

**BEFORE THE ENVIRONMENTAL APPEALS BOARD
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.**

In re Desert Rock Energy Company, LLC)

PSD Permit Number AZP 04-01)

PSD Appeal Nos. 08-03, 08-04,
08-05 & 08-06)

**PHYSICIANS FOR SOCIAL RESPONSIBILITY'S AMICUS CURIAE BRIEF
IN SUPPORT OF PETITIONERS**

I. INTRODUCTION

This Amicus Curiae Brief is filed by and on behalf of Physicians for Social Responsibility ("PSR") and its members.¹ For the reasons outlined herein, we request that the Environmental Appeals Board ("EAB" or "Board") remand the Clean Air Act ("CAA") permit issued to Desert Rock Energy Company, LLC, with instructions to complete a full analysis of the project's potential impacts on human health, including a comprehensive environmental justice analysis.

On July 31, 2008, EPA Region 9 issued a prevention of significant deterioration ("PSD") permit to the Desert Rock Energy Company ("Desert Rock") for construction of a 1500 Megawatt coal-fired power plant.² Desert Rock proposes to build the coal plant

¹ Physicians for Social Responsibility is a nonprofit organization, comprised of some 30 chapters located across the United States and 32,000 members. PSR submits this brief in its institutional capacity and on behalf of its membership.

² PSD permits are preconstruction permits required under section 165 of the CAA for any new major source of pollutant emissions or major modification of an existing source. This PSD permit was issued by EPA

on Navajo land near the town of Shiprock, New Mexico. After the permit was issued, petitions for review were filed with the Environmental Appeals Board ("EAB" or "Board") by a collection of conservation petitioners,³ the Center for Biological Diversity, and Ms. Leslie Glustrom. Petitioners have raised a variety of issues, including concerns regarding the adequacy of Desert Rock's air quality analysis (such as its assessment of potential ozone and PM_{2.5} impacts) and EPA's failure to fully evaluate the project's environmental justice implications.⁴

On January 22, the Board issued an Order granting review of the Desert Rock permit and inviting non-party briefs (on all issues except those regarding CO₂). PSR files this brief in support of the petition for review. As the discussion below makes clear, numerous adverse human health impacts are likely from the proposed Desert Rock Energy Facility, and these impacts have been either ignored, poorly characterized, or never meaningfully considered in the agency's decision-making process – including as they relate to their significant environmental justice implications. Nor has the public been provided a reasonable opportunity to examine and comment on any sound agency rationale. As a result, the Board should remand the permit to Region 9 with instructions

Region 9 because the proposed plant is to be located on Navajo land and the tribe does not have an EPA-approved tribal permitting program under the Clean Air Act.

³ These petitioners included Dine Care, Environmental Defense Fund, Grand Canyon Trust, Natural Resources Defense Council, San Juan Citizen's Alliance, Sierra Club, and WildEarth Guardians (collectively "conservation petitioners").

⁴ Petitioners also raised concerns regarding EPA's failure to require any emission limits or other conditions intended to address global warming pollutants. PSR strenuously objects to EPA's issuance of this permit without requiring a full and complete assessment of all potential measures to reduce greenhouse gases, including both imposition of appropriate BACT emission limitations and consideration of less polluting alternatives. However, EPA has withdrawn its permit decision, as it relates to CO₂, and is currently in the process of soliciting comments on a revised CO₂-specific administrative decision (that comment period currently closes on March 25). As a result, PSR will not address CO₂ in this brief, and will instead address any and all greenhouse gas-related issues in connection with the pending Region 9 comment period (and any subsequent petition for review).

to fully examine these potential health effects and provide the public with notice and an opportunity to comment on the agency's analysis and conclusions.

II. DISCUSSION

U.S. air-quality standards and related public policies are designed to restrict ambient pollutant concentrations in an effort to protect human health. Accordingly, in order for the Desert Rock Energy Company, LLC to receive a PSD permit, it must meet several required criteria in regard to ambient pollutants. In this regard, the EPA failed to satisfy several of the required criteria for obtaining a permit. These failures, if not properly addressed, could have serious consequences for the health and welfare of the citizens of the Navajo Nation tribal reservation, of the State of New Mexico, and for the U.S. and the global community. Below, we outline the health issues inherent in those shortcomings and their significance for public health.

1. Health Impacts of Ground-Level Ozone Must Be Considered

The Desert Rock Energy Facility will be a major source of ozone precursors. For that reason, the Desert Rock Energy Company, LLC was required to provide a demonstration that the plant would not cause or contribute to a violation of the NAAQS for ozone. Desert Rock Energy Company, LLC did not provide such a demonstration, thus failing to satisfy one of the required criteria for obtaining a permit. Because of the adverse and severe health effects known to be caused by exposure to ozone, this failure, if not rectified, could have serious consequences for the health and welfare of the people residing on the Navajo Nation and throughout Region 9.

Ground-level ozone, an air pollutant formed by the chemical reaction of volatile organic compounds with NO_x in the presence of sunlight, is a powerful oxidizing agent

that irritates the lungs at high concentrations, particularly in summer months. Ozone is acknowledged by EPA to cause various adverse health effects

that range from decreased lung function and increased respiratory symptoms to serious indicators of respiratory morbidity including emergency department visits and hospital admissions for respiratory causes, and possibly cardiovascular-related morbidity as well as . . . mortality.⁵

Multiple studies link increases in ozone to asthma as well as to other pulmonary diseases. (See Trasande and Thurston for an extensive review of this literature.⁶)

Asthma is a chronic disease of the lungs characterized by inflammation and narrowing of the airways. When provoked by a trigger such as ozone, the inflammation worsens and the insides of the airways produce extra mucus, swell even more, and the muscles that wrap around the airways may tighten. These changes produce airway obstruction, chest tightness, coughing and wheezing that can lead to asthma attacks.⁷ The consequences of severe asthma attacks are life-threatening. During severe attacks, the lungs fail to perform their task of exchanging carbon dioxide, produced by metabolic processes in the body, for oxygen. This can lead to hypoxia (low blood oxygen level), hypercarbia (high blood carbon dioxide level) and respiratory acidosis (acidification of the blood caused by carbon dioxide retention) that may, in turn, cause cardiac arrhythmias and death. Thus, EPA's failure to consider ozone and its links to asthma may imperil the health of the local community.

⁵ U.S. EPA, National Ambient Air Quality Standards for Ozone; Final Rule, 73 Fed. Reg. 16435, 16436, 16439 (March 27, 2008)

⁶ Trasande L, Thurston GD, Trasande L, Thurston GD. The role of air pollution in asthma and other pediatric morbidities. [Review] [101 refs]. *Journal of Allergy & Clinical Immunology* 2005; 115(4):689-699.

⁷ *American Lung Association, "Diseases."*

http://www.lungusa.org/site/apps/nlnet/content3.aspx?c=dvLUK9O0E&b=2058817&content_id={531795E9-AEA5-4917-A81C-E133E52E6E8A}¬oc=1

Ozone (along with other pollutants emitted by coal, including particulate matter, nitrogen dioxide, and sulfur dioxide) is one of the outdoor pollutants known to trigger asthma attacks.^{8,9} While there are multiple sources of outdoor air pollution that can contribute to asthma,

... pollution from power plants is estimated to cause more than 550,000 asthma attacks per year many of which could be avoided by cleaning up power plants to meet modern standards.¹⁰

In point of fact, "modern standards" in the form of NAAQS for ozone pollution are insufficient to fully protect health. This was indicated by a study by Gent et al linking ozone with asthma exacerbations.¹¹ In a prospective cohort study of 271 children with physician-diagnosed asthma, the children were divided into groups that did or did not use daily maintenance medications (for control of severe asthma). A logistic regression analysis was performed to examine the relationship between ozone levels below EPA standards, respiratory symptoms, and the use of rescue medications. A significant association was found between ozone levels and symptoms in the children who used daily maintenance medications. No significant relationships were found between ozone levels and symptoms in the children who did not take daily maintenance medications.

⁸ Committee of the Environmental and Occupational Health Assembly of the American Thoracic Society. State of the Art: Health Effects of Outdoor Air Pollution. American Journal of Respiratory and Critical Care Medicine. 1996; 153:3-50.

⁹ Brunekreef B, Holgate ST. Air Pollution and Health. Lancet. October 19, 2002; 360:1233-42.

¹⁰ Abt Associates. Power Plant Emissions: Particulate Matter-Related Health Damages and the Benefits of Alternative Reduction Scenarios. Prepared for the Clean Air Task Force. 2004.

¹¹ Gent JF, Triche EW, Holford TR et al. Association of low-level ozone and fine particles with respiratory symptoms in children with asthma. JAMA 2003; 290(14):1859-1867.

Thus, it appears that the threat that ozone poses to children is greatest among those with severe asthma -- even when ozone levels are below the EPA standard.

This finding is of importance in the case of Desert Rock. Initial reports on the findings of ozone monitoring indicated that ozone emissions did not exceed NAAQS standards. Although subsequent reports have shown non-compliance in regard to ozone, it should be noted that children with severe asthma are at risk for asthma exacerbations even when ozone levels are in compliance.

Ozone is also implicated in the development of lung cancer. The National Cancer Institute estimates that in the US in 2008, there were 215,020 new cases of lung cancer with 161,840 deaths. While a number of risk factors have been identified for developing lung cancer, data from a large epidemiological study show clearly that ozone is a factor that must be considered. A study of Seventh Day Adventists who lived in California followed a cohort of over 6,300 non-smoking white adults from 1977 to 1992.¹² This cohort was monitored for the development of lung cancer and those data combined with monthly ambient air pollution data in various zip codes. For men, the interquartile range increase for ozone of 100 ppb was associated with an increase in the relative risk for lung cancer. This study provides convincing evidence that ozone has substantial effects on mortality due to lung cancer.

The severity of the threats posed by ozone exposure is not to be underestimated. EAB is asked to remand the Desert Rock air quality permit as a means to protect the population of Region 9 from the threats to health posed by ozone.

¹² Beeson WL, Abbey DE, Knutsen SF. Long-term concentrations of ambient air pollutants and incident lung cancer in California adults: results from the AHSMOG study. *Adventist Health Study on Smog. Environ Health Perspect* 1998; 106(12):813-823.

2. Health Impacts of Particulate Matter 2.5 Must Be Considered

a. The use of PM10 as a surrogate for PM2.5 is unacceptable

In order to comply with its duty to protect air quality and public health for the Navajo Nation and other residents in EPA Region 9, EPA must directly and stringently limit fine particle pollution. Direct air quality modeling and “best available control technology” (BACT) limits of particulate matter less than 2.5 micrometers in diameter (PM2.5) are required under the Clean Air Act. Nonetheless, the air permit application for the proposed Desert Rock coal-fired power plant does not meet these requirements. Instead, it uses PM10 emissions as a surrogate for PM2.5. This surrogacy approach is unjustified, as it does not give an accurate assessment of the potential negative impacts of PM2.5 on human health.

The Clean Air Act and its implementing regulations require direct control of PM2.5. The legal distinction between PM2.5 and PM10 precludes the use of PM10 as a surrogate. There is no way a determination of BACT for PM10 can qualify as the required determination of BACT for the separate and distinct pollutant known as PM2.5. In this case, EPA Region 9 did not specifically evaluate whether its proposed coal-fired power plant would contribute to violations of federal ambient PM_{2.5} limits, and did not consider relevant data in the record regarding potential PM_{2.5} impacts. The conclusion that the proposed Desert Rock Energy Facility will not cause or contribute to a violation of the PM10 NAAQS does not satisfy EPA Region 9’s legal duty to evaluate whether a proposed source will cause or contribute to a violation of the PM2.5 NAAQS.

To fully protect public health and the environment, especially the health of its most vulnerable citizens, EAB should reject the continued use of PM10 as a surrogate for PM2.5, and require the air permit applicant, Desert Rock Energy Company, LLC, to submit direct PM2.5 air quality modeling and BACT analyses. The surrogacy approach does not protect vulnerable residents from the harms that PM2.5 pollution is known to cause. Even where PM10 is properly controlled and compliance with PM10 NAAQS has been sufficiently demonstrated, substantial harms are likely to occur from remaining PM2.5 pollution.¹³ Those harms are identified and discussed in the following section.

b. PM2.5 presents severe harms to public health

Coal-fired power plants are one of the leading causes of fine particulate matter, or PM2.5. PM2.5 comes in two distinct forms. Primary PM2.5 is present within the boiler stack and is generally subdivided into filterable PM2.5, which can be collected on filter paper, and condensable PM2.5, which condenses out of the gas phase. Secondary PM2.5 forms in the atmosphere, downwind of the stack, from the conversion of gases, mostly sulfur oxides, nitrogen oxides, and organic compounds, into particulate matter. Fine particle pollution from coal plants spreads over a wide area, with the majority occurring within a 500-mile radius of a plant and the greatest concentrations seen nearby and within a moderate distance of a coal plant.¹⁴

¹³ Board of Environmental Review of the State of Montana, "Findings of Fact, Conclusions of Law and Order on Claims of Petitioners that the Department of Environmental Quality Failed to Comply with Permitting Requirements Applicable to PM2.5 and Ruling on Regulation of CO₂ for BACT Purposes," *In the Matter of: Southern Montana Electric Generation and Transmission Cooperative-Highwood Generating Station*, Case No. BER 2007-07 AQ, 23-24 (May 30, 2008) (*Highwood Order*) (finding that the vast majority of uncontrolled PM emissions from a coal-fired boiler will be in the smaller PM2.5 size range).

¹⁴ L. Deck (Abt Associates, Inc.), "Particulate-Related Health Impacts in 2001 From 41 Major US Power Plants," (Nov. 2002); J. Levy et al., "The Importance of Population Susceptibility for Air Pollution Risk Assessment: A Case Study of Power Plants Near Washington, DC," *Environ Health Perspect* 110, 1253, 1257 (2002).

The PM2.5 fraction of particulate matter is a greater health concern than the coarse fraction, referred to as PM10, as the smaller particles pose the "largest health risks."¹⁵ Federal regulations have declared PM2.5 as a causal factor in premature death, as well as a causative factor in:

aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days), changes in lung function and increased respiratory symptoms, as well as new evidence for more subtle indicators of cardiovascular health.¹⁶

An extensive body of epidemiologic evidence now available continues to support likely causal associations between PM2.5 and a broad range of mortality and morbidity health outcomes. The role of PM2.5 in cardiovascular disease was documented fifteen years ago in the Harvard Six Cities study by Dockery et al, which demonstrated that chronic exposure to air pollutants is independently related to cardiovascular mortality.¹⁷ The study adjusted for a variety of risk factors (including, among others, tobacco smoking, occupational exposures, hypertension, diabetes, and gender) and found that they did not significantly alter the relationship. Among air pollutants, elevations of PM2.5 and sulfates showed the strongest associations with disease. Cardiovascular deaths accounted for the largest single category of increased mortality.

The Expert Panel on Population and Prevention Science of the American Heart Association expressed concern over the association between PM2.5 and cardiovascular effects, noting that

¹⁵ See EPA, "PM2.5 NAAQS Implementation," available at http://www.epa.gov/ttn/naaqs/pm/pm25_index.html.

¹⁶ Clean Air Fine Particle Implementation Rule, 72 Fed. Reg. 20,586, 20,586-20,587 (April 25, 2007) (codified at 40 C.F.R. Part 51).

¹⁷ Dockery D et al. An Association between Air Pollution and Mortality in Six U.S. Cities. *NEJM*. 1993; 329:1753-1759.

Over the last decade... a growing body of epidemiological and clinical evidence has led to a heightened concern about the potential deleterious effects of ambient air pollution on health and its relation to heart disease and stroke. ...Epidemiological studies have demonstrated a consistent increased risk for cardiovascular events in relation to both short- and long-term exposure to present-day concentrations of ambient particulate matter.¹⁸

They conclude that

Moreover, because a number of studies have demonstrated associations between particulate air pollution and adverse cardiovascular effects even when levels of ambient PM_{2.5} were within current standards, even more stringent standards for PM_{2.5} should be strongly considered by the EPA.¹⁹

Initially, the specific causes of the increased cardiovascular mortality due to long-term air pollution exposure remained unclear. Subsequently, Pope et al reported PM-mortality associations with the specific cause of death.²⁰ The American Heart Association, in reviewing that study, noted that

A statistically robust association between PM_{2.5} and overall cardiovascular mortality was confirmed for a 10- $\mu\text{g}/\text{m}^3$ increase in long-term exposure... The single largest increase in risk was for ischemic heart disease... which also accounted for the largest proportion of deaths. In addition, the risk for arrhythmia, heart failure, or cardiac arrest mortality was also increased.... There was no evidence for excess mortality in the entire cohort due to other reasons (eg, aortic aneurysms, stroke, diabetes, hypertensive disease, or any respiratory illness). These findings suggest that air pollution promotes both ischemic and nonischemic cardiovascular events.²¹

¹⁸ Brook, R et al. Air Pollution and Cardiovascular Disease. A Statement for Healthcare Professionals From the Expert Panel on Population and Prevention Science of the American Heart Association. *Circulation*. 2004;109:2655-2671.

¹⁹ Ibid.

²⁰ Pope CA, Burnett RT, Thurston GD, et al. Cardiovascular mortality and long-term exposure to particulate air pollution: epidemiological evidence of general pathophysiological pathways of disease. *Circulation*. 2004; 109: 71-77

²¹ Brook, R et al. Air Pollution and Cardiovascular Disease. A Statement for Healthcare Professionals From the Expert Panel on Population and Prevention Science of the American Heart Association. *Circulation*. 2004;109:2655-2671.

In addition to cardiovascular impacts, PM_{2.5} provokes respiratory disease. Virtually all airborne pollutants gain access to the body via the respiratory tract. Thus, it is no surprise that this important system is affected significantly by pollutants discharged into the atmosphere by electrical utilities that burn coal. For example, Chronic Obstructive Pulmonary Disease (COPD) is associated specifically with PM_{2.5}. COPD is a condition characterized by narrowing of the airway passages that, unlike asthma, are permanent rather than reversible. As with asthma, exposure to pollutants that produce an immunological response is critical in the pathogenesis of the condition. The COPD response in larger airways is referred to as chronic bronchitis, characterized by a cough that produces sputum. In the alveoli, the COPD inflammatory response leads to a destruction of tissue, or emphysema. These two conditions usually co-exist.

Exposure to air pollutants plays an important role in the pathogenesis of acute exacerbations and the development of COPD. While smoking tobacco is an important risk factor, data have emerged during the past several years showing a smaller but important link between air pollution, including pollutants produced by burning coal, and the subsequent development of COPD. In a study of the residents of Helsinki, Finland, where coal-derived air pollutants account for a relatively small portion of total pollutant levels, pooled asthma and COPD emergency room visits increased on the days that there were increases in PM_{2.5}, coarse particles and gaseous pollutants.²² In a U.S.-based study of hospitalization rates among Medicare enrollees, a 10 µg/m³ increase in the concentration of PM_{2.5} particles was associated with a same-day increase in COPD

²² Halonen JJ, Lanki T, Yli-Tuomi T, Kulmala M, Tiittanen P, Pekkanen J. Urban air pollution, and asthma and COPD hospital emergency room visits. *Thorax* 2008; 63(7):635-641.

admissions of 2.5%.²³ These studies, of different populations and using different criteria, both link increases in air pollutants to increases in exacerbations of COPD. Although they did not focus on pollutants derived exclusively from the combustion of coal, the PM_{2.5} they studied included particles produced by coal burned by electrical utilities as well other sources.

In addition to the documentation of negative health outcomes attributable to PM, a reduction in PM has been demonstrated to result in positive outcomes, notably improvement in life expectancy. A recent article in the New England Journal of Medicine directly evaluated the changes in life expectancy associated with differential changes in fine particulate air pollution. The authors compiled data on life expectancy, socioeconomic status, and demographic characteristics for 211 county units in the 51 U.S. metropolitan areas with matching data on fine-particulate air pollution. Regression models were used to estimate the association between reductions in pollution and changes in life expectancy, with adjustment for changes in socioeconomic and demographic variables and in proxy indicators for the prevalence of cigarette smoking. The study described its findings this way:

Improvements in life expectancy during the 1980s and 1990s were associated with reductions in fine-particulate pollution across the study areas, even after adjustment for various socioeconomic, demographic, and proxy variables... A decrease of 10 µg per cubic meter in the concentration of fine particulate matter was associated with an estimated increase in mean ($\pm$ SE) life expectancy of 0.61 ± 0.20 year ($P = 0.004$). ...Reductions in air pollution accounted for as much as 15% of the overall increase in life expectancy in the study areas.

The authors concluded that

²³ Dominici F, Peng RD, Bell ML et al. Fine particulate air pollution and hospital admission for cardiovascular and respiratory diseases. JAMA 2006; 295(10):1127-1134.

A reduction in exposure to ambient fine-particulate air pollution contributed to significant and measurable improvements in life expectancy in the United States.²⁴

In short, relief from exposure to fine-particle PM contributes to health, expressed in this case as life expectancy. This conclusion implies the positive contribution to well-being that would obtain by avoiding the increase in ambient PM pollution that would result from construction of the proposed Desert Rock Energy Facility. For all of the reasons cited in this section, the EAB should remand the air quality license issued for the Desert Rock Energy Facility.

Additional health concerns are linked to PM_{2.5}, several of which are discussed in the following section on Environmental Justice.

3. Environmental Justice must be addressed

EPA is under the obligation to document and consider the impact that coal-generated pollution would have on low-income communities of color ("EJ communities") that often bear a disproportionate share of industrialization's harmful byproducts. Specifically, it is mandated to identify and address disproportionately high and adverse human health and environmental effects of its programs, policies and activities on minority and low-income populations.

EPA is aware that the noxious health effects of air pollutants are likely to provoke greater harm in EJ communities and sensitive population subgroups. EPA discusses the particular affects of PM pollution on sensitive subpopulations, explicitly noting:

A number of population subgroups have been identified as potentially susceptible to health effects as a result of PM exposure, including people with existing heart and lung diseases, including diabetes, and older adults and children. In addition,

²⁴ C. Arden Pope III, Ph.D., Majid Ezzati, Ph.D., and Douglas W. Dockery, Sc.D. Fine-Particulate Air Pollution and Life Expectancy in the United States. *N Engl J Med* 2009; 360:376-86 (January 22, 2009)

new attention has been paid to the concept of some population groups having increased vulnerability to pollution-related effects due to factors such as socioeconomic status or factors that result in particularly elevated exposure levels, such as residence near sources such as roadways (EPA, 2004, p. 9–81). A good deal of evidence indicates that people with existing heart or lung diseases are more susceptible to PM-related effects. In addition, new studies have suggested that people with diabetes, who are at risk for cardiovascular disease, may have increased susceptibility to PM exposures.²⁵

The proposed Desert Rock Energy Facility would have an immediate impact on an EJ community as well as several sensitive population subgroups. Therefore the EPA is required to identify and address its impacts on those groups. We identify below some of those subgroups and the grave health impacts they would be subjected to, should the Desert Rock Energy Facility be built.

a. EPA must consider the needs of people with diabetes

The finding, above, that “people with diabetes, who are at risk for cardiovascular disease, may have increased susceptibility to PM exposures” is supported by several research studies. For example, studies published in *Epidemiology* and in the *American Journal of Respiratory Care Critical Medicine* in 2002 examined the effects of PM₁₀ air pollution on persons with diabetes.^{26,27} They found diabetics to be a population that is particularly susceptible to cardiovascular damage by airborne particles. There was a significant interaction for hospital admissions for heart disease, with more than twice the risk in persons with diabetes than in persons without diabetes. They also found persons 75 years of age and older to be at higher risk.

²⁵ 71 Fed. Reg. at 2636.

²⁶ Zanobetti, A. and Schwartz, J. Cardiovascular Damage by Airborne Particles: Are Diabetics More Susceptible? *EPIDEMIOLOGY* 2002; 13:588–592.

²⁷ Zanobetti, A. and Schwartz, J. Are Diabetics More Susceptible to the Health Effects of Airborne Particles? *Am. J. Respir. Crit. Care Med.*, Volume 164, Number 5, September 2001, 831-833

These findings are of particular relevance in regard to the Desert Rock Energy Facility. There is a reported age-adjusted prevalence of 22.9% for diabetes among Navajo adults ages 20 years or older.^{28,29} Because individuals with diabetes are more susceptible to cardiovascular complications, and these types of complications are more likely to occur with exposure to many of the pollutants from coal-burning facilities, the Navajo community stands at risk from the proposed plant. In fact, a study conducted for the Navajo Nation estimates that the risk pool of persons in the Navajo population likely to be at high risk for cardiovascular and pulmonary complications from coal-fired electricity plants will be 2.5-3 times higher than the general population.³⁰ Yet the proposed Desert Rock plant fails to take into account the health risks and impacts the proposed plant would impose on individuals diagnosed with diabetes. It must do so, in order to comply with its legal obligations.

b. EPA must consider the needs of people with chronic pulmonary disease

The association cited earlier in this document between PM2.5 and exacerbations of Chronic Obstructive Pulmonary Disease is not only a health concern in the case of the proposed Desert Rock Energy Facility; it is also an Environmental Justice issue. Persons with chronic pulmonary disease constitute a sensitive sub-population, and there is reason to infer that said sub-population exists among the people of the Navajo Nation in Region 9, given that COPD is the sixth leading cause of death from chronic disease for Native

²⁸ Mokdad, AH, Bowman, AB, Engelgau, MM, Vinicor, F, Diabetes Trends Among American Indians and Alaska Native: 1990-1998. Diabetes Care 2001; 24: 1508-9.

²⁹ Will, J, Strauss, K, Mendlein, J, Ballew, C, White, LL, Peter, DG, Diabetes Mellitus Among Navajo Indians: Findings from the Navajo Health and Nutrition Survey. J Nutr 127 (Suppl. 10): 2106S-2113S, 1997.

³⁰ Calwell C, Neugebauer R and Sheldon P, Energy and Economic Alternatives to the Desert Rock Energy Project. Ecos Consulting, Durango, Colorado. January 2008.

American men and the seventh leading cause of death for Native American women.³¹

The EPA should determine the prevalence of COPD and other chronic pulmonary diseases among the residents of the Navajo Nation and develop a plan to protect the health of that sensitive sub-population.

c. EPA must consider the needs of children

Children are another subpopulation that demonstrates particular vulnerability to coal-generated air pollution. According to the American Lung Association, children and infants are among the most susceptible to PM_{2.5}.³² Among children, there have been higher asthma-related hospitalization rates, more severe asthma attacks, and slowed lung function growth.³³

A review by Bateson and Schwartz notes that the susceptibility of children to the effects of air pollution is multifactorial, including the following factors related to exposure.³⁴ Children have different patterns of breathing than adults. They are predominantly mouth-breathers. This bypasses the filtering effects of the nasal passages, allowing pollutants to travel deeper into the lungs. They have a larger lung surface area per unit weight than adults. They spend more time out of doors, particularly in the afternoons and during the summer months when ozone and other pollutant levels are the highest. Children also have higher ventilation rates. These, combined with incomplete

³¹ National Vital Statistics Report: Report on Deaths: Leading Causes, 2003. Volume 55, No.10.

³² American Lung Association, "Particle Pollution Fact Sheet," available at <http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=50324>.

³³ *Id.*

³⁴ Bateson TF, Schwartz J, Bateson TF, Schwartz J. Children's response to air pollutants. [Review] [83 refs]. *Journal of Toxicology & Environmental Health Part A* 2008; 71(3):238-243.

pulmonary development and immature immune systems, appear to act in concert to make children highly susceptible to airborne pollutants.

Furthermore, children appear to be more susceptible to the development of pollution-related asthma attacks than adults. There are several explanations for this. Children breathe more air per unit body weight than adults and are more active. The diameter of the airways in children is less than that in adults and therefore may be more susceptible to the effects of airway narrowing that is characteristic of asthmatic attacks. In addition, children may ignore early symptoms of an asthma exacerbation and fail to seek treatment, leading to attacks of increased severity. These factors, combined with the possible adverse impact of pollutants on lung development, and the immaturity of enzyme and immune systems that detoxify pollutants, may all contribute to an increase in the sensitivity of children to pollutants produced by burning coal.³⁵

Alarming, the increase in susceptibility to pollutants appears to translate into pollution-related increases in infant mortality. Ritz, et al., reported increases in the risk of death from respiratory causes, including sudden infant death with rises in the concentration of carbon monoxide, PM₁₀ and NO₂.³⁶ Bateson and Schwartz also cite a study reporting between 4 and 7 fewer infant deaths per 100,000 live births with a reduction of total suspended particles of 1 µg/m³.³⁷

³⁵ Trasande L, Thurston GD, Trasande L, Thurston GD. The role of air pollution in asthma and other pediatric morbidities. [Review] [101 refs]. *Journal of Allergy & Clinical Immunology* 2005; 115(4):689-699.

³⁶ Ritz B, Wilhelm M, Zhao Y. Air pollution and infant death in southern California, 1989-2000. *Pediatrics* 2006; 118(2):493-502.

³⁷ Bateson TF, Schwartz J, Bateson TF, Schwartz J. Children's response to air pollutants. [Review] [83 refs]. *Journal of Toxicology & Environmental Health Part A* 2008; 71(3):238-243.

Given the special sensitivity of children and infants to pollutants produced by burning coal, it is a breach of environmental justice that the permitting process for the proposed Desert Rock Energy Facility failed to give sufficient consideration to this population. The EAB should remand the Facility's air quality permit so that the needs of children and infants are considered and fully addressed.

d. EPA must consider the needs of older adults

Older adults are also particularly susceptible to PM_{2.5} because of their weaker lungs and hearts. Studies suggest that serious health effects, such as premature mortality, are greater among older groups of individuals.³⁸ Additionally, older adults are more likely than younger ones to have preexisting respiratory and/or cardiovascular conditions that become aggravated with exposure to PM_{2.5}.³⁹ EPA must identify and address the effects of coal-generated pollution on the population of older adults and consider said impacts in making its permitting decisions.

e. EPA must consider elements related to socioeconomic status

EPA's failure to identify and address Environmental Justice issues extends to its failure to address questions related to socioeconomic status. Poverty holds many implications in regard to human health, including but not limited to:

- Elevated indices of disease. EPA should determine whether elevated indices of asthma and other respiratory diseases exist among the local population, as is reported based on the high levels of admittances to local clinics and hospitals. Likewise they should determine whether elevated indices of diabetes exist among the local population, based on prevalent rates among Native American populations.

³⁸ National Ambient Air Quality Standards for Particulate Matter, 71 Fed. Reg. 2620, 2637 (Jan. 17, 2006).

³⁹ *Id.*

- The inadequacy of health and medical facilities. The EPA should consider the level of care provided to residents of the Navajo reservation. Where such levels are below par, they increase vulnerability to negative health outcomes. This is particularly true in regard to chronic illnesses and emergencies such as stroke, heart attack, asthma attack, etc.
- The inadequacy of physical infrastructure. Such factors as the high number of unpaved roads and the inadequacy or absence of mass transit make medical attention inaccessible.
- Absence of financial resources. The low income levels among the Navajo population deprive them of options for securing the health care they need. This may range from the ability to pay doctors and specialists, to the inability to buy a car or otherwise secure transportation to medical services, to difficulties in purchasing adequate and nutritive food.

III. CONCLUSIONS

The proposed Desert Rock Energy Facility would emit noxious pollutants that would significantly and gravely threaten public health. Emissions of ozone and fine particulate matter (PM_{2.5}) in particular would put large populations at risk of life-threatening respiratory illnesses, cardiovascular illnesses, and cancer. The failure of the EPA to require thorough study and documentation of these potential emissions is unacceptable. Furthermore, the proposed location of the plant on a Native American reservation creates a host of environmental justice issues that have not to date been adequately addressed.

The cumulative impact of these factors creates greater than usual urgency for the EPA to address the impact of its programs, policies and activities on the overwhelmingly minority and low-income population in Region 9. We call on EAB to remand its air quality permit issued for the Desert Rock Energy Facility, with instructions to fully

examine these potential health effects and provide the public with notice and an opportunity to comment on the agency's analysis and conclusions.

A handwritten signature in cursive script, reading "Kristen Welker-Hood".

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