ATTACHMENT

SUMMARY OF THE LEGAL AND TECHNICAL BASES FOR INCLUDING A STANDARD FOR EMISSIONS OF CARBON DIOXIDE IN A REVISED SUBPART Da.

The Clean Air Act sets forth specific criteria and procedures for issuance and revision of new source performance standards. When the EPA administrator determines that a category of sources "causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare," she "shall" include that category on a list of stationary sources. CAA § 111(b)(1)(A). Then, "[w]ithin one year after the inclusion of a category of stationary sources in [that] list ..., the Administrator shall publish proposed regulations, establishing federal standards of performance for new sources within such category." CAA § 111(b)(1)(B). Those criteria are met with respect to carbon dioxide emissions from power plants.

A. Carbon Dioxide is a Pollutant Subject to Regulation Under Section 111

Carbon dioxide clearly meets the statutory definition of "air pollutant," which CAA § 302(g) defines to include "any physical, chemical, [or] biological ... substance or matter which is emitted into or otherwise enters the ambient air." *See also* CAA §103(g) (dealing with research and referring to "carbon dioxide" as an "air pollutant").

While the plain meaning of the statute -- that carbon dioxide is a pollutant -- is clear and dispositive, it is also supported by administrative determinations. EPA has twice officially concluded that carbon dioxide is an "air pollutant." In 1998, the EPA General Counsel Jonathan Cannon set forth the legal analysis supporting the agency's conclusion that greenhouse gases, including carbon dioxide, are "air pollutants" subject to regulation, in response to a request from Congressman Tom DeLay. Memorandum of Jonathan Z. Cannon, General Counsel, to Carol M. Browner, Administrator, regarding *EPA's Authority to Regulate Pollutants Emitted by Electric Power Generation Sources*, dated April 10, 1998. In 1999, EPA General Counsel Gary Guzy confirmed and reiterated this position in testimony to Congress in which he presented EPA's "views as to the legal authority provided by the Clean Air Act to regulate emissions of carbon dioxide." *Testimony of Gary S. Guzy, General Counsel, U.S. EPA, Before a Joint Hearing of the Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs of the Committee on Government Reform and the Subcommittee on Energy and Environment of the Committee on Science,* U.S. House of Representatives, Oct. 6, 1999.

B. Power Plant Carbon Dioxide Emissions are Significant Contributors to Global Warming

As noted, CAA § 111 is triggered if a category of sources "causes, or contributes significantly to, air pollution which may reasonably be anticipated to endanger public health or welfare." Power plant carbon dioxide emissions clearly cause or contribute significantly to global climate change.

First, the *U.S. Climate Action Report 2002*, U.S. Dept. of State, Washington, D.C., May 2002 (*Climate Action Report*) concludes that the dominant source of human-caused climate change is carbon dioxide (CO_2) emissions and that "the long lifetimes of greenhouse gases [such as CO_2] in the atmosphere and the momentum of the climate system are projected to *cause climate to continue to change* for more than a century." *Climate Action Report* at 82 (emphasis added). The *Climate Action Report* repeatedly notes that carbon dioxide emissions from the burning of fossil fuels, particularly in power plants (as well as industrial sources and vehicles), is most significant cause of global warming.

Second, a recent General Accounting Office report concluded that CO_2 emissions from power plants are likely to increase by 35% by 2020 on the assumption that electricity use will increase 42% by 2020. U.S. General Accounting Office, *AIR POLLUTION: Meeting Future Electricity Demand Will Increase Emissions of Some Harmful Substances*, GAO-03-49 (dated October 30, 2002) (*Future Demand*). The Report noted that EPA data show that in 1999 "power plants were the single greatest industrial source of [carbon dioxide, mercury, nitrogen oxides and sulfur dioxide], emitting 35 percent of the nation's carbon dioxide," *Future Demand* at 1. If emissions from other sectors remain constant, the share of world-wide carbon dioxide emissions attributable to domestic power plants will approach 10%.

Thus, power plant carbon dioxide emissions clearly "cause or contribute significantly to" global warming.

C. Global Warming Will Significantly Endanger Public Health and Welfare

The Clean Air Act defines "welfare" broadly. Indeed, as set forth below, the range of harms caused by the changing global climate covers virtually the entire panoply of considerations within the meaning of "welfare."

> All language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being ....

CAA § 302(h).

As discussed in detail in Appendix A, particular consequences of global warming -- that have occurred and will occur -- include the following:

- The 1990s was the warmest decade, and 1998, 2001, and 2002 were the warmest years, recorded since 1861. World Meteorological Organization, 2002, *WMO Statement on the Status of the Global Climate in 2001*. This warming will increase. IPCC 2001 at 7. A warming of only 1-2 degrees in polar regions from below to above freezing will have major global impacts.

- Precipitation patterns have already changed and are expected to change more with dry areas becoming drier and more frequent storms. Worldwide economic losses due to weather events are doubling every 10 years and are expected to reach $150 billion/year within a decade. United Nations Environment Programme Finance Initiatives Climate Change Working group, *CEO Briefing: Climate Risks to Global Economy* (July 2002) at 2.

- Sea level has risen 10-25 cms over the last 100 years; significant acceleration of this rate of sea level rise is expected over the next 100 years. This would flood millions of acres of lowland in the United States and abroad, displace millions of people, and destroy coastal habitats. Expected increases in the frequency of severe storms would compound the impact. Fifty-three percent of the U.S. population lives within the coastal regions, the location of hundreds of billions of dollars in associated infrastructure. *Climate Change Science at 20.* These coastal habitats are considered to be responsible for about 30% of "ecosystem services" (such as fish production, nutrient recycling, weather stabilization) produced by the entire world and estimated conservatively to be worth (replacement cost, if it were feasible) over $10 trillion/year. R. Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital,* 387 Nature 253, 259 (May 1997).

- Climate change may be much more abrupt than previously thought. Sudden and irreversible shifts in global climate patterns, although impossible to predict precisely, are "inevitable." For example, melting of Arctic and Greenland ice and subsequent reduction in the salinity of the surface water of the North Atlantic may result in the alteration of the Gulf Stream circulation patterns. National Research Council, *Abrupt Climate Change: Inevitable Surprises,* 2002, at 107-115, IPCC, *Climate Change 2001: Synthesis Report* (2001) at 14, 17. This would create massive and immediate climate changes.

- Many ecosystems in the United States are highly vulnerable to climate change. Alpine meadows in the Rocky Mountains and some barrier islands are likely to disappear entirely. Southeastern forests are likely to experience major shifts or breakup into a mosaic of grasslands, woodlands and forests. These changes "are likely to be costly or impossible to replace." *U.S. Climate Action Report-2002* (U.S. Department of State, May 2002 at 89).

- Serious impacts in New York, for example, include coastal erosion to Long Island's south shore; inundation of New York City infrastructure; New York City water supply changes; upstream movement of the Hudson River salt front, impacting the water supply of Poughkeepsie; saltwater intrusion into Long Island groundwater limiting that water supply; increases in exotic insects, pests and infectious diseases; increase in levels of ozone, a harmful air pollutant; loss of native species including trout and salmon. Increased water temperature due to global warming in Long Island Sound has already contributed to a large die-off of the American lobster. In New York City, temperature-related heat stress mortality, currently averaging 300 deaths per year, would increase 50-

200% over the next century. *See generally* U.S. EPA. U.S. Environmental Protection Agency, *Climate Change and New York* (1997); U.S. Global Change Research Program, New England Regional Assessment Group. *Preparing for a Changing Climate: The Potential Consequences of Climate Variability and Change; New England Regional Overview* (2001); Rosenzweig, C. and W.D. Solecki (Eds.), *Climate Change and a Global City: The Potential Consequences of Climate Variability and Change - Metro East Coast.* Report for the U.S. Global Change Research Program, National Assessment of the Potential Consequences of Climate Variability and Change for the United States (2001).

- Impacts in the New England states include the heat-related illness and death described above as well as significant loss of shoreline and associated coastal wetlands. Information found on EPA's website documents that sea level along the East Coast is rising by 11 inches per century, and is likely to rise another 22 inches by 2100 in Massachusetts and Connecticut. Northeastern forests will also be damaged. For example, Maine's vast spruce-fir forests will be especially susceptible to insect infestations exacerbated by warming-induced changes in the timing of spring frosts.

These impacts of climate change -- itself the result of, in large part, carbon dioxide emissions from power plants and other sources – thus span the range of "welfare" and public health effects covered by the Act. These impacts clearly "endanger" public health and welfare.

Swift action is mandated because many of the impacts of global climate change are <u>irreversible</u>, at least on a human time scale. Indeed, carbon dioxide emissions and other human actions are making – and have already made – irrevocable changes to humanity's only habitat. The National Academy of Sciences has found that: "Despite the uncertainties, there is general agreement that the observed warming is real and particularly strong within the past 20 years." National Academy of Science, *Climate Change Science: An Analysis of Some Key Questions* (2001) at 3 (prepared in response to a request from President Bush to evaluate the level of uncertainty associated with the areas of science underlying climate change). (Relevant excerpts from all documents cited are attached in Appendix C.) The United Nations International Panel on Climate Change (IPCC) has concluded "with high confidence" that recent regional changes in temperatures have had discernible impacts on many physical and biological receptors.

These impacts are already occurring and will continue to exacerbate for a substantial period due to the long life of carbon dioxide in the atmosphere. The National Academy reported that it takes over 100 years to remove carbon dioxide from the atmosphere. *Climate Change Science*, at 3 & n.3. Thus, the greater and earlier the reduction in emissions, the smaller and slower the projected warming and the rise in sea levels. IPCC*, Climate Change 2001: Synthesis Report, 2001, at 19.* In other words, time is of the essence for effective response to the confirmed dangers of global climate change. *See Climate Change Science*, at 1 ("national policy decisions made now and in the longer-term future will influence the extent of any damage suffered by vulnerable human populations and ecosystems later in this century.").

D. Technology is Available to Significantly Reduce Carbon Dioxide Emissions from Electric Utility Generating Systems

While EPA need not set a NSPS for a category of sources if all other conditions are met if "it would not be appropriate in light of readily available information on the efficacy of such standard," CAA § 111(b)(1)(B), readily available information in fact demonstrates that there is technology available that can effectively and efficiently reduce carbon dioxide emissions from electric utility generating systems.

Under the CAA, a new source performance standard defined as:

> a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.

CAA § 111(a)(1).

The technologies that can be mandated in an NSPS include "design, equipment, work practice or operational standards." CAA § 111(h)(1). *See generally State of New York v. Reilly* , 969 F.2d 1147 (D.C. Cir. 1992) (upholding in part and vacating in part on other grounds proposed NSPS for municipal incinerators that would have required operators to separate out certain batteries and other types of waste before incineration). Similarly, in the debates concerning the Clean Air Act Amendments of 1990, Congress noted that the stricter emission levels considered could be achieved through a variety of means, The Senate report notes that "[p]ollution can be reduced by (1) improving overall efficiency; (2) changing or cleansing fuels; (3) adopting alternative combustion technologies; (4) installing flue gas cleansing devices; or, (5) establishing end-use conservation programs." S. Rep. No. 228, 101st Cong., 1st Sess. at 291. Thus, EPA is not limited to end-of-pipe controls.

As noted in detail in Appendix B, there is technology available, much of which was not available in 1979 when the power plant NSPS was promulgated, to reduce CO_2 emissions. These include, among other things,

- Increasing generation efficiencies (thereby reducing CO_2 emissions/unit output)
- "End of pipe" capture of CO_2 at its sources
- Sequestration of captured CO_2 in a long-duration medium
- Generation mix changes offsetting CO_2 emissions (systemwide CO_2 reductions)
- Increased electrical use efficiency (reductions of CO_2 per service rendered)

Many of these technologies have been used on a wide variety of boilers and generation systems. Many have also already been mandated in the clean air or energy programs of states, local governments, or other countries. In addition, many technologies offer other air quality and

non-air quality environmental and health benefits, and would improve our energy security. Thus, such technologies readily lend themselves to the promulgation of an NSPS for electricity utility steam generating units.

We emphasize that it is in the process of reviewing and revising the NSPS that EPA will establish appropriate technology-based limits. The review in Appendix B is simply illustrative to demonstrate that an EPA review of the existing NSPS is highly likely to identify technologies that meet the criteria of the Clean Air Act.