Via electronic mail

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Ozone Review Panel
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Re: Comment on Release of Draft Documents Related to the Review of the National Ambient Air Quality Standards for Ozone, 79 Fed. Reg. 4694 (Jan. 29, 2014)

The Center for Biological Diversity ("Center") submits the following comments regarding the draft documents EPA has prepared as part of its 5-year review of the ozone National Ambient Air Quality Standards ("NAAQS"). The EPA has finalized its Integrated Science Assessment and is currently revising the Policy Assessment and Risk and Exposure Assessments. The Center primarily provides feedback herein regarding the treatment of climate change in the draft Policy Assessment.

The Center is a non-profit organization with more than 675,000 members and online activists and offices throughout the United States. The Center's mission is to ensure the preservation, protection and restoration of biodiversity, native species, ecosystems, public lands and waters and public health. In furtherance of these goals, the Center's Climate Law Institute seeks to reduce U.S. greenhouse emissions and other air pollution to protect biological diversity, the environment, and human health and welfare.

Overall, EPA staff have much improved the depth of analysis of climate impacts over the previous documents issued during the normal review cycle for ozone NAAQS. We appreciate the recognition of ozone as an important climate pollutant and the utility of methane mitigation to both reduce direct health impacts of ozone and to reduce global warming and consequent climate change. There is, however, still an excessive emphasis on the uncertainty of climate projections, and consequently an under-emphasis on the importance of ozone NAAQS to climate impacts. Furthermore, the dire status of ecosystems in sensitive regions such as the Arctic necessitates more complete consideration in the context of secondary NAAQS for ozone. Finally, the public health implications of climate change should be addressed more effectively.

As EPA is well aware, climate change is ravaging ecosystems both domestically and internationally.[1] Human populations are at risk due to heat waves, drought, extreme weather, sea

[1] USEPA, *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule,* 74 Fed. Reg. 66496 (Dec. 15, 2009) (USEPA Endangerment Finding)

level rise, food insecurity, national security threats, and increased disease. In an effort to avoid the worst impacts from global warming, the United States became a party to the Copenhagen Accord in 2009, which commits us to doing our part to keep global temperatures from rising more than 2°C. But even this goal will likely result in "disastrous consequences".[2] Thus, it is imperative that the United States use all potential avenues to reduce emissions of climate pollutants.

Tropospheric ozone is an important target for near-term climate mitigation[3] both because it is the third strongest greenhouse gas and because it is a short-lived climate pollutant. Ozone, unlike many traditional greenhouse gases, remains in the atmosphere for only about 22 days. The short lifetime is important because reductions in ozone will have an immediate "cooling" effect. Carbon dioxide reductions, in contrast, will not result in a reduction of radiative forcing for approximately 100 years. It is essential to reduce carbon dioxide, but with the Arctic on the precipice of several tipping points, we must find additional short-term solutions that will stave off immediate warming and give carbon dioxide reductions time to take effect.

The Integrated Science Assessment for Ozone and Related Photochemical Oxidants ("ISA") provides a summary of the current climate science related to ozone. The Draft Policy Assessment ("PA") which is currently under review, synthesizes this information for policy makers. As discussed in the following sections, there are several key areas in which the Policy Assessment should be revised and strengthened with regard to ozone climate science and policy.

A. The Draft Policy Assessment Exaggerates the Obstacles to Addressing Climate Change Through the Secondary NAAQS

Uncertainties in climate science related to ozone do not impede the use of a secondary NAAQS to reduce ozone-induced global warming and consequent climate change. Ozone-induced global warming and climate change will significantly harm public welfare and must be addressed through the ozone NAAQS.

The courts have made clear that uncertainty does not absolve the EPA of the obligation to protect public welfare. In *American Trucking Association*, the Court stated that with regard to secondary NAAQS, the "EPA must act as soon as it has enough information (even if crude) to 'anticipate' such effects."[4] The definition of "public welfare" under the CAA expressly includes the "climate."[5] The EPA currently has enough information regarding the climate impacts of ozone to trigger the duty to protect public welfare under section 109(b) of the CAA. There may be uncertainties in the exact magnitude of this effect and historical patterns, but there is no

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[2] J. Hansen et al., *Assessing ''Dangerous Climate Change'': Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE e81648 at 15 (2013).

[3] *See, e.g.*, Drew Shindell et al., *Simultaneously Mitigating Near-term Climate Change and Improving Human Health and Food Security*, 335 SCIENCE 183 (2012) (Shindell 2012); United Nations Environment Program (UNEP), INTEGRATED ASSESSMENT OF BLACK CARBON AND TROPOSPHERIC OZONE (2011); Center for Biological Diversity, NOT TOO LATE TO SAVE THE POLAR BEAR: A RAPID ACTION PLAN TO ADDRESS THE ARCTIC MELTDOWN (2007). The United States is also a member of the Climate and Clean Air Coalition, which focuses on reductions in short-lived pollutants to mitigate climate change, prevent deaths, and improve food security

[4] *American Trucking Associations, Inc. v. EPA*, 283 F.3d 355, 380 (D.C. Cir. 2002).

[5] 42 U.S.C. § 7602(h).

question that tropospheric ozone is an important climate forcer with the potential to exacerbate climate change if left unchecked.

While it is true, as outlined in the ISA, that there are a number of details related to ozone's climate impacts that have not been resolved,[6] the important facts are known. First, it is clear that ozone has a strong warming impact, especially in Northern mid-latitudes (where the United States is) and in the Arctic. Second, whatever its exact radiative forcing, ozone is the third strongest greenhouse gas. Third, it is well-established that ozone can be reduced through reductions in methane, carbon monoxide and VOCs. As EPA acknowledges, reducing these precursors would significantly benefit public health as well as climate.[7]

These facts together provide EPA with the basic information necessary to develop an ozone standard to address climate change. The ozone secondary standard is currently expressed as an atmospheric concentration. Because there is a complex interplay between precursors and climate impacts, a standard addressing climate change would likely benefit from a climate-relevant indicator and a form that links ozone concentrations with climatic impacts. Thus, we urge EPA staff to continue evaluating potential forms and indicators for a secondary ozone standard that could be used to control the climate impacts from ozone pollution.

We further request that EPA consider providing guidance to states interested in reducing climate impacts of ozone. This guidance could outline the importance of prioritizing reductions in methane, carbon monoxide and VOCs as well as provide mitigation options to reduce radiative forcing from ozone. This could be integrated with the process of preparing State Implementation Plans. EPA has already acknowledged the scientific studies that show the significant health, economic and climate benefits of reducing methane; now it is time to put that potential into action.

Ozone also has a strong impact on climate change through impacts on vegetation and consequent reductions in carbon storage.[8] Notably, this effect could be on par with the direct radiative forcing of ozone, making reductions all the more essential as part of a comprehensive climate program. In the context of carbon cycle impacts, all precursor emission reductions are beneficial, including nitrogen oxides. Consequently, we urge EPA to adopt a strong secondary standard based on effects on vegetation. Specifically, we support the cumulative averaging W126 method set at a level of 7 ppm-hrs.

B. The Draft Policy Assessment Fails to Adequately Address Climate Change in the Arctic

The Draft Policy Assessment should provide additional information regarding the effects of ozone on climate change in the Arctic. Ozone has a larger impact in the Arctic than in other regions.[9] This is so both because ozone remains in the atmosphere longer than average in the

[6] PA at 5-56; ISA § 10.5.
[7] Id.
[8] ISA at 10-15.
[9] ISA 10-13, 14, and 18.

Arctic Winter and Spring[10] and because ozone is most effective at absorbing shortwave radiation, such as that reflected back off snow and ice, in the Arctic.[11] In fact, ozone is estimated to exert a radiative forcing of approximately 1 W/m^2 during the Arctic summer[12] and to have increased temperatures as much as 0.5 °C in the winter and spring in the Arctic in the last century.[13]

The Arctic is a unique region that deserves special consideration. It hosts an intricate and highly specialized ecosystem. Many of the species in the region are the last survivors from the previous ice age. Because the environment is harsh, species in the Arctic are highly adapted to survive in a narrow range of conditions. Furthermore, the inhabitants of the Arctic have no options for migration in the face of a warming environment: they are already as far north as possible and there is no higher elevation to which these species can climb. Arctic species rely upon fundamental features of the Arctic landscape, such as sea ice, permafrost, and seasonal snowpack. Yet, these features are currently teetering on the brink of various "tipping points".

The Arctic is currently experiencing climate changes of a magnitude not experienced anywhere else on Earth. For instance, the Arctic is warming at twice the rate of the rest of the world.[14] Furthermore, sea ice is melting at precipitous and unprecedented rates.[15] Greenland ice sheets are contracting at accelerating rates and permafrost is experiencing deeper and more frequent freeze/thaw cycles.

Adverse impacts resulting from the accelerated loss of Arctic sea ice extend well beyond the Arctic Ocean and its coast. By reflecting the sun's energy back into space, sea ice is an effective insulator, preventing heat in the Arctic Ocean from escaping upward and warming the lower atmosphere.[16] The decline of sea ice amplifies warming in the Arctic, which in turn has major implications for temperature patterns over adjacent, permafrost-dominated land areas and for weather patterns across the Northern Hemisphere.[17] Rapid retreat of Arctic sea ice is predicted to accelerate warming 1,500 kilometers inland throughout Alaska, Canada and Russia.[18] Higher temperatures will thaw out extensive expanses of permafrost, resulting in the potential release of methane and carbon dioxide currently frozen in Arctic soils, thereby further accelerating additional warming.[19] Additional warming in the Arctic resulting from the loss of

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[10] ISA at 10-18.
[11] ISA at 10-13.
[12] ISA at 10-13.
[13] ISA at 10-18.
[14] IPCC, CLIMATE CHANGE 2007: SYNTHESIS REPORT at 30 (2007).
[15] See, e.g., Stroeve, J. et al., *Arctic Sea Ice Extent Plummets in 2007*, 89 EOS 2 (January 8, 2008); R. Kwok and D.A. Rothrock, *Decline in Arctic sea ice thickness from submarine and ICESat records: 1958-2008*, 36 GEOPHYS. RESEARCH LETT L15501 (2009).
[16] World Wildlife Fund Int'l, ARCTIC CLIMATE FEEDBACKS: GLOBAL IMPLICATIONS at 8 (Martin Sommerkorn & Susan Joy Hassol eds., 2009) at 19-20.
[17] *Id.* at 18.
[18] United Nations Environmental Programme, CLIMATE CHANGE 2009 SCIENCE COMPENDIUM at 19 (2009) (UNEP 2009) The disappearance of the Arctic ice cap during the sunlit period of the year would radically reduce the local albedo and cause an annually averaged 19.7 Wm^{-2} increase in absorbed solar flux at the Arctic Ocean surface, or equivalently an annually averaged 0.55 Wm^{-2} increase on the planetary scale. C. Matsoukas et al., *The Effect of Arctic Sea-Ice Extent of the Absorbed (Net) Solar Flux at the Surface, Based on ISCCP-D2 Cloud Data for 1983-2007*, 10 ATMOSPHERIC CHEMISTRY & PHYSICS 777, 777 (2010).
[19] *Id.*

sea ice will also affect weather patterns by altering atmospheric circulation patterns, leading to more extreme weather events and affecting transportation, agriculture, forestry and water supplies.[20] Loss of sea ice in the Arctic Ocean will therefore have serious repercussions as climactic feedbacks resulting from higher temperature increases accelerate, the timing of the seasons is altered, and shifting circulation patterns cascade through the Arctic and beyond.

Despite the drastic changes taking place in the Arctic, the Draft Policy Assessment fails to so much as mention the Arctic. This is a shortcoming that must be repaired. As the Draft Policy Assessment notes, EPA must consider "intended use and location" of potential adverse effects[21] when determining what constitutes an adverse effect on welfare. The Arctic is unique in its own right and provides important global climate services. It is clear that the effects of ozone in the Arctic are severe and detrimental, both regionally and globally. Thus, this region should be afforded special consideration.

In particular, it is crucial to note that ozone precursors emitted in the "Northern mid-latitudes"—including the United States—will exert an outsized impact on the Arctic.[22] Regional climate-positive reductions in ozone precursors will benefit the continental United States[23] as well as benefit the Arctic.

C. The Draft Policy Assessment Must Include More Information on Public Health Impacts of Climate Change

The Draft Policy Assessment fails to assess how ozone-induced climate change will impact public health. The EPA detailed the health impacts from climate change in the 2009 "Endangerment Finding" and associated Technical Support Documents.[24] Yet, the ISA improperly dismissed health impacts from climate change as a "downstream effect" that is "extremely complex and outside the scope of this assessment."[25] Public health damage due to climate change will impose significant costs on the United States.[26] Furthermore, the Clean Air Act places a high priority on the protection of public health. The courts have indicated that the "EPA must err on the side of caution … setting the NAAQS at whatever level it deems necessary and sufficient to protect the public health with an adequate margin of safety, taking into account both the available evidence and the inevitable scientific uncertainties."[27] As a result, EPA can not ignore known health impacts from ozone.

While climate-health impacts from ozone may be subject to some uncertainty, the extreme importance that the Clean Air Act places on public health necessitates analysis within

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[20] Francis, J. and Stephen Vavrus, *Evidence Linking Arctic Amplification to Extreme Weather in Mid Latitudes*, 39 GEOPHYS. RES. LETT. L06801 (2012).
[21] PA at 5-61.
[22] ISA at 10-14.
[23] *See, e.g.,* Drew Shindell and Greg Falugevi, *Climate response to regional radiative forcing during the twentieth century*, 2 NATURE GEOSCIENCE 294 (2009).
[24] USEPA Endangerment Finding, supra note 1.
[25] ISA at 10-7.
[26] See, e.g., K. Knowlton et al*., Six Climate Change–Related Events In The United States Accounted For About $14 Billion In Lost Lives And Health Costs*, 30 HEALTH AFFAIRS 2167 (2011).
[27] *American Trucking Associations, Inc. v. EPA*, 283 F.3d 355, 369 (D.C. Cir. 2002).

the air quality criteria documents. As EPA has acknowledged, studies have already concluded that the health benefits of reducing methane emissions (and consequently ozone formation) would exceed the costs of mitigation.[28]

Climate change imperils human health through increases in heat waves and other extreme weather events, aliments caused or exacerbated by air pollution and airborne allergens, and the increased occurrence of climate-sensitive infectious diseases.[29] Certain groups such as children, the elderly, the poor, and minorities are particularly vulnerable to climate-related health effects.[30] Heat is already the leading cause of weather-related deaths in the United States, and a recent study estimated that more than 150,000 Americans may die by the end of the century due to excessive heat caused by climate change.[31] Extreme precipitation, which has increased in the Midwest, South and other regions by 50% mostly over the last few decades,[32] poses significant human health risks including contaminated drinking water leading to disease outbreaks, drowning, and mold-related illnesses.[33] Air pollution components that trigger asthma attacks, specifically air particulates and ozone, are expected to increase with climate change.[34] Infectious diseases also pose an increased threat in a changing climate. There are an estimated 38 million cases of food and water-borne illness in the US each year, caused in part by an increasing number of pathogens in the wake of extreme weather events such as droughts, flooding, and hurricanes.[35] A recent study suggests that outbreaks of the vector-borne West Nile Virus are potentially related to higher summer temperatures and extreme variation in precipitation.[36]

Climate change affects food security through a number of complex pathways, both direct and indirect, including the reduced ability of crops to thrive, increased threats to livestock, climate-related contamination of food supplies, and an alteration in land use patterns and availability. Higher levels of warming and extreme weather events such as droughts and flooding are expected to negatively affect the growth and yields of many crops.[37] Warming will benefit weeds, diseases, and insect pests, increasing stress on crop plants and requiring more pest and

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[28] PA at 5-56; Shindell 2012, *supra* note 3.
[29] U.S. Global Change Research Program, Global Climate Change Impacts in the United States (2009) (USGRCP 2009).
[30] USGRCP 2009
[31] Natural Resources Defense Council, KILLER SUMMER HEAT: TOLL FROM RISING TEMPERATURES IN AMERICA DUE TO CLIMATE CHANGE (2012), *available at* http://www.nrdc.org/globalwarming/killer-heat/files/killer-summer-heat-report.pdf.
[32] USGRCP 2009
[33] Union of Concerned Scientists, AFTER THE STORM: THE HIDDEN HEALTH RISKS OF FLOODING IN A WARMING WORLD (2012), *available* at www.ucsusa.org/global_warming/science_and_impacts/impacts/global-warming-and-flooding.html.
[34] A. Bernstein & S.S. Myers, *Climate Change and Children's Health,* 23 CURRENT OPINION IN PEDIATRICS 221 (2011), *available at* http://journals.lww.com/co-pediatrics/Fulltext/2011/04000/Climate_change_and_children_s_health.16.aspx#.
[35] E. Maibach et al., Center for Climate Change Communication, CONVEYING THE HUMAN IMPLICATIONS OF CLIMATE CHANGE, 10-11 (2011), *available at* http://www.climatehealthconnect.org/resource/conveying-human-implications-climate-change-climate-change-communication-primer-public-heal.
[36] Shlomit Paz, *West Nile Virus Eruptions in Summer 2010 – What Is the Possible Linkage with Climate Change?,* Chapter 21 of NATIONAL SECURITY AND HUMAN HEALTH IMPLICATIONS OF CLIMATE CHANGE 253 – 260 (2012), *available at http://www.springerlink.com/content/978-94-007-2430-3#section=1013683&page=2&locus=0.*
[37] USGRCP 2009

weed control.[38] Increasing CO_2 concentrations are expected to lead to declines in forage quality in pastures and rangelands for livestock, while increased heat, disease, and weather extremes will increase livestock mortality.[39] Temperature increases, changes in rainfall, and extreme weather events are also expected to increase the incidence and intensity of food-borne diseases and food contamination, jeopardizing food security.[40]

In closing, we are encouraged to see the inclusion of climate impacts in the current air quality criteria review. There are several aspects of the analysis, however, that should be strengthened. The Policy Assessment serves an important purpose as a bridge between the science of ozone pollution and the policy decisions that will determine how ozone is regulated. Consequently, it is important to properly characterize the fact that scientific uncertainty need not stand in the way of meaningful pollution control. We urge EPA to consider how ozone NAAQS could be applied to climate mitigation. It is also essential to present information on ozone impacts in the Arctic, especially with regard to climate change. Finally, the EPA should include public health impacts from ozone-induced climate change in its analysis.

If you have any questions, please contact Anna Moritz at mmoritz@endangeredearth.org or (425) 780-0245.

Sincerely,

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[38] USGRCP 2009
[39] USGRCP 2009
[40] M.C. Tirado et al., *Climate Change and Food Safety: A Review*, 43 ELSEVIER 1745 (2010), *available at* www.elsevier.com/locat/foodres.