TESTIMONY OF

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Chairman Stewart and Members of the Committee, thank you for the opportunity to testify to this Subcommittee.

My name is John Vandenberg, and I am a Division Director in EPA's National Center for Environmental Assessment in the Office of Research and Development. My division is responsible for identifying and evaluating the world's scientific literature to create the Integrated Science Assessment (which I will refer to as the "ISA") for ozone. The ISA serves as the scientific foundation for decisions by the Administrator on retaining or revising the National Ambient Air Quality Standards (which I will refer to as "NAAQS") for Ozone. The Clean Air Act requires a review of the NAAQS for ozone every 5 years. My testimony today will include a brief overview of the process for reviewing the NAAQS, including how the ISA fits into this process, and scientific information related to background ozone levels in the United States.

The process for reviewing the NAAQS contains four major components: planning, science assessment, risk/exposure assessment, and policy assessment/rulemaking. The ISAs are the second component and are developed by the EPA Office of Research and Development to evaluate the atmospheric chemistry involved in pollutant formation and presence as well the human health and environmental consequences of exposure. The third component, the Risk and Exposure Assessment (REA) as well as the Policy Assessment are developed by the Office of Air and Radiation and draw from the ISA, but do not revisit the conclusions of the ISA. The REA presents quantitative analyses characterizing exposures and risks, including uncertainties and relative confidence in results. The Policy Assessment integrates and interprets the information from the ISA and the Risk and Exposure Assessment. It frames the range of policy options that are supported by the scientific evidence and assessments for consideration by the Administrator. Each of these assessments undergoes independent peer review by the Clean Air Scientific Advisory Committee (or CASAC) and public review. The final stage of the NAAQS review process is rulemaking, which involves developing a

proposed decision, considering public comments, and completing the review with a final decision by the Administrator.

Ozone is one of six pollutants for which a NAAQS has been established under the Clean Air Act. Ozone in the atmosphere is not directly emitted from sources, but rather ozone is formed in the atmosphere by photochemical reactions involving sunlight and certain air pollutants, or "precursors", contributing to what we typically experience as "smog" or haze. Based largely on a strong body of evidence showing ozone-induced respiratory health effects, in 2008, EPA lowered the NAAQS for ozone from the 1997 level of 0.08 parts per million (ppm) to 0.075 ppm

The current review of the air quality criteria for ozone, as required every 5 years by the Clean Air Act, was initiated in October of 2008 with a call for information and subsequent development of a draft ISA. The final ISA for ozone and related photochemical oxidants includes the evaluation of over 2200 scientific studies and it was released in February 2013 after three reviews by CASAC. The final ISA incorporated revisions based on CASAC and public comments on the drafts of the ISA.

In the February 2013 ozone ISA, EPA concluded there is clear, consistent evidence of a causal relationship between short-term exposure to ozone and respiratory health effects, which is consistent with the previous scientific assessment , completed in 2006. EPA also concluded that the current body of research provides consistent evidence for a causal relationship between exposure to ozone and ecosystem effects, including visible foliar injury, decreased photosynthesis, and decreased growth rates.

In the context of a review of the ozone NAAQS, EPA generally defines "background" ozone concentrations in ways that distinguish between concentrations that result from emissions of precursor pollutants that are relatively less controllable from those that are relatively more controllable through U.S. policies or through international agreements with other

countries. In previous NAAQS reviews, EPA used a specific definition of background concentrations referred to as "policy-relevant" background (PRB). In this review, the ISA characterizes background defined in three different ways. The most narrow definition is referred to as "natural" background (NB), which includes ozone resulting from precursor emissions of only natural origin from all over the world, such as from wildfires and intrusions of stratospheric ozone. A second definition is referred to as "North American" background (NAB, which is the same as the previously used PRB), which is ozone concentrations that would occur in the U.S. in the absence of man-made "precursor" emissions in continental North America, defined as the U.S., Canada, and Mexico. Thus, NAB includes "natural" background plus man-made precursor emissions from other continents. The third definition in the ISA is referred to as U.S. background (USB), which includes "natural" background plus man-made precursor emissions from all countries outside the United States, including Canada and Mexico.

Estimates of background concentrations in the U.S., regardless of which definition is used, cannot be obtained directly from measurements of ambient ozone because of long-range transport from man-made pollution in North America. Instead, air quality models are used to estimate background concentrations and the approach to estimate background using models has been supported by CASAC. The ISA included several recent modeling studies which showed that background concentrations vary by region of the country and by season.

These modeling efforts result in estimates of seasonal average North American background ozone concentrations of 29±8 ppb at low elevations. Modeling results also suggest that at high elevations background concentrations can make up a greater proportion of measured ozone on some high ozone days. In low elevations background concentrations make up a relatively small proportion of measured ozone on high ozone days. These results indicate that at low elevation areas on high ozone days that ozone is mainly formed from U.S. man-made emissions. Lower background ozone is estimated in the summer (than in the spring) when measured ozone concentrations are usually the highest.

In closing, EPA's Integrated Science Assessment for ozone evaluates the scientific information on atmospheric monitoring and chemistry and on the health and welfare effects of ozone. This information will be taken into account in the development of second drafts of the Risk and Exposure Assessment and Policy Assessment for consideration by the Administrator in the decision-making process on the National Ambient Air Quality Standards for ozone.

Thank you for the opportunity to testify today. I am happy to answer any questions you may have at this time.