft Endangerment TSD is consistent with its own analysis of these issues presented in other forums (or at least explain and justify the inconsistencies), and the Agency should update the Draft Endangerment TSD with the more recent information it addresses in its ozone and particulate matter assessment.

A number of recent studies indicate that certain previously projected effects of climate change will be less severe than was once anticipated or are, in fact, less certain to occur at all. The Draft Endangerment TSD, on the other hand, fails to note these recent changes in the state of the science. For instance, the Draft Endangerment TSD notes that hurricanes have trended

toward increased destructiveness and that such storms are likely to become more intense. Draft Endangerment TSD at 35, 57. It also cites a variety of projected effects of such storms, such as diseases, drowning, damage to forest systems, destruction of human habitat and resources, and coastline loss. *Id.* at 67, 83, 95-96, 99, 101. Significantly, however, the document does not address the implications of a recent and important new study finding hurricanes are likely to be substantially rarer events under projected climate conditions. Thomas R. Knutson et al., "Simulated Reduction in Atlantic Hurricane Frequency Under Twenty-First-Century Warming Conditions," *Nature Geoscience* Vol. 1 at 359-64 (2008). This finding could considerably revise the estimates of all of these impacts and should be incorporated into the Draft Endangerment TSD's analysis.

Similarly, the Draft Endangerment TSD devotes considerable discussion to ice sheet collapse, including abrupt ice sheet changes, Draft Endangerment TSD at ES-3, and states that ice sheet melting is a major component of projected sea level rise, an additional impact that receives considerable attention, *id.* at 30, 53. The document also speculates that rapid melting due to increased ice flow could hasten these projected changes. *Id.* at 53, 58-59. A recent study, however, indicates that ice sheets are less susceptible to climate change-related loss of mass than has previously been suggested. In particular, this study reported that ice sheets can adjust to what were assumed to be feedback mechanisms that were thought to cause accelerated melting, thus indicating that abrupt melting from increased ice flow is unlikely. *See* R.S.W. van de Wal, et al., "Large and Rapid Melt-Induced Velocity Changes in the Ablation Zone of the Greenland Ice Sheet," *Science* Vol. 321 no. 5885 at 111-13 (July 4, 2008). Thus, this study raises substantial questions as to a number of the Draft Endangerment TSD's assertions and requires reconsideration of the additional projected impacts that the draft seeks to tie to ice sheet loss.

Further, an additional study indicates that ocean temperatures have not risen in response to anthropogenic climate change and that any increase in ocean temperature is regional in nature and the result of natural variability. M. Susan Lozier et al., "The Spatial Pattern and Mechanisms of Heat-content Change in the North Atlantic," *Science* Vol. 319 no. 5864 at 800-03 (Feb. 8, 2008). Without addressing this study, however, the Draft Endangerment TSD asserts that ocean warming is unequivocal and that it is contributing, and will continue to contribute, to sea level rise. Draft Endangerment TSD at ES-1, 21, 30. Again, these findings should be reexamined in light of the new evidence and modified, as appropriate, to reflect the new information.

The Draft Endangerment TSD also points to a number of negative impacts that it projects will affect the health of the nation's water-based ecosystems, including rivers. In particular, the document notes that rivers may experience increases in river bottom sediment suspension, affecting water quality and river discharge. *Id.* at 89, 91. EPA suggests that these changes in river discharge will, in turn, negatively impact water management, park tourism, winter sport activities, inland water sports (e.g., fishing, rafting, and boating), and other recreational uses. *Id.* at ES-8, 33. Further, the Draft Endangerment TSD states that increased river discharge in the Arctic will accelerate future climate change and further impact water supplies. *Id.* at 88. All of these assumptions are significantly undercut by a recent study finding that, while climate-related changes in precipitation could theoretically affect river discharge, few rivers have experienced any significant changes to date, and any changes that might occur in the future are much more likely to be caused (or overwhelmed) by factors unrelated to climate change, such as damming and irrigation. J.D. Milliman et al., "Climatic and Anthropogenic Factors Affecting River Discharge to the Global Ocean, *Global and Planetary Change* Vol. 62 at 187-94 (2008).

The Draft Endangerment TSD also devotes considerable discussion to projected impacts on various species. For instance, the Draft Endangerment TSD states that climate change may assist in the spread of animal diseases. Draft Endangerment TSD at 79, 108. While examination of this area of the science is only beginning, it is important that EPA not overstate the likelihood or severity of potential effects and that it temper its speculation. This is especially the case because recent scientific analysis has determined that animal diseases previously thought to have been exacerbated by changing climatic conditions have been shown to have, in fact, been unrelated to climate. Karen R. Lips et al., "Riding the Wave: Reconciling the Roles of Disease and Climate Change in Amphibian Declines," *PLOS Biology* Vol. 6 no. 3 at 441-54 (Mar. 2008) (finding that amphibian declines due to disease increases are not related to climate change). There is also recent evidence indicating that previously common assumptions regarding the species level impacts of changing temperatures and the distribution of species impacts are undermined by some serious inaccuracies. Curtis A. Deutsch, et al., "Impacts of Climate Warming on Terrestrial Ectotherms Across Latitude," *PNAS* Vol. 105 no. 18 (May 6, 2008). Particularly important is the finding that species impacts will likely be greatest in the tropics, outside of the United States, and that species in higher latitudes are far more resilient to climate change. *Id.* at 6668-72. The Draft Endangerment TSD, on the other hand, indicates only that many species are likely to be negatively affected by temperature changes as they are living at or near their temperature thresholds. Draft Endangerment TSD at ES-6, 79-80.

Although all of the studies mentioned above have important implications for current scientific understanding of climate change impacts and reflect the need for reconsideration of specific conclusions contained in EPA's preliminary endangerment analysis, perhaps the most significant new information is that which calls into question important temperature record data

that are fundamental to our ability to project and understand potential climate change. This information has significant implications for the reliability of modeling results in that a model's ability to project future climate is assessed based on its ability to replicate past climate developments accurately based on available temperature records. Moreover, the data from the temperature record are used as an input in climate models, and thus dictate how they will perform. There are a number of studies that fall into this category. Regarding ocean temperatures, one study has recently uncovered previously undocumented biases that have resulted in significant overestimation of long-term temperature changes in the global ocean. Victor Gouretski and Klaus Peter Koltermann, "How Much Is the Ocean Really Warming?," *Geophysical Research Letters* Vol. 34 at L0610 (Jan. 12, 2007). The significance of the ocean temperature record was recently demonstrated by Keenlyside et al., who found that use of more accurate sea surface temperatures resulted in global surface temperature projections that, over the next several decades, would fall within natural climate variability. N.S. Keenlyside et al., "Advancing Decadal-scale Climate Prediction in the North Atlantic Sector," *Nature* Vol. 453 at 84-88 (May 2008). Similarly, several recent studies have uncovered comparable flaws, uncertainties, and biases in the multidecadal surface air temperature record. David W.J. Thompson et al., "A Large Discontinuity in the Mid-twentieth Century in Observed Global-Mean Surface Temperature," *Nature* Vol. 453 at 646-49 (May 29, 2008); Roger A. Pielke, Sr. et al., "Unresolved Issues With the Assessment of Multidecadal Global Land Surface Temperature Trends," *Journal of Geophysical Research* Vol. 112 at D24508 (Dec. 29, 2007); Roger Pielke, Sr. et al., "Documentation of Uncertainties and Biases Associated with Surface Temperature Measurement Sites for Climate Change Assessment," *American Meteorological Society* at 913-28 (June 2007); X. Lin et al., "An Examination of 1997-2007 Surface Layer Temperature Trends

at Two Heights in Oklahoma," *Geophysical Research Letters* Vol. 34 at L24705 (Dec. 22, 2007). These findings require reanalysis of modeling results previously relied on by the IPCC and the other synthesis reports cited by EPA as they are likely to have similarly significant effects on climate projections. These changes could fundamentally alter projections with respect to all other purported climate change-related impacts.

Other studies, unrelated to discrepancies in the temperature record, also indicate that other similarly pervasive inaccuracies may affect past climate modeling projections and require considerable reexamination. For instance, Spencer and Braswell, 2008, determined that previous estimates of the sensitivity of the climate system based on satellite data were biased toward the high side due to the neglect of natural cloud variability. Roy W. Spencer and William D. Braswell, "Potential Biases in Feedback Diagnosis from Observational Data: A Simple Model Demonstration," *Journal of Climate* Vol. 21 no. 21 at 5624-28 (Nov. 2008). This study determined that the failure to account for natural, chaotic cloud variability, a problem that continues to plague climate modeling, will always project a climate system that appears more sensitive than it really is. In another recent study, V. Ramanathan and G. Carmichael, "Global and Regional Climate Changes Due to Black Carbon," *Nature Geoscience* Vol. 1 at 221-27 (Apr. 2008), the authors demonstrated that global climate models consistently underestimate the percentage of climate forcing that is attributable to black carbon, a non-GHG. Further, a number of impacts associated with black carbon, including reduction of sea ice and snow albedo, were shown to dwarf similar effects that have been attributed to CO_2.

The Draft Endangerment TSD's analysis of these scientific issues is outdated. It fails to take into account any of the serious implications these studies have for previously performed modeling of projected climate change and the cascading effects attributed to that modeling.

Indeed, the Draft Endangerment TSD notes only in passing that inaccuracies, such as those described here, in surface and ocean temperature records may result in random biases that "likely" cancel one another out. Draft Endangerment TSD at 22. It is evident from the current scientific record that that is not the case. EPA therefore must significantly revise the Draft Endangerment TSD to reflect this new information, and it should engage in a thorough reanalysis of the scientific data to arrive at more accurate projections of climate change and its potential effects. Further, the Agency must strive to identify all other relevant scientific information, as exclusive reliance on older synthesis assessments is inadequate.

E. Uncertainty Is Not Adequately Reflected in the TSD's Analysis.

In addition to the other flaws identified in these comments regarding the nature and quality of its scientific analysis, the Draft Endangerment TSD consistently fails to incorporate adequate discussion of the uncertainties that characterize the science it addresses. Such information is critical to a thorough and reasoned understanding of the state of the science and cannot be avoided for the sake of simplicity or any other purpose. Nevertheless, EPA indicates that uncertainties and confidence levels are reported in the Draft Endangerment TSD only "to the extent that such information was provided in the original scientific reports upon which [the TSD] is based." Draft Endangerment TSD at 3. This approach is not adequate. First, the IPCC Assessment Reports make up the bulk of the sources on which the Draft Endangerment TSD relies, and they regularly report uncertainties associated with their conclusions. The Draft Endangerment TSD, however, seldom reports this information. Moreover, given the fact that the document is based almost exclusively on synthesis reports, even where those reports do not address uncertainties, it is imperative that EPA examine the underlying studies analyzed in them and attempt to determine and describe the uncertainties as discussed by the authors. Finally, even in the absence of uncertainty analysis in underlying studies, EPA should attempt to address

whether uncertainties or other complications were likely before reporting the results of such studies.

In numerous cases, the Draft Endangerment TSD fails to state with any clarity whether uncertainties exist. This leaves the impression that it is irrefutable that the described effects will occur, an impression that is in almost every case erroneous. For instance, within a few short paragraphs, the Draft Endangerment TSD reports that animal forage may be negatively impacted by CO_2 levels, that extremely high CO_2 levels in soil can cause root anoxia and result in significant vegetation loss, and that increased CO_2 levels could directly cause ocean acidification and "impair a wide range of planktonic and other marine organisms." Draft Endangerment TSD at 17. Nowhere in this litany of purported negative effects does EPA address the likelihood that any of these effects will occur, or describe the number or quality of the studies supporting these conclusions, or make any mention of uncertainties. EPA's characterization of various effects, in addition to the examples noted here, and their likelihood of occurrence should be clear and adequately supported by the science, or they should be removed from the document.

Elsewhere, uncertainties are noted in passing while their implications are utterly ignored or glossed over. This, too, gives the impression that the uncertainties are minimal and are likely to be resolved in favor of the worst case scenario that EPA presents. For instance, the Draft Endangerment TSD devotes considerable space to a discussion of projected increased tropical cyclone activity and the associated impacts of such storms. *Id.* at 34-36, 40, 57, 67. The document notes that "[m]ulti-decadal variability and the quality of the tropical cyclone records prior to routine satellite observations in about 1970 complicate the detection of long-term trends in tropical cyclone activity." *Id.* at 36. The document fails to indicate the importance of the lack of a clear trend, which could signal that such storms are unrelated to climate change or that its

effects on storm activity are unknown. Instead, the document treats this lack of information as if it has no bearing on its remaining assertions as to tropical cyclone impacts.

In addition, the Draft Endangerment TSD, while discussing the effects of climate change on various ecosystems, notes in passing that human system responses to climate change are "more difficult to identify and isolate due to the larger role that non-climate factors play (e.g., management practices in agriculture and forestry, and adaptation responses to protect human health against adverse climatic conditions)." *Id.* at 41. Nevertheless, the Draft Endangerment TSD discusses in considerable detail -- without noting uncertainties at all -- a wide range of human health effects that it attributes to climate change. *Id.* at 64-69. It is misleading to avoid discussion of these issues entirely in the chapters that purportedly address them while slipping in references to significant uncertainties in a section of the document that is unrelated to human health effects. The Draft Endangerment TSD must redress this significant failure.

Similarly, the Draft Endangerment TSD discusses and relies on the GHG emission scenarios, as well as their associated implications for future radiative forcing and temperature, precipitation, and sea level impacts, identified in the IPCC's 2000 *Special Report on Emission Scenarios*. *Id.* at 42. It also cites the emission scenarios described in CCSP Synthesis Report 2.1 and the most recent IPCC Assessment as evidence that newer studies have not significantly altered projections. *Id.* at 43, 44. The TSD acknowledges, however, that there are a number of uncertainties in these projections. *See, e.g.*, *id.* at 45. Further, it states that they do not take into account GHG mitigation policies in either the United States or the rest of the world, including the Kyoto Protocol or any other likely future regulation. *Id.* at 42. Thus, these emission scenarios are subject to considerable doubts as to their accuracy. Yet, this information and its significant implications for all of the projected effects described elsewhere in the Draft

Endangerment TSD are left wholly unaddressed. EPA needs to convey adequately the relevance of these uncertainties and indicate that they substantially affect the remainder of the document's analysis.

Similarly, far-reaching uncertainties go unaddressed in the Draft Endangerment TSD's discussion of climate modeling. The TSD describes climate change models as "well-tested," characterized by a "foundation in accepted physical principles," and possessing the "ability to reproduce observed features of current climate and past climate changes." *Id.* at 37. These assertions are overbroad and ignore critical shortcomings in modeling capabilities. As stated in a 2008 CCSP Report, current models contain "a number of systematic biases," their strengths and weaknesses "vary substantially" from model to model, and "several important aspects of the climate system present especially severe challenges to the goal of simulation." CCSP, Climate Models: An Assessment of Strengths and Limitations at 1 (July 2008). This report goes on to characterize in significant detail a variety of uncertainties and problems posed by current models, none of which is addressed adequately in the Draft Endangerment TSD. Moreover, in the few instances where model inconsistencies or uncertainties are mentioned, they are explained away as "under investigation" while their implications are left unaddressed. *See, e.g.*, Draft Endangerment TSD at 39-40, 49. Again, these significant issues should not be ignored.

The Draft Endangerment TSD should be revised to include discussion of uncertainties and to explain their meaning. Merely acknowledging that some uncertainty may exist while failing to address its implications does a disservice to the scientific understanding of these complex issues.

F. The Draft Endangerment TSD Contains Numerous Examples of Bias and Speculation that Are Inconsistent with the Scientific Evidence.

The analysis in the Draft Endangerment TSD is undermined, even where it may otherwise be sound, by a number of statements that could be interpreted as indicating bias. This bias is demonstrated in several ways. Of particular importance is information identified in the Draft Endangerment TSD as potentially significant but nonetheless excluded from analysis and consideration. EPA fails to make a compelling argument that this information should not be considered in assessing endangerment, thereby giving the appearance that its exclusion from the Draft Endangerment TSD is, at best, arbitrary and, at worst, designed to lead to a particular conclusion on the endangerment issue.

For instance, the Draft Endangerment TSD states that "[a]daptation to climate change is a key focus area of the climate change research community." Draft Endangerment TSD at 1. Nevertheless, EPA has determined that it is inappropriate to focus on adaptation in conducting its scientific assessment of endangerment issues, and it even suggests that the Administrator may not consider adaptation in assessing the possibility of endangerment. *Id.* at 118. Further, the Agency states that "mitigation measures to reduce GHGs, which could also reduce long-term risks, are not addressed." *Id*. at 1-2. The Agency's stated rationale for these exclusions is that the purpose of the Draft Endangerment TSD "is to review the effects of climate change rather than society's response to climate change." *Id.* This reasoning is unsatisfactory and has led to a preliminary endangerment analysis that, in essence, ignores reality.[14] First, as EPA notes,

[14] Indeed, EPA's reasons for distinguishing between "acceptable" and "unacceptable" fields of scientific inquiry is particularly unconvincing given that the IPCC deemed it appropriate to devote an entire Working Group Report to adaptation and mitigation -- a report that the Draft Endangerment TSD wholly ignores -- even as EPA has opted to rely almost exclusively on *other* IPCC Working Group Reports.

mitigation measures may themselves limit the effects of climate change, the extent of which is among the necessary areas of inquiry in an endangerment analysis. It is entirely inconsistent to assess the effects of anthropogenic GHG emissions without considering those anthropogenic actions that might limit those emissions or their impacts. Further, even while adaptation will not likely limit GHG emissions directly, there is no practical difference between minimizing emissions and minimizing the effects of emissions. In each case, the ultimate result is less likely or more limited climate change impacts, with the difference having a bearing on the endangerment question. Ignoring the possibility that GHG emissions will not result in endangerment because of adaptation or mitigation is unscientific and must be rectified.

Similarly, the Draft Endangerment TSD notes that it is relying on EPA's annual *Inventory of U.S. Greenhouse Gas Emissions and Sinks* for information regarding the primary GHGs of interest and indicates that this information is used to project the effects of climate change. *Id.* at 1. Further, the document states that this U.S. inventory does not account for emissions and sinks resulting from land use changes and the forestry sector. Importantly, in the United States, the forestry sector is "a significant sink, while in some developing countries it is a significant net source of emissions." *Id.* at 9. First, exclusion of a significant U.S. carbon sink results in a bias toward a finding that U.S. emissions will result in or contribute to endangerment. Further, the Draft Endangerment TSD ignores other significant carbon sinks, a fact that further biases the analysis in the document in the direction of a finding of endangerment. *See, e.g.*, *id.* ("Removals of carbon through land use, land-use change and forestry activities are not included in Figure 2.2, but are significant; net sequestration is estimated to be 828.5 $TgCO_2eq$ in 2005, offsetting 11.4% of total emissions (EPA, 2007)."). This problem is exacerbated by the fact that EPA's global emissions estimates may indeed include forestry-related emissions and sinks from

other countries, thereby skewing the Agency's assessment of the relative importance of U.S. emissions. *See id.* at 11 ("Excluding land use, land-use change, and forestry, U.S. emissions were 20% of the total year 2000 global emissions …."). EPA must clarify what sinks and emission sources, both in the U.S. and internationally, are taken into account in its endangerment assessment. Further, to ensure that the Agency's analysis of the endangerment issue is based on the most complete record possible, an adequate representation of U.S. carbon sinks must be incorporated.

Finally, the Agency wholly excludes any discussion of hydroxyl free radical in limiting the impacts of GHGs. This information is prominently featured in chapters of the IPCC Assessment Report cited extensively in the Draft Endangerment TSD, and the IPCC has characterized it as playing a "very significant role" in mitigating climate change effects. IPCC Working Group I, Ch. 2 at 147, Forster, P. et al., 2007.

In addition to the irrational exclusion of key scientific information, the Draft Endangerment TSD indicates bias through unfounded speculation about possible effects of climate change that are in no way supported by the scientific evidence discussed in the document. For instance, the Draft Endangerment TSD states that "[i]t is *likely* that there have been increases in the number of heavy precipitation events (e.g., 95th percentile) within many land regions, even in those where there has been a reduction in total precipitation amount, consistent with a warming climate and observed significant increasing amounts of water vapor in the atmosphere." Draft Endangerment TSD at 28 (emphasis added). The Agency, however, provides no citation and no evidence for this assertion. Indeed, elsewhere in the Draft Endangerment TSD, the Agency notes that "only a few regions have sufficient data to assess such [precipitation] trends reliably." *Id.* at 35. Accordingly, it is improper to suggest that other

regions have also experienced similar precipitation events in the absence of evidence for such effects. Similarly, the Draft Endangerment TSD states that significant effects "may" occur as a result of abrupt climate change, thus engaging in considerable speculation even as the Agency acknowledges substantial uncertainty. *Id.* at 59-60. Likewise, the Draft Endangerment TSD notes that there is insufficient current scientific knowledge to determine the effectiveness of adaptation. *Id.* at 119. Despite this, the Agency concludes without a basis that adaptation mechanisms will not be sufficient to respond to all aspects of climate change. *Id.* at 119-120.

Finally, the Draft Endangerment TSD states that "[i]t is *believed* that on average, over the period from 1961 to 2003, thermal expansion contributed about one-quarter of the observed sea level rise, while melting of land ice accounted for less than half; the full magnitude of the observed sea level rise was not satisfactorily explained by the available data sets (Bindoff et al., 2007)." *Id.* at 30 (emphasis added). Indeed, the uncertainties in this area are underscored particularly well by the scientific assertions put forward by petitioners in *Massachusetts v. EPA* to support their arguments that petitioners had standing to bring the case. In affidavits filed in that case, at least one of petitioners' scientific experts conceded that sea level rise will occur "regardless of" global climate change and that, at least with respect to some areas of the country, naturally occurring "land subsidence also contributes significantly to sea level rise." *Massachusetts v. EPA*, Kirshen Decl. ¶ 6, Standing App. at 197. Again, it is inappropriate to suggest scientific conclusions in the absence of available data. These speculative statements tend to suggest that climate change will result in effects for which evidence is lacking. EPA must more accurately present the state of the science and avoid speculation as to significantly uncertain potential effects.

In sum, the Draft Endangerment TSD displays a number of biases that minimize important scientific information that tends to support a finding of less likely, less severe, or less extensive GHG- or climate change-related effects. Further, the document includes numerous instances of unfounded speculation that tend to overstate the extent of various climate change-related effects or that portray the likelihood that certain effects will occur as more certain than the science supports. EPA must redress the specific flaws identified in these comments and review and revise the Draft Endangerment TSD to ensure that all similar problems are addressed.

G. The TSD's Conclusions as to Climate Change-Related Effects on Specific Health and Welfare Resources Must Be Revised To Address the Scientific Flaws Identified in the Comments.

As explained above, there are numerous and varying flaws in the analysis and underlying data relied on by EPA in the Draft Endangerment TSD. These problems undermine the document's conclusions with respect to the specific observed and projected U.S. human health and welfare effects from climate change. Because these flaws go to the fundamental scientific bases for many of the Draft Endangerment TSD's assertions, EPA must revisit its statements with respect to likely effects of climate change on: human health; air quality; food production and agriculture; forestry; water resources; sea level rise and coastal areas; energy, infrastructure, and settlements; and ecosystems and wildlife. For the sake of clarity, this section of these comments addresses the key flaws undermining the reliability of the Draft Endangerment TSD's statements as to each of these health and welfare interests and identifies areas in which the document would have to be revised to reflect the current science adequately.

1. Human Health

Several of the Draft Endangerment TSD's statements regarding the purported human health impacts of climate change require revision for the reasons identified in the previous sections of these comments. First, the document observes that climate change is projected to

have both positive and negative health effects and states that "[t]he balance of positive and negative health impacts will vary from one location to another, and will alter over time as temperatures continue to rise." Draft Endangerment TSD at 64. EPA goes on to address in substantial detail numerous potential negative outcomes, devoting substantially more space to negative than to positive outcomes. This approach overemphasizes potential negative effects, even as EPA notes that it is unclear whether positive or negative impacts will be greater. *Id.* at 64-66. The Agency must effectively present the uncertainties in this area of inquiry and must adequately explain the difficulties in assessing human health impacts that result from problems in accounting for the capacities of human response systems. *See id.* at 41.

For similar reasons, the Draft Endangerment TSD must revise its assertions regarding likely impacts on human health from climate change-related floods and storms as well as their possible secondary effects, such as increases in disease. Moreover, the information contained in recent scientific studies not addressed in the Draft Endangerment TSD indicates that these effects may be less extensive than the Draft Endangerment TSD acknowledges. *Id.* at 66-67. Further, the potential of mitigation and adaptation to minimize such impacts further should be considered and quantified. *See id.* at 68 (noting that disease impacts will be "strongly modulated by changes in health care, infrastructure, technology, and accessibility to health care."). Reanalysis of these issues is thus necessary.

In addition, a number of specific uncertainties should also be better reflected in this section of the document's analysis. Specifically, the Draft Endangerment TSD asserts that climate change will result in additional allergenic illnesses in approximately 20% of the U.S. population. *Id.* This assertion, however, is unfounded. Indeed EPA acknowledges that there is only a limited understanding of aeroallergens and their effects on sensitization of individuals. *Id.*

Similarly, even while acknowledging the paucity of studies addressing "the interaction effects of multi-sector climate impacts (they may be nonlinear) or of interactions between climate change health impacts and other kinds of local, regional, and global changes," EPA's analysis demonstrates that the Agency *assumes* that such studies would demonstrate additional negative impacts as opposed to possible mitigation. *Id.* at 64. Again, EPA may not properly substitute speculation for adequate information.

Finally, EPA must also consider the relevance of general information about potential human health effects. Information that does not assess specific effects is of very limited relevance to the endangerment question.

2. Air Quality

This section of the TSD cites the IPCC for the conclusion that air quality in cities is virtually certain to decline due to climate change. *Id.* at 70. It concludes that these projected changes are associated with the expected influence of climate change on biogenic emissions, chemical reaction rates, precipitation, and weather pattern modification. *Id.* As stated above, various recent studies suggest that the projections of these effects on which EPA relies require revision, and EPA accordingly would have to revisit these issues before it could propose any endangerment finding. Additionally, the Draft Endangerment TSD specifically cites changes projected in particulate matter and ozone as the primary sources of decreased air quality supposedly resulting from climate change. *Id.* at 70-75. Again, EPA's own recent analysis of these issues indicates that particulate matter effects are especially uncertain and that ozone concentrations may decrease in substantial portions of the United States. Assessment Report at 3-7, 3-17. Moreover, it is possible that ozone concentration increases resulting from climate change will be more than offset by reductions in anthropogenic precursors of ozone.

Accordingly, the Draft Endangerment TSD's air quality conclusions must be revised to reflect a more accurate presentation of the science.

In addition, this section of the Draft Endangerment TSD notes various uncertainties without addressing their implications for the document's assertions. *See, e.g.*, Draft Endangerment TSD at 72 (noting major discrepancies that prevent establishment of confidence in the models). As stated above, EPA must not only note uncertainties but explain their implications by incorporating them into the Agency's conclusions.

Finally, very little of this section of the Draft Endangerment TSD is specific to the United States. As described above, any CAA finding of endangerment must be tied to U.S. effects. Failure to identify adequately which of its conclusions apply to U.S. resources, and which do not, renders the Draft Endangerment TSD inadequate as a resource for evaluating endangerment under the CAA.

3. Food Production and Agriculture

The part of the Draft Endangerment TSD addressing food production and agriculture is also affected by each of the flaws identified in the previous sections of these comments. As is true throughout the document, EPA in this part relies almost exclusively on reports of the IPCC and CCSP. This creates problems with respect to the geographic scope of the document's analysis, and indeed, substantial portions of this section discuss global impacts and fail to distinguish adequately U.S. effects. Further, the limitations on the document's sources of scientific information lead EPA to ignore significant new findings influencing projections for all of the major effects identified in this section, including temperature changes, precipitation, and invasive species impacts. *See id.* at 76-77, 79. Estimates of these effects should be revisited in light of newly available information.

Further, this section of the TSD fails to quantify in any meaningful way the effects that it predicts, making a reasoned endangerment determination based on this information impossible. Similarly, despite acknowledging numerous beneficial effects in this area, the Draft Endangerment TSD rarely attempts to describe how positive and negative impacts may offset one another. *See, e.g.*, *id.* at 80 (discussing benefits to and negative impacts on fisheries). In fact, the document appears to undertake this kind of analysis only where it asserts negative effects will outweigh positive effects. *See, e.g.*, *id.* at 78 (discussing but downplaying benefits of direct CO_2 exposure); *id.* (indicating that extreme events may offset any benefits of moderate climate change). This bias calls into question the remainder of this section's analysis. Similarly, speculation in this section of the Draft Endangerment TSD undermines its reliability. Specifically, the Draft Endangerment TSD asserts that elevated CO_2 levels can lead to reduced nutritional value by resulting in a decrease in C4 grasses and an increase in C3 grasses. It also states, however, that "the exact effects on both types of grasses and their nutritional quality still need[] to be determined." *Id.* at 79. Accordingly, it is difficult to see how the Agency can predict negative outcomes given that, as its own document acknowledges, essential information is unknown.

Finally, in its discussion of drought, the Draft Endangerment TSD suggests that water shortages are a problem in certain regions of North America because of causes unrelated to climate change. *Id.* at 79. It is unclear precisely why this information is included in a document intended to address potential climate change-related endangerment of public health or welfare. Indeed, to the extent any of the impacts that EPA discusses in this document cannot be attributed to GHG emissions and their effects, discussion of those impacts only undermines the usefulness of the scientific information in the document for any endangerment inquiry.

4. Forestry

This section of the Draft Endangerment TSD makes assertions regarding potential climate change-related effects on forest resources, including projections of increased forest growth, increased wildfires and drought, more frequent insect and disease outbreaks, more severe extreme-event disruptions, and reduced biodiversity resulting from the spread of invasive species.

Again, all of these projections must be reexamined in light of new scientific studies that require reassessment of previous modeling, with potential to substantially reconfigure projections of climate change and related effects.

Additionally, this section of the Draft Endangerment TSD notes a number of uncertainties in the scientific record but fails to explain their significance. *See, e.g.*, *id.* at 81 (noting that the combined effect of temperature increases, CO_2 increases, nitrogen deposition, ozone, and forest disturbance on soil processes and carbon storage "remains unclear"). These limitations must be reflected in the conclusions presented. Further, this section of the Draft Endangerment TSD must avoid indulging in speculation in the face of uncertainties. For instance, the TSD cites as evidence for current climate change impacts that "[g]rowth is slowing in areas subject to drought." *Id.* at 82. It is not established that this drought was caused by climate change or GHG emissions. Elsewhere, the document suggests that wildfires will pose the largest threat to forests over time. It notes, however, that wildfires and other extreme events are "not well represented in models" even as it suggests that wildfires will increase by as much as 10%. *Id.* at 83. Similar points can be made with respect to other assertions in this section of the Draft Endangerment TSD.

This section of the Draft Endangerment TSD also continues to provide inadequate quantification of projected effects, limiting the ability to assess endangerment based on its

analysis. Again, U.S. and global emissions and effects are not sufficiently delineated. In addition, the Draft Endangerment TSD states that forest productivity impacts due to climate change are "difficult to separate . . . from other potentially influencing factors, particularly because these interactions vary by location." *Id.* at 81. This, however, is precisely the sort of information needed to evaluate the endangerment issue. Further, despite these acknowledged difficulties, the Draft Endangerment TSD asserts that certain observed changes, both negative and positive, are in fact due to climate change without providing support for that assertion. *Id.*

Finally, this section of the Draft Endangerment TSD suggests that changing forestry conditions in the United States might place it at a competitive disadvantage with other nations that will experience more positive effects from climate change. The document does not, however, attempt to analyze this issue at any useful level of detail. Further, no other sections of the Draft Endangerment TSD address this issue. If, as seems likely, the United States is projected to be placed at a competitive *advantage* to other regions with respect to other potential effects of climate change, those possible benefits should also be reflected in the document. Failure to address these issues indicates a bias that EPA must address. *Id.* at 82-83.

5. Water Resources

This section of the Draft Endangerment TSD addresses a number of climate change-related effects on U.S. water supply, water quality, and water uses. In general, these impacts must be reassessed in light of new scientific findings. Similarly problematic, this section, like the other "conclusion" sections of the Draft Endangerment TSD, fails to distinguish between global and U.S. effects, as is necessary to conduct an endangerment assessment. *Id.* at 87.

In addition to these more generally applicable flaws, this section of the Draft Endangerment TSD notes potential negative impacts on water quality and supply that are projected to result from population increases, *id.* at 86, but it does not tie these purported effects

to climate change; such effects thus cannot properly be considered in assessing endangerment. This problem further muddies the document's presentation of relevant scientific issues.

Similarly, scientific clarity is compromised by this section's treatment of various uncertainties and its tendency to engage in speculation. Specifically, the document acknowledges that data on existing groundwater supplies are "limited," yet it goes on to make a number of assertions about groundwater impacts despite the lack of information. *Id.* at 88. Additionally, this section of the document fails to note that modeling of extreme events is plagued by extreme uncertainties, even though this point is made in other sections. *Id.* at 90-91.

Finally, this section of the Draft Endangerment TSD fails to acknowledge and quantify clear beneficial effects even as it describes the negative effects associated with the source of such benefits. For instance, the Draft Endangerment TSD states that warmer water will result in transfer of pollutants from the water to the air and notes the negative impact on air quality. The document does not, however, attempt to quantify the benefit that this transfer will have on water quality or to compare the magnitude of this change to the other impacts on water quality discussed elsewhere in the document. *Id.* at 89. Similarly, the Draft Endangerment TSD notes that certain waters will likely experience increased navigability as a result of climate change, but the document fails to quantify this benefit or to compare its relative value to decreases in navigability elsewhere. *Id.* at 91.

6. Sea Level Rise and Coastal Areas

This section of the Draft Endangerment TSD describes the impacts in U.S. coastal areas of sea level rise projected to result from climate change. *Id.* at 92. It identifies a number of potential negative effects, including loss of salt marshes, coastal ecosystems, and the services and habitat that they provide. *Id.* at 92, 94. It also projects that sea level rise will result in increasing saltwater intrusion into drinking water supplies and freshwater resources, impacting

aquatic species. *Id.* at 94. It fails, however, to acknowledge the considerable uncertainties -- and their implications -- that plague this area of the science.

In addition to these impacts, however, this section of the Draft Endangerment TSD discusses various impacts on and problems facing coastal areas that are not necessarily linked to climate change or even to sea level rise. *See, e.g.*, *id.* at 92 (discussing coastal areas stressed by development and pollution); 93 (discussing "coastal squeeze" and its effects on wetlands), 93-94 (discussing erosion in the Great Lakes where sea level rise "is not a concern"). These issues are improper for inclusion in an assessment of endangerment from GHGs and climate change; their inclusion tends to lead to a misleading overstatement of the impacts that should be considered in an analysis of whether endangerment exists.

7. Energy, Infrastructure, and Settlements

This section of the Draft Endangerment TSD describes the effects climate change may have on energy, infrastructure, and settlements. It contains a number of flaws that must be addressed in addition to the general need for reanalysis of projected climate change and its effects based on new scientific studies.

This section of the Draft Endangerment TSD engages in speculation that is unsupported by the science and overstates the likely impact of climate change. For instance, the document acknowledges that industries and settlements "have become resilient to" variability in climate conditions but follows up this statement by suggesting that variability caused by climate change will be greater than capacity to adapt. *Id.* at 97. In the absence of evidence, the latter assertion is unwarranted.

Similarly, this section of the document appears to favor unjustifiably study results that suggest impacts will be significant over those studies that predict the opposite. This is especially problematic in the document's discussion of energy use for heating and cooling. The weight of

the evidence on this issue indicates that overall energy use will not increase substantially because the changes will generally net each other out. *Id.* at 98. The Draft Endangerment TSD places considerable weight, however, on one study that predicts a significant increase in electricity demand, requiring substantial investment in new generation. There is no indication as to why this study warrants such deference. Indeed, the Draft Endangerment TSD does not even cite this study specifically, but refers only to a CCSP synthesis report that apparently references it. *Id*. In such a circumstance as this, where one study is given special weight, it is particularly unacceptable to fail to identify it with reasonable clarity. EPA must redress this problem and should, in general, provide more extensive citations to individual studies on which EPA relies. Further, the Agency must justify its decision to downplay the greater body of science on this issue, or else revise its statements to provide an objective analysis.

8. Ecosystems and Wildlife

The final section of the Draft Endangerment TSD's discussion of specific impacts addresses ecosystem and species effects. Generally, it assesses impacts on ecosystem services, the effects of extreme events, and impacts on tourism and indigenous peoples. *Id.* at 104. In addition to the overarching concerns resulting from the need for reanalysis of earlier modeling results, this section must also be revised to redress a number of specific flaws.

Particularly problematic is that this section of the Draft Endangerment TSD places considerable emphasis on global impacts, especially regarding projected species loss, that are not relevant to an analysis of endangerment from GHG emissions and their resulting effects in the United States. *Id.* at 107. Further, the document states that there will be increases in the global likelihood of extinctions and that 20% to 30% of species globally will be at risk. *Id*. The document notes, however, that such risk varies regionally from as low as 1%. *Id*. EPA fails to

identify the risk levels applicable in the United States, a deficiency that, again, renders this information irrelevant to an endangerment assessment under the CAA.

This section of the document also engages in unfounded speculation. It cites, for instance, examples of greater species richness in areas that experienced less paleoclimatic changes as evidence that biodiversity is threatened by climate shifts. *Id*. There may be any number of explanations for such biodiversity differences, and, in any event, the document provides no scientific evidence for its proposition on this issue.

Finally, this section of the document includes information that is not clearly related to ecosystem services impacts. Specifically, the Draft Endangerment TSD discusses potential impacts on financial markets based on industries dependent on fisheries, timber, and tourism. *Id.* at 109. Similarly, this section's discussion of the economic impacts of temporarily closing tourist areas does not appear to be clearly related to the projected species and ecosystem effects that it addresses and does not belong in this section. *Id.* at 110.

H. Conclusion

The Draft Endangerment TSD suffers from a number of serious flaws that undermine its reliability and render it unfit for use in making a CAA endangerment determination for GHG emissions.

First, EPA's approach to analyzing these issues is hopelessly confused due to the Agency's failure to define properly the scope of the analysis contained in the document. The CAA requires that EPA examine specific effects on U.S. public health and welfare. Instead, EPA discusses a mixture of U.S. and global effects that the Agency fails to associate with either U.S. or global emissions consistently or clearly. Further, it is unclear whether the Agency is addressing climate change related to anthropogenic GHG emissions, all GHG emissions, or other various sources. These flaws necessitate substantial reexamination and revision.

Second, EPA has further undermined the usefulness of the Draft Endangerment TSD by relying almost exclusively on IPCC Assessments that do not address U.S.-specific effects. EPA's attempt to attribute projected general North American effects to the United States introduces a host of uncertainties and ambiguities into the Agency's analysis, and its attempt to justify such attribution is unsupported by the science. EPA must revise the Draft Endangerment TSD to incorporate information that is more relevant to effects on U.S. resources.

Third, EPA's interpretation of the material contained in the scientific reports that it does cite is not consistently accurate. It overstates the conclusions that may be drawn, fails to resolve inconsistencies contained in the reports it cites, and occasionally appears to cite studies as the source of information that they do not actually contain. These inaccuracies and misrepresentations must be corrected.

Fourth, the Draft Endangerment TSD fails to include in its assessment of the relevant science a number of significant new studies. These studies contradict specific statements and assertions in the Draft Endangerment TSD. Further, some of these studies significantly modify basic assumptions underlying, and thus demand reanalysis of, previously accepted modeling results.

Fifth, the Draft Endangerment TSD fails to address adequately the numerous uncertainties present in the current science. In order to portray realistically the state of scientific knowledge, EPA must more effectively explain the implications of the uncertainties it identifies and be far more rigorous in identifying uncertainties throughout the document.

Finally, the Draft Endangerment TSD exhibits significant biases through its failure to address fully all relevant issues, including the potential for positive effects associated with climate change. Further, the Agency has opted to ignore adaptation and mitigation in this

document, despite the fact that such matters relate directly to the endangerment question. These biases must be removed.

In sum, the ostensible purpose of the Draft Endangerment TSD is to inform any endangerment determination to be made by the EPA Administrator consistent with the provisions of the CAA. Failure to address the science in a thorough and balanced manner and to limit the document's analysis to those issues relevant to EPA's statutory authority has resulted in a document that overstates projected risks of climate change and that makes assertions that are not supported by available scientific information. Without substantial revision to correct its many deficiencies, the Draft Endangerment TSD cannot properly be used in any endangerment analysis.

VI. If EPA Decides To Propose Regulation of GHGs Under Any Existing Provision of the CAA, EPA Will Need To Consider Numerous Issues Further.

Section VI of the ANPR addresses issues related to the possibility of regulating GHGs from mobile sources under Title II of the CAA. 73 Fed. Reg. at 44432-76. Section VII of the ANPR discusses what EPA calls the "three major pathways that the CAA provides for regulating stationary sources" and additional stationary source authorities under the CAA that will be impacted by any future regulatory controls on emissions of GHGs under the Act. *Id.* at 44476/2-3. The three major pathways are: (1) national ambient air quality standards ("NAAQS") and state implementation plans ("SIPs") under sections 107, 108, 109, and 110 of the Act; (2) performance standards for new and existing stationary sources under section 111 of the CAA; and (3) hazardous air pollutant standards under section 112 of the Act. In addition, section VII of the ANPR discusses the impact of regulatory controls on emissions of GHGs under the CAA on other important CAA programs including the PSD and Title V operating permit programs.

UARG stresses that neither Title II of the CAA nor the "three major pathways" for stationary source regulation provides a suitable means for GHG regulation because none of these provisions of the CAA was designed to address air pollutants like GHGs. In considering whether to propose to regulate GHGs under the Act and under what section or sections to do so, EPA should consider the following important issues with regard to these sections.

A. Issues Relating to Possible Regulation of Mobile Sources Under Title II of the CAA

EPA's ANPR addresses the potential regulatory options available to the Agency to regulate mobile sources under the authorities provided in Title II of the CAA. Specifically, these authorities apply to cars and light duty trucks; heavy duty trucks and buses; nonroad recreation vehicles; farm and construction machines; lawn and garden equipment; marine engines; aircraft; and locomotives. *See id.* at 44432/1-2. Although mobile source regulation is not a primary UARG concern, a number of issues raised in the ANPR do implicate UARG members' interests. Accordingly, these comments address matters presented in Section VI of the ANPR that are relevant to the electric utility industry.

Briefly, these comments address several distinct categories of issues raised by EPA in its discussion of Title II authorities: (1) matters that implicate the relationship between mobile and stationary source regulation; (2) general legal issues raised in EPA's Title II discussion; and (3) issues raised in the petitions seeking regulation of GHGs that are currently before EPA.

1. Issues Raised in EPA's Title II Discussion that May Implicate Potential Regulation of Non-Mobile Sources

Many of the issues raised in Section VI of the ANPR are relevant only to mobile sources and are not specifically addressed in these comments. A number of matters raised by EPA, however, could affect potential regulation of electric generating facilities under the CAA. In

particular, EPA has requested comment on two issues addressing how it might structure the relationship between potential mobile and non-mobile source regulation.

Specifically, EPA seeks comment on whether it should allow trading of emissions credits between mobile sources and other potentially regulated sectors if EPA ultimately proposes and promulgates a GHG regulatory program that incorporates cap-and-trade mechanisms. *Id*. at 44433/1. Specifically, the Agency requests:

> [P]ublic comment on the available authority for, and the merits of, allowing credit trading between mobile sources and non-mobile source sectors. One of the potential limitations of allowing credit trading only within the transportation sector is that it would not permit firms to take advantage of emission reduction opportunities available elsewhere in the economy. In particular, EPA requests comment on the advantages and disadvantages of allowing trading across sectors, and how to ensure that credit trading would have environmental integrity and that credits are real and permanent.

Id. at 44440/3. In general, EPA should make every effort to ensure that any regulation that it may devise achieves its policy goals while minimizing burdens on the regulated community. Accordingly, to the extent that EPA is able to devise a legally sound cap-and-trade GHG regulatory program under the CAA, such program should accommodate trading across sectors. Such an approach would likely enhance the efficiency of any regulatory regime that EPA adopts, and the Agency should give serious consideration to its authority to implement such a program.

2. EPA's Mobile Source Discussion Raises General Legal Issues That May Be Relevant to Other Potentially Regulated Sectors.

The section of the ANPR addressing EPA's Title II authorities also addresses one issue of general legal significance that is relevant outside the Title II context. Specifically, EPA requests comment on whether it may consider any global benefits of a proposed GHG regulation or instead is limited to consideration of domestic benefits in conducting its regulatory analysis. *Id.* at 44446/3. Economic analysis of regulatory actions is required by Executive Order 12866, "Regulatory Planning and Review." This requirement is further governed by guidance issued by

OMB, entitled "Economic Analysis of Federal Regulations Under Executive Order 12866," (Jan. 11, 1996) ("OMB's Guidance"), *available at* http://www.whitehouse.gov/omb/inforeg/riaguide.html#ii.

OMB's Guidance addresses a number of issues, among them the consideration of international impacts in a regulatory cost-benefit analysis. Briefly, OMB's Guidance requires EPA to focus on domestic costs and benefits and allows only for limited consideration of international impacts. Specifically, OMB notes that a proper cost-benefit analysis may consider effects on foreign resources only to the extent that a proposed regulation's impacts on those resources would, in turn, result in domestic costs or benefits. This interpretation is supported by each of the examples OMB provides in the sections of its Guidance document addressing international considerations. For instance, OMB's Guidance states that an agency must consider the cost to domestic companies of a proposed regulation that would require the purchase of specific equipment from a foreign manufacturer. *See* OMB's Guidance at III.A.6. Further, OMB indicates that agencies will need to consider certain international trade implications of proposed regulations but only to the extent necessary to determine costs and benefits to the United States. Indeed, OMB's Guidance illustrates this point by suggesting that agencies must consider the role of foreign competition in assessing the impacts of a regulation on domestic industry. *Id*. Finally, OMB's Guidance states that special consideration must be given to costs and benefits of regulatory proposals that would have the effect of limiting imports. Again, OMB's Guidance makes clear, however, that it is only the economic loss or benefit "to the United States" that agencies should consider.

In sum, OMB's cost-benefit analysis guidance does not indicate that it is generally appropriate for agencies to consider foreign costs or benefits of U.S. regulations as a part of their

regulatory analysis. The governing Guidance instead indicates that international effects of regulatory action are relevant only to the extent that such effects result in domestic costs or benefits. Accordingly, EPA's cost-benefit analysis of any regulatory proposal to address GHG emissions should consider only domestic impacts.

3. The Petitions Before EPA Raise Certain Issues that Are Relevant to the Utility Industry.

This section of the ANPR also addresses the seven petitions that EPA has received seeking regulation of GHGs under various provisions of Title II. Specifically, EPA has received petitions seeking GHG regulation under sections 211, 213, and 231 to address emissions from fuels, nonroad sources, and aircraft. *See* 73 Fed. Reg. at 44458/3. In addition to raising questions regarding EPA's authority and the propriety of undertaking such regulation, these petitions address a number of issues of general relevance to other sectors that could be the subject of regulation under other CAA authorities. EPA requests comment on all of the issues raised by the petitioners. *Id*.

Generally, UARG disagrees with the legal analysis and conclusions contained in these petitions. These comments address the following issues: (1) the scientific claims made by petitioners and whether endangerment has been established; (2) whether an endangerment finding under one section of the CAA translates to an endangerment finding under other sections of the Act; (3) petitioners' misinterpretations of *Massachusetts v. EPA*; and (4) assertions as to the extraterritorial application of the CAA.

First, each of the petitions on which EPA requests comment makes numerous scientific assertions regarding the effects of climate change. Briefly, these petitions claim that GHG emissions are now resulting and will continue to result in climate change-related public health and welfare impacts that negatively affect the petitioners, specific states, and the United States as

a whole. These petitions generally conclude, without providing reasoned or thorough scientific analysis, that these effects will be "severe." *See, e.g.*, *California v. Stephen Johnson*, Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Ocean-Going Vessels, at 3 (Oct. 3, 2007). The petitions cite such purported effects as melting glaciers, rising sea levels, altered plant senescence, ocean acidification, proliferation of invasive species, droughts, floods, increased storm activity and intensity, decreasing water quality, heat waves, more frequent wildfires, decreases in air quality, threats to agricultural output, alteration of forest character, ecosystem and human infrastructure effects, and negative disease-related impacts. As support for these claims, the petitioners cite the Assessment Reports of the IPCC and a limited selection of individual scientific studies. *See, e.g.*, *California, et al. v. Stephen Johnson*, Petition for Rule Making Seeking Regulation of Greenhouse Gas Emissions from Aircraft, at 2-11 (Dec. 4, 2007); South Coast Air Quality Management District, Petition for Rulemaking Under the Clean Air Act to Reduce Global Warming Pollutants from Ships, at 2-4 (Jan. 10, 2008); California, et al., Petition for Rulemaking Seeking Regulation of Greenhouse Gas Emissions from Nonroad Vehicles and Engines, at 2-7 (Jan. 29, 2008); Friends of the Earth, et al., Petition for Rulemaking Under the Clean Air Act to Reduce the Emission of Air Pollutants from Aircraft that Contribute to Global Climate Change, at 5-6, 14-20 (Dec. 31, 2007).

These purported effects and others not listed here are addressed in significant detail in section V of these comments. Briefly, however, petitioners' claims are unfounded and fail to take into account significant scientific uncertainties regarding the effects of climate change and the substantial amount of scientific information that contradicts the conclusions petitioners present.

Further, the petitioners assert as to each source category for which they seek regulation that the contribution from these sectors is of sufficient size to require regulation. *See, e.g.*, *California v. Stephen Johnson*, Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Ocean-Going Vessels, at 6-7 (Oct. 3, 2007) (stating that percentage of ocean-going vessel contribution to GHG emissions renders it "a source that is vital to regulate"); *see also* South Coast Air Quality Management District, Petition for Rulemaking Under the Clean Air Act to Reduce Global Warming Pollutants from Ships, at 7 (Jan. 10, 2008) (stating that "ships emit 3% of the world's greenhouse gases" and that such contribution is "significant"). Petitioners have not provided a scientific assessment supporting their claims that the proportion of emissions attributable to each of these sectors makes that sector a cognizable "contributor" to any endangering air pollution.[15] Indeed, some petitioners cite a statement in *Massachusetts v. EPA* discussing, for standing purposes, the contribution of the U.S. transportation sector as a whole in support of their assertion that an endangerment finding is required, despite the fact the Court explicitly neither made nor required any endangerment finding. *Massachusetts*, 127 S. Ct. at 1463 ("We need not and do not reach the question whether on remand EPA must make an endangerment finding. . . ."). Accordingly, petitioners' claims that GHGs cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare are insufficiently supported and must be rejected.

Second, some petitioners assert that an endangerment finding under one section of the CAA should essentially result in an automatic determination of endangerment under other

[15] It is noteworthy that petitioners do not uniformly address the percentage of emissions from these source categories that is specific to the U.S. portion of the relevant industry. EPA should be certain that it bases any endangerment determination only on the portion of such emissions that falls within its jurisdiction under the CAA.

sections of the statute. Specifically, petitioners seeking regulation of GHGs from nonroad vehicles and engines assert that an endangerment finding under section 202 of the CAA, which governs on-road motor vehicles, is sufficient to serve as a proxy for an endangerment determination under section 213. *International Center for Technology Assessment v. Stephen Johnson*, Petition for Rulemaking Seeking the Regulation of Greenhouse Gas Emissions from Nonroad Vehicles and Engines, at 8 (Jan. 29, 2008). Importantly, before regulation is authorized under section 213, EPA must "conduct a study of emissions *from nonroad engines and nonroad vehicles* … to determine if *such emissions* cause, or significantly contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." CAA § 213(a)(1) (emphasis added). Likewise, the section 202 endangerment standard requires EPA to determine if emissions of a given air pollutant *from on-road motor vehicles and engines themselves* cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. CAA § 202(a)(1); *see also id.* § 202(a)(3)(D). These standards are not interchangeable. Indeed, each provision addressing endangerment determinations must be viewed independently, and EPA must engage in a separate and appropriate endangerment analysis that addresses the pertinent source-specific standards contained in each relevant provision of the CAA.

Third, petitioners make assertions regarding the meaning of the Supreme Court's decision in *Massachusetts v. EPA* that are incorrect and must be rejected by EPA. As stated above, some petitioners suggest that the Court's assessment of the significance, for standing purposes, of the U.S. transportation sector's contribution to GHG concentration levels is a *de facto* determination that mobile sources, even when further subdivided among source categories, are "significant" causes of or contributors to endangering air pollution. *See, e.g.*, *California v. Stephen Johnson*, Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Ocean-

Going Vessels, at 7 (Oct. 3, 2007). Again, this is a misinterpretation of the Supreme Court's ruling. The Court's statements on this point have no bearing on an endangerment determination, which involves a substantially different standard of scientific evidence and incorporates a degree of policymaking-related discretion not at issue in a standing analysis.

In addition, petitioners argue that the Court's opinion in *Massachusetts* constrains the policy reasons the EPA Administrator may choose as support for a determination to decline to regulate GHGs under the CAA. *See, e.g.*, *California, et al.*, Petition for Rulemaking Seeking Regulation of Greenhouse Gas Emissions from Nonroad Vehicles and Engines, at 13 (Jan. 29, 2008); *California v. Stephen Johnson*, Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Ocean-Going Vessels, at 11-12 (Oct. 3, 2007). Indeed, the Court did reject certain policy reasons advanced by EPA for its decision to deny a petition for rulemaking *under § 202 of the CAA*, including foreign policy considerations and judgments as to the efficacy of the CAA as a regulatory tool. *Massachusetts*, 127 S. Ct. at 1462-63. The limitations of the Supreme Court's decision, however, must be recognized. Its opinion addresses only regulation pursuant to section 202 and not other provisions of the CAA, including section 213, which the petitioners argue is subject to similar policy-related circumscriptions but which give EPA more discretion. *See* CAA § 213(a)(4) (EPA "*may* promulgate" regulations it "deems appropriate") (emphasis added); 73 Fed. Reg. at 44433/3. This difference illustrates the critical point that EPA must carefully evaluate each relevant provision of the CAA to determine the extent of its discretion under that provision.

Finally, several petitioners assert that EPA has the authority to regulate foreign vessels and aircraft pursuant to sections 213 and 231, respectively. Petitioners arguing in favor of regulation of foreign ocean-going vessels argue that Congress intended that the CAA be applied

extraterritorially. *California v. Stephen Johnson*, Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Ocean-Going Vessels, at 13 (Oct. 3, 2007). As stated by the Supreme Court, "[i]t is a longstanding principle of American law 'that legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States.' This 'canon of construction' . . . serves to protect against unintended clashes between our laws and those of other nations which could result in international discord." *EEOC v. Arabian Am. Oil Co.*, 499 U.S. 244, 248 (1991) (quoting *Foley Bros., Inc. v. Filardo*, 336 U.S. 281, 285 (1949)). There is no clear indication that Congress intended the CAA to apply outside of U.S. territory.[16] Indeed, the only argument offered by petitioners in support of its contention is that the Americans with Disabilities Act ("ADA"), 42 U.S.C. §§ 12101-12213 (1990), applies, in limited circumstances, to foreign flagged vessels. *See* California v. Stephen Johnson, Petition for Rule Making Seeking the Regulation of Greenhouse Gas Emissions from Ocean-Going Vessels, at 13-14 (Oct. 3, 2007). The Supreme Court decision explaining this interpretation of the ADA, however, demonstrates that a clear statement of congressional intent is required to give a general statute exterritorial application if the statute will affect the internal order of a foreign flagged ship. *Spector v. Norwegian Cruise Line Ltd.*, 545 U.S. 119, 125, 132, 134-35 (2005). Although the Court determined that the ADA contained such a statement of congressional intent, the text of the CAA contains no similar indication of

[16] One provision of the CAA authorizes consideration of the effects that air pollutants are expected to have on the public health or welfare of other nations to the extent that such foreign nations provide reciprocal rights. CAA § 115. This limited and clear expression of congressional intent does not, however, indicate that all CAA authorities also apply extraterritorially, and, in fact, suggests that Congress did not intend additional application of the CAA to foreign nations. *See Keene Corp. v. United States*, 508 U.S. 200, 208 (1993) (quoting *Russello v. United States*, 464 U.S. 16, 23 (1983)) ("[W]here Congress includes particular language in one section of a statute but omits it in another . . ., it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion.").

congressional intent. EPA appears to lack authority to apply the CAA in accordance with petitioners' request. At a minimum, EPA must conduct a thorough analysis of each CAA provision that might implicate these concerns and make a reasoned determination as to the extent of the Agency's authority.

B. Issues Relating to Possible Regulation Through NAAQS and SIPs (CAA §§ 107-110)

Section VII.A of the ANPR addresses issues relating to possible regulation of GHGs under sections 107 through 110 of the CAA. The discussion in this section of the ANPR highlights dramatically how ill-suited these provisions of the CAA are to any GHG regulation. As EPA acknowledges, "the ambient concentrations measured across all locations within the U.S. for purposes of comparison to the level of the standard would not vary, and all areas of the country would have the same designation -- that is, the entire U.S. would be designated either attainment or nonattainment, depending on the level of the NAAQS compared to observed GHG ambient concentrations." 73 Fed. Reg. at 44480/1. This presents a whole host of problems for potential GHG regulation under these sections of the Act.

The heart of Congress's design of the CAA is that states take the primary responsibility for ensuring that air quality within their borders meets the NAAQS. CAA §§ 107(a), 110(a); *see also Clean Air Implementation Project v. EPA*, 150 F.3d 1200, 1202 (D.C. Cir. 1998) ("The Act makes states primarily responsible for the attainment and maintenance of the NAAQS through state designed implementation plans. . . ."). States would have absolutely no control over whether they would attain a GHG NAAQS. As EPA notes, "[t]he SIP development process, because it relies in large part on individual states, is not designed to result in a uniform national program of emissions controls." 73 Fed. Reg. at 44480/2. No action that a state could take on its own would be able to assist it in either attaining or maintaining a GHG NAAQS. Indeed,

without international cooperation, no action that the United States takes could assure attainment or maintenance of a GHG NAAQS. That the entire United States would be either attainment or nonattainment for a GHG NAAQS, and that a state, in "implementing" such a NAAQS, would be unable to take any action to affect meaningfully the GHG "air quality" within its borders, demonstrate that no basis exists for any GHG NAAQS under the existing CAA.

Section 108(a)(1) of the CAA specifies three prerequisites for the listing of an air pollutant to be regulated by NAAQS. Specifically, this section provides that EPA:

> [S]hall from time to time . . . list . . . each air pollutant --
>
> (A) emissions of which, in [the Administrator's] judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare;
>
> (B) the presence of which in the ambient air results from numerous or diverse mobile or stationary sources; and
>
> (C) for which air quality criteria had not been issued before the date of enactment of the Clean Air Amendments of 1970, but for which [the Administrator] plans to issue air quality criteria under this section.

CAA § 108(a)(1) (quoted at 73 Fed. Reg. at 44477/1-2).

As discussed in more detail in sections IV and V of these comments, EPA has not yet made a determination whether GHG emissions endanger public health or welfare, which is the first prong of the section 108 test. Should EPA make such a determination with regard to another section of the CAA, such as section 202(a) regarding motor vehicles, that would not be dispositive with regard to section 108. Section 108 contains different language from that in section 202.

Unlike section 202(a), sections 108 and 109 authorize listing of a pollutant as a criteria air pollutant, and regulation of that pollutant through "national ambient air quality standards," for the purpose of addressing any endangerment of the public health or welfare that may reasonably

be anticipated due to the quantities of the pollutant *in the ambient air*, which is the relatively limited portion of the atmosphere to which the general public has access. CAA § 108(a)(2) ("Air quality criteria for an air pollutant [listed under section 108] shall accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from *the presence of such pollutant in the ambient air*, in varying *quantities*.") (emphasis added); *id.* § 109(b)(2) (secondary NAAQS for a section 108-listed air pollutant must be set at the level "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant *in the ambient air*") (emphasis added); 40 C.F.R. § 50.1(e) ("Ambient air means that portion of the atmosphere, external to buildings, to which the general public has access."); *Train v. NRDC*, 421 U.S. 60, 65 (1975) ("ambient air" is "the statute's term for the outdoor air used by the general public"). In any proposed rule that EPA may develop on possible regulation of GHGs under these provisions of the Act, EPA will need to examine what the effect is on U.S. public health or welfare due to the presence of GHGs *in the ambient air* in the United States. This may pose a serious obstacle to listing. It is far from clear, for example, that GHGs in the amount in which they are present in the ambient air in the United States could reasonably be anticipated to endanger public health or welfare. Thus, EPA will need to consider in any notice of proposed rulemaking how to differentiate the effects of GHGs due to their presence in the U.S. ambient air from the effects due to their presence in the rest of the global atmosphere. The absence of information supporting listing and regulation under sections 108 and 109 could, in fact, be the reason why the Administrator would conclude that he or she has no "plans to issue air quality criteria" for GHGs -- the third prerequisite for listing under section 108.

To use the third prerequisite in this fashion, however, EPA may well need to address whether and to what extent that prerequisite gives EPA discretion not to list a pollutant for which it has made an affirmative endangerment finding. EPA notes that the third prerequisite "could provide EPA discretion to decide whether to list those pollutants under section 108 for purposes of regulating them via the NAAQS." 73 Fed. Reg. at 44477/2. In the 1970s, however, NRDC successfully argued to two federal courts that this language gave EPA no discretion to decline to list and regulate a pollutant under sections 108 and 109 where the Agency had conceded that the endangerment criterion (and the "numerous or diverse mobile or stationary sources" criterion in section 108(a)(1)(B)) was satisfied for that pollutant. That litigation culminated in the decision of the U.S. Court of Appeals for the Second Circuit in *NRDC v. Train*, 545 F.2d 320 (2d Cir. 1976), *aff'g*, 411 F. Supp. 864 (S.D.N.Y. 1976), that EPA *must* list and regulate a pollutant under sections 108 and 109 when it has made an endangerment finding for that pollutant, notwithstanding the "plans to issue air quality criteria" provision in section 108(a)(1)(C). EPA correctly notes the existence of this case in the ANPR and notes that because it was decided before the Supreme Court's decision in *Chevron v. NRDC*, 467 U.S. 837 (1984), the Agency may have an argument that its original interpretation of the statute should now be accorded deference. 73 Fed. Reg. at 44477 n.229.

The interpretation that the third criterion does *not* provide EPA with discretion regarding whether to list an air pollutant for which an endangerment finding has been made was raised as recently as 2003 when three states (Connecticut, Maine, and Massachusetts) premised a 2003 citizen suit against the Administrator on that 1976 decision. *Massachusetts v. Horinko*, No. 3:03-CV-984 (D. Conn. filed June 4, 2003) (dismissed without prejudice by plaintiffs on September 3, 2003, in light of EPA's denial of the rulemaking petition that led to *Massachusetts*

v. EPA). More recently, national environmental group representatives -- as part of their attempt to blunt opposition to their campaign for GHG regulation under sections 202 and 111 -- have suggested that the "plans to issue air quality criteria" clause *does* give EPA discretion not to list and regulate, but they have not explained their legal rationale for abandoning the position advanced by NRDC and adopted by two courts. *See, e.g.*, *Strengths and Weaknesses of Regulating Greenhouse Gas Emissions Using Existing Clean Air Act Authorities: Hearing Before the House Energy and Commerce Subcommittee on Energy and Air Quality*, 110th Cong. (Apr. 10, 2008), Testimony of Lisa Heinzerling, Professor of Law, Georgetown University Law Center, at 6 (noting that the third prerequisite "may provide the Administrator somewhat more wiggle room in deciding whether to issue a NAAQS for a greenhouse gas, even after an endangerment finding); Massachusetts v. EPA *Part II: Implications of the Supreme Court Decision: Hearing Before the House Select Committee on Energy Independence and Global Warming*, 110th Cong. (Mar. 13, 2008), Testimony of David Bookbinder, Chief Climate Counsel, Sierra Club, at 9 ("Bookbinder Testimony") (noting that the third prerequisite "appears to contemplate some discretion on EPA's part in whether to establish a NAAQS"). There are, in UARG's view, compelling reasons to believe that that position was and is incorrect, but in any event, EPA should state clearly and comprehensively its view of the matter -- specifically including its interpretation of the current effect of *NRDC v. Train* -- before it proceeds with any proposed rule that addresses, or that arguably could give rise to, regulation of GHGs under section 108 and 109.

EPA notes that section 108 also requires EPA to issue "air quality criteria" once a pollutant has been listed. In response to this requirement, EPA issues "criteria documents" or, as they have been called more recently, "integrated science assessments," for each of the pollutants

listed under section 108. These documents are reviewed by EPA's Clean Air Scientific Advisory Committee and, as noted above, must "accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air, in varying quantities." CAA § 108(a)(2). EPA specifically asks whether it would be "appropriate" for the Agency to rely on the most recent reports of the IPCC and the synthesis reports of the CCSP "as an important source or as the primary basis for the Agency's issuance of 'air quality criteria.'" 73 Fed. Reg. at 44477/3.

For the numerous reasons discussed in more detail in section V.B. of these comments, reliance on the IPCC and CCSP reports for this purpose, without any independent analyses by EPA of the latest relevant scientific knowledge, would not be appropriate and would not comply with the requirements of the CAA. Moreover, as stated by the Agency throughout its most recently completed criteria document, the Integrated Science Assessment for Sulfur Oxides -- Health Criteria, Integrated Science Assessment for Sulfur Oxides -- Health Criteria, EPA/600/R-08/047F (Sept. 2008) ("SOx ISA"), EPA has established a number of basic standards governing preparation of these scientific analyses that would conflict with reliance on the IPCC and CCSP. First, EPA has generally established that to accurately reflect the latest scientific knowledge, air quality criteria must consist of EPA analysis of recent, individual scientific studies that have been subject to peer review. SOx ISA at 1-2. To ensure the timeliness of the research analyzed in the SOx ISA, EPA engaged a call for information from the public and its own "ongoing literature search process that includes extensive computer database mining on specific topics." *Id.* Additionally, the Agency indicated that "[a]ll relevant epidemiologic, human clinical, and animal toxicological studies … published since the last review were considered." *Id.* Indeed, at times, EPA has even altered its own self-imposed study publishing cut-off dates to include

especially important research in its air quality criteria analysis. *See, e.g.*, Air Quality Criteria for Particulate Matter, EPA/600/P-99/002aF at I-iii (Oct. 2004) (indicating that the Agency expanded its original limitations on study publication date to accommodate analysis of "important new studies published through 2003") (hereinafter "PM AQCD"). Failure to conduct a similar literature search and analysis of the most recent information would not only be inconsistent with basic principles of sound science but would also with past EPA practice.

Similarly, through its preparation of past air quality criteria, EPA has established study selection standards that emphasize the science that is most relevant to the establishment of NAAQS, a concern not reflected in IPCC or CCSP reports. For instance, in the SOx ISA, EPA placed considerable emphasis on those studies "conducted in the U.S. or Canada [as opposed to] those from other geographic regions." SOx ISA at A-2; *see also id.* at 1-1 ("The Integrated Science Assessment (ISA) is a concise review, synthesis, and evaluation of *the most policy-relevant science*, and communicates critical science judgments *relevant to the NAAQS review.*") (emphasis added). Further, criteria documents are drafted in response to specific "*policy-relevant questions* that provide a framework for [the] review of the scientific evidence." *Id.* at 1-1 (emphasis added). Other criteria documents have emphasized the importance of "substantial external peer and public review" and "iterative reviews of successive drafts" of the air quality criteria prepared by EPA. *See, e.g.*, PM AQCD at 1-12; *see also id.* at 1-16 ("The assessment presented in this document is framed by: (1) the selection of pertinent issues to be addressed; (2) the selection of relevant studies and an approach to the presentation of information drawn from those studies; and (3) the selection of an approach to interpreting and integrating the body of evidence evaluated in the document."). None of these crucial components to NAAQS-specific

scientific assessment can be achieved through adoption of the reports of the IPCC and CCSP as the statutory air quality criteria.

The analysis and conclusions of the IPCC primarily concern global effects and emissions. The purpose of a criteria document is to examine the latest scientific evidence regarding the effect that atmospheric concentrations of a criteria air pollutant have on public health and welfare in the U.S. due to its presence in the U.S. ambient air. The IPCC reports do not focus on the effects in the U.S. of the presence of GHGs in the U.S. ambient air. The closest the IPCC gets to examining the United States is a short discussion of projected effects of climate change in North America, and it is not scientifically justifiable to read conclusions with regard to North America as generally applying to the United States. In the event EPA were to list GHGs (or a subset of GHGs) as a criteria air pollutant under section 108, it could not avoid its obligation to "issue air quality criteria" that "accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air, in varying quantities." CAA § 108(a)(2). Moreover, any criteria document would need to address the beneficial effects of GHGs in the ambient air. *American Trucking*, 175 F.3d at 1051-53.

Because EPA cannot substitute the IPCC or CCSP reports for the criteria document, in the event EPA decides to establish a NAAQS for GHGs, it should wait to list GHGs (either as a group or individually) until it has made significant progress on both the air quality criteria and a proposed NAAQS. As the Agency acknowledges, preparation of air quality criteria and revisions to a proposed NAAQS can take several years even when the pollutant at issue has long been listed and regulated as a criteria pollutant, and EPA expects that preparation of a criteria document for GHGs would be particularly burdensome because of the complexity of climate

change science and the vast amount of research that would be relevant. 73 Fed. Reg. at 44483/2-3. Once EPA lists a pollutant under section 108, however, EPA must issue a criteria document and proposed NAAQS within twelve months, followed by a final NAAQS 90 days after that. CAA §§ 108(b)(2), 109(a)(1), (2). When criteria pollutants were first listed before enactment of the 1970 Clean Air Act, considerable work had already been done on criteria documents that made this schedule feasible. 73 Fed. Reg. at 44483/2.

Although EPA does not have discretion with regard to timing once it lists an air pollutant under section 108, it does have discretion with regard to the timing of the listing itself, as the Agency correctly notes. *Id.* To avoid a situation where due care cannot be taken to consider the science fully and what the "requisite" level of any NAAQS should be, in the event EPA decides to list a GHG as a criteria air pollutant under section 108, it should wait to list until after it has completed most of its work on the air quality criteria. This would be important to ensure that the Administrator has all of the relevant scientific information to determine at what specific level any NAAQS for GHGs would be "'requisite' -- that is not lower or higher than is necessary -- to protect the public health with an adequate margin of safety" or the "public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air." *Whitman*, 531 U.S. at 475-76; CAA § 109(b)(1), (2).

With regard to the setting of NAAQS, EPA specifically notes that in its view it has discretion to set either a primary or a secondary standard for a pollutant. 73 Fed. Reg. at 44478/2. EPA notes that it revoked the secondary standard for carbon monoxide after a review of the scientific evidence indicated that there was no evidence of adverse welfare effects from the presence of carbon monoxide in the ambient air. *Id.* This does not answer the question, however, of whether the CAA authorizes EPA to establish a secondary standard for an air

pollutant without a primary standard. UARG agrees with EPA that any possible public health effects from the presence of GHGs in the ambient air are the result of indirect effects from "ecological and meteorological changes, which are effects on welfare," and that it might not have the scientific evidence needed to establish a primary standard for GHGs. *Id.* Because of the lack of scientific evidence regarding direct effects of GHGs on public health, EPA discusses the possibility of setting only a secondary NAAQS for GHGs to address welfare effects. Should EPA decide to follow that course of action, it would need to discuss its legal authority for setting a secondary standard without a primary standard.

EPA notes that it has precedent for listing related compounds as a group rather than individually and has done so with nitrogen oxides and particulate matter. *Id.* at 44477/2. EPA discusses the fact that listing each GHG separately would present "significant challenges" for determining which level is appropriate because "the science of global climate change is generally focused on the total radiative impact of the combined concentration of GHGs in the atmosphere." *Id.* at 44479/2. Because the level that would be required to protect public health and welfare for any individual GHG is highly dependent on the concentration of other GHGs in the atmosphere, setting individual levels presents challenges. *Id.* In the event EPA decides to use section 108 of the Act, UARG generally supports listing GHGs as a group, if at all, but only if endangerment and other applicable statutory criteria have been satisfied for *all* of the gases to be regulated. UARG emphasizes that any CAA program to regulate GHGs would need to encompass sources of all GHGs and not only sources of CO_2.[17]

[17] Moreover, if EPA decides to regulate GHGs as a group under the Act, UARG supports measuring these GHGs using a common denominator, such as CO_2-equivalent.

C. Issues Relating to Possible Regulation Through Performance Standards for New and Existing Stationary Sources (CAA § 111)

Notwithstanding EPA's statements that the ANPR does not represent an Agency policy decision, it appears from its discussion of new source performance standard ("NSPS") authority that EPA believes that CAA section 111 in its current form may provide the most appropriate authority and flexibility to regulate GHG emissions from stationary sources under the CAA, including through a broad cap-and-trade program.[18] For that reason, it is particularly important that EPA carefully consider the many factors discussed below that suggest that section 111 is not an effective program for GHG regulation. Indeed, regulation under the existing section 111 would impose significant costs on companies and consumers at a time of great financial uncertainty without a clear health or environmental benefit.

As described below, and in response to the many issues raised by EPA in the ANPR, UARG does not believe section 111 is an appropriate mechanism for regulating GHG emissions. Moreover, regulation of GHG emissions under section 111 generally would not meet the policy design criteria set forth in the ANPR. In particular, using NSPS authority would require long, expensive, and complex category-by-category regulatory development that would be significantly limited by the technologies available for emission reductions. In addition, section 111 regulation could greatly overburden the Agency and states by requiring regulation of a large segment of economic actors without a real environmental benefit. Such regulation also may not

[18] If EPA decides to propose to regulate GHGs through a cap-and-trade program, it needs to address and solicit public comment on whether it is the appropriate federal agency to administer such a program. The size of a cap-and-trade program for GHGs would be enormous and would dwarf the size of any of EPA's existing trading programs. It might be more appropriate for another federal agency with more expertise in commodities markets -- such as the U.S. Commodity Futures Trading Commission -- to manage and administer a GHG market.

necessarily support an effective and broadly-based cap-and-trade program, further increasing costs to regulated industries and consumers.

Should EPA nevertheless decide to propose GHG regulations under section 111, it must be careful to do so in an even-handed manner and not overburden the electric power sector simply because more information is known about emissions from that sector and (arguably) potential emission reduction opportunities for that sector than for some other significant contributors. Moreover, any section 111 standard should not disproportionately burden smaller electricity generating units, which constitute a significant element of the nation's power generation supply.

1. Authority To Regulate

At the outset, it must be stressed that an affirmative endangerment determination under CAA section 202(a)(1) neither requires regulation under section 111 nor makes regulation under it inevitable. Section 111 establishes an endangerment criterion for new categories of stationary *sources* of pollutants and in this respect, therefore, differs significantly from CAA section 202(a)(1) and other relevant CAA sections that address regulation of *pollutants*. Under section 111, the Administrator *may* revise a list of categories of stationary sources and "shall include a category of *sources* in such list if in his judgment it causes, or contributes *significantly* to, air pollution which may reasonably be anticipated to endanger public health or welfare." CAA § 111(b)(1)(A) (emphasis added).

Section 111 thus differs from section 202(a)(1) and other CAA sections because it addresses categories of sources, not pollutants. Moreover, it provides EPA with significant discretion as to whether or not to list a source category. In addition, it requires that the category of sources "significantly" contributes to endangering air pollution. Perhaps most important, for source categories that are already listed under section 111, EPA has broad discretion to decide

whether or not to adopt standards for additional pollutants. *See, e.g.*, 73 Fed. Reg. 35838, 35858/3-35859/1 (June 24, 2008) (preamble to final rule on petroleum refineries NSPS). Therefore, should EPA determine that GHGs meet the section 202(a)(1) endangerment test, this would not require EPA automatically to list new categories of sources of GHGs, or to add standards for GHGs, under section 111.[19] Moreover, should EPA decide to list new categories of sources of GHGs under section 111(b), it would need to show that such categories "significantly" contribute to air pollution that endangers public health or welfare.

Moreover, the endangerment language cited above is directly relevant only to new, reconstructed, and modified sources. Many large sources of GHG emissions, e.g., fossil fuel-fired steam generators, industrial-commercial-institutional steam generating units, municipal waste combusters, Portland cement plants, and petroleum refineries, are already subject to section 111 standards for conventional pollutants. EPA can set standards for "new" pollutants (i.e., pollutants that generally are not otherwise regulated under the CAA) at existing sources, but only indirectly, by publishing "emissions guidelines." Following publication of such guidelines, these existing sources are regulated pursuant to state plans that set performance standards that take into consideration, among other factors, "the remaining useful life of the existing source." CAA § 111(d)(1). As a result, GHG emissions may be treated very differently under section 111, depending on whether they are emitted from categories of new stationary sources or existing sources.

At the same time, regulation of GHGs from a new or existing source may very well render GHGs "subject to regulation" under the CAA, and thus require GHGs to be considered in

[19] Should EPA nonetheless decide to propose to regulate GHGs under section 111, UARG would urge EPA to consider adding a broader set of new categories to lessen the burden on the electric power sector and other listed categories.

a Best Available Control Technology ("BACT") analysis for *any* PSD permit, regardless of the type of source to which the permit would apply. Therefore, regulation of one or more sources of GHGs under section 111 may result in piecemeal and inconsistent regulation of emitting industries yet require all major new sources of GHG emissions to undergo PSD determinations. 73 Fed. Reg. at 44492/3. This *ad hoc*, disjointed approach to regulation could significantly undercut any cost savings EPA would seek to achieve through market-based mechanisms under section 111.

2. Efficacy

EPA rightly points out that section 111 differs from other CAA provisions in that, when EPA determines under section 111 to list and regulate a category of sources (or set a design, equipment, work practice, or operational standard), it must consider the cost of achieving emission reductions along with any non-air quality health and environmental impacts and energy requirements, CAA § 111(a), (h), -- a range of factors beyond harm to public health or welfare. In addition, section 111 includes considerations of "efficacy." Under section 111(b)(1)(B), EPA in general is to review new-source standards of performance at least every eight years, and shall revise them "if appropriate," but need not review a standard (much less revise it) if it determines that "such review is not appropriate in light of readily available information on the efficacy of such standard." In other words, where EPA has already set standards for a category of sources, such as electric utility steam generating units, it is not required to review or revise the standards or to add standards for new pollutants for that source category if it does not consider such actions to be efficacious.[20]

[20] EPA has taken the position in response to comments on its final NSPS rules for petroleum refineries and for Portland cement manufacturers developed under the eight-year review provision that it is not required by section 111(b) to promulgate a new standard of performance (continued…)

3. Policy Design Criteria

According to EPA, it should consider potential sources of regulation based on specific policy design criteria set forth in the ANPR. 73 Fed. Reg. at 44491/2. Regulation of GHGs under section 111 would meet few, if any, of these criteria.

a. Effectiveness of Health and Environmental Risk Reduction

GHG emissions in the United States occur from a number of types of sources, including sources in the transportation, residential, commercial, and industrial sectors. *Id.* at 44402-03. Even within a given sector, emissions occur from a combination of large and small sources. Moreover, the perceived threat to human health and the environment is from global emissions. Thus, it is difficult to determine whether reductions from emissions from any one sector in the United States would be effective in risk reduction. Section 111 regulation, however, does not allow regulatory decisions by sector but by source category. This makes it very difficult, if not impossible, to determine whether a performance standard for a specific source category will really be effective in reducing any public health or welfare risks that may be associated with collective emissions. Moreover, as discussed below, it might be difficult to set a standard appropriate for all sources in even one sector, given cost and technology considerations. For example, small electric steam generating units make up an important part of the U.S. power sector but may warrant different standards or limits than larger sources, possibly complicating efforts to determine whether NSPS regulation would even be effective for the power industry.

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for an air pollutant not already covered by a standard of performance under review. *See* 73 Fed. at 35859/1-2; 73 Fed. Reg. 34072, 34084/2-3 (June 16, 2008). Rather, the Agency has discretion to decide whether to do so. 73 Fed. Reg. at 35858-60; 73 Fed. Reg. at 34084/2-3. UARG agrees that EPA has discretion as to whether to include GHGs in a standard of performance.

EPA would likely have to subcategorize steam generating units and set different NSPS for different sizes and fossil fuels as well as distinguish between new and existing units.

b. Certainty and Transparency of Results

Similarly, given the category-by-category nature of regulation under section 111, differences in emissions levels among differently sized and differently configured sources, and the global distribution of GHGs, it would be difficult to determine whether standards for a given source or category -- or even a number of categories -- would reduce national or global GHG emissions, let alone reduce any health or environmental risk in the United States.

c. Cost Effectiveness and Economic Efficiency

This is a particularly important criterion because cost, efficacy, technological availability, environmental impact, and energy requirements are all statutory factors that EPA must consider under section 111. Cost-effectiveness and efficiency are particularly important factors to consider given the current economic climate and financial troubles facing consumers and industry.

d. Equity Considerations

Regulation of GHGs under section 111 would raise equity concerns because section 111 regulation is based on specific source categories and is not comprehensive across all economic sectors that emit GHGs. In fact, in the ANPR, EPA asks whether section 111 would allow EPA to regulate GHGs only from certain source categories for which it has adequate information on emissions and reduction opportunities or for which control technologies may be available. This picking and choosing of source categories could result in the inequitable imposition of costly controls on one sector (or even on one category) while other sectors or categories would not be so regulated. Moreover, any regulations that significantly raise electricity costs would have a

disproportionate impact on consumers at lower income levels and could drive some industrial operations to foreign countries, leading to job losses.

e. Policy Flexibility Over Time

Although section 111 regulation gives EPA some flexibility to address sources differently through subcategorization, EPA also appears to recognize the limitations inherent in the NSPS approach, under which "stretch goals" may not be appropriate and control technologies must be adequately demonstrated. In addition, serious questions have been raised by environmental groups and some states as to whether section 111 is an appropriate statutory vehicle for a broad-based cap-and-trade system.

f. Incentives for Innovation and Technology Development

As is discussed below and as EPA acknowledges, section 111 does not lend itself to imposition of "technology-forcing" regulations due to requirements that technology be demonstrated and available and that standards be "achievable."

g. Pro-Competitiveness

EPA could create international competitiveness issues by establishing costly standards for certain categories of sources that are not regulated similarly outside the United States. Moreover, EPA could conceivably create domestic competitiveness issues between and among sectors, such as between large and small sources that have different technological and financial capabilities, between categories of sources, and between sectors. Indeed, the very flexibility that EPA perceives in section 111 to prioritize and differentiate among source categories can lead to competitiveness issues. Because existing-source regulations are imposed through state plans, a possibility also exists of creating competitiveness issues among states and regions.

h. Administrative Feasibility

Although EPA may be able to administer NSPS for GHG emissions from certain source categories with adequate monitoring and reporting capacity, it would not be able to address the full scope of GHG emissions from all significant sectors without establishing tailored standards or measures for all such sectors. These efforts could quickly overwhelm the capacity of the Agency (as well as some of the sources). Moreover, EPA must consider the administrative burdens on states, which would be the primary implementers of standards for existing sources (in addition to the burdens on states and facilities resulting from the fact that section 111 regulation would trigger PSD and Title V obligations for GHGs). States face increasing burdens on their resources, and state-to-state administration may vary considerably.

i. Enforceability

To a large extent, enforcement is a function of ease of administration, monitoring, reporting, and inspection. As with administrative feasibility, EPA may be able to enforce NSPS adequately for some categories of sources but may find it difficult to do so for other source categories or certain sources within categories. Moreover, enforcement of standards for existing sources would be a state responsibility as an initial matter, and enforcement may vary considerably among states, especially considering reductions in state administrative and enforcement resources in an economic downturn.

j. Avoidance of Unintended Consequences

As under other CAA sections, regulation of GHGs from even one source category under section 111 could be expected to make all major sources of GHGs subject to PSD and Title V requirements for GHGs. 73 Fed. Reg. at 44492/3. Thus, even if EPA should decide to regulate only one or a few source categories to simplify administration of the NSPS program, it may find itself overwhelmed by permitting requirements under the PSD and Title V programs. As

discussed above, category-by-category regulation may cause differential costs and burdens among sources, while increasing costs to consumers at a time of great financial uncertainty. Moreover, some may argue that any mandated increases in efficiency may trigger NSR requirements for existing units on the theory that more efficient equipment would be able to run longer, raising the potential for enforcement actions and citizen suits. NSR could, in turn, significantly affect costs and timing for facilities trying to meet efficiency-based standards. Finally, achieving lower emissions of conventional pollutants, such as NOx and SO_2, can give rise to significant ancillary power ("parasitic energy") needs to operate pollution control equipment, potentially leading to more, not fewer, GHG emissions.

4. New and Existing Sources

EPA asks in the ANPR whether, if section 111 standards were set for GHGs from specific source categories, those standards should differ between new and existing sources. If, notwithstanding the concerns described above about the appropriateness of section 111 regulation at all, EPA proposes regulations under section 111, it should treat new and existing sources differently. Under section 111, standards of performance for both new and existing sources share several common criteria, including the requirement that section 111 standards be established considering costs and energy requirements. These common criteria, however, will often result in different considerations for new and existing sources. In most cases, it would be more costly and energy-intensive to impose emission limits that would require retrofits at existing sources to meet emission standards than to require that new sources meet limits with emission control technology. For example, supercritical design boilers may be possible with new units for certain types of facilities, but completely impractical as a retrofit option. Differences in costs and energy requirements can also affect any resulting environmental benefits.

Significantly, section 111(d) recognizes the differences between new and existing sources by including, as an additional criterion for existing sources, the "remaining useful life of the existing source to which [the] standard applies." CAA § 111(d)(1); *see also id.* § 111(d)(2). Thus, any proposed section 111 standard for existing sources would have to be developed with consideration for how that standard could be met by sources with varying useful lives. This is particularly important for energy efficiency standards because a given source's efficiency tends to diminish over its useful life, and investments that may be economical for a newer source may be inappropriate for an older source near the end of its useful life.

5. Definition of Source Categories and Coverage of Sources

Section 111 gives EPA considerable discretion in distinguishing among classes, types, and sizes within categories of new sources for the purpose of establishing NSPS. CAA § 111(b)(2). The ANPR lists as relevant factors the magnitude of GHG emissions from a source category, the potency of particular GHGs emitted, whether emissions are continuous, seasonal, or intermittent, what information is known about that category's emissions, and whether regulating those emissions would be beneficial. 73 Fed. Reg. at 44487/3. EPA then inquires whether, given such discretion, it should develop sub- or super-categories of sources or set standards to be met plant-wide, facility-wide, or company-wide. It also asks whether it should set standards for all GHGs or for emissions of specific GHGs such as CO_2. Finally, EPA considers whether it has the discretion to set priorities among sources and categories, regulating some but not others based on such factors as available information on emissions, cost, and availability of reduction technologies. *Id.* at 44488/2-3, 44490/3.

As an initial matter, UARG believes that any such discretion, where it exists, should be exercised in accordance with principles of fairness. Nothing in the CAA requires EPA to set NSPS for GHG emissions from new, reconstructed, or modified sources simply because it makes

an affirmative endangerment finding under another CAA provision. But if EPA decides to set an NSPS for GHGs, it should be careful to do so in a way that does not penalize a sector for providing data to EPA and should be careful not to do so simply because more is known about that sector than others. This is a particular concern for the electric utility generating sector, which has long been required to report CO_2 emissions and which is subject to comprehensive regulation of conventional pollutant emissions. EPA should not succumb to the temptation to focus any regulatory efforts only on one sector in order to avoid difficult decisions with respect to other sectors; if it proposes GHG standards for any source categories, it should propose how it will address other significant emitters of GHGs as well, regardless of whether it may be relatively more difficult or costly to achieve reductions from those sources.

If EPA proposes regulating GHGs under section 111, it should seek to provide sources with maximum flexibility to meet any standards or requirements, including, where appropriate, through subcategorization of sources that could take into account differences among the capacities of various types of sources. On the other hand, super-categories, especially those envisaged by EPA in the ANPR may simply be too broad to apply in a meaningful way.[21] Facility-wide, plant-wide, and company-wide standards would provide valuable flexibility but also complexity in trying to integrate such standards into potential economy-wide programs like trading. Such standards also might be challenged by environmental organizations as not authorized by the CAA. The important criteria for EPA to consider are achievement of cost-effective emission reductions, energy requirements, and other relevant factors, including equity

[21] Super-categories, into which many types of sources are combined, may also unfairly skew a finding that a source category meets the "significance" factor in section 111(b)(1)(A). In addition, life-cycle approaches, as suggested in the ANPR, would be hard to administer, measure, and enforce.

in relation to other sectors. These criteria should apply to any regulatory option that EPA may decide to propose.

6. Best Demonstrated Technology

a. Technological Availability

EPA claims that "[t]he systems, and corresponding emission rates, need not be actually in use or achieved in practice at potentially regulated sources or even at a commercial scale" and that, "if a technology is 'adequately demonstrated' for use at a date in the future, EPA could establish a future-year standard based on that technology." 73 Fed. Reg. at 44487/1. EPA fails to show that either the CAA or case law supports these assertions. Under section 111, EPA is to set NSPS at a level that "reflects the degree of emission limitation achievable through the application of the 'best system of emission reduction' which [taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements] . . . has been 'adequately demonstrated.'" *Id.* at 44368/1 (quoting CAA § 111(a)(1)(A)). This standard is commonly referred to as "Best Demonstrated Technology" or "BDT." Section 111 "most reasonably seems to require that EPA identify the emission levels that are 'achievable' with 'adequately demonstrated technology.' After EPA makes this determination, it must exercise its discretion to choose an achievable emission level which represents the best balance of economic, environmental, and energy considerations." *Sierra Club v. Costle*, 657 F.2d 298, 330 (D.C. Cir. 1981).

But, under section 111, it is not enough that "the system . . . be adequately demonstrated." *Essex Chem. Corp. v. Ruckelshaus*, 486 F.2d 427, 433 (D.C. Cir. 1973). Rather, the standard that is set based on BDT must also be "*achievable*." *Id*. (emphasis added); *see also Portland Cement Ass'n v. Ruckelshaus,* 486 F.2d 375, 391 (D.C. Cir. 1973) ("Section 111 looks toward what may fairly be projected for the regulated future, rather than the state of the art at

present, since it is addressed to standards for new plants. . . . It is the 'achievability' of the proposed standard that is in issue." Thus, the technology on which the standard is based must not be a matter of speculation or conjecture, *cf. Nat'l Asphalt*, 539 F.2d at 787 (finding that EPA had adequate factual basis for standards), and the technology must not be "uncertain and unproven," *Sierra Club*, 657 F.2d at 346-47 ("The statutory factors which EPA must weigh are broadly defined and include within their ambit subfactors such as technological innovation, [but] . . . [t]his is not to say . . . that NSPS may be relaxed just to accommodate an uncertain and unproven technology.").

The U.S. Court of Appeals for the D.C. Circuit has exclusive jurisdiction to review NSPS and has examined section 111 standards on numerous occasions. *See, e.g.*, *Nat'l Lime Ass'n v. EPA*, 627 F.2d 416 (D.C. Cir. 1980); *Nat'l Asphalt*, 539 F.2d at 775; *Essex Chem.*, 486 F.2d at 427; *Portland Cement*, 486 F.2d at 375. The D.C. Circuit has established a rigorous standard of review. The court, for example, has remanded section 111 standards where the agency had "legitimate problems with the methodology of . . . tests" on which EPA relied in setting the standards, *Portland Cement,* 486 F.2d at 392, and in light of the limited relevance and reliability of those tests, *id*. at 396, 401. For the standards to be upheld, the record must support their "achievability."

Thus, according to the D.C. Circuit, the CAA:

> [D]oes [not] allow the EPA to set the standards solely on the basis of its subjective understanding of the problem or "crystal ball inquiry." *See Portland Cement*, . . ., 486 F.2d 391. An adequately demonstrated system is one which has been shown to be reasonably reliable, reasonably efficient, and which can reasonably be expected to serve the interests of pollution control without becoming exorbitantly costly in an economic or environmental way. An achievable standard is one which is within the realm of the adequately demonstrated system's efficiency and which, while not at a level that is purely theoretical or experimental, need not necessarily be routinely achieved within the industry prior to its adoption.

Essex Chem., 486 F.2d at 433-34 (footnote omitted). The D.C. Circuit in *National Lime* later defined "achievable" as denoting "a uniform standard [that] must be capable of being met under most adverse conditions which can reasonably be expected to recur and which are not or cannot be taken into account in determining the 'costs' of compliance." *Nat'l Lime*, 627 F.2d at 431 n.46.

EPA's claim in the ANPR that it could establish a future-year standard based on "adequately demonstrated" technology that is not actually in use or achieved in practice must contend with the fact that, "[a]lthough it is conceivable that a particular control technique could be considered both an emerging technology and an adequately demonstrated technology, there is inherent tension between the two concepts." *Sierra Club*, 657 F.2d at 341 n.157. In light of the novelty of any emerging technology, it inevitably would be harder for EPA to acquire the necessary information about that technology than it would to support a standard based on established technologies. Thus, if EPA were to propose a "future-year" standard that is not based on technology in current commercial use, it would have great difficulty justifying that proposal in light of the section 111 factors.

The ANPR language discussed above simply does not account properly for the requirement that any section 111 standard must be achievable through an adequately demonstrated system of emission reduction. It also does not account properly for the role of EPA's periodic review of NSPS. Because section 111(b)(1)(B) of the CAA requires EPA to review NSPS periodically, the Agency does not even arguably have a need to establish "future" standards at this time based on a "crystal ball inquiry" but may undertake new rulemaking, where appropriate and justified, to review the NSPS when a previously inadequately demonstrated technology has matured to a degree that its capabilities can fairly be assessed. Accordingly, if

EPA does not have enough information regarding available demonstrated technologies to propose a standard, it should wait until such information exists to do so; it should not propose or establish standards based on what technology it estimates *might become* available in the future.[22]

b. Technological Availability in the Power Sector

The ANPR and EPA's draft Technical Support Document on Stationary Sources ("Draft Stationary Source TSD") make certain assumptions about what technology may be available to achieve emissions reductions at sources in various sectors in the near and longer term, including the electric power sector and coal-fired power plants in particular. For existing facilities, EPA acknowledges that flexibility for new technologies is limited and instead identifies a number of ways plants can increase their efficiencies through "well known" modifications and upgrades to plant systems suggesting, for example, that net heat rate reductions (improvements) of up to 10% may be feasible through various efficiency improvements. 73 Fed. Reg. at 44488/1, 44492/1; Draft Stationary Source TSD at 16-18. EPA states that these options are well known in the industry "but for many reasons are not equally feasible from plant to plant or from unit to unit in a plant" and that combined cycle and simple cycle combustion turbine units "have fewer physical options for significant efficiency improvement." Draft Stationary Source TSD at 16. Thus, EPA effectively acknowledges that establishing sector-wide performance standards for existing sources in the power sector would be difficult and clearly would involve different considerations than would establishing standards for new sources, and that BDT may not be available for all sources in a category.

[22] EPA asks whether it should or must set unit-specific requirements for categories of sources under section 111 in addition to any cap-and-trade system. 73 Fed. Reg. at 44490 n.247. To the extent that EPA proposes such standards for categories of sources as an independent requirement, the compliance costs would significantly undermine the cost savings EPA might estimate from use of a cap-and-trade system.

As to new sources, EPA observes that as older plants are retired, their capacity could be replaced with new, more efficient units such as those with supercritical coal plant design, which may produce 10% to 15% lower GHG emissions than the average existing coal plant per British thermal unit for the same amount of electricity that is produced. According to EPA, future, more advanced ultra-supercritical plant designs with efficiencies of about 40% would have heat rates that are 18% below the current coal fleet average and produce much lower GHG emissions than the average existing coal plant. *Id.* at 16, 17.[23]

Many of EPA's assumptions are based on a limited deployment of supercritical plants with comparatively high thermal performance that may be beyond the abilities of the many smaller sources that make up an important portion of U.S. electric power production, especially in rural areas. For example, a DOE report addressing new pulverized coal-generation options reports that subcritical pulverized coal-fired units are typified by full-load gross plant thermal efficiencies of 37.6% (and may be able to extract approximately 38% to 39% gross thermal efficiency).[24] Some units that have recently been permitted in the U.S. achieve efficiencies by adopting super-critical and ultra-critical steam condition, but most higher-performing new plants have been deployed on a limited basis in Europe and Japan. Even at new plants, the highest gross thermal efficiencies that can be achieved will degrade by 2 to 3 percentage points over the load range; thus, a plant full-load gross thermal efficiency of 39% may relax to a load-weighted gross thermal efficiency of 36% to 37%. EPA should also recognize the role of variability in

[23] EPA also briefly discusses biomass co-firing as a potential substitute for coal in existing and future coal-fired boilers. Although biomass can reduce GHG emissions, it still produces significant amounts of those emissions. Moreover, its usefulness at plants, particularly large coal-fired plants, is acknowledged to be limited due to supply and operational constraints. Draft Stationary Source TSD at 17.

[24] U.S. Department of Energy, *Market-Based Advanced Coal Power Systems*, DOE/FE-0400 at 3.1-6 (1999).

determining gross thermal efficiency and the need to account for such variability in setting any NSPS based on such efficiencies.

In addition, efficiencies of new plants inevitably degrade over their lifetimes. Historically, the aging of equipment and compromise in tolerances of the steam turbine will degrade efficiency over time. That factor brings down the gross thermal efficiency of a subcritical boiler design over an entire plant lifetime to 36%, which would presumably lower the lifetime estimates of efficiencies in higher thermal performance technologies. In addition, whereas high thermal efficiency technologies for new units have been used in a limited number of plants around the world, mandating such efficiency in an NSPS could eliminate or severely restrict the role of smaller generating units (i.e., less than 200 megawatts) that are key to the portfolios of smaller public power and municipal agencies. This is a critical problem because NSPS must be broadly achievable by sources and applications in a given regulated sector.

Finally, EPA asks whether section 111 might allow for "technology-forcing" requirements, a subject discussed above. The technology forcing concept might apply to expectations of refinements and improvements in the pollution control capacity of a technology that is already well demonstrated, as opposed to a regulatory "leap of faith" that a technology that is not demonstrated today will eventually prove to be a viable technology within some time certain. For example, it may be rational for EPA to project that selective catalytic reduction could achieve 88% NOx reductions some years in the future if it has determined that that technology can currently reduce NOx by 86%. But unless a technology is currently viable, any assessments of the cost of achieving any emissions standard premised on that technology would rest on speculation would, thus, be impermissible.

c. Carbon Capture and Sequestration

EPA also seeks information as to whether CCS technologies are adequately demonstrated to be available in the electric power and other sectors. 73 Fed. Reg. at 44492/1-2. Although CCS may indeed hold promise for mitigation of GHG emissions in the future, it is not currently available or ready for large-scale and rapid deployment. At the current time, it has not been adequately demonstrated on the necessary scale and is not presently available to most sources, and thus cannot be relied on in a section 111 context to achieve necessary reductions either at existing or at new or modified sources.

Numerous impediments exist to wide-scale application of CCS technology, especially in the power sector. For example, in a recent study, the U.S. Government Accountability Office ("GAO") found that key technological barriers include a lack of experience in capturing significant amounts of CO_2 from commercial-scale power plants and the significant costs of retrofitting existing plants.[25] GAO found that, to date, there have been only small-scale tests of CO_2 capture at power plants around the world, and these projects typically remove CO_2 from only a small fraction of the power plant's overall output; "CO_2 capture has not been demonstrated on a large scale at a power plant in the United States or in any country." GAO

[25] GAO Report, *Climate Change, Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option,* Report to the Chairman on the Select Committee on Energy Independence and Global Warming, House of Representatives, GAO-08-1080 (Sept. 2008) ("GAO Report"). In particular, GAO noted that the challenges to CCS deployment include: "(1) the absence of any commercial-scale demonstration of the technology at a power plant; (2) certain limitations of coal gasification technology for capturing CO_2 emissions at new power plants; and (3) the high cost of retrofitting CCS to existing pulverized coal-fired power plants that will, for the next several decades, account for a significant share of U.S. CO_2 emissions." GAO Report at 16; *see also* World Resources Institute, *CCS Guidelines: Guidelines for Carbon Dioxide Capture, Transport, and Storage* at 34 (2008) (discussing high costs of retrofit relative to costs for new plants, as well as facility space limitations and other factors that make retrofit difficult); *id.* at 35 (noting that CCS technologies have not been proven on a commercial scale).

Report at 17. Further, the IPCC found in its special report on CCS that "there have been no applications [of carbon capture] at large-scale power plants of several hundred megawatts."[26] Indeed, DOE, the International Energy Administration, and others have recommended accelerating the development of full-scale CCS demonstration projects for this very reason.[27] Finally, parasitic energy costs associated with using CCS technology are substantial.

There are further technological barriers to the availability of CCS technology. Integrated Gasification Combined Cycle ("IGCC") technology combined with CCS is seen by some as promising for new plants because CCS costs are thought to be lower at IGCC plants than at pulverized coal-fired plants. There are impediments, however, to deployment of IGCC technology with CCS, including the large costs of construction, reliability concerns, and challenges to building new plants in the United States. Moreover, the GAO Report concludes that "[k]ey assessments indicate that post-combustion capture of CO_2, which would be used at

[26] IPCC, Special Report on Carbon Dioxide Capture and Storage at 107 (2005). The GAO Report does conclude that carbon capture technology has been demonstrated at plants that purify natural gas and produce chemicals, and some of the captured CO_2 at those plants is used in enhanced oil recovery, while the remainder is vented. GAO Report at 17 & n.15. According to the GAO Report, there are technological barriers to direct adaptation of CCS technologies from the natural gas purification process to coal-fired power plants, and CCS in the natural gas processing industry would account for a very small percentage of GHG emissions per year from large stationary sources. *Id.* at 18.

[27] GEO reported that the National Coal Council noted that CCS "'deployment will require successful pilot-scale testing and operation at a demonstration scale of 50 to 100 megawatts before companies will have confidence in their cost and performance for large scale systems.'" GAO Report at 16; *see also* Union of Concerned Scientists, *Coal Power in a Warming World; A Sensible Transition To Cleaner Energy Options*, Exec. Summ. at 1-2 (Oct. 2008) ("UCS Report") ("CCS is still an emerging technology. It has the potential to substantially reduce CO_2 emissions from coal plants, but it also faces many challenges. In its current form the technology would greatly increase the cost of building and running coal plants while greatly reducing their power output. . . . For CCS to play a major role in reducing CO_2 emissions, an enormous new infrastructure must be constructed to capture, process, and transport large quantities of CO_2. And although CCS has been the subject of considerable research and analysis, it has yet to be demonstrated in the form of commercial-scale, fully integrated projects at coal-fired power plants.").

pulverized-coal power plants, faces significant technical challenges that greatly affect the cost and feasibility of its deployment using currently available technology." *Id.* at 22.[28]

Beyond technological and cost limitations, there are regulatory and legal uncertainties that serve as significant barriers to the availability of CCS, including legal uncertainty regarding liability for potential CO_2 leakage and ownership of the CO_2 once it is injected. *Id*. at 15, 23-26; *see also* World Resources Institute, *Capturing King Coal: Deploying Carbon Capture and Storage Systems in the US at Scale* at 24 (2008); UCS Report, Exec. Summ. at 1 (observing that "the development of regulatory standards and mechanisms to guide this process[] will be needed to minimize the environmental risks associated with CO_2 leakage (including groundwater contamination)"). These uncertainties are seen as presenting significant financial barriers to further development and deployment.[29] Consequently, for many reasons, CCS technology could not be considered adequately demonstrated or available as BDT at this time for section 111 standards for the power sector or for most other major GHG-emitting sectors. Moreover, given its cost and complexity, CCS would not be appropriate for the multitude of smaller sources of GHG emissions.

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[28] The GAO Report identifies such challenges as the need to treat large volumes of flue gas to remove CO_2, the need to remove impurities from the flue gas before CO_2 removal, the large amount of energy needed to compress the captured or separated CO_2, and the significant cost increases in retrofitting CCS to an existing plant. As to the last factor, an IPCC assessment concluded that retrofitting a CO_2 capture system to existing coal-fired power plants would increase the incremental cost of producing electricity from about 150% to 290%. GAO Report at 22-23.

[29] *See e.g.*, CCS Alliance**,** "Study of Legal Issues Relating to Risk and Liability in Connection with Carbon Capture and Storage" (July 23, 2008), *available at* http://www.ccsalliance.net; C. Trabucchi & L. Patton, *Storing Carbon: Options for Liability Risk Management, Financial Responsibility*, Daily Environment Report, Vol. 2008 no. 170 (Sept. 3, 2008) (proposing a design for addressing the financial risk arising from deployment of CCS technology).

7. Market Mechanisms

EPA opines that section 111 as it currently exists can provide statutory authority for a comprehensive cap-and-trade program for GHG emissions because such a program meets the three criteria for "standard of performance" set out in section 111(a), namely that such a program would constitute (1) "a standard for emissions of air pollutants," that (2) "reflects the degree of emission limitation achievable," and (3) does so "through the application of the best system of emission reduction" that "has been adequately demonstrated." 73 Fed. Reg. at 44491/2; *see* CAA § 111(a)(1). There are several reasons for believing that questions likely would be raised as to whether a proposed cap-and-trade program under section 111 actually would satisfy those criteria.

First, section 111, as noted above, authorizes regulation by category of sources and not by pollutant. It is not practical to set, administer, and enforce NSPS for every source of GHG emissions in the United States, and EPA, should it decide to propose regulations for GHG emissions under the CAA, will certainly look to the major sources of those emissions. If it does regulate, EPA may be able to create an industry-specific cap-and-trade program in which only some categories of sources and sectors could participate, but that approach would undercut one of the presumptive main goals of any broad-based cap-and-trade regime -- to maximize emissions reductions and spread the costs across the economy so that no one industry, or its customers, is disproportionately burdened.

Second, assuming that GHGs are not listed as criteria pollutants or regulated under section 112, promulgation of NSPS for GHGs would also trigger regulation under section 111(d) for existing sources. But regulation of existing sources is a state function, albeit one based on EPA guidelines. The Agency itself recognizes the need for compatible state rules "promoted" by EPA rules and guidance if such a broad cap-and-trade program were to be possible under section

111. 73 Fed. Reg. at 44487/2. This may be very difficult to achieve in practice as states may choose different regulatory approaches and might not be required to join, or to coordinate their programs with, a national trading program. Indeed, under the now-invalidated Clean Air Mercury Rule ("CAMR"), which was based on section 111 authority and sought to create a cap-and-trade program for mercury emissions, several states declined to implement the model cap-and-trade program that EPA had adopted.

Third, environmental organizations have raised significant questions as to whether section 111 can provide the legal basis for a trading program. When EPA used section 111 to establish a cap-and-trade program for mercury under CAMR, it was strongly opposed by those organizations, arguing that a trading program that allowed some sources to purchase emission allowances and not reduce their own emissions did not constitute a "standard of performance" within the meaning of section 111 because, in their view, it did not constitute "a requirement of continuous emission *reduction*, including any requirement relating to the operation or maintenance of a source to assure continuous emission *reduction.*" CAA § 302(*l*) (emphasis added) (defining "standard of performance"). These groups further argued that, under section 111(d), each source had to achieve continuous emission reductions and that sections 111(a) and (d) required state plans under section 111(d) to reduce emissions from any and all existing sources covered by those plans.

Finally, these groups argued that EPA would be prevented from instituting a trading program under section 111 by application of *ASARCO Inc. v. EPA*, 578 F.2d 319 (D.C. Cir. 1978), which rejected a proposed form of emissions trading under section 111 because, among other things, it allowed operators to "avoid installing the best pollution control technology" and thereby "postpone[d] the time when the best technology must be employed." *Id.* at 327-328.

The environmental groups argued that section 111 is meant to apply *uniformly* to new and modified sources, regardless of their location. *See* Final Opening Brief of Environmental Petitioners, *New Jersey v. EPA*, No. 05-1097, at 26-29 (D.C. Cir. final form brief filed July 23, 2007). Although the D.C. Circuit to date has had no occasion to resolve the merits of this argument, one cannot conclude that such an argument would not be made to challenge the legal basis of any section 111 cap-and-trade program for GHG emissions.

8. Updating Information and Standards

EPA solicits comment on whether and how often it should revise standards and require and review information from sources under section 111. 73 Fed. Reg. at 44489/2-3. UARG understands that global climate change is a long-term issue with an evolving body of science and data, and that technologies change over time, so that regulatory programs must have the flexibility to adapt. Although section 111 does provide EPA with authority to revise NSPS periodically, it is not required to do so, and in fact, need not review (or revise) them if it is "not appropriate in light of readily available information on the efficacy of [the] standard." CAA § 111(b)(1)(B). If EPA decides to propose to regulate GHGs under section 111, it should ensure that any policy it follows on requiring submission of information and on revising standard fairly and appropriately balances the need to reflect significant new circumstances with sources' need for long-term planning and certainty, and it should not impose unnecessarily onerous reporting and information requirements. For example, the Agency should not constantly update standards but do so only when substantial developments occur in new and available technologies.

D. Issues Relating to Possible Regulation of GHGs as Hazardous Air Pollutants (CAA § 112)

Section 112 is the third "main regulatory pathway" identified by EPA for possible regulation of stationary sources under the CAA. EPA must list for regulation all categories of

major sources that emit one or more of the hazardous air pollutants ("HAPs") listed under section 112. If it decided to regulate GHGs under section 112, EPA would first need to add GHGs to the list of HAPs and then would need to regulate GHG emissions from all major sources of GHG emissions. A source is considered "major" under section 112 when it emits or has the potential to emit 10 tons per year or more of any one HAP or 25 tons per year of any combination of HAPs. CAA § 112(a)(1). For many of the reasons identified by EPA, regulation of GHGs under section 112 would be problematic.

As EPA notes, regulation under section 112 would result in EPA having to regulate a very large number of new and existing stationary sources, including small GHG emitters, because of the low 10 and 25 ton per year thresholds. Unlike section 111, section 112 does not give EPA discretion to limit regulation to those sources that contribute "significantly" to air pollution endangering public health and welfare. 73 Fed. Reg. at 44494/2-3. EPA is right to be concerned that a large number of small sources would be required to comply if GHG regulation occurred under section 112. Given the section 112 thresholds, a large family residence that has all natural gas appliances would have to comply with GHG regulation. *Id.* at 44495/1.

On the other hand, one aspect of regulation under section 112 is that pollutants regulated under that section are exempt from regulation under the PSD program. CAA § 112(b)(6). In addition, a section 111 standard for existing sources also cannot be established to regulate emissions of a listed HAP that are regulated under section 112. *Id.* § 111(d)(1)(A)(i). Any usefulness that these exemptions may provide, however, are outweighed by the disadvantages of regulation under section 112. For example, although regulation under the PSD program would be precluded by regulation under section 112, the problem that the PSD program presents with regard to the sheer numbers of covered sources would only be magnified under section 112. The

thresholds for the PSD program are 100 or 250 tons per year of a GHG. As discussed above, the thresholds for regulation under section 112 are much lower -- 10 or 25 tons per year. Thus, far from decreasing the number of sources that would have to comply with GHG regulation, regulation under section 112 would be expected to increase that number exponentially

In addition, EPA would have little flexibility with regard to the timing of any controls for GHGs as listed HAPs under section 112. EPA says that, under section 112, it generally would have to adopt maximum achievable control technology ("MACT") requirements for newly listed source categories within two years after it lists the source category. 73 Fed. Reg. at 44494/3. As EPA notes, MACT standards are more complicated to set than standards under section 111; and meeting a two-year deadline for developing a MACT standard would be difficult; and these short timelines would not allow time for emerging GHG technologies to be further developed. *See id.* at 44494/3, 44495/2

Another aspect to regulation under section 112 is that regulation under section 112 *might* preclude regulation of GHGs under the NAAQS program of sections 108 and 109. As EPA acknowledges, however, although it is clear that regulation of an air pollutant under section 108 generally precludes regulation of that pollutant under section 112, it is much less clear that the converse is true. *Id.* at 44495/2. If EPA should decide to propose regulation under section 112, it will need to explore further whether a basis exists for concluding that doing so would preclude regulation under section 108.

EPA also notes that a significant impediment to any GHG regulation under section 112 is that, in EPA's view, that section does not provide it with the flexibility to use a market-based approach to GHG regulation, which could mean that any regulation of GHGs under section 112 would be even more costly, and less cost-effective. *Id.* at 44495/1.

It is important to note, however, that although this point may apply generally, it may not apply to electric utility steam generating units. Electric utility steam generating units are subject to a specific provision of section 112 -- section 112(n)(1) -- which provides EPA with more flexibility for this source category than section 112 does for other categories. Section 112(n)(1) is the exclusive regulatory authority under which section 112 for this source category. As UARG explained in its comments on EPA's proposed CAMR, UARG believes that section 112(n)(1)(A) provides EPA with authority to adopt a cap-and-trade program for electric utility steam generating units. *See* Comments of the Utility Air Regulatory Group on the Proposed National Emission Standard for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, Docket ID No. OAR-2002-0056 (June 29, 2004), at 120-39. Section 112(n)(1) establishes an additional distinction with respect to any regulation under section 112 of emissions from electric utility steam generating units. Specifically, regulation of those units under section 112(n)(1) can be based only on public health reasons; effects on public welfare are not considered in determining whether to regulate this source category under section 112. CAA § 112(n)(1)(A). As EPA acknowledges, and as these comments discuss above, any public health effects from GHG emissions are far from scientifically certain and in any event are not direct effects. *See* 73 Fed. Reg. at 44478/2.

E. Implications for the PSD Program from Possible Regulation of GHGs Under the CAA

The potential for regulation of GHGs under the PSD program presents an enormous challenge for EPA and the nation. The CAA requires owners and operators of major stationary sources of air pollution to obtain construction permits before building or modifying those sources. PSD applies in areas that are in attainment with the NAAQS. Nonattainment NSR

("NNSR") applies in nonattainment areas and generally is more stringent than PSD.[30] *Id.* at 44497/2. Although PSD primarily applies to criteria air pollutants for which a NAAQS has been established, PSD can also apply to CAA-regulated pollutants for which there is no NAAQS. It does not apply to HAPs listed under section 112 or to section 211(o). At the present time, EPA believes -- and UARG agrees -- that PSD does not currently apply to GHGs.[31] *Id.* at 44497/3. If EPA decided to propose and promulgate a rule establishing limits on emissions of GHGs from mobile sources or stationary sources, PSD permits would need to contain an emissions limit for those GHGs that reflects BACT. BACT is "defined as the maximum achievable degree of emissions reduction for a given pollutant (determined by the permitting authority on a case-by-case basis), taking into account energy, environmental, and economic impacts." *Id.*

Under the PSD program, a PSD permit is required for the construction or modification of any major stationary source that emits or has the potential to emit 250 tons per year of a regulated pollutant (100 tons per year for a source in listed categories, including large fossil fuel-fired steam electric plants); the threshold in nonattainment areas for NNSR generally is 100 tons per year. *Id.* at 44498/2-3. Because many sources emit CO_2, EPA anticipates that "many types of new small fuel-combusting equipment could become newly subject to the PSD program if

[30] If EPA decided to propose and promulgate a NAAQS for GHGs that resulted in the country being deemed nonattainment, then NNSR would apply throughout the United States. This would result, among other things, in new and modified sources having to offset their GHG emissions and meeting the Lowest Achievable Emission Rate ("LAER") instead of BACT. 73 Fed. Reg. at 44498/2. LAER does not allow consideration of costs or energy and environmental impacts of emissions control technology. *Id.* at 44502/2. Because the ANPR primarily discusses PSD, not NNSR, UARG's comments do the same.

[31] Note that environmental groups, led by Sierra Club, have argued in numerous permit proceedings that PSD does in fact now apply to CO_2 emissions. EPA's Environmental Appeals Board recently held that because the language of the CAA is ambiguous on this issue, EPA has discretion to provide a reasonable interpretation of that language. *In re: Deseret Power Elec. Coop.*, PSD Appeal No. 07-03 (EPA Envtl. Appeals Board Nov. 13, 2008).

CO_2 becomes a regulated . . . pollutant." *Id.* at 44498/3. Additionally, for sources already considered major sources, such as fossil fuel fired power plants, regulation of CO_2 likely would create the risk that many more changes would arguably be deemed major modifications. *See id.* at 44499/1. As an example, EPA notes that a hypothetical 500 megawatt electric utility boiler that burns bituminous coal and that is well controlled for traditional air pollutants can emit more than 580 tons per hour of CO_2. At such a source, any change that otherwise qualifies as a modification triggers NSR under applicable regulations and results in just 10 additional minutes of utilization over the course of a year could result in a 100-ton-per-year increase, and thus could potentially become subject to PSD requirements. *See id.*

EPA currently estimates that approximately 200-300 PSD permits are issued nationally each year for construction of new sources and major modifications at existing sources. If CO_2 were to become a regulated pollutant, EPA estimates that the number of PSD permits required to be issued each year would increase by more than a factor of 10 (i.e., more than 2000 to 3000 permits each year). *Id.* at 44499/1-2. UARG believes, however, that this is actually an underestimate. EPA's estimate does not account for a source's potential to emit year-round but is based on actual emissions, and if year-round operation is assumed to be a source's potential to emit, EPA's "estimates would likely be an order of magnitude higher." *Id.* at 44504/2. EPA's sole reliance on actual emissions is misplaced, as EPA's rules make clear that a source's potential to emit applies in the case of brand new construction and for modifications where the existing facility has not begun normal operations. 40 C.F.R. § 52.21(b)(21).

UARG agrees with EPA that regulation of CO_2 through the PSD program "would be a very inefficient way to address the challenges of climate change." 73 Fed. Reg. at 44501/3. To determine if it is possible to avoid the extraordinary administrative and regulatory burdens that

this regulation would create, EPA in the ANPR discusses various alternatives under which, it suggests, it might be possible to mitigate the impact of PSD regulation on small sources: (1) reduce the number of sources subject to the program through "potential to emit" approaches; (2) increase the major source thresholds and PSD significance levels for GHGs "to permanently restrict the program to larger sources"; (3) phase in the applicability of PSD for GHGs; (4) develop streamlined approaches to implementing the BACT requirement; and/or (5) issue general permits for numerous similar sources. *Id.* at 44503/2. EPA notes that some legal barriers may exist for some of these options, and UARG agrees.

If EPA were to propose *any* regulation of GHGs that would trigger PSD, EPA would need to address in detail the specific basis for any authority it believes it may have to mitigate the dramatic and disruptive effects on the nature and scope of the PSD program that would flow from any such regulation. This issue has generated substantial controversy because, for example, some environmental groups' recent suggestions that EPA may have broad administrative or regulatory flexibility to mitigate or even avoid these effects are plainly contrary to their past statements. For example, in the past, environmental organizations and others have argued that EPA cannot issue general permits for PSD and that BACT determinations must be made on a case-by-case basis. *See, e.g.*, Statement of David Hawkins, NRDC (stating that proposed utility BACT presumption for NOx emissions from modified electric utility steam generating units (proposed at 56 Fed. Reg. 27630, 27638 (June 14, 1991)) had "no legal basis" because "[t]he Act specifies that BACT control decisions must be made on a case-by-case basis"); Statement of Congressman Henry A. Waxman (stating with regard to the same proposed utility BACT presumption that "[i]t is highly unusual -- if not illegal -- for EPA to set a federal BACT presumption"). EPA would need to explain in any proposed rulemaking on GHG regulation

under the CAA why those prior arguments are incorrect and why contrary views now expressed by certain representatives of those groups can be relied on with assurance. *See* Bookbinder Testimony at 9 (noting that a "possibility" to avoid the PSD problem would be to "allow[] for coverage of all sources below an individual permitting level (again, possibly 5-10,000 [tons per year]) to be covered by a general permit"). In addition, UARG notes that the thresholds for PSD applicability are written directly into the statute itself. If EPA decides to increase these thresholds to ensure that PSD applies only to large sources, it will need to justify its legal authority to take that step without express congressional approval.

EPA also states its belief that PSD program requirements become applicable on the effective date of the first regulation requiring GHG control under the Act. 73 Fed. Reg. at 44500/1. UARG notes that exactly when a regulation becomes "effective" can vary depending on the CAA provision at issue. For example, section 202(a)(2) of the Act specifies that any section 202(a)(1) emission standard for new motor vehicles "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."

UARG joins EPA in its "strong[] belie[f]" that any CAA regulation of a GHG for the first time would have to be coordinated carefully with a lawful and appropriate approach to PSD permitting, and EPA must consider the effects of regulation under the PSD program when it decides whether to propose to regulate GHGs under the Act. 73 Fed. Reg. at 44510/1. EPA states that this "is necessary to minimize confusion on the part of sources, permitting authorities, and the public, to provide for as effective a transition as possible, and to ensure that the strategies intended to avoid problems can be in place in time to prevent those problems." *Id.* UARG agrees that, because of the overwhelming burden on administrative agencies and regulated

entities that would occur if GHGs become regulated pollutants for purposes of the PSD program, EPA would have to consider carefully not only the nature but also the timing of any regulation of GHGs under the CAA. Moreover, to the extent EPA believes it can propose alternatives to ease this regulatory burden, it would have to provide in any notice of proposed rulemaking a complete and adequate explanation of the authority it believes it has to accomplish this and regarding how its action would not conflict with positions previously taken by the Agency or the courts in this matter.

F. Implications for the Title V Operating Permit Program Due to Possible Regulation of GHGs Under the CAA

Regulation of GHGs under any of the CAA provisions described above, including the PSD program, could give rise to applicable requirements that would need to be included in a Title V permit. In a GHG regulatory environment, if a source emits greater than 100 tons per year of a GHG, including CO_2, it would need to apply for a Title V permit within one year of becoming subject to Title V requirements. The Title V permit for that source would include not only applicable requirements for the GHG but also general requirements that apply to other pollutants such as generally applicable opacity limitations that exist in several SIPs. 73 Fed. Reg. at 44510/2.

EPA notes that the Title V permit program would bring in even more sources than the PSD program because the 100-ton-per-year cutoff applies to all source categories, not only to categories listed in the CAA. *Id.* at 44511/1. EPA estimates that more than 550,000 sources would require Title V permits.[32] Currently, there are approximately 15,000-16,000 Title V sources. *Id.* at 44511/1-2.

[32] EPA states that if it decided to regulate GHGs as HAPs under section 112, Title V would apply at an even lower threshold (25 tons per year for any combination of HAPs and 10 tons per (continued…)

EPA also expresses concern that Title V permits might have to be continually reopened as GHG regulation goes into effect under the Act. The hypothetical example EPA gives involves mobile source requirements for GHGs taking effect, triggering Title V permitting requirements. Small GHG sources would need to obtain Title V permits even though these sources would, at that time, have no applicable requirements. If additional regulations are promulgated and take effect, permits with three or more years remaining would need to be reopened within 18 months to incorporate any applicable requirements from the new regulations. (Permits with less than three years remaining do not need to be reopened; applicable requirements are added to those permits at the time of renewal.) *Id*. at 44514/1-2. As EPA notes, "[t]his scenario would result in duplicative effort as permitting authorities issued hundreds of thousands of minimal Title V permits with no GHG requirements, followed by a period of numerous reopenings for some GHG source categories, while the requirements for other GHG source categories would remain off-permit until renewal, at which point they would need to be included in the renewal permit." *Id.* at 44514/2.

UARG agrees with EPA that the burden of Title V permits and reopenings in a GHG regulatory context would be overwhelming. *Id.* at 44512/1. In addition, EPA expresses concern that there would be relatively little benefit from regulating these small sources because of the lack of anticipated add-on control devices at such sources and their relatively small emissions. *Id.* at 44512/2. Although UARG agrees that there likely would be little demonstrable benefit

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year for any single HAP). This is one of the many problems with potential regulation under section 112, according to the Agency. 73 Fed. Reg. at 44511/2. If EPA decided to use section 112 to regulate GHGs, the number of sources needing a Title V permit "would easily number in the millions absent a means to limit [potential to emit]." *Id.* Moreover, section 112 does not exclude fugitive emissions, a fact that would capture even more sources under Title V, such as agriculture and mining sources. *Id.* at 44511/2-3.

from regulating these small sources, it notes that Congress enacted these requirements of the Title V operating permit in the Act, and EPA is bound to follow the directives of Congress.

EPA describes several alternatives that it suggests might address the burden of the Title V program in the GHG context. EPA attempts to justify these putative alternatives on two general grounds: (1) application of the literal language of the CAA results in absurd results contrary to congressional intent; and (2) a literal application of the Act results in administrative burden.[33] *Id*. at 44512/3-44513/1. To deal with the problem of so many additional sources having to obtain Title V permits, EPA discusses the possibility of a phased-in approach to Title V permitting, which would defer Title V permitting for GHG sources until they become subject to applicable requirements for GHGs. *Id.* at 44513/1. EPA also discusses the possibility of phasing in Title V applicability by starting with the largest sources of GHGs first and phasing in the smaller sources. *Id.* Finally, EPA addresses the possibility of using general permits under Title V, although EPA expresses concern that, even with general permits for Title V, "the sheer volume of sources and number of different types of sources affected [would] present challenges." *Id.* at 44513/2. UARG believes that legal barriers exist that might well prevent EPA from implementing these alternative approaches.

As with the PSD program, UARG believes that EPA would need, in any notice of proposed rulemaking for GHG regulation, to address the specific basis for any authority it believes it may have to mitigate the dramatic and disruptive effects on the nature and scope of the Title V program that would flow from a decision to regulate GHGs under the Act. As with PSD, emission thresholds that give rise to Title V permit obligations are in the text of the CAA,

[33] EPA used these same two general grounds as a possible justification for measures to provide relief in the PSD context as well. *See, e.g.*, 73 Fed. Reg. at 44503/2-3.

as are the timetables by when Title V permits must be applied for or reopened. In proposing or adopting any measures intended to mitigate the impact of GHG regulation on the Title V program, EPA would have to justify its ability and authority to do so without express congressional approval.

A problem also arises with the fees for Title V permitting in a potential GHG regulatory environment. Title V requires permitting authorities to collect permit fees adequate to cover the costs of running the Title V program. *Id.* at 44512/1. In the case of GHGs, the cost may be extremely high, especially with respect to small sources. Yet EPA suggests that, because most states charge Title V fees on a dollar-per-ton basis, EPA "expect[s] that the fee revenues [for GHG sources] would be grossly excessive for what is needed to process permits for GHG sources. This is particularly true for the universe of small sources brought into Title V solely for their GHG emissions because those permits are expected to be relatively simple and may be addressed through general permits." *Id.* at 44513/3. Thus, EPA asserts that permitting authorities would need to consider other options for fees, such as a lower per-ton fee amount for GHGs, fixed fees for applicants below a certain size, and/or no fees for smaller GHG sources. *Id.*

Should EPA propose regulation of GHGs under Title V, UARG believes that Title V permitting fees should apply consistently to all sources regardless of source size. As EPA notes, Title V requires that the permitting programs be self-funding. Rather than set fixed fees for applicants below a certain size or provide an exemption from fees for smaller GHG sources, in the event of any GHG regulation, permitting authorities should institute a lower dollar-per-ton fee amount for GHGs to account for the large volume of GHGs, particularly CO_2, that sources

emit. This approach, or any other fee relief, should apply to all Title V sources regardless of size. Large sources should not have to bear the permitting cost for smaller sources.

As with PSD, EPA needs to consider carefully the effects on the Title V permitting program when it makes any decision whether to propose regulation of GHGs under the CAA. *Id*. at 44514/1. UARG agrees that, because of the overwhelming burden on administrative agencies and regulated entities that would occur if GHGs become regulated pollutants for purposes of the Title V program, EPA would have to consider carefully the nature and timing of any regulation. Moreover, to the extent EPA believes it can propose alternatives to ease this regulatory burden, it would have to provide in any notice of proposed rulemaking a complete and adequate explanation of the authority it believes it has to accomplish this and regarding how its action would not conflict with positions previously taken by the Agency or the courts in this matter.

G. Title VI of the CAA, Which Addresses Stratospheric Ozone Protection, Does Not Provide EPA with Authority To Regulate GHGs.

As EPA notes, section 615 of the CAA provides specific regulatory authority to address effects on the stratosphere. That section, like the other provisions of Title VI, does not authorize regulatory action to control emissions of GHGs or to address global climate change.

Section 615 and the other provisions of Title VI must be construed in light of the specific stratospheric-ozone-protection purpose of that title and Congress's direction -- in the one provision of Title VI that expressly refers to "global warming" (section 602(e)) -- that the Administrator's obligation to publish the global warming potential of listed Title VI substances "shall not be construed to be the basis of any additional regulation under this [Act]." *See* 73 Fed. Reg. at 44518/3-44519/1 (quoting CAA § 602(e)). Moreover, in enacting Title VI in 1990, Congress rejected the Senate Environment and Public Works Committee's proposed approach to the issue, which was to combine regulatory authority to limit emissions of stratospheric-ozone-

depleting substances with regulatory authority to control emissions of GHGs. *See* S. REP. NO. 101-228, at 377-402, 682-701 (1989), *reprinted in A Legislative History of the Clean Air Act Amendments of 1990*, Vol. 5 at 8338, 8717-42, 9022-41 (Nov. 1993) (describing and setting out the provisions of the proposed but never-enacted "Stratospheric Ozone and Climate Protection Act"). Thus, the Senate committee proposed to provide, in its version of what became Title VI, authority "to reduce the generation of greenhouse gases in order … to limit anthropogenically induced global climate changes" and "to reduce to the maximum extent possible emissions of … gases caused by human activities that are likely to affect adversely the global climate." *See id.* at 683, 684 (setting out text of proposed CAA § 502(a), (b)). The committee's description of these proposed provisions emphasized that "global climate change resulting from an intensified greenhouse effect" was a "distinct" problem from "destruction of the stratospheric ozone layer." *Id.* at 387. Yet Congress, in enacting Title VI, tellingly refused to enact the GHG regulatory authority proposed by the committee.

As EPA observes, section 615 "was intended to augment other authorities and responsibilities established by Title VI." 73 Fed. Reg. at 44519/2. As discussed above, those other authorities and responsibilities address protection of the stratosphere from depletion of ozone, not broader concerns about global climate changes and the role of GHG emissions with respect to such changes.

Moreover, even if section 615 could be construed to grant regulatory authority to control GHG emissions to address global climate change, EPA, to invoke any such authority, plainly "would have to consider whether available scientific information supports making the requisite findings." *Id.* Indeed, EPA at a minimum would have to have scientific information sufficient to demonstrate that (1) particular emissions of GHGs "may reasonably be anticipated to affect the

stratosphere" and (2) the effect on the stratosphere "may reasonably be anticipated to endanger public health or welfare." *Id.* at 44519/1 (quoting CAA § 615). EPA's discussion of this issue in the ANPR indicates that, in the Agency's own view, available scientific information is, at least at this time, *not* sufficient to establish the basis for any such findings under section 615. *See id.* at 44519/2-3.

VII. Conclusion

UARG appreciates the opportunity to comment on the ANPR. UARG agrees with EPA's decision to examine the possibility of GHG regulation under the current CAA in the broadest context, especially because the scope of such regulation would be greater than that of any previous CAA program. As these comments demonstrate, the basis for any proposed regulation of GHG emissions under the existing provisions of the CAA has not been established. In any event, in determining whether to propose regulation of GHG emissions under the CAA, EPA must examine carefully the effects that any such regulation would have within the United States, including effects on the economy, and should consider and engage the issues addressed in the comments on this ANPR.