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To Dina Kruger

12/05/2007 02:31 PM

cc

bcc

Subject Fw: Draft endangerment preamble

Jason Burnett

----- Original Message -----

From: Jason Burnett

Sent: 12/05/2007 02:22 PM EST

To: Nicole Owens

Subject: Fw: Draft endangerment preamble

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----- Forwarded by Jason Burnett/DC/USEPA/US on 12/05/2007 02:21 PM -----

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To Susan Dudley

12/05/2007 02:15 PM

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Subject Draft endangerment preamble

Susan,

Attached is the post-FAR draft endangerment preamble.



Endangerment preamble post FAR 120507 to transmit.doc

Thank you,

Jason

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Draft Outline of Summary of Proposed Endangerment Finding in Preamble

III. Endangerment and Cause or Contribute Analyses

The Administrator proposes to find that the air pollution of elevated levels of greenhouse gas (GHG) concentrations may reasonably be anticipated to endanger public welfare. The Administrator is defining the air pollution to be the elevated concentrations of the mix of six GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). The Administrator further proposes to find under section 202(a) that CO₂ emissions from new motor vehicles contribute to this air pollution, and that under section 211(c)(1) CO₂ emissions from the combustion of fuels used by motor vehicles, nonroad vehicles, and nonroad engines contribute to this air pollution. As discussed further below, the Administrator is considering whether emissions of CH₄, N₂O, and HFCs under sections 202(a) and 211(c)(1) do or do not contribute to this air pollution, and intends to make a determination on this issue in the final rule.

This section is organized in the following manner. Section III.A discusses the legal framework for the endangerment and “cause or contribute” analyses. Section III.B sets forth the definition of the “air pollution” that causes endangerment, and provides the evidence and rationale for EPA’s positive endangerment finding. Finally, Section III.C sets forth the Administrator’s proposal regarding whether emissions of “air pollutants” from the relevant mobile sources under sections 202 and 211 of the CAA “cause or contribute” to this air pollution.

A. Legal Framework

1. Statutory Endangerment Language

Section 202(a)(1) of the Act states that

[t]he Administrator shall by regulation prescribe (and from time to time revise) . . . standards applicable to the emissions of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, *which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.*

42 U.S.C. §7521(a)(1)(emphasis added). Similarly, section 211(c)(1) of the CAA in relevant part provides that:

[t]he Administrator may, from time to time on the basis of information obtained under subsection (b) of this section or other information available to him, by regulation, control or prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive for use in a motor vehicle, motor vehicle engine, or nonroad engine or nonroad vehicle (A) *if in the judgment of the Administrator any emission product of such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be anticipated to endanger the public health or welfare.* . . .

1
2 42 U.S.C. §7545(c)(emphasis added). This language establishes a two part test, both parts of
3 which must be satisfied before the Administrator is authorized to take certain regulatory actions
4 under section 202(a) or section 211(c)(1) to address GHG emissions from new motor vehicles or
5 engines or motor vehicle or nonroad fuels. First the Administrator must decide if, in his
6 judgment, air pollution -- here the elevated concentration of six GHGs in the atmosphere -- may
7 reasonably be anticipated to endanger public health or welfare. Second, the Administrator must
8 decide whether, in his judgment, emissions of GHGs from new motor vehicles or engines, or the
9 emission products of fuel or fuel additives used in motor vehicles and nonroad vehicles and
10 engines, cause or contribute to this air pollution.

11
12 2. Origin of Current Endangerment and Cause or Contribute Language

13
14 As part of the 1977 amendments to the Clean Air Act, Congress revised prior endangerment
15 language in sections 202(a)(1) and 211(c) to the versions in the current Act. The legislative
16 history provides important information regarding Congress= intent when it revised this language.
17 In particular, the House Report by the Committee on Interstate and Foreign Commerce provides
18 a long discussion on the amendments. *See* H.R. Rep. 95-294 (1977), *as reprinted in* 4 A
19 Legislative History of the Clean Air Act Amendments of 1977 at 2465 (hereinafter “LH”).

20
21 a. *Ethyl Corp. v. EPA*

22
23 As noted in the legislative history, Congress relied heavily on the approach discussed in a D.C.
24 Circuit opinion interpreting the pre-1977 version of section 211. In *Ethyl Corp v. EPA*, 541 F.2d
25 1 (D.C. Cir. 1976), the en banc court reversed a panel decision regarding an EPA rule restricting
26 the content of lead in leaded gasoline.¹ The en banc court opened its opinion by stating the
27 context for its decision:

28
29 Man=s ability to alter his environment has developed far more rapidly than his ability to
30 foresee with certainty the effects of his alterations.

31
32 541 F.2d at 6. After reviewing the facts, statute, proceedings and regulations, the full-court then
33 went on to evaluate the statutory language at issue to see what level of Acertainty [was] required
34 by the Clean Air Act before EPA may act.@ *Id.*

35
36 The 3-judge panel had held that the language Awill endanger@ required proof of actual harm, and
37 that the actual harm had to come from fuels Ain and of themselves.@ *Id.* at 12. The en banc

1 At the time of the 1973 rules requiring the reduction of lead in gasoline, section 211(c)(1)(A) of the CAA stated that the Administrator may promulgate regulations that

control or prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive for use in a motor vehicle o motor vehicle engine (A) if any emissions product of such fuel or fuel additive *will endanger the public health or welfare*

CAA 211(c)(1)(A) (1970) (emphasis added). The italicized language in the above quote is the relevant language revised by the 1977 amendments.

1 court rejected this approach, finding that the term "endanger" allowed the Administrator to act
 2 when harm is threatened, and did not require proof of actual harm. *Id.* at 13. A statute allowing
 3 for regulation in the face of danger is, necessarily, a precautionary statute. *Id.* Optimally, the
 4 court held, regulatory action would not only precede, but prevent, a perceived threat. *Id.*
 5

6 The court also rejected petitioners' argument that any threatened harm must be "probable"
 7 before regulation was authorized. Specifically, the court recognized that danger is set not by a
 8 fixed probability of harm, but rather is composed of reciprocal elements of risk and harm, or
 9 probability or severity. *Id.* at 18. Next, the court held that EPA's evaluation of risk is
 10 necessarily an exercise of judgment, and that the statute did not require a factual finding. *Id.* at
 11 24. Thus, ultimately, the Administrator must act, in part on "factual issues," but largely "on
 12 choices of policy, on an assessment of risks, [and] on predictions dealing with matters on the
 13 frontiers of scientific knowledge . . ." *Id.* at 29 (citations omitted). Finally, the en banc court
 14 agreed with EPA that even without the language in section 202 regarding "cause or contribute
 15 to," section 211 authorized EPA to consider the cumulative impact of lead from numerous
 16 sources, not just the fuels being regulated under section 211. *Id.* at 29-31.
 17

18 b. The 1977 Clean Air Act amendments

19
 20 It is against this backdrop that Congress amended the CAA in 1977. The dissent in the original
 21 *Ethyl Corp.* decision and the en banc opinion were of "critical importance" to the House
 22 subcommittee and Committee which proposed the revisions to the endangerment language in the
 23 CAA. H.R. Rep. 95-294 at 48, 4 LH at 2515. In particular, the Committee believed the *Ethyl*
 24 *Corp.* decisions posed several "crucial policy questions" regarding the protection of public
 25 health and welfare. *Id.* The House Report addresses these questions in setting forth the reasons
 26 for the committee proposal that eventually became the language in sections 202 and 211 of the
 27 CAA.²
 28

29 The Committee proposed specific language to implement several purposes consistent with the en
 30 banc decision in *Ethyl Corp.*³ In total, the "endangerment" language in section 202(a)(1) now
 31 reads "which in his judgment causes, or contributes to, air pollution which may reasonably be
 32 anticipated to endanger public health or welfare."⁴
 33

2 The Supreme Court recognized that the current language in section 202(a)(1) is "more protective" than the 1970 version that was similar to the section 211 language before the D.C. Circuit in *Ethyl Corp.* 127 S.Ct. at 1447, fn 1.

³ Specifically, the language (1) emphasizes the precautionary or preventive purpose of the CAA; (2) authorizes the Administrator to reasonably project into the future and weigh risks; (3) requires the consideration of the cumulative impact of all sources; (4) instructs that the health of susceptible individuals, as well as healthy adults, should be part of the analysis; and (5) indicates an awareness of the uncertainties and limitations in information available to the Administrator. H.R. Rep. 95-294 at 49-50, 4 LH at 2516-17. Congress also wanted to standardize this language across the various sections of the CAA which address emissions from both stationary and mobile sources which may reasonably be anticipated to endanger public health or welfare. H.R. Rep. 95-294 at 50, 4 LH at 2517; Section 401 of CAA Amendments of 1977.

⁴ The language in section 211(c)(1)(A) is slightly different: "if in the judgment of the Administrator any emission product of such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be anticipated to endanger the public health or welfare, . . ."

1 First, the phrases "in his judgment" and "in the judgment of the Administrator" call for the
2 Administrator to make comparative assessment of risks and projections of future possibilities,
3 consider uncertainties, and extrapolate from limited data. Thus, the Administrator must balance
4 the likelihood of effects with the severity of the effects in reaching his judgment. The
5 Committee emphasized that "judgment" is different from a "finding." Importantly,
6 projections, assessments and estimates must be reasonable, and cannot be based on a "crystal
7 ball" inquiry." Moreover, procedural safeguards apply (e.g., CAA 307(d)) to the exercise of
8 judgment, and final decisions are subject to judicial review. Last, the phrase "in his judgment"
9 modifies both phrases "cause and contribute" and "may reasonably be anticipated" discussed
10 below. H.R. Rep. 95-294 at 50-51, 4 LH at 2517-18.

11
12 Second, the phrase "may reasonably be anticipated" builds upon the precautionary and
13 preventative goals already provided in the use of the term "endanger." Thus, it is the
14 Administrator's duty to assess current and future risks rather than wait for proof of actual harm.
15 This phrase is also intended to instruct the Administrator to consider the limitations and
16 difficulties inherent in information on public health and welfare. H.R. Rep. 95-294 at 51, 4 LH
17 at 2518.

18
19 Finally, the phrase "cause or contribute" ensures that all sources of the contaminant which
20 contribute to air pollution be considered in the endangerment analysis (e.g., not a single source or
21 category of sources). It was also intended to require the Administrator to consider all sources of
22 exposure to a pollutant (e.g., food, water, air) when determining risk. *Id.*

23 24 3. Additional considerations for the "cause or contribute" analysis

25
26 The statute does not define the concept "cause or contribute" and instead requires that the
27 Administrator exercise his judgment when determining whether emissions of air pollutants cause
28 or contribute to air pollution. Thus, the statute is ambiguous as Congress did not provide a clear,
29 bright line test for determining whether the contribution test has been met under the varying
30 circumstances that might arise. Instead, the Administrator has the discretion to interpret "cause
31 or contribute" in a reasonable manner when applying it to the circumstances present in this case.
32 For example, Congress did not specify that the mere fact that new motor vehicles or fuels emit
33 some amount of a GHG (e.g., one molecule) means that these emissions "cause or contribute" as
34 that term is used under the CAA.⁵

35
36 The D.C. Circuit has discussed the concept of "contribution" in the context of a CAA section
37 213 rule for nonroad vehicles. In *Bluewater Network v. EPA*, 370 F.3d 1 (2004), industry argued
38 that section 213(a)(3) required a finding of a significant contribution before EPA could regulate,

⁵ Moreover, even if the statute were unambiguous, the courts have recognized that "the law does not concern itself with trifling matters" and thus allows an agency to create exemptions based on *de minimis* rationale. *Alabama Power v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1979). As noted above, however, the statute is ambiguous and the Administrator has greater discretion when analyzing whether emissions of air pollutants "cause or contribute" to air pollution.

1 but EPA argued that the CAA required a finding only of Acontribution.@⁶ *Id.* at 13. The court
 2 looked at the Aordinary meaning of >contribute=@ when upholding EPA’s reading. After
 3 referencing dictionary definitions of contribute,⁷ the court also noted that A[s]tanding alone, the
 4 term has no inherent connotation as to the magnitude or importance of the relevant >share= in
 5 the effect; certainly it does not incorporate any >significance= requirement.@ *Id.* The court
 6 found relevant the fact that section 213(a) uses the term Asignificant contributor@ in some places,
 7 and the term Acontribute@ elsewhere. *Id.* at 14 (AThe repeated use of the term >significant= to
 8 modify the contribution required for all nonroad vehicles, coupled with the omission of this
 9 modifier from the >cause, or contribute to= finding required for individual categories of new
 10 nonroad vehicles, indicates that Congress did not intend to require a finding of >significant
 11 contribution= for individual vehicle categories.@). The decision supports EPA’s position that
 12 sections 202(a) and 211(c)(1) are ambiguous in that they do not contain any “inherent
 13 connotation as to the magnitude or importance of the relevant ‘share’” and instead provide that
 14 the Administrator is to exercise his judgment. Thus, looking at the totality of the circumstances,
 15 the Administrator must exercise his judgment in a reasonable manner when making a
 16 contribution determination under these sections.

17
 18 In the past, the Administrator has looked at emissions of air pollutants in various ways to
 19 determine whether they Acause or contribute@ to the relevant air pollution. For instance, in some
 20 mobile source rulemakings, the Administrator has looked at the percent of emissions from the
 21 regulated mobile source category compared to the total mobile source inventory for that air
 22 pollutant. *See, e.g.*, 66 Fed. Reg. 5001 (2001) (heavy duty engine and diesel sulfur rule). In
 23 other instances the Administrator has looked at the percent of emissions compared to the total
 24 nonattainment area inventory of the air pollution at issue. *See, e.g.*, 67 Fed. Reg. 68,242 (2002)
 25 (snowmobile rule). EPA has found that levels of air pollutant emissions at amounts as low as 1.2
 26 percent Acontribute.@ *Bluewater Network*, 370 F.3d at 15 (AFor Fairbanks, this contribution was
 27 equivalent to 1.2% of the total daily CO inventory for 2001.@).

28
 29 While these prior precedents are instructive, they also do not establish bright line emission levels
 30 above which a contribution finding must be made, or below which a contribution may not be
 31 made. Where appropriate, the Administrator may determine that emissions at a certain level or
 32 percentage contribute to air pollution in one instance, while also finding that the same level or

⁶ The relevant language in section 213(a)(3) reads A[i]f the Administrator makes an affirmative determination under paragraph (2) the Administrator shall, . . . promulgate (and from time to time revise) regulations containing standards applicable to emissions from those classes or categories of new nonroad engines and new nonroad vehicles (other than locomotives or engines used in locomotives) which in the Administrator’s judgment cause, or contribute to, such air pollution.@ Notably, CAA section 213(a)(2), which is referenced in section 213(a)(3), requires that the AAdministrator shall determine . . . whether emissions of carbon monoxide, oxides of nitrogen, and volatile organic compounds from new and existing nonroad engines or nonroad vehicles (other than locomotives or engines used in locomotives) are *significant contributors* to ozone or carbon monoxide concentrations in more than 1 area which has failed to attain the national ambient air quality standards for ozone or carbon monoxide.@ (Emphasis added).

⁷ Specifically, the decision noted that “=contribute= means simply >to have a share in any act or effect,= WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY 496 (1993), or >to have a part or share in producing,= 3 OXFORD ENGLISH DICTIONARY 849 (2d ed. 1989).@ 370 F.3d at 13.

1 percentage of another air pollutant and involving different air pollution, and different overall
2 circumstances, does not contribute. When exercising his judgment, the Administrator not only
3 considers the cumulative impact, but also looks at the totality of the circumstances (e.g., the air
4 pollutant, the air pollution, the type of source category, the number of sources in the source
5 category, the number and type of other source categories that may emit the air pollutant) when
6 determining whether the emissions justify regulation under the CAA. *See Ethyl Corp.*, 541
7 F.2d at 31, n62 (Moreover, even under a cumulative impact theory emissions must make more
8 than a minimal contribution to total exposure in order to justify regulation under §
9 211(c)(1)(A)).

10
11 B. Is Air Pollution Reasonably Anticipated to Endanger Public Health or Welfare?

12
13 1. What Is The Air Pollution?

14
15 For purposes of the endangerment finding and this rulemaking, the Administrator has determined
16 that the “air pollution” is the elevated combined or mixed atmospheric concentration of six
17 GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs),
18 perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

19
20 a. Why elevated concentrations of these GHGs are the air pollution

21
22 Greenhouse gases trap in the Earth’s heat that would otherwise escape to space. The additional
23 heating effect caused by the buildup of GHGs in the atmosphere enhances the Earth’s natural
24 greenhouse effect and causes global temperatures to increase, with associated climatic changes
25 (e.g., change in precipitation patterns, rise in sea levels, change in frequency and intensity of
26 extreme weather events). It is the elevation in concentration and the resulting impact on climate
27 and climate-sensitive systems that is the cause for concern.

28
29 These six GHGs can remain in the atmosphere for decades to centuries. Therefore, these GHGs,
30 once emitted, become well mixed in the global atmosphere regardless of their emission origin,
31 such that their concentrations over the U.S. are, for all practical purposes, the same as the global
32 average. This also means that current GHG concentrations are the cumulative result of both
33 historic and current emissions, and that future concentrations will be the cumulative result of
34 historic, current and future emissions.

35
36 As discussed further below, current atmospheric concentrations of all of these GHGs are
37 significantly higher than pre-industrial (~1750) levels as a result of human activities. Future
38 projections show that, for most scenarios assuming no additional GHG emission reduction
39 policies, atmospheric concentrations of these GHGs are expected to continue climbing for most
40 if not all of the remainder of this century.

41
42 b. Why the “air pollution” is the combined mix of these six GHGs

43
44 There are a number of scientific, legal and policy reasons why EPA is determining that the air
45 pollution for the endangerment finding and this rulemaking is the elevated combined current and
46 projected atmospheric concentration of the six GHGs.

1
2 i. The six GHGs
3

4 Carbon dioxide is the most important GHG directly emitted by human activities, and is the most
5 significant driver of climate change.. The anthropogenic combined heating effect (referred to as
6 forcing) of CH₄, N₂O, HFCs, PFCs and SF₆ is about 40% as large as the CO₂ heating effect
7 according to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change
8 (IPCC). The IPCC focuses on these six GHGs for both scientific assessments and emissions
9 inventory purposes because these are the six long-lived, well-mixed GHGs not controlled by the
10 Montreal Protocol on Substances that Deplete the Ozone Layer.

11
12 The President's Executive Orders 13423 and 13432 issued in 2007 also define GHGs to include
13 the same six GHGs being considered here (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆).
14

15 There are other GHGs and aerosols that have warming effects but are not being included in the
16 definition of "air pollution" for purposes of the endangerment finding and this rulemaking.
17 These include water vapor, chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs),
18 halons, tropospheric ozone (O₃), and black carbon. There are different scientific and policy
19 reasons why these substances are not being included in the definition of air pollution.
20

21 Water vapor is the most abundant naturally occurring GHG and therefore makes up a significant
22 share of the natural, background greenhouse effect. However, water vapor emissions from
23 human activities have only a negligible effect on atmospheric concentrations of water vapor. It
24 follows that no emission control measures could significantly and directly affect atmospheric
25 concentrations of water vapor. Significant changes to global atmospheric concentrations of
26 water vapor occur indirectly through human-induced global warming, which then increases the
27 amount of water vapor in the atmosphere because a warmer atmosphere can hold more moisture.
28 Therefore, changes in water vapor concentrations are not an initial driver of climate change, but
29 rather an effect of climate change which then acts as a positive feedback that further enhances
30 warming. For this reason, the IPCC does not list direct emissions of water vapor as an
31 anthropogenic forcing agent of climate change, but does include this water vapor feedback
32 mechanism in response to human-induced warming in all modeling scenarios of future climate
33 change. Based on this recognition that anthropogenic emissions of water vapor are not a
34 significant contributor to anthropogenic climate change, EPA's annual *Inventory of U.S.*
35 *Greenhouse Gas Emissions and Sinks* does not include water vapor, and GHG inventory
36 reporting guidelines under the United Nations Framework Convention on Climate Change
37 (UNFCCC) do not require data on water vapor emissions.
38

39 The CFCs, HCFCs and halons are all strong anthropogenic GHGs that are long-lived in the
40 atmosphere, and are contributing to the global anthropogenic heating effect. Therefore, these
41 gases share common climatic properties with the six GHGs included in EPA's definition of "air
42 pollution" for purposes of this rulemaking. However, EPA is not including CFCs, HCFCs and
43 halons in this definition of "air pollution" for policy reasons. The production and consumption
44 of these substances (and hence the anthropogenic emissions) are being controlled and *phased*
45 *out*, not because they contribute to climate change, but due to their stratospheric ozone-depleting
46 properties. The control and phase-out of these substances in the U.S. and globally is occurring

1 under Title VI of the CAA and the Montreal Protocol on Substances that Deplete the Ozone
2 Layer⁸. Therefore, the climate change research and policy community typically does not focus
3 on these substances, precisely because they are essentially already being ‘taken care of’ with
4 non-climate policy mechanisms. For example, the UNFCCC does not address these substances,
5 and instead defers their treatment to the Montreal Protocol. And as mentioned above, the
6 President’s Executive Orders 13423 and 13432 do not include these substances in the definition
7 of GHGs.
8

9 Increased concentrations of tropospheric O₃ are causing a significant anthropogenic warming
10 effect, but, unlike the long-lived six GHGs, tropospheric O₃ has a short atmospheric lifetime
11 (hours to weeks) and therefore its concentrations are more variable over space and time. For
12 these reasons, its global heating effect and contribution to climate change tends to entail greater
13 uncertainty compared to the well-mixed, long-lived GHGs. More importantly, tropospheric
14 ozone is already listed as a criteria air pollutant under the CAA, due to its direct health effects
15 including increases in respiratory infection, medicine use by asthmatics, emergency department
16 visits and hospital admissions, and its potential to contribute to premature death in people with
17 heart and lung disease. Due to its designation as a criteria air pollutant, EPA issues National
18 Ambient Air Quality Standards (NAAQS) for tropospheric ozone to protect public health and
19 welfare, including the health of sensitive populations such as asthmatics, children and the
20 elderly. Therefore, EPA is not including tropospheric ozone in the definition of “air pollution”
21 for purposes of this rulemaking because, as with CFCs, HCFCs and halons, it is already being
22 addressed by regulatory actions that control precursor emissions (nitrogen oxides (NO_x) and
23 volatile organic compounds (VOCs)) from all major U.S. sources. The climate change research
24 and policy community has also traditionally not focused on tropospheric ozone due to its
25 different climate properties compared to the long-lived GHGs, and because tropospheric ozone
26 has been the subject of local and regional air quality policies. Tropospheric ozone is not
27 addressed under the UNFCCC.
28

29 Black carbon is an aerosol particle that results from incomplete combustion of the carbon
30 contained in fossil fuels, and remains in the atmosphere for only about a week. Black carbon
31 causes a warming effect by absorbing incoming sunlight (whereas GHGs cause warming by
32 trapping outgoing, infrared heat), and by darkening bright surfaces such as snow and ice, which
33 reduces reflectivity. Like other aerosols, black carbon can also affect the properties of clouds,
34 which in turn can have an additional climate effect by altering the reflectivity and lifetime of
35 clouds. How black carbon and other aerosols alter cloud properties is a key source of uncertainty
36 in climate change science. Given these reasons, there is considerably more uncertainty
37 associated with black carbon’s warming effect compared to the estimated warming effect of the
38 six long-lived GHGs. Black carbon is also co-emitted with organic carbon, which tends to have
39 a cooling effect on climate because it reflects and scatters incoming sunlight. The ratio of black
40 carbon to organic carbon varies by fuel type and by combustion efficiency. The net effect of

⁸ Under the Montreal Protocol, production and consumption of CFCs were phased out in developed countries in 1996 (with some essential use exemptions) and are scheduled for phase-out by 2010 in developing countries (with some essential use exemptions). For halons the schedule was 1994 for phase out in developed countries and 2010 for developing countries; HCFC production was frozen in 2004 in developed countries, and in 2016 production will be frozen in developing countries; and HCFC consumption phase-out dates are 2030 for developed countries and 2040 in developing countries.

1 black carbon and organic carbon on climate should therefore be considered. Also, black carbon
2 is a subcomponent of particulate matter (PM), which is regulated as a criteria air pollutant under
3 the CAA due to its direct health effects caused by inhalation. Diesel vehicles are estimated to be
4 the largest source of black carbon in the U.S., but these emissions are expected to decline
5 substantially over the coming decades due to recently EPA promulgated regulations targeting
6 PM_{2.5} emissions from on-road and off-road diesel vehicles (the Highway Diesel Rule and the
7 Clean Air Nonroad Diesel Rule). In sum, because black carbon has different climate properties
8 compared to long-lived GHGs, and because major U.S. sources of black carbon are already being
9 addressed through regulatory actions due to health concerns, EPA is not including black carbon
10 in the definition of “air pollution” for purposes of this rulemaking.

11
12 ii. The combined mix of six GHGs

13
14 The scientific literature that assesses the potential risks and end-point impacts of climate change
15 (driven by the accumulation of atmospheric concentrations of GHGs) does not assess these
16 impacts on a gas-by-gas basis. Observed climate change and associated effects are driven by the
17 buildup of all GHGs in the atmosphere, as well as other natural and anthropogenic factors that
18 influence the Earth’s energy balance. Moreover, due to the cumulative purpose of the statutory
19 language, even if the Administrator were to look at the concentration of each GHG individually,
20 he would most likely still have to consider the impact of the concentration of a single GHG in
21 combination with that caused by the other GHGs.. Likewise, future projections of climate
22 change are driven by emission scenarios of all six GHGs, as well as other already regulated
23 pollutants.

24
25 Treating the air pollution as the elevated combined current and projected atmospheric
26 concentration of the six GHGs is consistent with other provisions of the CAA and previous EPA
27 practice under the CAA, where separate air pollutants from different sources but with common
28 properties may be treated as a class (e.g., Class I and Class II substances under Title VI). This
29 approach addresses the cumulative effect that the elevated concentrations of the six GHGs have
30 on climate, and thus on different elements of health, society and the environment.

31
32 2. Science Summary

33
34 The following provides a summary of the underlying science that was reviewed and utilized in
35 [ADD REFERENCES], as well as other key scientific findings from [ADD REFERENCES],
36 utilized in support of this rulemaking.

37
38 a. Summary of key findings

39
40 i. Observed global effects

41
42 The global atmospheric CO₂ concentration has increased about 35% from pre-industrial levels to
43 2005, and almost all of the increase is due to anthropogenic emissions. The global atmospheric
44 concentration of CH₄ has increased by 148% since pre-industrial levels. Current atmospheric
45 concentrations of CO₂ and CH₄ far exceed the recorded natural range of the last 650,000 years.
46 The N₂O concentration has increased 18%. The observed concentration increase in these non-

1 CO₂ gases can also be attributed primarily to anthropogenic emissions. The industrial fluorinated
2 gases, HFCs, PFCs, and SF₆, have relatively low atmospheric concentrations but are increasing
3 rapidly; these gases are entirely anthropogenic in origin.

4
5 The global average net effect of the increase in atmospheric GHG concentrations, plus other
6 human activities (e.g., land use change and aerosol emissions), on the global energy balance
7 since 1750 has been one of warming. This total net radiative forcing (a measure of the heating
8 effect caused by changing the Earth's energy balance) is estimated to be +1.6 Watts per square
9 meter (W/m²). The combined radiative forcing due to the cumulative (i.e., 1750 to 2005)
10 increase in atmospheric concentrations of CO₂, CH₄, and N₂O is +2.30 W/m². The rate of
11 increase in positive radiative forcing due to these three GHGs during the industrial era is very
12 likely to have been unprecedented in more than 10,000 years. The positive radiative forcing
13 due to CO₂ is the largest (+1.66 W/m²). Methane is the second largest source of positive
14 radiative forcing (+0.48 W/m²). Nitrous oxide has a positive radiative forcing of +0.16 W/m².

15
16 Warming of the climate system is unequivocal, as is now evident from observations of increases
17 in global average air and ocean temperatures, widespread melting of snow and ice, and rising
18 global average sea level. Global mean surface temperatures have risen by 0.74°C (1.3°F) over
19 the last 100 years. The rate of warming over the last 50 years is almost double that over the last
20 100 years. Global mean surface temperature was higher during the last few decades of the 20th
21 century than during any comparable period during the preceding four centuries.

22
23 Most of the observed increase in global average temperatures since the mid-20th century is very
24 likely due to the observed increase in anthropogenic GHG concentrations. Global observed
25 temperatures over the last century can be reproduced only when model simulations include both
26 natural and anthropogenic forcings, i.e., simulations that remove anthropogenic forcings are
27 unable to reproduce observed temperature changes. Thus, the warming cannot be explained by
28 natural variability alone.

29
30 Observational evidence from all continents and most oceans shows that many natural systems are
31 being affected by regional climate changes, particularly temperature increases. Observations
32 show that changes are occurring in the amount, intensity, frequency and type of precipitation.
33 There is strong evidence that global sea level gradually rose in the 20th century and is currently
34 rising at an increased rate. Widespread changes in extreme temperatures have been observed in
35 the last 50 years. Globally, cold days, cold nights, and frost have become less frequent, while
36 hot days, hot nights, and heat waves have become more frequent.

37
38 The [ADD REFERENCES] provide evidence that the U.S. and the rest of the world are
39 experiencing effects from climate change now. Current ambient concentrations of CO₂ and other
40 GHGs, however, remain well below published thresholds for any direct adverse health effects,
41 such as respiratory or toxic effects.

42
43 ii. Observed U.S. effects

44
45 U.S. temperatures also warmed during the 20th and into the 21st century. U.S. temperatures are
46 now approximately 1.0°F warmer than at the start of the 20th century, with an increased rate of

1 warming over the past 30 years. The past nine years have all been among the 25 warmest
2 years on record for the contiguous U.S., a streak which is unprecedented in the historical
3 record. Like the average global temperature increase, the observed temperature increase for
4 North America has been attributed to the global buildup of anthropogenic GHG concentrations
5 in the atmosphere.

6
7 Total annual precipitation has increased over the U.S. on average over the last century (about
8 6%), and there is evidence of an increase in heavy precipitation events. Nearly all of the Atlantic
9 Ocean shows sea level rise during the past decade with highest rate in areas that include the U.S.
10 east coast.

11
12 ii. Projected effects

13
14 The [ADD REFERENCES], IPCC Fourth Assessment Report, as well as a recent report under
15 the U.S. Climate Change Science Program, also provide projections of future ambient
16 concentrations of GHGs, future climate change, and future anticipated effects from climate
17 change under various scenarios. This section summarizes some of the key global projections, as
18 well as those particular to North America and the United States. Projections for global
19 temperature change are discussed because changes in global temperature are projected to cause
20 effects in the United States.

21
22 Overall risk increases with increases in both the rate and magnitude of climate change. Climate
23 warming may increase the possibility of large, abrupt, and worrisome regional or global climatic
24 events (e.g., disintegration of the Greenland Ice Sheet or collapse of the West Antarctic Ice
25 Sheet). The majority of the impacts literature assesses the effects of warming for climate
26 sensitivities within the most likely range, not at the tails of the distribution. Consideration of
27 possible extreme outcomes is crucial for risk-management analysis even if potential impacts are
28 of low probability or low confidence.

29
30 (1) Global Effects

31
32 The majority of future reference-case scenarios (assuming no explicit GHG mitigation actions
33 beyond those already enacted) project an increase of global GHG emissions over the century,
34 with climbing GHG concentrations. However, projected ambient concentrations of CO₂ and
35 other GHGs remain well below published thresholds for any direct adverse health effects, i.e.,
36 asphyxiation from direct inhalation.

37
38 Through about 2030, the global warming rate is affected little by different future scenario
39 assumptions or different model sensitivities, i.e., there is already some degree of commitment to
40 future warming given past and present GHG emissions. By mid-century, the choice of scenario
41 becomes more important for the magnitude of the projected warming because only about a third
42 of that warming is projected to be due to climate change that is already committed. By the end
43 of the century, projected average global warming (compared to average temperature around

1 1990) varies significantly by emissions scenario, ranging from 1.8 to 4.0°C (3.2 to 7.2°F), with
2 an uncertainty range of 1.1 to 6.4°C (2.0 to 11.5°F), according to the IPCC.⁹

3
4 The IPCC identifies the most vulnerable world regions as the Arctic, because of high rates of
5 projected warming on natural systems; Africa, especially the sub-Saharan region, because of
6 current low adaptive capacity as well as climate change; small islands, due to high exposure of
7 population and infrastructure to risk of sea-level rise and increased storm surge; and Asian mega
8 deltas, due to large populations and high exposure to sea level rise, storm surge and river
9 flooding. Climate change impacts in certain regions of the world may exacerbate problems that
10 raise humanitarian and national security issues for the U.S. Climate change has been described
11 as a potential threat multiplier regarding national security issues.

12 13 (2) United States Effects

14
15 Projected global warming is anticipated to lead to effects in the U.S. For instance, all of the U.S.
16 is very likely to warm during this century, and most areas of the U.S. are expected to warm by
17 more than the global average. The U.S, along with the rest of the world, is projected to see an
18 increase in the intensity of precipitation events and the risk of flooding, greater runoff and
19 erosion, and thus the potential for adverse water quality effects.

20
21 Severe heat waves are projected to intensify in magnitude, frequency and duration over the
22 portions of the U.S. where these events already occur, with likely increases in mortality and
23 morbidity, especially among the elderly, young and frail. Warmer temperatures can lead to
24 fewer cold-related deaths. It is currently not possible to quantify the balance between decreased
25 cold-related deaths and increased heat-related deaths attributable to climate change over time.

26
27 The IPCC projects with virtual certainty (e.g., greater than 99% likelihood) declining air quality
28 in cities due to warmer and fewer cold days and nights and/or warmer/more frequent hot days
29 and nights over most land areas, including the U.S. Climate change is expected to lead to
30 increases in regional ozone pollution, with associated risks in respiratory infection, aggravation
31 of asthma, and potential premature death in people with heart and lung disease. Climate change
32 effects on ambient PM is currently less certain.

33
34 Additional human health concerns include a change in the range of vector-borne diseases, and a
35 likely trend towards more intense hurricanes (even though a singular hurricane event cannot be
36 attributed to climate change) and other extreme weather events. For many of these issues,
37 particular populations, such as the elderly, young, asthmatics, the frail and the poor, are most
38 vulnerable.

39
40 Moderate climate change in the early decades of the century is projected to increase aggregate
41 yields of rainfed agriculture in the United States by 5-20%, but with important variability among
42 regions. However, major challenges are projected for crops that are near the warm end of their
43 suitable range or depend on highly utilized water resources. How climatic variability and

⁹The IPCC scenarios are also described in the [ADD REFERENCES] and include a range of future global emission scenarios and a range of climate sensitivities (which measure how much global warming occurs for a given increase in global CO₂ concentrations).

1 extreme weather events will continue to change under a changing climate is a key uncertainty,
2 and these events also have the potential to offset the benefits of CO₂ fertilization and a longer
3 growing season.

4 Disturbances like wildfire and insect outbreaks are increasing and are likely to intensify in a
5 warmer future with drier soils and longer growing seasons. Overall forest growth in U.S. will
6 likely increase modestly (10-20%) as a result of extended growing seasons and elevated CO₂
7 over the next century, but with important spatial and temporal variation. Although recent climate
8 trends have increased vegetation growth in parts of the United States, continuing increases in
9 disturbances are likely to limit carbon storage, facilitate invasive species, and disrupt ecosystem
10 services.

11
12 Climate change is projected to constrain over-allocated water resources in the U.S., increasing
13 competition among agricultural, municipal, industrial, and ecological uses. Rising temperatures
14 will diminish snowpack and increase evaporation, affecting seasonal availability of water.

15
16 The U.S. will be affected by global sea level rise, which is expected to increase between 0.18 and
17 0.59 meters relative to around 1990. These numbers represent the lowest and highest projections
18 of the 5 to 95% ranges for all scenarios considered collectively and include neither uncertainty in
19 carbon cycle feedbacks nor rapid dynamical changes in ice sheet flow. U.S. coastal communities
20 and habitats will be increasingly stressed by climate change interacting with development and
21 pollution. Sea level is already rising along much of the coast, and the rate of change will
22 increase in the future, exacerbating the impacts of progressive inundation, storm-surge flooding,
23 and shoreline erosion.

24
25 Climate change is likely to affect U.S. energy use (e.g., heating and cooling requirements), and
26 energy production (e.g., effects on hydropower), physical infrastructures and institutional
27 infrastructures. Climate change will likely interact with and possibly exacerbate ongoing
28 environmental change and environmental pressures in settlements, particularly in Alaska where
29 indigenous communities are facing major environmental and cultural impacts.

30 31 3. Endangerment Analysis and Finding

32
33 Based on the information before the Administrator, the Administrator proposes to find that, in his
34 judgment, the elevated combined atmospheric concentrations of the six GHGs are reasonably
35 anticipated to endanger public welfare. As discussed in more detail below, the scientific
36 evidence regarding changes to the environment and changes to the climate that result from
37 elevated levels of GHG concentrations supports this proposed finding.

38
39 A finding of endangerment to public welfare satisfies the criteria in sections 202 and 211 for a
40 determination that the air pollution is reasonably anticipated to endanger “public health or
41 welfare.” (emphasis supplied).¹⁰ Whether the Administrator’s final endangerment finding is
42 based on endangerment to public health or on endangerment to public welfare does not change
43 the proposed standards contained in either the EPA Fuels Proposal or in the EPA Vehicles
44 Proposal because EPA is considering all the benefits from reduced GHG emissions in its

¹⁰ The “cause or contribute” element of the endangerment finding is discussed in section III.B. below.

1 analyses. Thus, at this time the Administrator does not need to and is not addressing whether
2 elevated levels of GHG concentrations may reasonably be anticipated to endanger public health.
3

4
5 a. Legal context
6

7 As discussed above, the Administrator must exercise his judgment in evaluating whether the
8 endangerment criteria are met. In exercising his judgment it is appropriate for the Administrator
9 to make comparative assessments of risk and projections of future possibilities, consider
10 uncertainties, and extrapolate from limited data. The precautionary nature of the statutory
11 language also means that the Administrator should act to prevent harm rather than wait for proof
12 of actual harm.
13

14 b. Administrator's reasoning
15

16 The Administrator believes that there is compelling and robust evidence that observed climate
17 change can be attributed to the heating effect caused by global anthropogenic GHG emissions.
18 The evidence goes beyond increases in global average temperature to include observed changes
19 in precipitation patterns, sea level rise, extreme hot and cold days, sea ice, glaciers, ecosystem
20 functioning and wildlife patterns. Recent global warming trends stand out as significant
21 compared to estimated global average temperatures for at least the last few centuries. The
22 experts agree that some degree of future warming is now unavoidable given the current buildup
23 of atmospheric concentrations of GHGs, as the result of past and present GHG emissions. Based
24 on the evidence before him, the Administrator believes it is reasonable to conclude current and
25 future emissions of GHGs will contribute to future climate change. Future warming over the
26 course of the 21st century, even under scenarios of low emissions growth, is very likely to be
27 greater than observed warming over the past century.
28

29 The Administrator is aware that the range of potential impacts that can result from climate
30 change spans many elements of the global environment, and that all regions of the U.S. will be
31 affected in some way. The U.S. has a long and populous coastline. Sea level rise will continue
32 and exacerbate storm-surge flooding and shoreline erosion. In areas where heat waves already
33 occur, they are expected to become more intense, more frequent, and longer lasting. Wildfires
34 and the wildfire season are already increasing and climate change is expected to continue to
35 worsen conditions that facilitate wildfires. Where water resources are already scarce and over-
36 allocated in the western U.S., climate change is expected to put additional strain on these water
37 management issues for municipal, agricultural, energy and industrial uses. Climate change also
38 introduces an additional stress on ecosystems which are already affected by development, habitat
39 fragmentation, and broken ecological dynamics. The Administrator is also aware that there is a
40 wide range in the magnitude of these estimated impacts, with there being more confidence in the
41 occurrence of some effects and less confidence in the occurrence of other effects.
42

43 In addition to the effects from changes in climate, there are some additional welfare effects that
44 occur directly from the anthropogenic GHG emissions themselves. For example, ocean
45 acidification occurs through elevated concentrations of CO₂, and crop and other vegetation
46 growth can be enhanced through elevated CO₂ concentrations as well.

1
2 The Administrator is proposing that elevated concentrations of the GHGs are reasonably
3 anticipated to endanger public welfare, given the stated vulnerabilities, risks and impacts from
4 climate change on air quality (and related effects on the environment from the changes in air
5 quality), agriculture, forestry, water resources, ecosystems, coastal areas, the energy sector,
6 infrastructure and settlements, and the direct effects of such elevated concentrations on the
7 environment.

8
9 Current and projected levels of ambient concentrations of the six GHGs are not expected to
10 cause any direct adverse health effects, such as respiratory or toxic effects. However, there are
11 human health risks and benefits associated with climate change. It is not clear how these impacts
12 should be characterized under the Clean Air Act for purposes of an endangerment analysis,
13 however, which defines “welfare” as including weather, climate and other effects. For this
14 reason the Administrator is not proposing a separate endangerment finding for public health at
15 this time. As noted above, the Administrator needs to find only that elevated levels of GHG
16 concentrations may reasonably be anticipated to endanger public health *or* welfare, and the
17 proposed finding for public welfare meets this statutory hurdle.

18
19 Some elements of human health, society and the environment may benefit from climate change,
20 but the potential for some benefits does not undermine the positive endangerment finding, which
21 is based on the full weight of evidence showing numerous risks and the potential for adverse
22 impacts.

23
24 Quantifying the exact nature and timing of impacts due to climate change over the next few
25 decades and beyond across all vulnerable elements of U.S. health, society and the environment is
26 currently not possible. The Administrator acknowledges these uncertainties but does not view
27 these uncertainties as being “so profound” that they preclude the Administrator “from making a
28 reasoned judgment.” 127 S.Ct. at 1463. First, the full weight of evidence as summarized above
29 and in the [ADD REFERENCES] points towards the robust conclusion that expected rates of
30 climate change (driven by past, present and plausible future GHG emissions) pose a number of
31 serious risks to the U.S., even if the exact nature of the risks are difficult to quantify with
32 confidence. Second, the uncertainties in this context can also mean that future rates of climate
33 change are being underestimated, and that the potential for associated and difficult-to-predict-
34 and-quantify extreme events are not adequately incorporated into impact assessments. The
35 scientific literature states that risk increases with increases in both the rate and magnitude of
36 climate change.

37
38 In light of the precautionary nature of the statutory language, the Administrator does not need to
39 find that current levels of GHG concentrations endanger public welfare now. As noted above,
40 the fact that GHGs remain in the atmosphere for decades to centuries means that future
41 concentrations are dependent not only on tomorrow’s emissions, but also on today’s emissions.
42 The Administrator has considered both current and projected future elevated concentrations of
43 GHGs, as well as the totality of the observed and projected effects that result from current and
44 projected concentrations. The Administrator focused on future projected elevated concentrations
45 of GHGs and their projected effects in the United States because they are larger and of greater
46 concern than current GHG concentrations and observed effects. Out of concern for the future

1 effects -- and considering uncertainties, comparing risks and extrapolating from available data --
2 the Administrator is proposing that projected elevated concentrations of GHGs (due to historic,
3 current and projected emissions) are reasonably anticipated to endanger public welfare.
4
5 In sum, the Administrator is proposing to find that elevated levels of GHG concentrations may
6 reasonably be anticipated to endanger public welfare. At this time, the Administrator is not
7 addressing whether there is such endangerment for public health. We note that some take the
8 position that the Agency should not find endangerment and the EPA takes comment on that
9 position as well as all aspects of this endangerment analysis.
10

1 C. Do emissions of air pollutants from motor vehicles or fuels contribute to the air pollution
2 that is reasonably anticipated to endanger public welfare in the United States?
3

4 1. What is/are the air pollutant(s)?
5

6 a. Background and context
7

8 As noted above, the Administrator has proposed to define the air pollution for purposes of the
9 endangerment finding to be the elevated combined atmospheric concentrations of six greenhouse
10 gases (i.e., CO₂, CH₄, N₂O, HFCs, PFCs, SF₆). The Administrator must also define “air
11 pollutant(s)” for purposes of making the “cause or contribute” determination. The question is
12 whether the “air pollutants” to be evaluated for “cause or contribute” should be the individual
13 GHGs, or whether the “air pollutant” is the class of GHGs as a collective whole.
14

15 Sources covered by Sections 202 and 211 of the Clean Air Act emit four of the six greenhouse
16 gases discussed above: CO₂, CH₄, N₂O, and HFCs. Importantly, under either approach to
17 defining “air pollutant,” the Administrator could propose the same standards under section 202
18 and 211 because of the flexibility the statute gives the Administrator to consider factors such as
19 technical feasibility and cost. Of course, a finding of contribution is required before a standard
20 for an air pollutant can be finalized.
21

22 b. Proposal to define “air pollutant” as each individual greenhouse gas
23

24 The Administrator is proposing to define “air pollutant” as each individual GHG rather than as a
25 class of GHGs as a collective whole for the purposes of assessing “cause or contribute.” Thus,
26 the Administrator will be evaluating each individual GHG to determine if it causes, or
27 contributes to, the elevated combined level of GHG concentrations. The Administrator is
28 proposing this approach because it enables a more complete evaluation of the unique
29 characteristics and properties of each GHG (e.g., radiative forcing, lifetimes, etc.), as well as
30 current and projected emissions. This facilitates a customized approach accounting for these
31 factors.
32

33 This approach is consistent with the approach taken in several federal GHG programs which
34 target reductions of individual greenhouse gases. For example, EPA manages a variety of
35 partnership programs aimed at reducing emissions of specific sources of methane and the
36 fluorinated gases (HFCs, PFCs and SF₆). In addition, EPA currently collects CO₂ data from
37 electric power generators regulated under Title IV of the Clean Air Act (based on the language of
38 Section 821 of the CAA Amendments of 1990) and does not collect data on emissions of other
39 GHGs from combustion (i.e., CH₄ and N₂O) from these sources.
40

41 We recognize that this proposed definition could have important implications for how GHGs are
42 treated in the context of other Titles of the Clean Air Act. These implications have not been
43 fully characterized. The Administrator seeks comment on this proposal, and is particularly
44 interested in views regarding its implications for the potential future regulation of GHGs under
45 other parts of the Clean Air Act.
46

1 c. Defining “air pollutants” collectively as a class of greenhouse gases

2
3 The Administrator has also considered the possibility of defining “air pollutant” collectively as a
4 single class of greenhouse gases. Under this collective approach, the Administrator could define
5 the “air pollutant” as either the collective group of six greenhouse gases in the definition of air
6 pollution (CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆), or the collective group of the four greenhouse
7 gases that are emitted from Section 202/211 sources (CO₂, CH₄, N₂O, and HFCs).

8
9 There are several federal and state climate programs, such as EPA’s Climate Leaders program,
10 DOE’s 1605b program, and California’s Climate Action Registry, that encourage firms to report
11 (and reduce) emissions of all 6 greenhouse gases. In addition, the President’s recent 2007
12 Executive Orders (13423 and 13432) and his 2002-2012 intensity goal both encompass the
13 collective emissions of all 6 greenhouse gases. A brief discussion of the emissions trends for all
14 greenhouse gases combined are presented in parts 2g and 3f of this section.

15
16 As above, the Administrator is seeking comment on how other programs under the CAA might
17 be affected by using this definition.

18
19 2. Discussion of contribution of greenhouse gases from 202 source categories

20
21 a. Overview of Section 202 source categories

22
23 The relevant mobile sources under section 202 (a)(1) of the Clean Air Act are “any class or
24 classes of new motor vehicles or new motor vehicle engines, . . .” CAA §202(a)(1). To support
25 the Administrator’s assessment, EPA has analyzed historical greenhouse gas emissions data for
26 motor vehicles and motor vehicle engines in the United States from 1990 to 2005 (the most
27 recent year for which official EPA estimates are available).

28
29 The motor vehicles and motor vehicle engines (hereinafter “Section 202 source categories”)
30 addressed are:

- 31
32
- 33 • Passenger cars
 - 34 • Light-duty trucks
 - 35 • Motorcycles
 - 36 • Buses
 - 37 • Medium/heavy-duty trucks
 - 38 • Cooling¹¹

39 The source of the emissions data is the *Inventory of U.S. Greenhouse Gas Emissions and Sinks:*
40 *1990-2005 (USEPA #430-R-07-002)* (hereinafter “U.S. Inventory”). See [ADD REFERENCES]
41 for a discussion on the correspondence between Section 202 source categories and IPCC source
42 categories.

43

11 Greenhouse gas emissions result from the use of HFCs in cooling systems designed for passenger comfort, as well as auxiliary systems for refrigeration.

1 There are many possible ways of assessing “cause and contribute” and no single approach has
2 been used in previous endangerment determinations under the CAA. To support an informed
3 assessment, we provide the following types of comparisons for emissions of each GHG from
4 Section 202 source categories:

- 5
- 6 • As a share of total global aggregated emissions of the 6 greenhouse gases included in the
7 definition of “air pollution”;
- 8 • As a share of total aggregated U.S. emissions of these greenhouse gases;
- 9 • As a share of aggregated U.S. greenhouse gas emissions for existing motor vehicles and
10 engines;
- 11 • As a share of global emissions of that individual greenhouse gas; and
- 12 • As a share of total U.S. emissions of that individual greenhouse gas, including
13 comparisons to the magnitude of emissions of that gas from other non-transport related
14 source categories.

15
16 As usual, for the "cause or contribute" evaluation, the Administrator is comparing and
17 considering annual emissions data. Because the air pollution to which the contribution is being
18 evaluated is the mix of six GHG concentrations, the logical starting point for any contribution
19 analysis is a comparison of the emissions of the air pollutant from the Section 202 or 211 source
20 category to the total, global emissions of the six GHGs. The Administrator recognizes that there
21 are other comparisons, such as those listed above, that can be considered in the decision about
22 whether emissions of the air pollutant causes or contributes to the elevated combined
23 concentration of the six GHGs, and those assessments are provided within the discussions of the
24 contributions from Section 202 and 211 source categories. The Administrator is considering all
25 of this information, as well as various policy considerations discussed below, and proposes a
26 decision based on the body of information before him. As discussed below, EPA invites
27 comment on the weight that should be placed on the various information and policy
28 considerations discussed below.

29
30 An overview of the analysis is presented here, and a more detailed description along with data
31 tables is contained in [ADD REFERENCES]. All annual emissions data are being considered
32 on a CO₂ equivalent basis, which is a commonly accepted metric for comparing different GHGs,
33 both in the U.S. annual GHG Inventory and with international GHG inventories from other
34 Parties to the UNFCCC.¹²

35
36 EPA invites comment on these and other comparisons, as well as on the data used in the
37 analysis. For example, comparing the contribution of the flow of emissions of a particular GHG
38 from Section 202 or Section 211 source categories to the stock of that GHG concentration in the
39 atmosphere could provide useful insights.

12 Emissions of different greenhouse gases are compared using global warming potentials (GWPs). The GWP of a greenhouse gas is defined as the ratio of the time-integrated radiative forcing from the instantaneous release of 1 kilogram (kg) of a trace substance relative to that of 1 kg of a reference gas (IPCC 2001). Direct radiative effects occur when the gas itself is a greenhouse gas. The reference gas used is CO₂, and therefore GWP-weighted emissions are measured in teragrams of CO₂ equivalent (Tg CO₂ Eq.).

1 b. Proposal regarding the contribution of carbon dioxide emissions from Section 202 source
2 categories to the elevated combined level of GHG concentrations
3

4 Carbon dioxide is emitted from motor vehicles and motor vehicle engines during the fossil fuel
5 combustion process. During combustion, the carbon stored in the fuels is oxidized and emitted
6 as CO₂ and smaller amounts of other carbon compounds.¹³
7

8 The positive radiative forcing due to carbon dioxide since pre-industrial times is the largest
9 among the 6 GHGs which constitute the “air pollution.” Carbon dioxide is indisputably the
10 most significant GHG emitted by the transportation sector. Carbon dioxide is the dominant
11 greenhouse gas emitted from motor vehicles and motor vehicle engines (94 percent of total U.S.
12 Section 202 source category GHG emissions in 2005). Carbon dioxide emissions from these
13 source categories grew by 34 percent between 1990 and 2005, largely due to increased CO₂
14 emissions from light-duty trucks (75 percent since 1990) and medium/heavy-duty trucks (70
15 percent).
16

17 Globally, in 2000, CO₂ from motor vehicles and engines in the U.S. contributed more to global
18 aggregate greenhouse gas emissions (4.3 percent) than total national emissions of most
19 individual countries, with the exception of the People’s Republic of China and the Russian
20 Federation.¹⁴ This information alone could support a positive contribution proposal. However,
21 the Administrator also looked at additional information.
22

23 In 1990, Section 202 source categories emitted just under 23 percent of total U.S. CO₂ emissions,
24 behind the electricity generation sector (36 percent) and ahead of the industrial sector (19
25 percent). By 2005, Section 202 source categories collectively were again the second largest
26 sector, growing to 26 percent of total U.S. CO₂ emissions. Section 202 CO₂ emissions are a
27 significantly larger share of global transportation greenhouse gas emissions (29 percent) than the
28 corresponding share of all U.S. CO₂ emissions to the global total (18 percent), reflecting the
29 comparatively larger size of the transport sector in the U.S. compared to the global average.
30

31 Based on these data, the Administrator proposes to find that, for purposes of section 202, carbon
32 dioxide emissions from Section 202 source categories contribute to the elevated combined level
33 of GHG concentrations.
34

35 c. Proposal regarding the contribution of methane emissions from Section 202 source
36 categories to the elevated combined level of GHG concentrations
37

38 Methane emissions from motor vehicles are a function of the CH₄ content of the motor fuel, the
39 amount of hydrocarbons passing uncombusted through the engine, and any post-combustion
40 control of hydrocarbon emissions (such as catalytic converters).
41

¹³ Detailed carbon dioxide emissions data from Section 202 source categories are presented in Tables [ADD REFERENCES].

¹⁴ United Nations Framework Convention on Climate Change (UNFCCC). Greenhouse Gas Inventory Data (http://unfccc.int/ghg_emissions_data/ghg_data_from_unfccc/items/4146.php).

1 As noted above, the Administrator reviewed first the share of emissions of methane from Section
2 202 source categories compared to total global GHG emissions. Methane emissions from
3 Section 202 source categories were 0.01 percent of total global greenhouse gas emissions in
4 2000. When compared to the smaller subsets of global transportation emissions, and global
5 methane emissions, Section 202 source category CH₄ emissions were 0.06 and 0.05 percent
6 respectively in 2000.

7
8 Compared to U.S. emissions, methane emissions from Section 202 source categories were 0.12
9 percent of total GHG emissions from motor vehicles and motor vehicle engines in 2005.
10 Methane emissions from these source categories decreased by 53 percent between 1990 and
11 2005, largely due to decreased CH₄ emissions from passenger cars (59 percent) and light-duty
12 trucks (43 percent). In 2005, CH₄ emissions from these source categories equaled 0.37 percent
13 of total U.S. CH₄ emissions and 0.04 percent of total U.S. GHG emissions.

14
15 Based on this information, the Administrator is proposing two findings in the alternative. First,
16 the Administrator proposes to find that, for purposes of Section 202, methane emissions from
17 Section 202 source categories do contribute to the elevated combined level of GHG
18 concentrations. Alternatively, the Administrator proposes to find that they do not. As discussed
19 below, information and policy considerations could support a final determination on either
20 option, and thus, the Administrator is soliciting comment on both possible final determinations.¹⁵

21
22 In proposing a finding of non-contribution, the Administrator recognizes that Section 202 source
23 category emissions of methane were very small percentages of the total global GHG emissions,
24 as well as all of the other comparisons (e.g., U.S. methane emissions and U.S. GHG emissions).
25 Section 202 methane emissions were the smallest of any of the four greenhouse gases and lower
26 than any amount that has been found to contribute in other rulemakings. In the past, the smallest
27 level or amount of emissions that the Administrator determined “contributed” to the air pollution
28 at issue was just less than 1 percent [67 Fed. Reg. 68,242 (2002)]. Moreover, Section 202 source
29 category emissions of CH₄ are on the decrease, having decreased by 53 percent between 1990
30 and 2005.

31
32 In proposing a finding of contribution, the Administrator notes several other factors. First, given
33 the global nature of air pollution being addressed in this rulemaking, one might expect that
34 percentage contribution of specific gases and sectors would be much smaller than for previous
35 rulemakings when the nature of the air pollution was national, regional or local. On an absolute
36 basis, for example, a small U.S. source on a global scale may have emissions at the same level as
37 one of the largest sources in a single small to medium size country, and given the size of the
38 denominator, even sectors with significant emissions could be very small in percentage terms.

39
40 The Administrator notes that the EPA promotes the reduction of methane and other non-CO₂
41 GHG emissions, as manifested in its domestic methane partnership programs and the
42 international Methane to Markets Partnership, which was launched in 2004. The Administrator
43 requests comment on how these and other efforts to encourage the voluntary reductions in even

15 Detailed methane emissions data for Section 202 source categories are presented in Tables [ADD REFERENCES]

1 small amounts of GHG emissions are relevant to decisions about what level of “contribution”
2 merits mandatory regulations.

- 3
4 d. Proposal regarding the contribution of nitrous oxide emissions from Section 202 source
5 categories to the elevated combined level of GHG concentrations
6

7 Nitrous oxide (N₂O) is a product of the reaction that occurs between nitrogen and oxygen during
8 fuel combustion. Nitrous oxide (and nitrogen oxide (NO_x)) emissions from motor vehicles and
9 motor vehicle engines are closely related to fuel characteristics, air-fuel mixes, combustion
10 temperatures, and the use of pollution control equipment. For example, some types of catalytic
11 converters installed to reduce motor vehicle NO_x, CO, and hydrocarbon emissions can promote
12 the formation of N₂O.
13

14 Starting with global, total GHG emissions, nitrous oxide emissions from Section 202 source
15 categories were 0.15 percent in 2000. Also in 2000, they accounted for 1.5 percent of global
16 N₂O emissions and just less than 1 percent of global transportation emissions.
17

18 Looking at U.S. GHG emissions, nitrous oxide emissions from Section 202 source categories
19 accounted for 2.0 percent of total GHG emissions from motor vehicles and motor vehicle
20 engines in 2005. Nitrous oxide emissions from these source categories decreased by 16 percent
21 between 1990 and 2005, largely due to decreased emissions from passenger cars (50 percent) and
22 light-duty trucks (46 percent). In 2005, N₂O emissions from these source categories equaled 7.2
23 percent of total U.S. N₂O emissions.
24

25 Based on this information, the Administrator is proposing two findings in the alternative. First,
26 the Administrator proposes to find that, for purposes of Section 202, nitrous oxide emissions
27 from Section 202 source categories do contribute to the elevated combined level of GHG
28 concentrations. Alternatively, the Administrator proposes to find that they do not. As discussed
29 below, information and policy considerations could support a final determination on either
30 option, and thus, the Administrator is soliciting comment on both possible final determinations.¹⁶
31

32 In proposing a finding of non-contribution, the Administrator recognizes that the Section 202
33 source categories N₂O emissions in 2000 were only 0.15 percent of total global greenhouse gas
34 emissions in 2000, and less than 1 percent of global transportation emissions. In the past, the
35 smallest level or amount of emissions that the Administrator determined “contributed” to the air
36 pollution at issue was just under one percent. [67 Fed. Reg. 68,242 (2002)]. Moreover, Section
37 202 source category emissions of N₂O are on the decrease, having decreased by 16 percent from
38 1990 to 2005. Earlier generation control technologies initially resulted in higher N₂O emissions,
39 causing a 24 percent increase in N₂O emissions from motor vehicles between 1990 and 1995.
40 Improvements in later-generation emission control technologies have reduced N₂O output,
41 resulting in a 32 percent decrease in N₂O emissions from 1995 to 2005.
42

43 In proposing a finding of contribution, the Administrator notes that although Section 202
44 emissions of N₂O were small on a global basis, they were 7.2 percent of total U.S. N₂O
45 emissions in 2005, and 1.5 percent of global N₂O emissions in 2000. In fact, Section 202 source

¹⁶ Detailed nitrous oxide emissions data for Section 202 source categories are presented in [ADD REFERENCES].

1 categories were the second largest U.S source of nitrous oxide, behind only agricultural soil
2 management (which represented 78 percent of total N₂O emissions in 2005). In addition, as
3 mentioned in the previous discussion of methane, given the vast number of sources and sectors
4 that emit greenhouse gases around the world, even sources which represent a small percentage of
5 U.S. or global emissions can have large absolute emissions. Finally, past experience has shown
6 that small nitrous oxide sources can contribute substantial emissions reductions. For example,
7 the N₂O emissions from adipic acid production is smaller than that of Section 202 sources, and
8 this sector reduced its emission by over 60 percent from 1990 to 2005 as a result of voluntary
9 adoption of N₂O abatement technology by the three major U.S. adipic acid plants (U.S. GHG
10 Inventory, 2007, p.2-16).

11
12 e. Proposal regarding the contribution of HFC emissions from Section 202 source
13 categories to the elevated combined level of GHG concentrations
14

15 Hydrofluorocarbons (a term which encompasses a group of eleven related compounds) are
16 progressively replacing CFCs and HCFCs in Section 202 cooling and refrigeration systems as
17 they are being phased out under the Montreal Protocol and Title VI of the Clean Air Act.¹⁷ For
18 example, HFC-134a has become a replacement for CFC-12 in mobile air conditioning systems.
19 A number of HFC blends, containing multiple compounds, have also been introduced. The
20 emissions pathway can be complex, with HFCs being emitted to the atmosphere during charging
21 of cooling and refrigeration systems, during operation, and during decommissioning/disposal.
22

23 In 2000, hydrofluorocarbons from Section 202 source categories were 0.15 percent of total
24 global greenhouse gas emissions. When compared to the smaller subset of global transportation
25 emissions, Section 202 source category HFC emissions were slightly over 1 percent in 2000.
26 Turning to U.S. emissions, Section 202 source categories accounted for 4.0 percent of total GHG
27 emissions from motor vehicles and motor vehicle engines in 2005. Hydrofluorocarbons were not
28 used in motor vehicles in 1990, but by 2005 emissions had increased to 67 Tg CO₂e. In 2005,
29 HFC emissions from these source categories equaled 48 percent of total U.S. HFC emissions,
30 making it the single largest source category, and 19 percent of global HFC emissions.
31

32 Based on this information, the Administrator is proposing two findings in the alternative. First,
33 the Administrator proposes to find that, for purposes of section 202, HFC emissions from Section
34 202 source categories do contribute to the elevated combined level of GHG concentrations.
35 Alternatively, the Administrator proposes to find that they do not. As discussed below,
36 information and policy considerations could support a final determination on either option, and
37 thus, the Administrator is soliciting comment on both possible final determinations.¹⁸
38

39 In proposing a finding of non-contribution, the Administrator recognizes that, in 2000, HFC
40 emissions from Section 202 source categories accounted for 0.15 percent of total global GHG
41 emissions in 2000.¹⁹ This percentage is much smaller than the contribution of the CO₂ emissions

¹⁷ 2006 IPCC Guidelines, Volume 3, Chapter 7. Page 43.

¹⁸ Detailed HFC emissions data for Section 202 source categories are presented in Tables [ADD REFERENCES].

¹⁹ Estimates of HFC emissions included in Tables [ADD REFERENCES] include a small share of emissions resulting from sources not included under Section 202 (e.g., nonroad and agricultural vehicles). As the majority of

1 of Section 202 source categories. In the past, the smallest level or amount of emissions that the
2 Administrator determined “contributed” to the air pollution at issue was just less than 1 percent.
3 [67 Fed. Reg. 68,242 (2002)]. Even when compared to the smaller subset of global
4 transportation emissions, Section 202 source category HFC emissions are just over 1 percent.
5

6 In co-proposing a finding of contribution, the Administrator again recognizes that when looking
7 at a global air pollution problem, a smaller percentage from a U.S. source category may be
8 considered to “contribute” than if the Administrator were assessing air pollution of national,
9 regional or local concern. In addition, the Administrator notes that Section 202 HFC emissions
10 are the largest source of HFC emissions in the United States, that these emissions increased by
11 250% from 1995 to 2005, and that they are also the largest source of emissions of HFCs, PFCs or
12 SF₆. Thus, a decision not to set standards for HFCs under Section 202 could be viewed as
13 precedential with respect to the likelihood of future regulatory actions for any of these three
14 gases.
15

16 The Administrator recognizes that the U.S. has a long history of encouraging HFC emission
17 reductions. The program to reduce emissions of HFC-23 associated with HCFC-22 production,
18 for example, has been very successful and this is a much smaller emission source than Section
19 202 sources. The Administrator requests comment on how these and other efforts to encourage
20 the voluntary reductions in even small amounts of GHG emissions are relevant to decisions
21 about what level of “contribution” merits mandatory regulations.
22

23 f. PFC and SF₆ emissions are not emitted by Section 202 source categories
24

25 Perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆) are not emitted from motor vehicles or
26 motor vehicle engines in the United States.
27

28 g. Information regarding total GHG emissions from Section 202 source categories
29

30 As discussed above, the Administrator is proposing to define “air pollutant(s)” for purposes of
31 making the Sections 202/211 contribution findings as the individual GHGs emitted by the
32 section 202 and 211 source categories. Nonetheless, the Administrator is seeking comment on
33 whether, instead, to make the contribution finding as to the collective whole of these emissions.
34 Thus, the discussion in this section summarizes information in [ADD REFERENCES] on
35 emissions of total greenhouse gases (CO₂, CH₄, N₂O, and HFCs) from Section 202 source
36 categories.²⁰ The Administrator notes that if he were to define the “air pollutant” as the
37 collective group of four to six greenhouse gases, he would likely find contribution on the basis
38 that he is already proposing that CO₂ alone contributes. Additionally, given that total greenhouse
39 gas emissions from Section 202 source categories are almost 5 percent of total global GHG
40 emissions, adopting this definition of “air pollutant” would make it unnecessary to assess the
41 individual GHG emissions levels less than that amount.
42

air conditioning and cooling systems are related to road transport, the effect of this overestimate is expected to be negligible. See US Inventory (www.epa.gov/climatechange/emissions), Chapter 4.

²⁰ Detailed combined greenhouse gas emissions data for Section 202 source categories are presented in Tables [ADD REFERENCES]

1 Between 1990 and 2005, *total* greenhouse gas emissions (measured in CO₂ equivalents) from
2 passenger cars decreased 1.6 percent, while emissions from light-duty trucks increased 72
3 percent, largely due to the increased use of sport-utility vehicles and other light-duty trucks. In
4 2005, the CO₂ made up the largest share of emissions (94 percent), followed by HFCs (4.0
5 percent), N₂O (2.0 percent) and CH₄ (0.12 percent). Since 1990, the share of HFCs has
6 increased (from zero in 1990), whereas the share of the other gases has correspondingly
7 decreased. Methane and N₂O emissions have decreased in absolute terms since 1990.
8

9 In 2005 Section 202 source categories collectively were the second largest sector with 23 percent
10 of total U.S. emissions behind the electricity generating sector. Section 202 greenhouse gas
11 emissions are a 31 percent share of global transport greenhouse gas emissions and 4.6 percent of
12 total global emissions in 2000. The global transport sector was 15 percent of all global emissions
13 in 2000.
14

15 h. Request for comment on contribution proposals
16

17 The Administrator is seeking comment on all of the above proposals regarding the contribution
18 of carbon dioxide, methane, nitrous oxide, and HFC emissions from Section 202 source
19 categories to the “air pollution”. Specifically, the Administrator is interested in comments
20 regarding the data and comparisons underlying the analysis contained in Annex A to the
21 Technical Support Document. The Administrator also welcomes comment on prior precedents
22 for assessing contributions, as well as the precedential impact of today’s contribution findings for
23 other potential sources of these and other greenhouse gases. We also welcome comment on the
24 relationship of these proposals to existing U.S. climate change emissions reduction programs and
25 the magnitude of reductions sought under these programs.
26

27 The Administrator is proposing standards for emissions of the non-CO₂ GHGs from section 202
28 source categories, conditioned on a final decision that emissions of one or more of these GHGs
29 from Section 202 source categories do contribute to the relevant air pollution.
30

31 3. Discussion of contribution from 211 source categories
32

33 a. Overview of Section 211 source categories
34

35 Section 211 (c)(1) of the Clean Air Act, in relevant part, states that “The Administrator may . . .
36 by regulation, control or prohibit the manufacture, introduction into commerce, offering for sale,
37 or sale of any fuel or fuel additive for use in a motor vehicle, motor vehicle engine, or nonroad
38 engine or nonroad vehicle (A) if in the judgment of the Administrator any emission product of
39 such fuel or fuel additive causes, or contributes, to air pollution which may reasonably be
40 anticipated to endanger the public health or welfare, . . .” Thus, Section 211 regulates a larger
41 set of sources than Section 202. It also requires that the contribution finding be made for the
42 “emissions product of such fuel or fuel additive.”
43

44 As with the Section 202 analysis, EPA has analyzed historical greenhouse gas emissions
45 resulting from fuels and fuel additives used in motor vehicles, motor vehicle engines, nonroad
46 engines and nonroad vehicles in the United States from 1990 to 2005. The source categories

1 which use the fuel or fuel additives under Section 211 include the Section 202 source categories,
2 with a few differences. HFC emissions are excluded in Section 211, because they are not an
3 emission product of a fuel or fuel additive. Additional source categories in Section 211 are:

- 4
- 5 • Boats and ships (domestic)
- 6 • Locomotives, transit rail
- 7 • Agricultural equipment (i.e., mobile farm equipment)
- 8 • Construction equipment (i.e., mobile construction equipment)
- 9 • Other equipment (i.e., other mobile equipment not included elsewhere)

10
11 As with data provided earlier for Section 202 source categories, the source of the emissions data
12 is the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 (USEPA #430-R-07-*
13 *002)*. An overview of the analysis is presented here, and a more detailed description along with
14 data tables is contained in [ADD REFERENCES]. All the emissions data are presented in
15 carbon dioxide equivalents. EPA provides data to make the same comparisons as were described
16 for the Section 202 source categories, and as for Section 202 source categories, solicits comment
17 on the relevant comparisons, additional comparisons, and the data used for the comparisons.

18
19 b. Proposal regarding the contribution of carbon dioxide emissions from Section 211 source
20 categories to the elevated combined level of GHG concentrations

21
22 Section 211 source category CO₂ emissions were 5.1 percent of total global emissions in 2000.
23 Section 211 source category CO₂ emissions are a significantly larger share of global
24 transportation greenhouse gas emissions (34 percent) than the corresponding share of all U.S.
25 CO₂ emissions to the global total (18 percent), reflecting the relative size of the transport sector
26 in the United States compared to the global average.

27
28 In 1990, Section 211 source categories emitted just over 27 percent of total U.S. CO₂ emissions,
29 behind the electricity generation sector (36 percent) and ahead of the industrial sector (19
30 percent). By 2005, Section 211 source categories collectively remained the second largest sector
31 with 31 percent of total U.S. CO₂ emissions.

32
33 The Administrator proposes to find that, for purposes of Section 211, carbon dioxide emissions
34 from fuels and fuel additives used in Section 211 source categories contribute to the elevated
35 combined level of GHG concentrations.²¹ Carbon dioxide emissions from Section 211 source
36 categories are larger than that for Section 202 source categories because they reflect emissions
37 from Section 202 source categories as well as additional nonroad sources. Thus, if the level of
38 CO₂ emissions from section 202 source categories is a basis for proposing to find a contribution
39 finding, the level of emissions from Section 211 source categories must be as well.

40
41 c. Proposal regarding the contribution of methane emissions from Section 211 source
42 categories to the elevated combined level of GHG concentrations

43

²¹ Detailed carbon dioxide emissions data from Section 211 source categories are presented in Tables [ADD REFERENCES].

1 Methane is emitted from Section 211 source categories via the same processes described for
2 Section 202 source categories.

3
4 Again, looking at the global emissions, methane emissions from Section 211 source categories
5 were 0.01 percent of global, total GHG emissions in 2000. They accounted for 0.06 percent of
6 global CH₄ emissions and 0.07 percent of global transportation emissions in 2000.

7
8 Section 211 methane emissions were 0.13 percent of total GHG emissions from motor vehicles
9 and motor vehicle engines in 2005. Methane emissions from these source categories decreased
10 by 46 percent between 1990 and 2005, largely due to decreased CH₄ emissions from passenger
11 cars (59 percent) and light-duty trucks (43 percent). In 2005, CH₄ emissions from these source
12 categories equaled 0.46 percent of total U.S. CH₄ emissions.

13
14 At this time, the Administrator is proposing two findings in the alternative. First, the
15 Administrator proposes to find that, for purposes of Section 211, methane emissions from
16 Section 211 source categories do contribute to the elevated combined level of GHG
17 concentrations. Alternatively, the Administrator proposes to find that they do not. As discussed
18 above, information and policy considerations could support a final determination on either
19 option, and thus, the Administrator is soliciting comment on both possible final determinations.²²
20 The rationale supporting each proposal is described in the discussion of the methane emissions
21 from Section 202 sources. There are modest differences in the percentages of emissions
22 associated with different comparisons; the data specific to Section 211 methane emissions are
23 summarized in [ADD REFERENCES].

24
25 d. Request for comment on the contribution of nitrous oxide emissions from Section 211
26 source categories to the elevated combined level of GHG concentrations

27
28 Nitrous oxide (N₂O) is emitted from Section 211 source categories through the same processes
29 described for Section 202 source categories.

30
31 Nitrous oxide emissions from Section 211 source categories were 0.15 percent of total, global
32 GHG emissions in 2000. Compared to the smaller subsets of global transportation emissions and
33 global nitrous oxide emissions, Section 211 source category N₂O emissions were just over 1
34 percent and 1.5 percent respectively in 2000.

35
36 When looking at U.S. emissions, N₂O emissions from Section 211 source categories accounted
37 for 1.9 percent of total GHG emissions from motor vehicles and motor vehicle engines in 2005.
38 Nitrous oxide emissions from these source categories decreased by 14 percent between 1990 and
39 2005, largely due to decreased N₂O emissions from passenger cars (33 percent). In 2005, N₂O
40 emissions from these source categories equaled 7.7 percent of total U.S. N₂O emissions.

41
42 Based on this information, at this time, the Administrator is proposing two findings in the
43 alternative. First, the Administrator proposes to find that, for purposes of Section 211, nitrous
44 oxide emissions from Section 211 source categories do contribute to the elevated combined level

22 Detailed methane emissions data for Section 211 source categories are presented in Tables [ADD REFERENCES].

1 of GHG concentrations. Alternatively, the Administrator proposes to find that they do not. As
2 discussed above, information and policy considerations could support a final determination on
3 either option, and thus, the Administrator is soliciting comment on both possible final
4 determinations.²³ The rationale supporting each proposal is as described in the discussion of the
5 methane emissions from Section 202 sources. There are modest differences in the percentages of
6 emissions associated with different comparisons; the data specific to Section 211 nitrous oxide
7 emissions are summarized in Tables A.29–A.31 of [ADD REFERENCES].
8

9 e. HFCs, PFC and SF₆ emissions

10 Hydrofluorocarbons are not an emission product of a fuel or fuel additive. Thus, unlike section
11 202 source categories, Section 211 source categories do not emit any HFCs. Perfluorocarbons
12 (PFCs) and sulfur hexafluoride (SF₆) also are not emitted from Section 211 source categories.
13
14

15 f. Information regarding total GHG emissions from Section 211 source categories

16
17 As discussed above, the Administrator is proposing to define “air pollutant(s)” for purposes of
18 making the sections 202/211 contribution findings as the individual GHGs emitted by the
19 Section 202 and 211 source categories. Nonetheless, the Administrator is seeking comment on
20 whether, instead, to make the contribution finding as to the emissions of these four substances
21 collectively. Thus, the following discussion summarizes information in [ADD REFERENCES]
22 on emissions of total greenhouse gases (CO₂, CH₄, N₂O, and HFCs) from Section 211 source
23 categories.²⁴ The Administrator notes that if he were to define the “air pollutant” as the
24 collective group of four to six greenhouse gases, he would likely find contribution on the basis
25 that he is already proposing that CO₂ alone contributes. Additionally, given that total greenhouse
26 gas emissions from Section 202 source categories are almost 5 percent of total global GHG
27 emissions, adopting this definition of “air pollutant” would make it unnecessary to assess the
28 individual GHG emissions levels less than that amount.
29

30 Due to the large share of emissions from passenger cars, light-duty trucks, and medium/heavy-
31 duty trucks in 2005, the overall emissions and trends from Section 211 source categories are very
32 similar to those presented for Section 202. From 1990 to 2005, greenhouse gas emissions from
33 Section 211 source categories grew by 34 percent. In 2005, CO₂ made up the largest share of
34 emissions (98 percent), followed by N₂O (1.9 percent) and CH₄ (0.13 percent). In 1990, Section
35 211 source categories emitted 23 percent of total U.S. emissions, behind the electricity
36 generation sector (30 percent) and the industrial sector (24 percent), but by 2005 the total had
37 climbed to 26 percent, surpassing the industrial sector. Section 211 greenhouse gas emissions
38 were 35 percent of global transport greenhouse gas emissions and 5.2 percent of total global
39 emissions in 2000.²⁵ The global transport sector was 15 percent of all global greenhouse gas
40 emissions in 2000.

²³ Detailed nitrous oxide emissions data from Section 211 source categories are presented in [ADD REFERENCES].

²⁴ Detailed data on all greenhouse gas emissions from Section 211 source categories are presented in Tables [ADD REFERENCES].

²⁵ The year 2000 is the most recent year for which comprehensive greenhouse gas emissions data are available for all gases, all countries, and all sources. Global estimates are ‘gross’ emissions estimates and do not include removals of greenhouse gas emissions from the atmosphere by terrestrial sinks (i.e., forests and other biomass).

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g. Request for comment on contribution proposals

The Administrator is seeking comment on the above proposals regarding contribution of carbon dioxide, methane and nitrous oxide emissions from fuels and fuel additives used in Section 211 source categories to the elevated combined GHG concentrations. Specifically, the Administrator is interested in comments regarding the data and comparisons underlying the analysis contained in [ADD REFERENCES]. The Administrator also welcomes comment on prior precedents for assessing contributions, as well as the precedential impact of today’s contribution findings for other potential sources of these and other greenhouse gases. We also welcome comment on the relationship of these proposals to existing U.S. climate change emissions reduction programs and the magnitude of reductions sought under these programs.

The Administrator is proposing fuel standards that take into consideration emissions of CO₂, N₂O and CH₄, conditioned on a final decision that emissions of one or both of the non-CO₂ GHGs from Section 211 sources do contribute to the relevant air pollution. Based on EPA’s evaluation in the fuels proposal of the various emissions, EPA also expects that a final decision that N₂O or CH₄ do or do not contribute would not lead to any significant change in the fuel standard.