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January 31, 2008

Via Hand Delivery
U.S. Environmental Protection Agency
Clerk of the Board
Environmental Appeals Board
Colorado Building
1341 G Street N.W. Suite 600
Washington D.C. 20005

Re: Brief of *Amicus Curiae* Climate Scientist Dr. James E. Hansen in Support of Petitioner
In re Deseret Power Electric Cooperative PSD Permit Number OU-0002-04.00

Dear Clerk of the Board:

Attached for filing please find the original of the following:

- Brief and Appendix of *Amicus Curiae* Climate Scientist Dr. James E. Hansen in Support of Petitioner; and
- Certification of Service.

Thank you. If you have any questions about this matter, please do not hesitate to contact me at (212) 854-4376

Sincerely,

Edward Lloyd

Edward Lloyd
Counsel for *Amicus*, Dr. James E. Hansen

Enclosures
cc: Service List

IN RE DESERET POWER ELECTRIC COOPERATIVE PSD PERMIT NUMBER OU-0002-04.00	BEFORE THE ENVIRONMENTAL APPEALS BOARD U.S. ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, D.C. PSD APPEAL NO. 07-03

BRIEF AND APPENDIX OF *AMICUS CURIAE* CLIMATE SCIENTIST DR. JAMES E. HANSEN IN SUPPORT OF PETITIONER

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INTRODUCTION

For the reasons stated below, James E. Hansen ("Hansen"), is filing this amicus brief with the Environmental Appeals Board (the "EAB") in support of Sierra Club's petition for review of the Prevention of Significant Deterioration ("PSD") Permit Number PSD-OU-0002-04.00 (the "Bonanza PSD Permit") issued by EPA Region 8 to Deseret Power Electric Cooperative ("Deseret") on August 30, 2007.

The Bonanza PSD Permit authorizes construction of a new coal-fired electric utility generating unit at the existing Bonanza power plant near Bonanza, Utah. Hansen supports Sierra Club's contention that the EPA erred by not requiring, pursuant to Section 165(a)(4) of the Act, a BACT emission limit for carbon dioxide ("CO_2") emissions from the new Bonanza coal-fired unit.

STATEMENT OF INTEREST

James E. Hansen is the Director of the NASA Goddard Institute for Space Studies (GISS). At GISS, Dr. Hansen is responsible for defining the research direction of the Goddard Institute, obtaining research support for the Institute, carrying out original scientific research directed principally toward understanding global change, and providing relevant information to the public. Dr. Hansen received his bachelor's degree in physics and mathematics, his master's degree in astronomy, and his Ph.D. in physics, all from the University of Iowa.[1] Dr. Hansen's research interests include radiative transfer in planetary atmospheres, development of global climate models, current climate trends from observational data, and projections of man's impact on climate. He is a member of the National Academy of Sciences and served on the National Research Council's

[1] Appended to this brief as Exhibit 1 is Dr. James Hansen's Curriculum Vitae. Exhibit 1.

Committee on Climate Change Science that reviewed the state of climate science for President Bush and produced the 2001 NAS/NRC Report.[2]

Mr. Hansen submits the attached Exhibits and this brief to provide the Board with a full assessment of the nature and extent of scientific understanding of human-induced climate change. He supports the position of petitioners and urges that this Board grant the Sierra Club's petition to require the EPA to set a BACT emission limit for carbon dioxide ("CO_2") emissions from the new Bonanza coal-fired unit.

[2] National Research Council, Climate Change Science: An Analysis of Some Key Questions (2001) ["Climate Change Science" or "2001 NAS/NRC Report"], Preface.

ARGUMENT

I. CARBON DIOXIDE UNDENIABLY CONTRIBUTES TO GLOBAL CLIMATE CHANGE AND IS THEREBY A "DANGER TO PUBLIC HEALTH AND WELFARE" AS DEFINED BY THE CLEAN AIR ACT; REQUIRING A BACT LIMIT ON CARBON DIOXIDE EMISSIONS AT THE BONANZA PLANT WOULD REDUCE THE ANTICIPATED DANGERS TO PUBLIC HEALTH AND WELFARE.

In *Massachusetts v. EPA*, the Supreme Court recognized what many climate scientists have documented for years: that greenhouse gases contribute significantly to global warming and that the attendant "serious and well recognized harms" include "the global retreat of mountain glaciers, reduction in snow-cover... [an] accelerated rise of sea levels,... and severe and irreversible changes to natural ecosystems."[3] Emissions from coal-fired power plants significantly contribute to this warming and must be controlled by requiring the use of the best available technology at all such plants, including the Bonanza facility.

A. The Earth Is Rushing Toward Dangerous And Potentially Catastrophic Climatic Tipping Points As A Result Of Carbon Dioxide Emissions From Coal-Fired Power Plants And Other Sources.

The earth's climate is at a critical juncture – additional warming caused by CO_2 emissions may lead to the disintegration of ice sheets in West Antarctica and Greenland, subsequently causing an irreversible rise in sea level.[4] Other dangerous consequences of unabated CO_2 emissions include: the shifting of climatic zones with extermination of many animal and plant species; the reduction of fresh water supplies for hundreds of millions of people; and severe effects on the hydrologic cycle resulting in more extreme

[3] *Massachusetts v. EPA*, 127 S.Ct. 1438, 1455 (2007)(citations omitted).
[4] Appended to this brief as Exhibit 3 is Dr. Hansen's testimony before the Iowa Utilities Board in In re Interstate Power and Light Company, Docket No. GCU-07-1, July 11, 2005. Exhibit 3 at 3.

weather events such as stronger droughts and forest fires, heavier rains and floods, and stronger storms driven by latent heat, including tropical storms, tornados and thunderstorms.[5]

The urgency of the situation is amplified by the pendency of the climatic tipping points towards which humanity is racing.[6] A tipping point arises in a system of positive feedbacks such as the Earth's climate. In such a system, when force toward a change, and the change itself, become large enough, positive feedbacks can cause sudden acceleration of change with very little, if any, additional forcing. For example, arctic sea ice loss which may seem slow and unnoticeable at first can pass a tipping point and then suddenly proceed at a rapid pace. At this tipping point ice sheet disintegration will be unstoppable, as will the resulting sea level rise. Sea level rise increases beach erosion, salt water intrusion into water supplies, and damage from storm surges.[7] Moreover, modern civilization depends on sea level stability. Over time, settlement patterns have led to enormous modern day infrastructure construction along coastlines and many historic cities in the developed world. All major East Coast cities in the United States are within a 25 meter elevation of sea level.[8] About one billion people worldwide live within this elevation zone, including the entire nation of Bangladesh, around 300 million Chinese people, and large populations of other low-lying countries.[9] A sea level rise of only 5-7 meters (which would be produced by the melting of the West Antarctic ice sheet alone) has the potential to displace hundreds of millions of people.[10] The social and economic

[5] For a full discussion of dangerous climate change consequences and their rates of occurrence, see Exhibit 3 at 21 --25.
[6] For a full discussion of these tipping points, see Exhibit 3 at 3.
[7] *Id.* at 22.
[8] *Id.* at 23.
[9] *Id.*
[10] *Id.*

toll on civilization is unimaginable--the world is ill-prepared for sea level rises of this nature.

In addition to widespread displacement of humans, the resulting shift of climate zones will lead to the mass extermination of species. Ecologist E.O. Wilson described this period of potential climate change as a bottleneck through which all of Earth's species must pass.[11] The width of the bottleneck, and thus the number of species who pass through and avoid extinction, depends entirely on the measures we take today to curb CO_2 emissions, such as those emitted at coal-fired power plants like Deseret. If climate change continues to increase, it could lead to the collapse of ecosystems and rapid nonlinear loss of species due to interdependencies among species, some of which are less mobile than others. Mass extinctions of species have occurred during the Earth's history and new development of species requires hundreds of thousands, and even millions, of years. Proceeding with a business-as-usual approach to carbon dioxide emissions may result in the loss of a majority of existing species during this century alone.

B. Carbon Dioxide Emitted By Coal-Fired Power Plants Like The Deseret Facility Is A Significant Contributor To Climate Change And Its Dangerous Repercussions. Requiring A BACT Limit For Control Of CO_2 Emissions From The Proposed Deseret Power Plant Would Have A Cognizable Beneficial Effect On Current And Future Levels Of Atmospheric CO_2.

Global climate change is caused by the anthropomorphic release of greenhouse gases into the atmosphere. Though all fossil-fuel-based emissions contribute to greenhouse gas accumulation in the atmosphere, the gas which has the most significant impact on the climate is carbon dioxide (CO_2). While CO_2 emissions from oil use

[11] *Id.* at 24.

represent the largest fraction of today's emissions, historic and modern coal use has contributed to fully half of all excess CO_2 existing in the air today.[12] Downward trends in oil and gas usage and enormous existing coal reserves make coal the most significant source of carbon dioxide in terms of potential impact of fossil fuel use on global warming.[13] While oil and gas use, if unchecked, are sufficient to push the atmosphere to dangerous levels of CO_2 concentrations, coal use will catapult it to concentrations, and thus climate changes, of indescribable consequences. In short, oil will not determine future climate change; coal will.[14]

Because of coal's dominant role in climate change, every effort must be made to minimize its effects through the use of the best available control technology ("BACT"). Current technology allows power plants and other coal-burning units, such as the Deseret power plant, to monitor and reduce their CO_2 emissions. Such technology is one of the most practical ways to accommodate fossil fuel use. Oil and gas emissions tend to originate from small sources, e.g., automobiles, making CO_2 capture during their release impractical. Emissions from large sources, such as coal-fired power plants, do not pose such a dilemma. That a number of coal-fired power plants are slated to be built in the United States without "capture and sequester" technology is cause for extreme concern. Because newly built plants will operate long into the future and massive coal reserves will continue to feed these plants for many years to come, our policy towards new coal-fired power plant construction has the potential to set us on a path to destruction. Affirmative steps must be taken to prevent the development of infrastructure that fails to

[12] Appended to this brief as Exhibit 2 is a letter from Dr. Hansen to Chancellor Angela Merkel of the Federal Republic of Germany, dated January 22, 2008, which includes a section discussing "Basic Fossil Fuel Facts." Exhibit 2 at 3.
[13] *Id.*
[14] *Id.* at 4.

comply with emissions levels called for by current scientific understandings. Placing BACT requirements on carbon dioxide emission levels from coal-fired power plants is an important step in stemming the tide of global climate change.

Deseret Power Electric Cooperative intends that the proposed power plant burn through what would otherwise be an unused stockpile of eight million tons of coal.[15] While the EPA views this coal as an "otherwise wasted energy source,"[16] it bears repeating that humanity is faced with the option of controlling coal use now or seeing the earth and society as we know it change drastically in the near future. We can no longer afford to continue using coal with the attitude that we must use it because it is there, regardless of the method by which it is used. Without the best available control technology to limit CO_2 emissions at coal burning facilities, society is faced with a use it *and* lose it proposition—if we continue to use coal as we have been, we risk losing much of our planet's natural and manmade desirability for subsequent generations.

Any source of CO_2 emissions is potentially significant in the battle against global warming because greenhouse gases are cumulative in nature. The Bonanza plant's emissions will contribute to significant species loss on Earth. Though it may be impossible to determine exactly which species will be driven to extinction by the Bonanza plant, it is certain that a fraction of species extinction may be attributed to its carbon dioxide emissions. If the United States continues with a "business-as-usual" approach to CO_2 emissions, this approach may be the "straw that broke the camel's back" in irreversible climate change.[17] If instead of continuing to ignore such an imminent problem, the EPA places limits on CO_2 emissions from coal, the airborne fraction of CO_2

[15] EPA Region VIII'S Response to Petition for Review at 2.
[16] *Id.*
[17] See discussion of tipping points in Section A above.

will decrease in the near and medium term, resulting in a decrease of the annual growth in atmospheric CO_2.[18] The issuance of such a limit represents a fork in the road for coal-fired power plant development—the decision made here will have implications for all future coal-fired power plant developments.

The question now is whether to continue on with a business-as-usual approach to coal use or to heed the imperatives drawn from an accurate and scientific understanding of coal's effect on global change by requiring sustainable coal development from this point forward. The answer must be that carbon dioxide emissions from coal-fired power plants should be limited so that the reductions in emissions demanded by current scientific understandings can be achieved.

II. CARBON DIOXIDE'S UNDENIABLE CONTRIBUTION TO GLOBAL CLIMATE CHANGE REPRESENTS A "DANGER TO PUBLIC HEALTH AND WELFARE" AS ENVISIONED UNDER THE CLEAN AIR ACT. EPA'S DELAY IN MAKING SUCH A DETERMINATION AND AVOIDANCE OF CO_2 EMISSIONS REGULATION DOES NOT JUSTIFY THE AGENCY'S DETERMINATION IN THIS CASE THAT CO_2 IS NOT A REGULATED POLLUTANT UNDER THE ACT AND THUS IS NOT REQUIRED FOR CONSIDERATION IN A PSD LICENSING CASE.

As the Environmental Appeals Board considers the Bonanza Petition, it should bear in mind that EPA should have already made an endangerment finding under Section 202 of the Clean Air Act. Specifically, it is only because the EPA avoided making an endangerment finding, an action the Supreme Court found unlawful in the *Massachusetts v. EPA* case, that there exists any uncertainty today regarding the regulation of CO_2 as a pollutant. If the EPA had not acted unlawfully, it is beyond doubt that it would have been convinced by the enormous weight of scientific evidence that CO_2 and other

[18] Exhibit 3 at 28.

greenhouse gases "endanger public health or welfare." CAA § 202, 42 U.S.C.A. § 7521(a)(1).

The Clean Air Act's various regulatory programs work in concert to control emissions of dangerous air pollutants. Once sound science establishes that a pollutant endangers public health or welfare, the Act not only permits but obligates the EPA to develop complementary emissions limits for various significant sources of that pollutant including: motor vehicles, CAA § 202, 42 U.S.C. § 7521; aircraft, CAA §§ 231-234, 42 U.S.C. §§ 7571-7574; and new and modified power plants, CAA §§ 111, 165, 42 U.S.C. §§ 7411 (NSPS), 7475 (PSD). Regulating one category of sources may not fully address the identified pollution threat; however, if the agency develops coordinated regulations of *all* such categories, it has sufficient breadth of authority under the Act to orchestrate significant pollution reductions.

Despite a reprimand from the Supreme Court in *Massachusetts v. EPA*, the agency remains inactive, defying the Court's observation that the agency "can avoid taking further action [to regulate such emissions] only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation … within defined statutory limits … as to why it cannot or will not exercise its discretion to determine whether they do." *Massachusetts v. EPA*, 127 S.Ct. 1438, 1462 (2007). In the present PSD licensing case, the agency has relied on its own inaction with respect to motor vehicles and other sources to conclude that CO_2 is not yet "subject to regulation" under other provisions of the Act – and thus that the agency has no obligation to address the pollutant in the PSD licensing process.

In the wake of *Massachusetts v. EPA*, the agency may no longer maintain this regulatory posture. Consider first the agency's obligations under Clean Air Act section 202: to "prescribe ... by regulation ... standards applicable to the emission of *any air pollutant* from any class or classes of new motor vehicles ... which in [the Administrator's] judgment *cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.*" 42 U.S.C. § 7421(a)(1) (emphasis added). As the Supreme Court recently stated, "greenhouse gases [such as CO_2] fit well within the Clean Air Act's capacious definition of 'air pollutant.'" *Massachusetts v. EPA*, 127 S.Ct. at 1462. The only as-yet unaddressed question, therefore, is whether, in the Administrator's judgment, CO_2 "cause[s], or contribute[s] to, air pollution which may reasonably be anticipated to endanger public health or welfare."

There is only one possible answer to this "endangerment question": CO_2 clearly and unequivocally contributes to air pollution that endangers health and welfare. The Clean Air Act is a precautionary statute. The EPA need not document "proof of actual harm" as a prerequisite to regulation, rather, the agency must act whenever there is "a significant risk of harm."[19] Indeed, the Act envisions "preventive" regulatory actions that "protect against incompletely understood dangers to public health... in addition to well-known risks."[20] Thus, in *Ethyl Corporation v. EPA*, the Court of Appeals for the District of Columbia Circuit observed:

> Sometimes, of course, relatively certain proof of danger or harm from such modifications can be readily found. But, more commonly, "reasonable medical concerns" and theory long precede certainty. Yet the

[19] *Ethyl Corp. v. EPA*, 541 F.2d 1, 12-13 (D.C. Cir. 1976).
[20] *Hercules Inc. v. EPA*, 598 F.2d 91, 104 (D.C. Cir. 1978) (construing similar phrase in Federal Water Pollution Control Act), *quoted in Natural Resources Defense Council v. EPA*, 824 F.2d 1146, 1165 (D.C. Cir. 1987)(construing similar phrase in § 112 of Clean Air Act).

> statutes – and common sense – demand regulatory action to prevent harm, even if the regulator is less than certain that harm is otherwise inevitable.[21]

The 1977 Clean Air Act Amendments confirmed and adopted the precautionary interpretation enunciated in *Ethyl Corporation*, enacting special provisions to "apply this interpretation to *all* other sections of the act relating to public health protection."[22] The 1977 legislative history indicates that the Amendment drafters rejected the notion that agency responsibility to tighten emissions standards should be contingent on "conclusive proof of actual harm... based on the past occurrence of adverse effects," because such a regulatory approach would "ignore[] the commonsense reality that 'an ounce of prevention is worth a pound of cure.'"[23]

Further, the "endangerment question" does not turn on a finding that a specific category of emission sources (such as power plants) is the complete or sole cause of the anticipated risk to public health or welfare. Rather, the Act expressly obligates EPA to regulate emissions from a source category if the Administrator determines that sources in the category "cause, *or contribute to*," pollution that may reasonably be anticipated to cause that harm. CAA § 202(a)(1), 42 U.S.C. § 7521(a)(1). Thus, in *Ethyl Corporation*, the Court noted that EPA had no obligation to determine that lead in gasoline was solely responsible for lead poisoning problems, independent of other sources of lead exposure (such as lead paint). Rather, it was sufficient that lead from gasoline contributed to such problems.[24] Similarly, to trigger EPA's statutory responsibility to regulate CO_2 from coal plants, it is not necessary to show that the emissions of CO_2 and other greenhouse gases

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[21] *Ethyl Corp.*, 541 F.2d at 25.
[22] H.R. Rep. No. 294, 95th Cong., 1st Sess. 49 (1977) (emphasis added) (hereinafter "1977 House Report") (discussing Pub. L. No. 95-95, § 401, 91 Stat. 790-91 (August 7, 1977)). *See also id.* at 50 n.3; 51 (amendments are designed to "emphasize the precautionary or preventive purpose of the act (and, therefore, the Administrator's duty to assess risks rather than wait for proof of actual harm)").
[23] 1977 House Report at 127
[24] *Ethyl Corp. v. EPA*, at 30-31; 1977 House Report at 49-50.

from newly constructed facilities are solely responsible for climate change and the reasonably anticipated public health and environmental effects thereof. Rather, it is sufficient to establish that emissions from new power plants contribute to such climate change and its many adverse effects.

Finally, the Act defines "effects on welfare" quite broadly, to encompass almost every aspect of human life on earth, including "but … 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), 42 U.S.C. § 7602(h). The Supreme Court itself has recognized the expansiveness of this definition.[25] Thus, to "anticipate" that CO_2 "cause[s], or contribute[s] to, air pollution" that may "endanger public health or welfare," the Administrator need only recognize that CO_2 from coal plants contributes to (rather than causes) climate change, and that climate change in turn poses a significant risk (rather than certainty) of harm to "soils, water, crops, vegetation, … animals, wildlife, weather, … climate, … property," or human "comfort and well-being." CAA § 302(h), 42 U.S.C. § 7602(h).

The EPA cannot be unaware of its obligations in this regard. The agency has been involved in litigation for several years now, culminating in the Supreme Court's observation that the only ground on which EPA may lawfully decline to regulate CO_2 from power plants is if it makes a "judgment" that CO_2 does not "cause[], or contribute[] to, air pollution which may reasonably be anticipated to endanger public health or welfare" or "if it provides some reasonable explanation as to why it cannot or will not

[25] *Massachusetts v. EPA*, 127 S.Ct. at 1447.

exercise its discretion to determine whether they do."[26] While the agency's posture delays regulation of CO_2 emissions from new and modified power plants in attainment areas (required once there are other emissions limitations in place under the Act, CAA § 165(a)(4), 42 U.S.C. § 7475(a)(4)), the imminence of dangerous climate change makes immediate action on power plant emissions the agency's only reasonable choice. The fact that they have not yet made industry-wide regulations does not make application of these requirements to the Bonanza plant unfair, but rather points to the need for formal industry-wide regulation by the agency. The Clean Air Act envisions complementary and precautionary regulations of the various sources of a dangerous air pollutant. EPA's inaction on this issue thwarts that careful statutory design. The result is not just a legal injury, but real and dire threats to the health and welfare of many.

[26] *Id.*

CONCLUSION

As further support for Sierra Club's petition for review, I respectfully submit my Curriculum Vitae (Exhibit 1), a letter to German Chancellor Angela Merkel with accompanying "Basic Fossil Fuel Facts" (Exhibit 2), and testimony I provided to the Iowa Utilities Board regarding a proposed coal-fired power plant in Marshalltown, Iowa (Exhibit 3). For the foregoing reasons the Board should review and remand the Bonanza PSD Permit to EPA.

Dated: January 31, 2008

Respectfully submitted,

Edward Lloyd

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