

**SIERRA CLUB PETITION**

**EXHIBIT 2**



May 4, 2009

VIA OVERNIGHT MAIL

Rachel Doctors  
Hearing Officer  
Illinois Environmental Protection Agency  
1021 N. Grand Ave. E  
P.O. Box 19276  
Springfield, IL 62794-9276

**Re: Comments on Draft Prevention of Significant Deterioration Construction Permit for Power Holdings of Illinois, LLC (DLC # 347-08)**

Dear Ms. Doctors:

These comments are submitted on behalf of the Sierra Club and its 800,000 members, including 26,000 members in Illinois regarding the Illinois Environmental Protection Agency's ("IEPA") draft air permit for Power Holdings of Illinois, LLC's ("Power Holdings") proposed coal-to-synthetic natural gas plant in Blissville Township, Illinois.

For the reasons set forth below, IEPA must deny the draft permit, as it fails to meet the requirements of the Clean Air Act. If IEPA does not deny the permit, Power Holdings must submit an amended application including the required information and analyses and IEPA must redraft substantially the permit terms and conditions, renounce the revised draft permit, and provide the public with a meaningful opportunity to comment on the revised draft permit.

### INTRODUCTION

The action before IEPA is not a narrow proceeding confined to the Power Holdings plant. The implications are much broader, affecting the environment across the State of Illinois and beyond. The question before IEPA is whether additional air pollution from new uses of coal, including pollutants that contribute to the pending climate crisis, is acceptable as a policy, public health, and ethical matter. Illinois will, whether it intends to or not, be taking a position on these broader issues when it decides this permitting. Any objective and reasonable review would conclude that this permit cannot be issued, especially when cleaner and less expensive alternatives to the proposed coal-to-gas project exist.

Coal plants, and presumably facilities such as Power Holdings', have a life span of at least 50 years. IEPA's proposal, therefore, is to allow Power Holdings to construct and operate a facility that will have policy, energy, and environmental implications 50 years from now—at a time when the best science available tells us we will need to have reduced our global warming emissions by 80%. That necessary reduction is frustrated, if not precluded, if IEPA allows projects like the one at issue here that emit significantly more global warming pollution per unit of energy than the alternatives, and for which the applicant refuses to commit to capture and permanent sequestration of its greenhouse gas emissions. In short, if IEPA grants this permit it will be committing Illinois to a future where it is committed to dirty energy, and hindering the rest of the country and world's efforts to avoid the catastrophic results of greenhouse-gas-induced climate changes.

We are past the point where the old, worn arguments that coal is a cheap source of energy have any merit. As numerous regulatory agencies and private market leaders have determined, the increasing cost of coal and coal-based plants, combined with the certain future cost of greenhouse gas regulation, make projects like the one proposed by Power Holdings here simply irresponsible investments. When the cost of future greenhouse gas regulations are factored in (and often even when they are not), cleaner options are more economic. The good news is that 21st century alternatives are available. Efficiency, wind, solar, biomass, and highly-efficient natural gas combined cycle options are commercially available and less costly ways to meet our energy needs. They also have the potential to grow Illinois-based jobs to a much greater degree than a fuel of the past like coal.

Other states have already shown the path to a clean energy future. Governor Sebelius of Kansas prohibited two 700-megawatt coal-burning plants in southwest Kansas because of concerns over climate-changing carbon dioxide emissions and the possibility of expensive federal regulations on coal facilities. "We must move forward strategically—steering our state clear of the environmental, health and economic risks of massive new carbon emissions," she said. Montana passed a law requiring that all new electric generating units that are "primarily fueled by coal" capture and sequester at least 50% of their CO<sub>2</sub> emissions. Mt. Code 69-8-421(7). Delaware recently promulgated regulations significantly limiting CO<sub>2</sub> emissions from electric generating units. Del. Admin. Code 7 1000 1144 §§ 3.2.1.1, 3.2.2.1; 73 Fed. Reg. 23,101 (April 29, 2008); 40 C.F.R. § 52.420(c).

Minnesota enacted the Next Generation Energy Act of 2007, which establishes statewide GHG reduction goals of 15 percent by 2015, 30 percent by 2025, and 80 percent by 2050, a requirement that utilities achieve a 1.5% energy efficiency saving annually in 2012 and each year thereafter. In addition, the law prohibits the construction of any power plants which would produce a net increase in carbon emissions after Aug. 1, 2009. Specifically, absent a new law that "directly limits and substantially reduces greenhouse gas emissions," the law prohibits new large fossil fuel-fired power plants and energy imports from a large fossil fuel-fired power plant built in another state that was not operating on Jan. 1, 2007. A Georgia state court recently ruled that the Georgia Department of Environmental Protection had to establish BACT limits for CO<sub>2</sub> emissions from the proposed Longleaf coal-fired power plant. *Friends of the Chattahoochee, Inc. v. Couch*, Docket No. 2008CV146398 (Ga. Sup. Ct. June 30, 2008). Utility regulators in Wisconsin and Florida have rejected proposals for coal-fired power plants based, in significant

part, on concerns about global warming impacts.<sup>1</sup> The State of Washington, as of June, 2008, is committed to reducing greenhouse gas emissions to 1990 levels by 2020, to 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050. 2008 Wash. Laws, Chapter 14. Washington also passed legislation requiring that long-term utility financial commitments only be made with sources that meet stringent CO<sub>2</sub> limits. Wash. Rev. Code 80.80. In 2007, the State of Oregon similarly passed the Climate Change Integration Act, which requires the state to achieve greenhouse gas levels that are 10 percent below 1990 levels by 2020, and 75% below 1990 levels by 2050. California passed legislation requiring that certain power contracts only be made with sources that have limited greenhouse gas impacts. Cal. Pub. Util. Code § 8341.

Such progress in the fight against drastic climate changes would be wiped out if Illinois were to ignore the impacts of coal-based emissions from new plants like Power Holdings'. Moreover, it is well known that nearly every highly-respected scientific body asserts that solving the climate crisis is possible only if new coal plants are not allowed to emit uncontrolled greenhouse gases. The American Geophysical Union concluded that a prompt moratorium on new coal use that does not capture CO<sub>2</sub>, and a phase-out of existing coal emissions by 2030, are critical to solving climate change. The Pew Center on Global Climate Change and the Massachusetts Institute of Technology have both concluded that reductions in coal-based CO<sub>2</sub> emissions are critical in solving the climate crisis. James Hansen of NASA has similarly noted in his testimony to Congress that “[p]hase out of coal use except where the carbon is captured and stored below ground is the primary requirement for solving global warming.”

The Intergovernmental Panel on Climate Change (“IPCC”), the foremost international authority on global warming and Nobel Prize winner, concludes that the warming of the climate system is “unequivocal,” that changes in atmospheric concentrations of CO<sub>2</sub> and other greenhouse gases alter the energy balance of the planet’s climate system, that atmospheric concentrations of CO<sub>2</sub> exceed the natural range over the last 650,000 years, and that continued CO<sub>2</sub> emissions will lead to continued warming and possibly irreversible impacts. Therefore, it recommends switching from coal in uncontrolled facilities like the one being proposed by Power Holdings to plants that commit to capturing and permanently sequestering all of their carbon emissions.

IEPA has a legal obligation to make a searching inquiry into the problems posed by Power Holdings’ proposed coal plant. If done, IEPA would necessarily determine that a permit cannot be issued.

## **I. THE DRAFT PERMIT FAILS TO IMPOSE BACT FOR GREENHOUSE GASES.**

Although Power Holdings recognizes that the facility will emit significant quantities of CO<sub>2</sub>, a greenhouse gas, and a CO<sub>2</sub> management strategy is contemplated at some point in the future, for now, CO<sub>2</sub> emissions are planned to be exhausted to the atmosphere. Power Holdings does not even estimate the quantities of CO<sub>2</sub> that can be emitted by the facility. A detailed

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<sup>1</sup> Business Journal of Milwaukee, PSC Rejects Alliant’s Proposed Coal Plant, (Nov. 11, 2008) (attached as Exhibit 1); Thomas Content, PSC Rejects Alliant Energy’s Proposed Coal Plant, Milwaukee Journal Sentinel (Nov. 11, 2008) (attached as Exhibit 2); Craig Pittman, PSC Bars Coal-Fired Plant, St. Petersburg Times (Sept. 6, 2007) (attached as Exhibit 3).

inventory of not only CO<sub>2</sub> emissions but that of the other greenhouse gases (including N<sub>2</sub>O, which can and will be emitted from all of the combustion sources relying on air, and CH<sub>4</sub>, a product of the facility, and therefore likely to be emitted from the methanator as well as fugitives from valves and pumps, etc.) should be included in the analysis. In the absence of such an analysis, using carbon mass-balance assumptions and relying on simplifying assumptions (which can only be refined further using process details that are unavailable in the application or the record at this time), it is estimated that CO<sub>2</sub> emissions will be greater than 8 million tons per year (see table attached as Exhibit 4).<sup>2</sup> While this value may not be exact, it is indicative of the rough order of magnitude of the considerable quantities of CO<sub>2</sub> emissions that will be emitted from this facility. In short, it is undeniable that the proposed plant will emit huge quantities of the pollutants causing a climate crisis.

The draft permit fails to satisfy the minimum requirements of the Clean Air Act because it does not contain a “best available control technology” (“BACT”) analysis and limit (or any other limit) for carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), or methane. In light of the United States EPA’s recent greenhouse gas endangerment finding and position regarding CO<sub>2</sub> BACT, and the Environmental Appeal Board’s recent decisions related to other greenhouse gases such as N<sub>2</sub>O and methane, the IEPA must either reissue a draft permit that contains a BACT limit (or synthetic minor limit) for CO<sub>2</sub>, N<sub>2</sub>O and methane for Power Holdings and begin a new public comment process, or suspend permit proceedings on the draft permit until after U.S. EPA completes its reconsideration and rulemaking discussed below.

As noted, the proposed facility could produce more than 8 million tons of CO<sub>2</sub> every year (see above) or 400 million tons of CO<sub>2</sub> total if the plant operates for 50 years.<sup>3</sup> In fact, the lifecycle of coal-to-gas plants creates more than twice as much carbon dioxide (CO<sub>2</sub>) as a conventional natural gas life cycle plant. Additionally, the greenhouse gas emissions from the proposed plant will include not only CO<sub>2</sub>, but also the extremely potent N<sub>2</sub>O and methane gases.

It is beyond dispute that greenhouse gas (“GHG”) pollution is a major contributor to climate change, which is likely to have numerous and severe adverse public health, environmental, and economic impacts. As the Director of the Kansas Department of Health and the Environment recently stated in denying a permit application for the proposed 1,400 MW Holcomb coal plant, “it would be irresponsible to ignore emerging information about the contribution of carbon dioxide and other greenhouse gases to climate change and the potential harm to our environment and health.”<sup>4</sup> It would also be contrary to law because the Clean Air Act requires that binding BACT limits be placed on any major new or modified source of GHG emissions because GHGs are “subject to regulation under the Act.” 42 U.S.C. §§ 7475(a)(4), 7479(3); 40 C.F.R. § 51.166(b)(49). A state court in Georgia also recently held that any

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<sup>2</sup> Also, at the public hearing for the Power Holdings project, IEPA staff stated that a potential CO<sub>2</sub> emissions estimate of 10 million tons per year was “reasonable.” Hearing Tr. at 116.

<sup>3</sup> The Power Holdings application does not contain enough information for a precise estimate of greenhouse gas emissions. Power Holdings must provide more detailed information on processes and emission points as part of an Application Addendum that includes estimates of greenhouse gases.

<sup>4</sup> Kansas Dept. of Health and the Environment, Press Release: KDHE Electric Denies Sunflower Electric Air Quality Permit (Oct. 18, 2007) (attached as Exhibit 6).

argument to the contrary is “untenable.” *Friends of the Chattahoochee, Inc. v. Couch*, Docket No. 2008CV146398, slip. op. at 7 (Ga. Sup. Ct. June 30, 2008) (attached as Exhibit 5).

A PSD permit for a source that emits significant quantities of a pollutant “subject to regulation” under the Clean Air Act must include an emissions limit based on the best available control technology (“BACT”) for that pollutant. 42 U.S.C. § 7475(a)(4); *see also* 40 C.F.R. § 52.21(b)(50) (2007). As discussed below, CO<sub>2</sub> is currently regulated under the Act because various statutory and regulatory provisions require monitoring, reporting, and control of CO<sub>2</sub> emissions. Greenhouse gases are also “subject to regulation” under the Act. The Supreme Court has determined that carbon dioxide and other GHGs are “pollutants” under the Act, *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007), and the EPA recently issued a greenhouse gas endangerment finding that will trigger regulation of greenhouse gases from motor vehicles under the Clean Air Act. Power Holdings’ PSD permit must therefore include a BACT emission limit for CO<sub>2</sub>.

**A. Climate Change Background: The Power Holdings Plant Would Contribute to the Climate Change Crisis**

Global warming is a threat to public health, welfare, and the environment. As the United States Environmental Protection Agency (“EPA”) recently found in a proposed rule on greenhouse gas endangerment:

The evidence points ineluctably to the conclusion that climate change is upon us as a result of greenhouse gas emissions, that climatic changes are already occurring that harm our health and welfare, and that the effects will only worsen over time in the absence of regulatory action. The effects of climate change on public health include sickness and death. . . . The effects on welfare embrace every category of effect described in the Clean Air Act’s definition of “welfare” and, more broadly, virtually every facet of the living world around us. . . . In both magnitude and probability, climate change is an enormous problem.<sup>[5]</sup>

The effects of climate change include “heat waves, more wildfires, degraded air quality, more heavy downpours and flooding, increased drought, greater sea level rise, more intense storms, harm to water resources, harm to agriculture, and harm to wildlife and ecosystems.” *Id.* at 1.

EPA’s recent pronouncement is based on well-established facts that the international scientific and regulatory community has known for over a decade. The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and the United Nations Environment Programme in 1988 to comprehensively and objectively assess the scientific, technical, and socio-economic information relevant to human-induced climate change, its potential impacts, and options for adaptation and mitigation.<sup>6</sup>

<sup>5</sup> EPA Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Proposed Rule, 74 Fed. Reg. 18886, 18904 (April 24, 2009).

<sup>6</sup> More information about the IPCC is available at <http://www.ipcc.ch/about/index.htm>.

The IPCC reports<sup>7</sup> include the following significant findings, many of which will have significant impacts in Illinois:

- In North America, major challenges are projected for crops that are near the warm end of their suitable range or depend on highly utilized water resources;
- Approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperatures exceed 1.5-2.5 Degrees Celsius;
- Even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which make adaptation essential, particularly in addressing near term impacts. Unmitigated climate would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt.
- Fuel switching from coal to gas, renewable heat and power (hydropower, solar, wind, geothermal and bioenergy), and early applications of carbon capture and storage (*e.g.*, storage of removed carbon dioxide from natural gas) are key mitigation technologies and practices currently commercially available.

Illinois agriculture is particularly sensitive to warming because of the existing threats of heat waves, flooding and drought. The drought emergency declared in the state in 2005 illustrates one of the problems global warming poses in the coming decades. The Union of Concerned Scientists estimate that by 2100, average summer temperatures in the state could increase between 9-17 degrees. Rain would occur less often, but would come in more severe downpours, resulting in major flooding. Unless releases of global warming pollution are curbed and then significantly decreased, global warming pollution will continue to pose significant threats to the health, welfare, and economy of Illinois.<sup>8</sup>

Global warming also exacerbates the problem of ground-level ozone (“smog”), intensifying the public health dangers associated with air quality violations. Breathing ozone can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion, and repeated exposure can lead to bronchitis, emphysema, asthma, and permanent scarring of lung tissue. In addition, global warming will result in increased surface water evaporation, which in turn could lead to more wildfires and increased dust from dry soil, both of which generate particulate matter emissions. Particulate matter triggers a host of health problems, including aggravated asthma, development of chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease.

The IPCC reports authoritatively document the adverse environmental and socio-economic impacts of global warming at local, regional, national, and global scales, and the primary role of the burning of fossil fuels, including coal, in causing global warming. The

<sup>7</sup> The IPCC reports are available at available at <http://www.ipcc.ch/ipccreports/assessments-reports.htm>.

<sup>8</sup> See National Wildlife Federation, Global Warming and Illinois, available at <http://www.nwf.org/GlobalWarming/pdfs/Illinois.pdf>.

evidence in the IPCC reports conclusively shows that greenhouse gases, including CO<sub>2</sub> and N<sub>2</sub>O and methane, endanger public health, welfare, and the environment. The United States government recently officially adopted this conclusion.

New evidence suggests that even the alarming estimates of the dire threat of the pending global climate meltdown by the IPCC are too conservative and that the threat of global warming may be even more imminent than originally anticipated. A recent study found that from 2000 to 2006, the average growth in GHG emissions was 3.3% per year, compared to 1.3% per year during the 1990s.<sup>9</sup> The study estimates that the climate meltdown is happening faster than previously feared, and attributes this to recent growth in carbon intensity, and decreasing efficiency in carbon sinks on land and in oceans.

While global warming will have a significant impact on the human environment, IEPA did not consider these effects. Consideration of the direct and collateral effects from construction of the proposed plant must be analyzed before any permit decision is made. Moreover, limits on the global warming pollution from the proposed plant must be included in the permit.

**B. There are Numerous Options Available to Avoid or Minimize the Project's Greenhouse Gases.**

Options exist to reduce the emission of GHGs from the Power Holdings facility that could be included in a BACT analysis. These include:

- Increased Efficiency;
- Use of carbon capture and sequestration, which holds the potential to reduce the GHG emissions by 80% or more;<sup>10</sup>
- Controls options and work practice standards; and
- Co-firing the combustion sources proposed for the plant with lower carbon fuels, including biomass or natural gas, instead of coal-based fuels.

**1. The potential for complete carbon sequestration must be evaluated.**

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<sup>9</sup> See <http://www.ucar.edu/news/releases/2008/climate-threat.jsp>.

<sup>10</sup> Any carbon sequestration must be sited and carried out in ways to ensure that the CO<sub>2</sub> stays sequestered, is geologically safe, and does not impact drinking water supplies. Local residents are especially concerned about the fault lines located under the Power Holdings facility site (see fault line map and related information attached as Exhibit 7). Highly faulted storage basins are poor candidates for carbon storage. See IPCC Report on Carbon Capture and Storage, Chapter 5, available at [http://arch.rivm.nl/env/int/ipcc/pages\\_media/SRCCS-final/IPCCSpecialReportonCarbondioxideCaptureandStorage.htm](http://arch.rivm.nl/env/int/ipcc/pages_media/SRCCS-final/IPCCSpecialReportonCarbondioxideCaptureandStorage.htm). To the extent IEPA engages in its obligation to consider CCS and to the extent that analysis considers sequestration on or near the project site, the agency should seek an official opinion from the Director of the Illinois State Geological Survey's Energy and Earth Resources Center regarding the fault lines and how seismic risk could affect the potential for accidental syngas releases from the facility and overall suitability of the area for carbon sequestration.

At the outset, we want to note that the requirements of the Clean Air Act, including BACT limits, are obligations that apply to IEPA. At a minimum, IEPA must consider all pollution control options when establishing emission limits. Carbon sequestration is one such option that must be considered. The following discussion regarding carbon capture and sequestration (“CCS”) is intended to inform IEPA in carrying out its obligations under the law and does not necessarily constitute an endorsement of CCS as a solution to the climate change problems posed by the construction of a coal-based plant. The Sierra Club believes that CCS is a last resort and strongly believes that there are abundant non-coal alternatives that avoid the toxic problems of coal mining and coal waste disposal while creating sustainable, family-supporting jobs. These coal alternatives are sufficient to satisfy any energy needs without turning to coal combustion—with or without CCS. Notwithstanding the last-resort nature of CCS, IEPA is obligated to consider it and IEPA has clearly failed to do so.

Power Holdings’ website advertises that the project would “separate[] about 90% of the carbon dioxide in the Syngas stream for possible use.”<sup>11</sup> In fact, the developer intends to take advantage of a recent law that gives special treatment to “clean coal SNG facilities,” *e.g.*, 220 ILCS 5/9-220(h), as amended by Ill. Pub. Act 095-1027, which is defined to require that the SNG manufacturing process “sequesters at least 90% of the total carbon emissions . . . .” 20 ILCS 3855/1-10.<sup>12</sup> Moreover, the project is already designed to include the Retisol system to separate carbon dioxide from the syngas. The sequestration of CO<sub>2</sub> must be considered in the top-down BACT analysis, and complete capture must be considered.

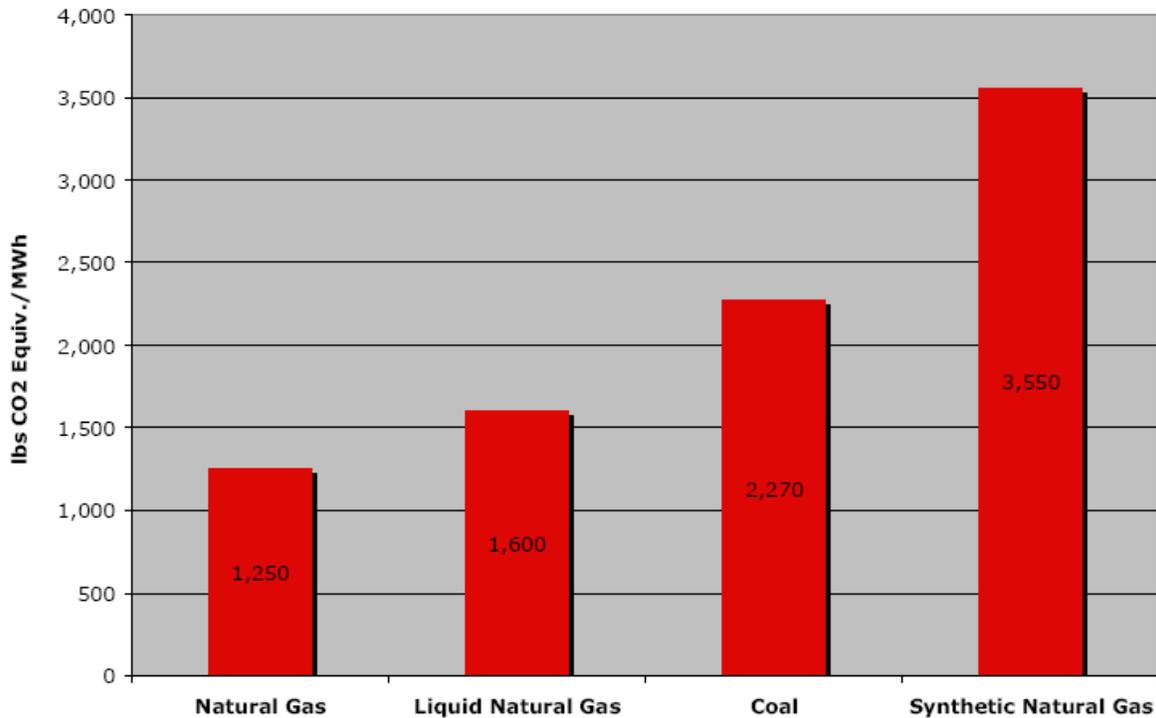
Despite its ability and publicly-announced plans to capture and sequester 90% of the CO<sub>2</sub> produced, Power Holdings does not include a carbon capture and sequestration proposal in its application. Instead, as proposed in the draft permit, the plant will be among the most GHG-polluting contraptions as shown in the chart below.

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<sup>11</sup> See <http://www.powerholdingsllc.com> (attached as Exhibit 8).

<sup>12</sup> According to Public Act 95-1027 § 1.5(8) Illinois is supposed to “encourage the use of advanced clean coal technologies that capture and sequester carbon dioxide emissions to advance environmental protection goals . . . .”

## Life Cycle Greenhouse Gas Emissions without CO2 sequestration



Data Source: Jaramillo, Paulina; Griffin, W. Michael; and Matthews, H. Scott. "Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation." *Environmental Science & Technology* 41.17 (2007): 6293

CCS is a way to reduce the emissions from a plant such as the proposed PH facility and, therefore, must be considered as an alternative to the project, pursuant to 42 U.S.C. § 7475(a)(2), as well as BACT, pursuant to § 7475(a)(4). In U.S. EPA’s comments on a draft EIS for the then-proposed White Pine plant in Nevada, directed the federal Bureau of Land Management (BLM) to “discuss carbon capture and sequestration and other means of capturing and storing carbon dioxide as a component of the proposed alternatives.”<sup>13</sup> Additionally, the EPA’s determination that it is appropriate for the BLM to consider carbon capture and sequestration and other means of carbon dioxide storage at the White Pine plant is a reasonable indication that carbon capture and sequestration (and other means of storing carbon) should also be considered in the top-down BACT process for the Clean Air Act PSD permit.

Recent similar project applications include CO<sub>2</sub> BACT analyses that consider carbon capture and sequestration as a control option, such as the Cash Creek Generating Station in Kentucky.<sup>14</sup> While the Cash Creek CO<sub>2</sub> Analysis should not be used as a model because it has some flaws—including ignoring efficiency and biomass (discussed in more detail below)—it should be used as a starting point for a CO<sub>2</sub> reduction analysis that includes CCS.

<sup>13</sup> Nevada Division of Environmental Protection Determination of Greenhouse Gas Regulation Pursuant to the Clean Air Act For The White Pine Energy Station, Feb. 2009 (attached as Exhibit 9).

<sup>14</sup>See Addendum #2, CO<sub>2</sub> BACT Analysis for Cash Creek Generating Station, dated December 2008 (attached as Exhibit 10).

We also note that other gasification plants are being rejected for failure to incorporate significant carbon dioxide capture and sequestration. On April 14, 2008, the Virginia State Corporation Commission (SCC) denied Appalachian Power Company's (APCo) application to ratebase the \$1 billion component attributable to Virginia of the projected \$2.23 billion cost of APCo's proposed 629 MW Mountaineer Integrated Gasification Combined Cycle (IGCC) plant.<sup>15</sup> In that case, APCo attempted to highlight the unique value of IGCC for its potential to capture and sequester CO<sub>2</sub>, yet included no estimated costs in its application for CO<sub>2</sub> capture or sequestration. The Virginia SCC cited the cost of CO<sub>2</sub> capture and sequestration at \$300 to \$500 million in its decision. Effectively the Virginia SCC denied the APCo application because the applicant was asserting the reason for proposing IGCC was for its superior CO<sub>2</sub> capture capability, without also proposing to actually construct the equipment necessary to capture the CO<sub>2</sub>. Power Holdings' application shares the same flaws and should be denied.

## **2. IEPA must review technically feasible control options for carbon dioxide.**

The IEPA and Power Holdings must include in the PSD application and permit application review an analysis of technically feasible control options for minimizing CO<sub>2</sub> (and all greenhouse gas emissions) during startup of the facility and during any other time during which the sale of CO<sub>2</sub> is interrupted. In other words, a CO<sub>2</sub> BACT analysis for all normal operating periods, including startup, shutdown, and malfunction, should be prepared.

## **3. Clean fuels must be evaluated.**

Consistent with the statutory definition of BACT, long-standing practice, and the recent Environmental Appeal Board ("EAB") ruling in the *Northern Michigan* case, a top-down BACT determination must include consideration of "clean fuels." See 42 U.S.C. § 7479(3); *In re Northern Michigan University Ripley Heating Plant*, Slip. Op., PSD Appeal No. 08-02 (E.A.B. 2009) (attached as Exhibit 11). "Congressional direction to permitting applicants and public officials is emphatic. In making determinations, they are to give prominent consideration to fuels." *Id.* at 17-18. For a gasification plant and its auxiliary equipment this may include the use of natural gas, fuel oil, or landfill gas in some processes (especially to replace syngas or SNG for production and combustion processes), gasification of biomass in place of some or all of the coal stock, or a combination of any of these, as readily available methods to reduce carbon dioxide emissions. The Department of Energy's website notes that in 2002 there were about 9,733 megawatts of installed biomass capacity in the United States, the largest source of non-hydro renewable electricity.<sup>16</sup>

The sources of biomass included forest products and agricultural residues and were fired using gasification, direct firing, or co-firing. Additionally, gasification of biomass is possible in a conventional gasification plant and would reduce CO<sub>2</sub> emissions. One example is the recent

<sup>15</sup> Virginia State Corporation Commission, Case PUE-2007-00068, Final Order, April 14, 2008 (attached as Exhibit 12).

<sup>16</sup> See <http://www1.eere.energy.gov/biomass/index.html>; see also U.S. Forest Service, Research Note NRS-3, Illinois' Forest Resources, 2006 (attached as Exhibit 73); U.S. Department of Energy - Energy Efficiency and Renewable Energy Alternative Fuels and Advanced Vehicles Data Center: Illinois State Assessment for Biomass Resources, available at <http://www.afdc.energy.gov/afdc/sabre/sabre.php?state=illinois> (attached as Exhibit 74).

announcement by Progress Energy Florida signing another contract with Biomass Gas & Electric LLC (BG&E) to purchase electricity from a waste-wood biomass plant planned for Florida.<sup>17</sup> This was the second biomass gasification plant that BG&E signed a contract to build, and the company proposes to build a total of four. The Progress Energy plant will be built in north or central Florida that will use waste wood products—such as yard trimmings, tree bark, and wood knots from paper mills—to create electricity. The gasification process would supply sufficient gas to generate about 75 MW. The plant will use gasification and projected commercial operation is expected is projected to begin in June 2011.

More recently, Xcel Energy proposed to build a biomass gasification plant at the site of its existing Bayfront Generating Station in Ashland, Wisconsin.<sup>18</sup> According to Xcel Energy:

Biomass gasification is a technology that has been studied and developed over the past half century and continues to have global activity due to growing interest in clean, renewable energy. Hundreds of biomass gasifiers are in operation around the world. The majority of these are in Asia and Europe and are small-scale plants providing less than 5 MWe of heat or electricity to farms and small industries. To date, biomass gasification installations for production of electricity in the U.S. have predominantly been small-scale plants; however, some larger-scale plants have been installed in recent years. The pulp and paper and food processing industries have employed biomass gasification to a much greater extent in the U.S. to provide steam.<sup>[19]</sup>

The Xcel gasifier will gasify 200,000 to 250,000 tons of biomass annually.<sup>20</sup> The most recent publicly-available cost information shows that using biomass is cost-effective. The Xcel Bay Front facility is currently paying between \$25.00 and \$29.00 per ton of wood waste, which provides between 5,500 and 6,500 Btu/pound (\$3.85 to \$5.27/MMBtu).<sup>21</sup>

### **C. IEPA is Required by the Clean Air Act's BACT Provisions to Impose Stringent Limits on Greenhouse Gas Emissions from Power Holdings.**

Given the threat posed by global warming, it is now more important than ever to implement the federal Clean Air Act's requirement to impose stringent BACT limits on GHG

<sup>17</sup> See <http://www.ct-si.org/news/press/item.html?id=240>; <http://www.green-energy-news.com/nwslnks/clips208/feb08014.html>.

<sup>18</sup> See Application of Northern States Power Company, a Wisconsin Corporation, for a Certificate of Authority and Any Other Authorizations Needed to Construct and Place Into Operation a Biomass Gasifier at Its Bay Front Generating Facility, Docket No. 4220-CE-169, PSC Ref # 108437 (attached as Exhibit 13).

<sup>19</sup> *Id.* at 6.

<sup>20</sup> *Id.* at 8.

<sup>21</sup> See Assessment of Biomass Resources for Energy Generation at Xcel Energy's Bay Front Generating Station at Ashland, Wisconsin, Energy Center of Wisconsin, 2007 (attached as Exhibit 14).

emissions from new coal plants. The PSD program requires that each “new major stationary source shall apply best available control technology for *each regulated new source review pollutant* that it would have the potential to emit in significant amounts.” 40 C.F.R. §§ 52.21(j), 51.166(j)(2) (emphasis added). A “regulated new source review pollutant” includes any pollutant for which there is a national ambient air quality standard (“NAAQS”), a standard promulgated under Section 111 of the Act, and “any pollutant that otherwise is subject to regulation under the Act.” 40 C.F.R. §§ 52.21(b)(50), 51.166(b)(49). The Clean Air Act itself also makes clear that the BACT requirements extend to “each pollutant subject to regulation under the Act.” 42 U.S.C. §§ 7475(a)(4), 7479(3). This includes carbon dioxide, which is already regulated under both the Delaware SIP (which is adopted into federal law under the Clean Air Act), the municipal solid waste landfill New Source Performance Standard, 40 C.F.R. §§ 60.33c, 60.751; 63 Fed. Reg. 2154-01 (Jan. 14, 1998), and through CAA section 821 and its various implementing regulations—including 40 C.F.R. parts 71 and 75 (explained in detail in section 2 below).

As IEPA is aware, the Environmental Appeals Board (“EAB”) has repeatedly rejected refusals by EPA and delegated states to apply BACT requirements to GHG emissions under the Clean Air Act as unsupported by any existing law or policy. *In re Deseret Power Electric Coop.*, PSD Appeal No. 07-03, slip op. at 25 (Nov. 13, 2008) (attached as Exhibit 15); *In re Northern Michigan University Ripley Heating Plant*, Slip. Op., PSD Appeal No. 08-02 (E.A.B. 2009) (attached as Exhibit 11). In *Deseret*, the EAB remanded the issue to the EPA Region to reconsider whether CO<sub>2</sub> BACT limits should be required. *In re Deseret* at 63-64. The EAB remanded the permit in *Northern Michigan* for the same reasons as *Deseret*, and additionally instructed the Michigan Department of Environmental Quality to consider whether nitrous oxide (N<sub>2</sub>O) is regulated under the Act. The only legally defensible conclusion on remand is that CO<sub>2</sub> is subject to regulation and, therefore, that BACT limits are required for CO<sub>2</sub>. IEPA cannot ignore these clear directives from the EAB.

Additionally, the U.S. EPA has recently announced that it is continuing to reassess whether greenhouse gases are regulated under the Clean Air Act. *See* Letter from Lisa Jackson to David Bookbinder (February 16, 2009) (attached as Exhibit 16). Most recently, the U.S. EPA granted a petition for reconsideration of former Administrator Stephen Johnson’s memorandum of December 18, 2008 (the “Johnson memo”), which purported to establish that greenhouse gases are not subject to the Act. *Id.* In agreeing to revisit the issue, the current Administrator warned “PSD permitting authorities,” such as IEPA, that they “should not assume that the memorandum is the final word on the appropriate interpretation of Clean Air Act requirements.” *Id.* Instead, U.S. EPA intends to begin notice-and-comment rule-making in order to establish U.S. EPA’s official interpretation in the “near future.” *Id.* The result of U.S. EPA’s rulemaking will have a direct impact on the Power Holdings permit. However, that final rulemaking is unnecessary for determining that CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> are already subject to regulation under the Clean Air Act, as shown below.

We also note that even before Administrator Jackson’s February 16, 2009, letter, the EPA Region 9 withdrew a PSD permit previously proposed for the Desert Rock plant in New Mexico based on the EAB’s decision in *Deseret*. *See* Notice of Partial Withdrawal of Permit, *In re*

*Desert Rock Energy Company LLC*, PSD Appeal Nos. 08-03, 08-04, 08-05 and 08-06, Docket Entry No. 60 (Jan. 8, 2009) (attached as Exhibit 17).

In light of these actions, other project proponents have begun to submit CO<sub>2</sub> BACT analyses.<sup>22</sup> And other EPA-delegated permit authorities have issued draft permits with CO<sub>2</sub> BACT limits.<sup>23</sup> While these CO<sub>2</sub> analyses suffer their own flaws, they do demonstrate that the regulated community and regulatory agencies have now concluded that CO<sub>2</sub> BACT limits are a requirement of the Clean Air Act.

## **1. Greenhouse gases are air pollutants under the Clean Air Act.**

The Clean Air Act defines “air pollutant” expansively to include “any physical, chemical, biological, radioactive . . . substance or matter which is emitted into or otherwise enters into the ambient air.” 42 U.S.C. § 7602(g) (emphasis added). The U.S. Supreme Court recently confirmed in *Massachusetts v. EPA*, 127 S.Ct. 1438 (2007), that greenhouse gases fit within this expansive definition. The Court held that it is “unambiguous” that the “sweeping definition” of air pollutant found in the Act “embraces all airborne compounds of any stripe,” including CO<sub>2</sub> and other greenhouse gases.” *Id.* at 1459-60.

Following up on that decision, on April 17, 2009, EPA issued a draft endangerment finding for carbon dioxide and other greenhouse gases.<sup>24</sup> EPA has now officially declared that carbon dioxide and other greenhouse gases are air pollutants that “may be reasonably anticipated to endanger public health and welfare,” as defined under the Clean Air Act. Although CO<sub>2</sub> is already regulated under other parts of the Clean Air Act, as explained in detail below, with a final endangerment finding, EPA is obliged to begin the process of regulating global warming pollution from motor vehicles. Clean Air Act Section 202 specifically states that EPA “shall” (*i.e.*, must, not may) regulate pollutants once they are found to endanger public health or welfare.

## **2. CO<sub>2</sub> is currently regulated under the Clean Air Act.**

In addition to being an “air pollutant,” CO<sub>2</sub> also qualifies as subject to regulation under the Clean Air Act because it is actually regulated under the Act. In particular, Section 821 of the Clean Air Act Amendments of 1990 required EPA to promulgate regulations to require certain sources, including coal-fired electric generating stations, to monitor CO<sub>2</sub> emissions and report monitoring data to EPA. 42 U.S.C. § 7651k note.

Section 821, and the EPA regulations promulgated jointly pursuant to that section and other CAA sections, plainly make CO<sub>2</sub> “subject to regulation” under the Clean Air Act. *Friends*

<sup>22</sup> See Addendum #2, CO<sub>2</sub> BACT Analysis for Cash Creek Generating Station, dated December 2008 (attached as Exhibit 10); Hyperion Energy Center, Best Available Control Technology (BACT) Analysis for Emissions of Carbon Dioxide, March 2009 (attached as Exhibit 18).

<sup>23</sup> See Statement of Basis for Draft Amended Federal “Prevention of Significant Deterioration” Permit—Russell City Energy Center at 62-63 (December 8, 2008) (establishing a CO<sub>2</sub> limit of 1100 lb/MMBtu for the Russell City Energy Center ) (attached as Exhibit 19).

<sup>24</sup> EPA, Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, (“Endangerment finding”), 74 Fed. Reg. 18886 (April 24, 2009) (also available at <http://epa.gov/climatechange/endangerment/downloads/GHGEndangermentProposal.pdf>).

*of the Chattahoochee, Inc. v. Couch*, Docket No. 2008CV146398, slip. op. at 7 (Ga. Sup. Ct. June 30, 2008) (attached as Exhibit 5). The U.S. Supreme Court has found recordkeeping and reporting requirements to constitute regulation in other contexts. *Buckley v. Am. Constitutional Law Found., Inc.*, 525 U.S. 182, 204 (1999) (holding that compelled reporting of ballot initiative petition circulators' names was impermissible regulation of speech and association rights); *Riley v. Nat'l Fed'n of the Blind, Inc.*, 487 U.S. 781, 798-99 (1988) (compelled reporting of professional fundraiser status is impermissible regulation of speech); *Buckley v. Valeo*, 424 U.S.1, 66-68 (1976) (evaluating recordkeeping, reporting, and disclosure requirements as regulation of political speech). Therefore, by requiring "regulation" of CO<sub>2</sub> in Section 821, Congress clearly made CO<sub>2</sub> "subject to regulation" for purposes of the Act's Section 165 BACT provisions.

In 1993, EPA made CO<sub>2</sub> further subject to regulation under the CAA by promulgating regulations at 40 C.F.R. Part 75. Those regulations generally require monitoring of carbon dioxide emissions through installation, certification, operation, and maintenance of a continuous emission monitoring system or an alternative method, 40 C.F.R. §§ 75.1(b), 75.10(a)(3); preparation and maintenance of a monitoring plan, 40 C.F.R. § 75.33; maintenance of certain records, 40 C.F.R. § 75.57; and reporting of certain information to EPA, including electronic quarterly reports of carbon dioxide emissions data, 40 C.F.R. §§ 75.60 – 64. Additionally, 40 C.F.R. § 75.5 prohibits operation of an affected source in the absence of compliance with the substantive requirements of Part 75, and provides that a violation of any requirement of Part 75 is a violation of the Clean Air Act. Enforcement of Section 821 is accomplished through the enforcement mechanism in the Act, 42 U.S.C. §§ 7413(a)(4), (b)(2), 7604(a)(1), and a violator is subject to the penalty provisions of the Act. 42 U.S.C. § 7651k(e). Furthermore, EPA has identified the CO<sub>2</sub> monitoring and reporting requirements in Part 75 as applicable Clean Air Act requirements that must be incorporated into Title V operating permits. 40 C.F.R. § 71.2. Numerous states, including Illinois, Wisconsin, Indiana, and Michigan have included CO<sub>2</sub> monitoring, record keeping, and reporting requirements in Title V permits. EPA has also enforced these CO<sub>2</sub> monitoring regulations under the Clean Air Act on a number of occasions.<sup>25</sup> It is, therefore, undeniable that CO<sub>2</sub> is subject to regulation under the Clean Air Act.

In addition to section 821 of the Act, and its implementing regulatory requirements, greenhouse gases such as CO<sub>2</sub> and methane are also regulated as a component of landfill gases. EPA has promulgated emission guidelines and standards of performance for municipal solid waste (MSW) landfill emissions. 40 C.F.R. §§ 60.33c, 60.752. "MSW landfill emissions" are defined as "gas generated by the decomposition of organic waste deposited in an MSW landfill or derived from the evolution of organic compounds in the waste." 40 C.F.R. § 60.751. EPA has specifically identified CO<sub>2</sub> as one of the components of the regulated "MSW landfill emissions."<sup>26</sup> Thus, CO<sub>2</sub> is regulated through the landfill emission regulations at 40 C.F.R. Part 60 Subparts Cc, WWW. *See also* 56 Fed. Reg. 24468 (May 30, 1991) ("Today's notice

<sup>25</sup> *See, e.g., In re City of Detroit, Dept. of Public Lighting, Mistersky Power Station*, Docket No. CAA\_05-2004-0027, Consent Agreement and Final Order ¶ 7 (May 10, 2004) (attached as Exhibit 20); *In re Indiana Mun. Power Agency*, Docket No. CAA-05-2000-0016, Compl. ¶¶ 5, 14-15, 34-37 (attached as Exhibit 21).

<sup>26</sup> *See* Air Emissions from Municipal Solid Waste Landfills – Background Information for Final Standards and Guidelines, U.S. EPA, EPA-453/R-94-021 (Dec. 1995), *available at* <http://www.epa.gov/ttn/atw/landfill/landflpg.html> (explaining "MSW landfill emissions, or [landfill gas], is composed of methane, CO<sub>2</sub>, and NMOC.").

designates air emissions from MSW landfills, hereafter referred to as ‘MSW landfill emissions,’ as the air pollutant to be controlled”).

Arguments that CO<sub>2</sub> is not regulated were rejected as unsupported by any law or policy in *In re Deseret Power*. For example, in contrast to EPA’s assertion that Section 821 is somehow not part of the Act, the EAB found that the EPA’s “past actions certainly seem to treat Section 821 as if it were part of the Act.” *In re Deseret Power*, slip op. at 58. In addition, the EAB found that the EPA had not supported its argument that the monitoring and reporting requirements of Section 821 and 40 C.F.R. Pt. 75 do not constitute “regulation” for purposes of concluding whether CO<sub>2</sub> is “subject to regulation.” *Id.* at 35-54; accord *In re Northern Michigan University Ripley Heating Plant*, Slip. Op., PSD Appeal No. 08-02 (E.A.B. 2009).

In sum, section 165 of the Clean Air Act requires a BACT limit for “any pollutant subject to regulation” under the Act. 42 U.S.C. § 7475(a)(4). Accordingly, a plain-language reading of the Act compels the conclusion that, in light of *Massachusetts v. EPA*, the regulation of CO<sub>2</sub> under section 821 of the Act and the regulation of CO<sub>2</sub> under 40 C.F.R. § 60.751 and parts 71 and 75, Section 165 requires the establishment of BACT limits for CO<sub>2</sub> emissions from coal plants under the PSD program.

### **3. EPA’s approval of CO<sub>2</sub> limits in the Delaware SIP also demonstrates that CO<sub>2</sub> is currently regulated under the Clean Air Act.**

Further still, even if IEPA were to give an incredibly restrictive interpretation to the Clean Air Act, CO<sub>2</sub> is still subject to regulation under the Act through EPA’s recent approval of amendments adding various CO<sub>2</sub> regulations to the SIP for the state of Delaware. 73 Fed. Reg. 23,101 (April 29, 2008); 40 C.F.R. § 52.420(c). Those amendments establish CO<sub>2</sub> emission limits and operating requirements, record keeping and reporting requirements, and CO<sub>2</sub> emissions certification, compliance, and enforcement obligations for new and existing stationary electric generators. Del. Admin. Code 7 1000 1144; *see also* Letter from Brian L. Doster, U.S. EPA Office of General Counsel, to Erika Durr, EAB (Sept. 9, 2008) (attached as Exhibit 22) (“...Office of General Counsel... believe that it is incumbent on them, in recognition of a duty of candor, to inform the Board of a recent action by the Agency... EPA Region 3 issued a final approval of a Delaware State Implementation Plan (SIP) revision incorporating state regulations which include specific limitations on the rate of several pollutants, including carbon dioxide...”). EPA’s approval was made “in accordance with the Clean Air Act,” 73 Fed. Reg. 23,101, and by approving inclusion of these provisions into Delaware’s SIP, the agency confirmed that CO<sub>2</sub> is “subject to regulation” under the Act, as SIPs are developed pursuant to Sections 110 and 113 of the Act, 42 U.S.C. §§ 7410, 7413, and become federally enforceable parts of federal law upon approval.<sup>27</sup> *El Comite Para El Bienestar de Earlimart v. Warmerdam*, 539 F.3d 1062, 1066 (9th Cir. 2008); *Espinosa v. Roswell Tower, Inc.*, 32 F.3d 491, 492 (10th Cir. 1994); *Her Majesty the Queen in Right of the Province of Ontario v. City of Detroit*, 874 F.2d 332, 335 (6th Cir. 1989). As such, the Delaware SIP approval also demonstrates that CO<sub>2</sub> is subject to regulation under the Clean Air Act for purposes of triggering the BACT requirements.

<sup>27</sup> Indeed, even the Bush administration’s EPA acknowledged the significance of the Delaware SIP provision. *See* U.S. EPA letter to Clerk of the Board regarding *Deseret Power Electric Cooperative*, PSD Appeal No. 07-03 (Sept. 9, 2008) (attached as Exhibit 22) (informing the Environmental Appeals Board of EPA’s Delaware SIP-approval action).

#### **4. IEPA cannot rely on the Johnson Memo.**

As noted above, the U.S. EPA recently granted a petition for reconsideration of former Administrator Stephen Johnson's memorandum of December 18, 2008, (the "Johnson memo") which purported to establish that greenhouse gases are not subject to regulation under the Act for purposes of the PSD program. *See* Letter from Lisa Jackson to David Bookbinder (February 16, 2009) (attached as Exhibit 16). In granting that petition, Administrator Jackson warned "PSD permitting authorities" like IEPA that they "should not assume that the [Johnson] memorandum is the final word on the appropriate interpretation of Clean Air Act requirements." *Id.* Further still, the Johnson Memo is also being challenged in a federal court appeal. The Johnson Memo will almost certainly be reversed by the courts or withdrawn by the Obama Administration, and the IEPA should not and cannot rely on it.

#### **5. Congress' 2008 appropriations legislation further demonstrates that CO<sub>2</sub> is currently regulated under the Clean Air Act.**

In the Fiscal Year 2008 Consolidated Appropriations Act, Congress specifically required EPA to undertake rulemaking to establish monitoring and reporting requirements for all greenhouse gases (including CO<sub>2</sub>), economy wide. H.R. 2764; Public Law 110-161, at 285 (enacted Dec. 26, 2007). Congress made clear that the agency is "to use its existing authority under the Clean Air Act" including "existing reporting requirements for electric generating units under section 821 of the Clean Air Act" in adopting these regulations.<sup>28</sup> This action by Congress not only confirms that section 821 is part of the Clean Air Act, but also establishes a separate and distinct statutory obligation to regulate CO<sub>2</sub> through mandatory emission monitoring requirements under the Act. In fact, the EPA's regulatory obligations under the Appropriations Act are much broader than the agency's duties under section 821 as the Appropriations Act requires *economy wide* reporting. Such requirements are further evidence that CO<sub>2</sub> is actually regulated under the Clean Air Act.

#### **6. N<sub>2</sub>O is currently regulated under the CAA.**

As noted above for CO<sub>2</sub>, pollutants regulated by approved state implementation plans are regulated under the Clean Air Act. Nitrous oxide (N<sub>2</sub>O) emissions must also be controlled, as this greenhouse gas is 296 times as potent as CO<sub>2</sub>. The proposed plant will emit N<sub>2</sub>O, although further process and emission point information is needed from Power Holdings to determine the precise figure. N<sub>2</sub>O is regulated in at least one State Implementation Plan approved by EPA, and therefore, is not only subject to, but is *regulated* under the Act. *See* Wis. Stat. §§ 285.60 (requiring air permits for all sources not otherwise exempted), 285.62(1); Wis. Admin. Code § NR 407.05, Table 3 (requiring permit application to include Nitrous Oxides if greater than 2,000 lbs/year). Moreover, nitrous oxide is also regulated under Wis. Admin. Code § NR 438.03(1)(a) and Table 1, adopted under the Act at 40 C.F.R. § 52.2570(c)(70)(i). Therefore, BACT limits are also required for N<sub>2</sub>O.

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<sup>28</sup> Conference Report for the Consolidated Appropriations Act, at 1254, at <http://www.epa.gov/climatechange/emissions/ghgrulemaking.html>.

**7. Greenhouse gases are also “subject to regulation under the Act.”**

Carbon dioxide is already regulated under the Clean Air Act for the many reasons explained above. Additionally, it is clear that all greenhouse gases are subject to regulation under the Clean Air Act. “Subject to regulation” means “capable of being regulated” and is not limited to pollutants that are “currently regulated.” Federal regulations define “regulated NSR pollutants” to include not only air pollutants for which there are NAAQS under Section 109 of the Act, standards of performance for new sources under Section 111 of the Act, or standards under or established by Title VI of the Act (relating to acid deposition control), but also “[a]ny pollutant that is otherwise subject to regulation under the Act.” 40 C.F.R. §§ 52.21(b)(50) & 51.166(b)(49).

The EPA’s recent endangerment finding irrefutably shows that greenhouse gases are subject to regulation under the Act. The EPA specifically states that it is developing standards for greenhouse gas emissions from motor vehicles and the standard will be issued for public comment in a few months. Endangerment finding p. 23-24. The endangerment finding concludes that greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations and that greenhouse gas emissions from motor vehicles contribute to the atmospheric concentrations of these key greenhouse gases and hence to the threat of climate change. Once these findings are finalized, the EPA has a mandatory legal duty to regulate greenhouse gas emissions from motor vehicles. *Mass. v. EPA*, 549 U.S. at 533. Section 202 of the Clean Air Act requires that the EPA Administrator “shall” proscribe regulations for pollutants that may endanger health or welfare. Thus, not only are greenhouse gases clearly subject to regulation, the regulatory process is in motion for further regulations of greenhouse gases under the Act.

Because BACT requirements extend to pollutants that are “subject to regulation under the Act,” rather than to only those that are actually regulated, Illinois need not and, in fact, cannot wait until the U.S. EPA actually promulgates further regulations. Instead, the IEPA must include GHG BACT limits for the Proposed Coal Plant. Given the well known actual and potential adverse impacts of GHG emissions, and the widely acknowledged need to reduce and control such emissions, it would be nonsensical to allow a major new source of GHGs to slip in under the wire and avoid regulation.

**8. Illinois has the authority under Section 165 of the Clean Air Act and state air pollution laws to impose BACT or stricter limits on greenhouse gas emissions from the proposed plant.**

In addition to being *required* by the Clean Air Act to impose BACT limits on greenhouse gas emissions from the proposed Power Holdings facility, the IEPA is authorized to take steps to avoid or minimize such GHG emissions, including the authority to require a BACT analysis and BACT-level emission limits and/or GHG offsets. One source of such authority is Section 165(a)(2) of the Clean Air Act. Section 165(a)(2) grants a permitting authority broad discretion to impose permit conditions beyond the baseline requirements of BACT in order to protect air quality. *In re Prairie State Generating Co.*, PSD Appeal No. 05-05, slip op. at 40 (E.A.B. 2006),

quoting NSR Manual at B.13. Thus, the IEPA could and should elect to approve a PSD permit only where the permit requires construction of a plant that fully incorporates all available measures for reducing GHGs, adopts appropriate GHG-related emission limits, and/or imposes GHG offset requirements. Under Section 165(a)(2), IEPA should consider such additional permit conditions on its own. *Id.*

In addition, the BACT provisions themselves, 42 U.S.C. § 7479(3), authorize a state permitting agency to take steps to protect air quality that go beyond the bare minimum requirements of BACT. For example, the EAB has found that while a permitting agency may not be required to evaluate the substitution of a gas-fired combustion turbine for a proposed coal-fired steam boiler plant, the agency certainly has the authority to do so. *In re Knauf Fiber Glass, GmbH*, 8 E.A.D. 121, 136 (EAB 1999) (citing *NSR Manual* at B.13-B.14); see also EPA Region 9's Motion for Voluntary Remand at 19-20, *In re Desert Rock Power Company, LLC*, PSD Appeal Nos. 08-03, 08-04, 08-05 and 08-06 (April 27, 2009) ("The Administrator and EAB have generally recognized that the decision about whether to include a lower polluting process in the list of potentially-applicable control options compiled at Step 1 of the top-down BACT analysis is a matter within the discretion of the PSD permitting authority . . . Individual permitting authorities have the discretion to conduct a broader BACT analysis that reflects consideration of alternative production processes when appropriate . . .").

EPA has also recognized that "a PSD permitting authority still has an obligation under section 165(a)(2) to consider and respond to relevant public comments on alternatives to the source," and that a "PSD permitting authority has discretion under the Clean Air Act to modify the PSD permit based on comments raising alternatives or other appropriate considerations." Brief of the EPA Office of Air and Radiation and Region V, *In re Prairie State*, PSD Appeal 05-05, 12 E.A.D. 176 (EAB, Aug. 24, 2006). Here, these comments expressly require IEPA to fulfill this duty. Moreover, the EAB has made clear that a permitting authority has discretion to modify a permit based on consideration of "alternatives," whether or not the commenters raise the issues:

Indeed, the permit issuer is not required to wait until an "alternative" is suggested in the public comments before the permit issuer may exercise the discretion to consider the alternative. Instead, the permit issuer may identify an alternative on its own. This interpretation of the authority conferred by CAA section 165(a)(2)'s reference to "alternatives" is consistent with the Agency's longstanding policy that, . . . "this is an aspect of the PSD permitting process in which states have the discretion to engage in a broader analysis if they so desire."

See *In re Prairie State*, PSD Appeal 05-05 (Aug. 24, 2006) (quoting the NSR Workshop Manual at B.13).

In fact, under this authority, a permitting authority can engage in a wide-ranging exploration of options. Under this authority the IEPA clearly has the discretion to require specific evaluation and control of carbon dioxide emissions, and/or to require other action to

mitigate potential global warming impacts. Failure to do so in this case is a material breach of the agency's obligations to the people of Illinois and the United States.

To date, there has been no specific assessment of available measures or options to reduce the expected greenhouse gas emissions from the proposed Power Holdings facility. The IEPA must consider and could require any number of possible actions to address the carbon dioxide footprint of the proposed plant. Options include requiring construction of a more efficient facility, use of biomass fuel stock, use of a less polluting fuel to run plant processes, and requiring the purchase of carbon dioxide offsets, or some combination of these approaches or others. Offsets can be an essential component of reducing carbon dioxide emissions because they can be implemented quickly for a relatively low cost, such as programs to increase the energy efficiency in buildings, factories, or transportation, generating electricity from renewable energy sources like wind or solar, shutting down older and less efficient power plants, and capturing carbon dioxide in forests and agricultural soils. An advantage of offsets is that they often result in other environmental, social, and economic co-benefits such as reductions in other dangerous pollutants, restoration of degraded lands, improvement in watersheds and water quality, creation of jobs and lower prices for electricity and gasoline.

Additionally, under § 165(a)(2) of the Act, IEPA must consider the “no-build” option, whereby IEPA would deny the PSD permit based on policy considerations related to carbon dioxide and other harmful emissions.

Accordingly, even assuming that IEPA could lawfully issue a PSD permit for the Power Holdings facility without establishing BACT limits for GHGs, the agency has the duty and authority under Section 165 of the Clean Air Act to require GHG emission limits, application of all measures and technologies available to reduce GHG emissions, impose GHG offset measures, and any other appropriate alternatives and options in order to avoid or minimize the GHG emissions from the plants.

**D. IEPA May Not Increase Emissions of Global Warming Under Illinois's Ambient Air Standard and Other Applicable Emission Standard or Standard of Performance for CO<sub>2</sub>.**

IEPA is prohibited from granting this permit without mitigating the global warming impacts because it would allow the project proponent to emit carbon dioxide and other greenhouse gases such as nitrous oxide in such quantities that would cause or tend to cause air pollution. The State Implementation Plan states: “[N]o person shall cause or threaten or allow the discharge or emission of any contaminant into the environment in any State so as, either alone or in combination with other sources, to cause or tend to cause air pollution in Illinois.” 35 Ill. Admin. Code § 201.141.

The term “air pollution” is further defined to mean “the presence in the atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as to be injurious to human, plant, or animal life, to health.” 35 Ill. Admin. Code § 201.102.

Greenhouse gases plainly fit within this definition of air pollution and adding more global warming pollution will accelerate global warming and cause further harm human, plant and animal life. The earth is already beyond safe levels of greenhouse gases in the atmosphere, and adverse impacts are beginning and will continue as a result.

## 1. GHG emissions threaten human health and the environment.

The Intergovernmental Panel on Climate Change<sup>29</sup> (“IPCC”) found that total GHG emissions have grown since pre-industrial times, with an increase of 70% between 1970 and 2004.<sup>30</sup> Of primary concern is Carbon Dioxide (“CO<sub>2</sub>”), which is emitted in much larger quantities than any of the other greenhouse gases and is responsible for close to 85% of the total U.S. GHG inventory.<sup>31</sup> CO<sub>2</sub> emissions have grown between 1970 and 2004 by about 80% (28% between 1990 and 2004).<sup>32</sup> In 2006, U.S. fossil fuel combustion produced 5,637.9 metric tons of carbon dioxide, and emissions from coal alone used in electricity generation accounted for over 2,000 million metric tons of CO<sub>2</sub> in 2006.<sup>33</sup> Indeed, coal is the largest contributor to anthropogenic CO<sub>2</sub> increases into the atmosphere.<sup>34</sup>

Atmospheric CO<sub>2</sub> concentrations are reaching dangerous and unprecedented levels.<sup>35</sup> The global atmospheric concentration of CO<sub>2</sub> has increased from a pre-industrial value of about 280 parts per million (ppm) to 379 ppm, in 2005. The Atmospheric concentration of CO<sub>2</sub> in 2005 exceeds by far the natural range over the last 650,000 years (180-300 ppm) as determined from ice cores.<sup>36</sup> In fact, CO<sub>2</sub> levels are far outside their range of the past 800,000 years for which ice core records of atmospheric composition are available.<sup>37</sup> As further reference, fossil fuels burned

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<sup>29</sup> The IPCC is perhaps the leading source of research and data regarding climate change, its causes, and its impacts. The IPCC is charged with comprehensively and objectively assessing the scientific, technical and socio-economic information relevant to human-induced climate change, its potential impacts, and options for adaptation and mitigation. See “About IPCC,” attached as Exhibit 23. The IPCC has released four assessments—in 1990, 1995, 2001, and 2007—so far, each one stating with greater confidence than the one before that the climate change situation has become increasingly dire.

<sup>30</sup> IPCC Working Group III, Climate Change 2007: Mitigation, Summary for Policy Makers (“IPCC Working Group III Report”) at ES-3 (attached as Exhibit 24).

<sup>31</sup> Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006, EPA #430-R-08-005, April 2008, (“EPA Inventory 1990-2006”) at ES-4, Figure ES-4 (attached as Exhibit 25).

<sup>32</sup> IPCC Working Group III Report at ES-3 (attached as Exhibit 24).

<sup>33</sup> EPA Inventory 1990-2006 at ES-5, 7 (attached as Exhibit 25); EPA Inventory 1990-2006, at A-3 (attached as Exhibit 25). This report expresses these figures as teragrams of CO<sub>2</sub> equivalent (TgCO<sub>2</sub>). One teragram is equal to one million metric tons.

<sup>34</sup> “Dr. James E. Hansen Direct Testimony,” In re Interstate Power and Light Company, before the Iowa Utilities Board, Docket No. GCU-07-01 (“Hansen Testimony”), at 3 (attached as Exhibit 26). Dr. Hansen is Director of the Goddard Institute for Space Studies. A trained physicist and astronomer, Mr. Hansen has focused on climate and global change for about twenty-five years.

<sup>35</sup> Hansen Testimony at 3 (attached as Exhibit 26).

<sup>36</sup> IPCC Working Group I, Climate Change 2007: The Physical Science Basis, Summary for Policymakers (“IPCC Working Group I Report”) at ES-2 (attached as Exhibit 27).

<sup>37</sup> Hansen Testimony at 21 (attached as Exhibit 26).

now by humans in one year contain the amount of carbon buried in organic sediments in approximately 100,000 years.<sup>38</sup>

Evidence shows emissions rates continue to rise. A recent study found that from 2000 to 2006, the average emissions growth rate was 3.3% per year, compared to 1.3% per year during the 1990s.<sup>39</sup> The U.S. E.P.A. found that total U.S. emissions have risen by 14.7 percent from 1990-2006.<sup>40</sup> According to a prominent expert, “The world is already at or above the worst case scenarios.... In terms of emissions, we are moving past the most pessimistic estimates of the I.P.C.C. and by some estimates we are above that red line.”<sup>41</sup> Looking forward, the International Energy Agency (“IEA”) estimates a 57% jump in CO<sub>2</sub> emissions between 2005 and 2030, with the U.S., China, Russia and India contributing two-thirds to this increase.<sup>42</sup> Total CO<sub>2</sub> emissions in Illinois are expected to increase to 325 million metric tons by 2020, a 37% increase over 1990 levels.<sup>43</sup>

The sheer volume of CO<sub>2</sub> in the air diminishes our planet’s ability to process the amount of CO<sub>2</sub> that humans unleash into the atmosphere. The earth is able to ingest atmospheric CO<sub>2</sub>, but only to a certain point. Commonly referred to as “carbon sinks,” oceans and forests absorb CO<sub>2</sub> from the atmosphere. Human sources of CO<sub>2</sub>, such as power plant emissions, have disrupted this carbon cycle: the ocean’s uptake of CO<sub>2</sub> slows as its CO<sub>2</sub> concentrations increase, and in some cases oceans are reaching their saturation points.<sup>44</sup> Once the saturation point is reached, a carbon sink is no longer able to absorb carbon emissions and it may actually begin releasing excess carbon into the atmosphere. For example, one study, published in May 2007, shows that the Southern Ocean—which accounts for 15% of Earth’s carbon sinks—has gradually slowed in its ability to absorb carbon dioxide from the atmosphere since 1990.<sup>45</sup> Another study suggests that a similar reduction in oceanic absorption of carbon dioxide has occurred in the northern Atlantic Ocean.<sup>46</sup> The inevitable result of such carbon cycle disruption is the

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<sup>38</sup> *Id.* at 25.

<sup>39</sup> Canadell, J.G., C.L. Quere, M.R. Raupach, C.B. Field, E.T. Buitenhuis, P. Ciais, T.J. Conway, N.P. Gillett, R.A. Houghton, and G. Marland, “Contributions to accelerating atmospheric CO<sub>2</sub> growth from economic activity, carbon intensity, and efficiency of natural sinks,” *Proc. Natl. Acad. Sci. USA*, doi 10.1073, 2007 (attached as Exhibit 28).

<sup>40</sup> EPA Inventory 1990-2006 at ES-3 (attached as Exhibit 25).

<sup>41</sup> Elizabeth Rosenthal, “U.N. Report Describes Risks of Inaction on Climate Changes,” *The New York Times*, November 17, 2007 (attached as Exhibit 29).

<sup>42</sup> International Energy Agency, *World Energy Outlook 2007, China and India Insights*, (“IEA World Energy Outlook 2007”) at Executive Summary 11 (attached as Exhibit 30).

<sup>43</sup> World Resources Institute, *Illinois Greenhouse Gas Emissions Inventory and Projections*, prepared for the Illinois Climate Change Advisory Group (Feb. 2007), at 8 (attached as Exhibit 31).

<sup>44</sup> Hansen Testimony at 49 (attached as Exhibit 26); Le Quere, C., C. Rodenbeck, E.T. Buitenhuis, T.J. Conway, R. Langenfelds, A. Gomez, C. Labuschagne, M. Ramonet, T. Nakazawa, N. Metzl, N. Gillett, and M. Heimann, “Saturation of the Southern Ocean CO<sub>2</sub> sink due to recent climate change,” *Science*, 316 (5832), 1735-1738, 2007 (attached as Exhibit 32).

<sup>45</sup> Le Quere, C., et.al., “Saturation of the Southern Ocean CO<sub>2</sub> sink due to recent climate change,” *Science*, 316 (5832), 1735-1738, 2007 (attached as Exhibit 32).

<sup>46</sup> Schuster, U., and A.J. Watson, “A variable and decreasing sink for atmospheric CO<sub>2</sub> in the North Atlantic,” *J. Geophysical Res.*, 112, C11006, doi:10.1029/2006JC003941, 2007 (attached as Exhibit 33).

dominance of CO<sub>2</sub> in the atmosphere, which is creating and will continue to wreak catastrophic consequences for humans and other species.<sup>47</sup>

Rising atmospheric CO<sub>2</sub> concentrations is a leading cause of global warming.<sup>48</sup> In fact, the IPCC reports CO<sub>2</sub> as the most influential factor contributing to global warming.<sup>49</sup> Based on more than 29,000 observational data series, from 75 studies, the IPCC has concluded that “Warming of the climate system is unequivocal.”<sup>50</sup> The IPCC reports the temperature increase since the 1950s is very likely due to the increase in human caused GHG pollution, and cannot be due to natural causes alone.<sup>51</sup> Put another way, as NASA scientist explained, when discussing warming in Antarctica, “It’s extremely difficult to think of any physical way” the increase in greenhouse gases could *not* lead to global warming.<sup>52</sup>

The IPCC measured direct indicators of climate change, including global average air and ocean temperatures, ice and snow melt patterns, rising sea levels, changes in arctic temperatures, ocean salinity, and wind patterns, and incidence of extreme weather events. The following are among the reports’ more alarming conclusions:

- Eleven of the last twelve years (1995-2006) rank among the 12 warmest years in the instrumental record of global surface temperature (since 1850).<sup>53</sup>
- Total temperature increase from 1850-1899 to 2001-2005 is .76 degrees C.
- The average atmospheric water vapor content has increased since at least the 1980s over land and ocean as well as in the upper troposphere. The increase is broadly consistent with the extra water vapor that warmer air can hold.
- Average Northern Hemisphere temperatures during the second half of the 20<sup>th</sup> century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1300 years.

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<sup>47</sup> Hansen Testimony at 31 (attached as Exhibit 26).

<sup>48</sup> IPCC Working Group I Report at ES-3-4, Figure SPM.2 (attached as Exhibit 27); IEA World Energy Outlook, 2007, at Executive Summary 11 (attached as Exhibit 30); *see also* Hansen Testimony at 3 (attached as Exhibit 26).

<sup>49</sup> IPCC Working Group I Report at ES-2-4, Figure SPM.2 (attached as Exhibit 27). A factor’s radiative forcing is the influence the factor has on tending to warm or cool the planet.

<sup>50</sup> *Id.* at ES-5.

<sup>51</sup> *Id.* at ES-10

<sup>52</sup> Kenneth Chang, “Study Finds New Evidence of Warming in Antarctica,” *The New York Times*, January 22, 2009 (attached as Exhibit 34).

<sup>53</sup> *See also*, National Oceanic and Atmospheric Administration, National Climatic Data Center, “A Paleo Perspective on Global Warming,” available at <http://www.ncdc.noaa.gov/paleo/globalwarming/end.html> (attached as Exhibit 35) (“Multiple paleoclimatic studies indicate that recent years, the 1990s, and the 20th century are all the warmest, on a global basis, of at least the last 1000 years.”).

- Glacial lakes are growing in number and size, permafrost regions are experiencing ground instability and hydrological systems suffer from increased runoff and earlier spring peak discharge, effecting the thermal structure and water quality of glacier-fed lakes and rivers.
- Global average sea level rose at an average rate of 1.8 mm per year between 1961 and 2003. The rate was faster over 1993-2003, about 3.1 mm per year.
- Average arctic temperatures increased at almost twice the global average rate in the past 100 years.
- Satellite data since 1978 show that annual average arctic sea ice extent has shrunk by 2.7% per decade.
- Temperatures at the top of the permafrost layer have generally increased since the 1980s in the Arctic by up to 3 degrees C. The maximum area covered by seasonally frozen ground has decreased by about 7% in the Northern Hemisphere since 1900.
- Increased precipitation and increased drying has been observed in different global regions.
- Changes in precipitation and evaporation over the oceans have increased ocean salinity in low-latitude waters and decreased salinity in high-latitude waters.
- The uptake of anthropogenic carbon since 1750 has led to the ocean becoming more acidic with an average decrease in pH of .1 units.
- Mid-latitude westerly winds have strengthened in both hemispheres since the 1960s.
- More intense and longer droughts have been observed over wider areas since the 1970s.
- In the past 50 years, cold days, cold nights and frost have become less frequent, while hot days, hot nights and heat waves have become more frequent.
- There is observational evidence for an increase in intense tropical cyclone activity in the North Atlantic since about 1970, correlated with increases of tropical sea surface temperatures.

In light of these findings, climate scientists urge immediate action to curtail CO<sub>2</sub> and other GHG emissions. Rajendra Pachauri, and IPCC scientist and economist asserts, “If there is no action before 2012, that’s too late.... What we do in the next two to three years will determine our future. This is the defining moment.”<sup>54</sup> Dr. Hansen opines that the single most

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<sup>54</sup> Elisabeth Rosenthal, “U.N. Chief Seeks More Climate Change Leadership,” The New York Times, Nov. 18, 2007 (attached as Exhibit 36).

important action needed to decrease the present planetary imbalance driving climate change is curtailment of CO<sub>2</sub> emissions from coal burning.<sup>55</sup>

It is important to note that increasing emissions of CO<sub>2</sub> and other greenhouse gases may also be compounding the dangers of climate change by creating self-triggering feedback loops.<sup>56</sup> For example, the melting of Arctic ice, which occurs as the atmosphere warms, can trigger additional warming because ice is more reflective of the Sun's heat than is the land and ocean that replaces the melting ice. In other words, as the planet's surface albedo (or reflectivity) lowers, the planet absorbs more sunlight, leading to further warming. As such, it is possible that increased CO<sub>2</sub> emissions will lead to a tipping point beyond which climate change will rapidly accelerate beyond what the scientific models currently predict.

There is no doubt, then, that greenhouse gases (including CO<sub>2</sub>, N<sub>2</sub>O and methane) threaten human health and the environment. Indeed, the IEA has warned that “[u]rgent action is needed if greenhouse-gas concentrations are to be stabilised at a level that would prevent dangerous interference with the climate system.” Specifically, the Agency focused on the dangers posed by the increased construction of coal-fired power plants. According to the IEA, “government action must focus on curbing the rapid growth in CO<sub>2</sub> emissions from coal-fired power stations – the primary cause of the surge in global emissions in the last few years.”<sup>57</sup> Numerous additional scientific studies directly link climate change with significant public health, environmental, economic, and ecological impacts.<sup>58</sup> Such impacts include direct heat-related effects, extreme weather events, climate-sensitive disease impacts, air quality effects, agricultural effects (and related impacts on nutrition), wildlife and habitat impacts, biodiversity impacts, impacts on marine life, property damage, and social disruption (such as population displacement).<sup>59</sup>

The IPCC reports and other studies provide compelling evidence of dramatic changes in Earth's climatic systems. Changes in climatically sensitive indicators support the inference that the average temperature in the Northern Hemisphere over the last half-century is likely higher than at any time in the previous 1,300 years, while ice core records indicate that the polar regions have not experienced an extended period of temperatures significantly warmer than today's in about 125,000 years.<sup>60</sup>

The IPCC, other agencies and scientists report numerous long-term changes occurring across many different climate sectors. These observed changes applied to scientific modeling

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<sup>55</sup> Hansen Testimony at 6 (attached as Exhibit 26).

<sup>56</sup> IPCC, *Climate Change 2007: Synthesis Report: Summary for Policymakers*, at 7-8 (attached as Exhibit 37).

<sup>57</sup> IEA *World Energy Outlook 2007* at Executive Summary 12 (attached as Exhibit 30).

<sup>58</sup> See, e.g., IPCC Working Group II Report, *Climate Change 2007: Impacts, Adaptation, and Vulnerability* (“IPCC Working Group II Report”) (attached as Exhibit 38); see also Matthias Ruth, *et al.*, *The US Economic Impacts of Climate Change and the Costs of Inaction*, Center for Integrative Environmental Research (Oct. 2007) (attached as Exhibit 39). The Pew Center on Global Climate Change has also issued a series of reports on the impacts of climate change (see attached Exhibit 40).

<sup>59</sup> EPA, *Climate Change, Health and Environmental Effects* (attached as Exhibit 41).

<sup>60</sup> IPCC Working Group I Report at ES-9 (attached as Exhibit 27).

and compared against paleoclimatic data yield startling results, first and foremost being that temperature changes of a few degrees can cause large impacts.<sup>61</sup> Most troubling, however, are the secondary consequences arising from seemingly insignificant temperature increases, upon sea level, the Earth's hydrological and biological systems, plant and animal habitats, weather patterns and public health.

Rising temperatures melt large Arctic and Antarctic ice sheets, filling the oceans and raising the sea level. NASA physicist James Hansen predicts "business-as-usual" growth of GHGs will result in a sea level rise of 1 meter during this century. The IPCC calculated a sea level rise of only 21-51 centimeters by 2095, but that report omitted any calculation due to ice sheet disintegration, because the IPCC was unable to reach a consensus on the magnitude of likely ice sheet disintegration.<sup>62</sup> "The last time the Earth was 2-3 degrees warmer than today, about 3 million years ago, sea level was about 25 meters higher. More than a billion people live within 25 meters above sea level. The last time the planet was 5 degrees warmer, just prior to the glaciation of Antarctica, about 35 million years ago, there were no large ice sheets on the planet. If ice sheets melt entirely, sea level will rise about 70 meters."<sup>63</sup> Sea level is rising about 35 cm per century, which is double the rate of 20 years ago. This data contrasts with historical data, which shows sea level had been relatively stable for the past several millennia.<sup>64</sup> The IPCC estimates that if the Greenland Ice Sheet, which is expected to continue melting, disappears completely, the result would be a 7 meter rise in sea level.<sup>65</sup>

Paleoclimate data has shown a correlation between increased warming and release of methane gas. Methane gases, trapped in ocean sediments and frozen ground, can be released during periods of melt.<sup>66</sup> Though methane is less prevalent in the atmosphere than is CO<sub>2</sub>, it is far more effective than CO<sub>2</sub> in trapping heat in the atmosphere.<sup>67</sup>

Warmer temperatures are affecting water systems and terrestrial habitats. Increased runoff from melting snow and earlier spring peak discharge not only threatens flooding, but alter the temperature and quality of glacier-fed lakes and rivers.<sup>68</sup> These changes in hydrology, in turn, have consequences upon aquatic plants and animals.<sup>69</sup> Global warming is also triggering spring-time events to occur earlier than normal. Earlier spring and warmer temperatures are forcing some animal species to migrate northward in attempt to stay within their natural climate.<sup>70</sup> Animal species living in polar climates are not so lucky, as their habitats are shrinking

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<sup>61</sup> Hansen Testimony at 10 (attached as Exhibit 26).

<sup>62</sup> *Id.* at 16.

<sup>63</sup> *Id.* at 15.

<sup>64</sup> *Id.* at 43.

<sup>65</sup> IPCC Working Group I Report at ES-17 (attached as Exhibit 27).

<sup>66</sup> Hansen Testimony at 37 (attached as Exhibit 26).

<sup>67</sup> Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, EPA #430-R-07-002, April 2007, ("EPA Inventory 1990-2005") at ES-8 (attached as Exhibit 42).

<sup>68</sup> IPCC Working Group II Report at ES-8 (attached as Exhibit 38).

<sup>69</sup> *Id.*

<sup>70</sup> *Id.*; Hansen Testimony at 7 (attached as Exhibit 26).

with no possibility of moving northward. For example, the U.S. Fish and Wildlife Service has proposed to list the polar bear as a threatened species under the Endangered Species Act because global warming is destroying its critical habitat, Arctic sea ice.<sup>71</sup> Projected changes in future sea ice conditions, if realized, will result in loss of approximately 2/3 of the world's current polar bear population by the mid 21st century. Because the observed trajectory of Arctic sea ice decline appears to be underestimated by currently available models, this assessment of future polar bear status may be conservative.<sup>72</sup> In general, approximately 20-30% of plant and animal species are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5 degrees C to 2.5 degrees C.<sup>73</sup>

In addition to the evolving changes in hydrology and terrestrial climates, our planet has recently experienced and will continue to experience an increase in number and severity of extreme weather events. As global warming increases, the risks associated with catastrophic natural disasters, such as hurricanes, tornados, and tsunamis, also increase.<sup>74</sup> One study predicts an 8% to 16% average increase in intensity of hurricanes.<sup>75</sup> Another study predicts similar results for tornadoes and thunderstorms, with the most severe storms occurring more often.<sup>76</sup>

Numerous additional environmental impacts are likely to occur as a result of climate change.<sup>77</sup> These impacts include:

- 10-30% decreases in annual average river runoff and water availability in some dry regions at mid-latitudes and in the dry tropics;
- Declines in water supplies stored in glaciers and snow cover, which approximately one-sixth of the world relies at least in part on for water;
- Decreased snowpack, more winter flooding, and reduced summer river flows in western North America, exacerbating competition for over-allocated water resources;

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<sup>71</sup> U.S. Dept of Interior, Fish & Wildlife Service, "12-Month Petition Finding and Proposed Rule To List the Polar Bear (*Ursus maritimus*) as Threatened Throughout Its Range," 72 Fed. Reg. 1064 (Jan. 9, 2007) (attached as Exhibit 43).

<sup>72</sup> United States Geological Survey, "Science to Inform U.S. Fish & Wildlife Service Decision Making on Polar Bears: Executive Summary" (attached as Exhibit 44).

<sup>73</sup> IPCC Working Group II at ES-11 (attached as Exhibit 38).

<sup>74</sup> See, e.g., Emanuel, K., Increasing destructiveness of tropical cyclones over the past 30 years, *Nature*, online publication; published online 31 July 2005 | doi: 10.1038/nature03906 (2005) (attached as Exhibit 45); Knutson, T. K., and R. E. Tuleya, 2004: Impact of CO<sub>2</sub>-induced warming on simulated hurricane intensity and precipitation: Sensitivity to the choice of climate model and convective parameterization. *Journal of Climate*, 17(18), 3477-3495 (attached as Exhibit 46).

<sup>75</sup> Knutson, T. K., and R. E. Tuleya, 2004: Impact of CO<sub>2</sub>-induced warming on simulated hurricane intensity and precipitation: Sensitivity to the choice of climate model and convective parameterization. *Journal of Climate*, 17(18), 3477-3495 (attached as Exhibit 46).

<sup>76</sup> Del Genio, Yao, and Jonas, *Geophysical Research Letters*, v.34, L16703, doi:10.1029/2007GL030525, 2007 (attached as Exhibit 47).

<sup>77</sup> IPCC Working Group II Report (attached as Exhibit 38).

- Increased drought, coupled with increased heavy precipitation events that augment flood risks;
- Impacts to North American forests from increased pests, droughts, and fires;
- Agricultural disruption from increased droughts and heat, and declining water availability in some areas;
- Widespread coral mortality and negative impacts on their dependent species from increased temperature and acidification of the oceans;
- Loss of coastal wetlands and habitats from rising sea levels.

Public health is closely linked to climate and, therefore, it is not surprising that global climate change is expected to have numerous significant impacts on human health. The U.S. EPA warns:

Throughout the world, the prevalence of some diseases and other threats to human health depend largely on local climate. Extreme temperatures can lead directly to loss of life, while climate-related disturbances in ecological systems, such as changes in the range of infective parasites, can indirectly impact the incidence of serious infectious diseases. In addition, warm temperatures can increase air and water pollution, which in turn harm human health.<sup>78</sup>

Specifically, human and public health threats from ambient air concentrations of greenhouse gases include:

- Increased heat-related mortalities stemming from dramatic increases in summer heat index values in the Northeast, Southeast, and Midwest;<sup>79</sup>
- Worsening of air quality problems that already impact human health, including increased concentrations of ground-level ozone and particulate matter, exacerbated cardiovascular and pulmonary illnesses, asthma and chronic obstructive pulmonary disorders;<sup>80</sup>

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<sup>78</sup> EPA, Climate Change, Health and Environmental Effects (attached as Exhibit 41).

<sup>79</sup> U.S. Department of State, U.S. Climate Action Report (2002) at 106 (attached as Exhibit 48); *See also*, Patz, “Impact of Regional Climate Change on Human Health,” *Nature*, 438, 310-317 (attached as Exhibit 49) (The World Health Organization estimates climate change causes more than 150,000 deaths annually world-wide, killing a disproportionate amount of children in poor countries.).

<sup>80</sup> U.S. Department of State, U.S. Climate Action Report (2002) at 107 (attached as Exhibit 48); U.S. Climate Change Science Program, *Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems*, Third Review Draft, at ES-9 (attached as Exhibit 50).

- Increased risk of infectious diseases, including the expansion of the range of malaria and dengue fever, and more favorable conditions for outbreaks of West Nile Virus in the Northeastern U.S.<sup>81</sup>
- Greater casualties from extreme weather events, such as hurricanes, droughts, floods, wildfires and severe storms.<sup>82</sup>

The only reasonable way to address these threats to human health is to address the underlying problem, global warming, as the U.S. public health community is not prepared for multiple, global warming induced, large scale disasters.<sup>83</sup>

Climate change is not limited to arctic regions or people living on the coasts. While global warming is a worldwide phenomenon, the major climate changes associated with global warming – increases in average temperature, and increased incidences of extreme heat, droughts, and heavy rain events – will be experienced throughout Illinois. For example, just a few of the likely impacts of climate change in the Midwest include:<sup>84</sup>

- A 6 to 10 degree increase in average winter temperatures and a 7 to 13 degree increase in average summer temperatures by the end of the century;
- A changing of the climate in to resemble that of northern Arkansas in the summer and southern Ohio in the winter;
- Increased heavy rainstorms and precipitation, yet a drier climate due to increased evaporation from the heat;
- A double or tripling of days in which the temperature exceeds 90 degrees in the Detroit area, and a five to ten fold increase in the number of days in which the temperature exceeds 97 degrees;
- A 1.5 to 8 foot decline in water levels in the Great Lakes and declines in the levels of inland lakes;

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<sup>81</sup> EPA, Climate Change, Health and Environmental Effects (attached as Exhibit 41); Peter C. Frumhoff, *et al.*, *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions* (July 2007) (attached as Exhibit 51).

<sup>82</sup> U.S. Climate Change Science Program, *Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems*, Third Review Draft, at ES-4 (attached as Exhibit 50).

<sup>83</sup> “Dr. Kristen Welker-Hood Direct Testimony,” In re Interstate Power and Light Company, before the Iowa Utilities Board, Docket No. GCU-07-01, at 5 (attached as Exhibit 52).

<sup>84</sup> National Conference of State Legislatures, *Illinois: Assessing the Costs of Climate Change* (Oct. 2008) (attached as Exhibit 53); Matthias Ruth, *Economic Impacts of Climate Change on Illinois*, A Review and Assessment Conducted by the Center for Integrated Environmental Research, University of Maryland (July 2008) (attached as Exhibit 54); George W. Kling, et al., *Findings From Confronting Climate Change in the Great Lakes Region: Impacts on Illinois Communities and Ecosystems* (April 2003) (attached as Exhibit 55); U.S. Global Climate Change Research Program, *Climate Change Impacts on the United States*, ch. 6 (2001) (attached as Exhibit 56).

- Substantial disruption to agriculture from increased heavy rainstorms, a drier climate, increased heat, and the spread of agricultural pests;
- Disruption of the shipping industry, including the need for costly dredging, as a result of declining Great Lakes water levels; and
- Significant drain on public sector budgets, as infrastructure such as sewers and waste-water treatment plants will have to be upgraded to handle heavy precipitation events, and other areas will have to take steps to deal with droughts.

Therefore, it is undeniable that increases greenhouse gas emissions from the proposed facility here “alone or in combination with other sources” will result in “the presence in the atmosphere of . . . air contaminants in sufficient quantities and of such characteristics and duration as to be injurious . . .” IEPA may not issue a permit that will cause additional injury to human health and the health of animal and plant life. Pursuant to 42 U.S.C. § 7475(a)(3)(A), (C), IEPA cannot issue a PSD permit for the facility unless and until the applicant demonstrates that emissions from the facility will not cause or contribute to air pollution in violation of this SIP-approved standard, which limits emissions and resulting ambient concentration of greenhouse gases.

#### **E. IEPA Should Follow Other States’ Leads to Curb Greenhouse Gas Emissions.**

IEPA should look to a number of different judicial bodies and states that have already taken steps to curb GHG emissions from coal plants in actions relevant to the required BACT analysis. For example:

- Montana law requires that all new electric generating units that are “primarily fueled by coal” capture and sequester at least 50% of their CO<sub>2</sub> emissions. Mt. Code 69-8-421(7).
- Delaware recently promulgated regulations limiting CO<sub>2</sub> emissions from electric generating units to 1,900 lbs/MWh for existing units and units installed by the end of 2011, and to 1,650 lbs/MWh for units installed on or after January 1, 2012. Del. Admin. Code 7 1000 1144 §§ 3.2.1.1, 3.2.2.1. Those regulations have been incorporated into Delaware’s State Implementation Plan under the Clean Air Act. 73 Fed. Reg. 23,101 (April 29, 2008); 40 C.F.R. § 52.420(c).
- A Georgia state court recently ruled that the Georgia Department of Environmental Protection had to establish BACT limits for CO<sub>2</sub> emissions from the proposed Longleaf coal-fired power plant. *Friends of the Chattahoochee, Inc. v. Couch*, Docket No. 2008CV146398 (Ga. Sup. Ct. June 30, 2008). The court found that the argument that CO<sub>2</sub> need not be limited is “untenable” because “there is no question that CO<sub>2</sub> is ‘subject to regulation under the Act.’” *Id.*, slip op. at 7.

- The State of Washington passed legislation requiring that long-term utility financial commitments only be made with sources that have the lower of 1100 pounds of greenhouse gas emissions per megawatt-hour (lbs/MWh) or the average greenhouse gas emission output of new combined cycle natural gas thermal electric generation turbines commercially available and offered for sale. Wash. Rev. Code 80.80. Projects that would emit more than 1,100 lbs/MWh of greenhouse gases must capture and sequester the excess. *Id.* In November 2007, the Washington Energy Facility Site Evaluation Council halted consideration of Energy Northwest’s proposal for a 793 MW coal plant because the company had not submitted a plan for sequestering excess CO<sub>2</sub> emissions from the facility.<sup>85</sup>
- California passed legislation requiring that long-term baseload power contracts of five years or longer only be made with sources that have a greenhouse gas impact no higher than that of a natural gas combined cycle plant. Cal. Pub. Util. Code § 8341. The California Public Utilities Commission and the California Energy Commission have since established the operative level as 1,100 pounds per megawatt-hour.<sup>86</sup>
- On December 15, the New Jersey Department of Environmental Protection (NJDEP) announced a plan to reduce greenhouse gas emissions to 1990 levels by 2020, followed by another reduction by 2050 to a level that is 80% below 2006 levels. The plan includes fossil fuel standards for electrical generating units, among other recommendations.

## **II. The Draft Permit Fails To Include BACT and Satisfy Air Quality Protections For PM<sub>2.5</sub>.**

Before IEPA can issue a permit for the PH plant, it must ensure that: (1) The plant is subject to BACT for each regulated NSR pollutant, 40 C.F.R. § 52.21(j); and (2) The plant will not cause or contribute to any violation of a national ambient air quality standard (NAAQS) or increment, 40 C.F.R. § 52.21(k). *See also* 42 U.S.C. § 7475(a)(3), (4).

The Draft Permit does not include PM<sub>2.5</sub> BACT limits, nor does the record contain a top-down BACT analysis specific to PM<sub>2.5</sub>. Controlling law requires a BACT limit “for each pollutant subject to regulation under the Act that it would have the potential to emit in significant amounts.” 40 C.F.R. § 52.21(j)(2). PM<sub>2.5</sub> is “a pollutant subject to regulation under the Act” because EPA established a NAAQS for PM<sub>2.5</sub> in 1997. 62 Fed. Reg. 38711; 40 C.F.R. § 50.7. Moreover, PM<sub>2.5</sub> will be emitted from the new and modified emission sources at the PH plant in a “significant” amount because it will be emitted at 10 tons per year or more, 73 Fed. Reg. at 28,332, and because the plant will have a significant increase in PM<sub>2.5</sub> precursors SO<sub>2</sub> and NO<sub>x</sub>. *Id.* at 28,333.

There is no legal or factual basis for IEPA’s failure to include a PM<sub>2.5</sub> BACT limit for each emission point at the facility. There are no longer any technical reasons prohibiting such

<sup>85</sup> In re Application No. 2006-01, Energy Northwest, Order Staying Adjudicative Proceeding (Wash. Energy Facility Site Eval. Council, Nov. 7, 2007) (attached as Exhibit 57).

<sup>86</sup> California Public Utilities Commission, Greenhouse Gas Emissions Performance Standard (attached as Exhibit 58); California Energy Commission, SB 1368 Emission Performance Standards (attached as Exhibit 59).

limits. Proposed Rule, 72 Fed. Reg. 54,112 (Sept 12, 2007); *see also* 70 Fed. Reg. at 66,043 (recognizing that the “practical difficulties” identified in the Seitz memo “have been resolved in most respects”). EPA withdrew all guidance suggesting that PM<sub>10</sub> could be used as a surrogate. 73 Fed. Reg. 28,321 (May 16, 2008). EPA has also stayed the effectiveness of 40 C.F.R. § 52.21(i)(1)(xi), which purported to allow the limited time use of PM<sub>10</sub> as a surrogate for PM<sub>2.5</sub>. *See* Letter from Administrator Jackson to Paul Cort, Earthjustice (April 24, 2009) (attached as Exhibit 60).

Moreover, there is no legal or factual basis to assume that a PM (or PM<sub>10</sub>) limit is equivalent to a PM<sub>2.5</sub> limit. The EPA’s promulgation of PM<sub>2.5</sub> NAAQS is premised upon the finding that PM<sub>10</sub> and PM<sub>2.5</sub> are not equivalent and a PM<sub>2.5</sub> standard—rather than merely a PM<sub>10</sub> standard—was necessary to protect health and welfare. That finding cannot be effectively undone, by substituting PM<sub>10</sub> through a guidance document, based upon administrative expediency. Moreover, PM<sub>2.5</sub> is comprised of a larger fraction of condensable particulates than is PM or PM<sub>10</sub>, and controls for PM and PM<sub>10</sub> are not necessarily controls for PM<sub>2.5</sub>. *See* 73 Fed. Reg. at 28,334; *In re So. Montana Elec. Generation and Transmission Coop., Highwood Gen. Station*, Slip. Op. at 9, 25-30 (Mont. Bd. Env’t. Rev. May 30, 2008) (attached as Exhibit 61).

In addition, Power Holdings assumes that BACT for PM<sub>2.5</sub> is the same as the BACT for the other PM size fractions, such as PM<sub>10</sub>.<sup>87</sup> This is technically incorrect and invalid. PM<sub>2.5</sub> and PM<sub>10</sub> are different pollutants in so far as the size fraction affects control equipment and efficiencies differently. Thus, assuming that equipment designed and deemed appropriate as BACT for PM<sub>10</sub> is also the same as BACT for PM<sub>2.5</sub> is erroneous. Power Holdings should conduct a separate BACT analysis for PM<sub>2.5</sub>.

Furthermore, IEPA has not modeled the PM<sub>2.5</sub> emissions from the facility to demonstrate that they comply with either the PM<sub>2.5</sub> NAAQS or PM<sub>2.5</sub> increment, despite EPA’s instructions to do so. 73 Fed. Reg. at 28,336 (“sources will be required to perform [air quality impact] analysis for the PM<sub>2.5</sub> NAAQS and, when finalized, PM<sub>2.5</sub> increments.”). Moreover, IEPA has not required, and PH has not done preconstruction monitoring of ambient PM<sub>2.5</sub> concentrations as required before a PSD permit can be issued. 42 U.S.C. § 7475(a)(7), (e); 40 C.F.R. § 52.21(m).

The applicant, for its part, provided unsupported estimates of only filterable PM<sub>2.5</sub> emissions in a submittal dated August 20, 2008. However, this submittal did not address the condensable fraction of PM<sub>2.5</sub>—which comprises the majority of PM<sub>2.5</sub> emissions. The applicant apparently believes that because EPA did not address condensable PM<sub>2.5</sub> in their May 8, 2008, rule-making for PM<sub>2.5</sub>, condensable PM<sub>2.5</sub> emissions need not be estimated or accounted for. There is no legal basis for this belief. Indeed, since condensable PM<sub>2.5</sub> are significant (in many cases the majority of the PM<sub>2.5</sub> emissions), and because PM<sub>2.5</sub> is a known health and welfare threat, assuming condensable PM<sub>2.5</sub> emissions to be zero is arbitrary, capricious, and a dereliction of IEPA’s duties. The total PM<sub>2.5</sub> emission rate, which is the combination of filterable and condensable PM<sub>2.5</sub> emissions, must be determined and an air impact analysis done. In any event, the facility is a major source for PM<sub>2.5</sub>.

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<sup>87</sup> *See* Submittal titled PM<sub>2.5</sub> Permit Input, dated August 30, 2008, page 2.

Moreover, regardless of the federal PM<sub>2.5</sub> standards, IEPA is prohibited from granting this permit without first determining that the facility will not “cause or threaten or allow the discharge or emission of” PM<sub>2.5</sub> “into the environment... so as, either alone or in combination with other sources, to cause or tend to cause air pollution in Illinois.” 35 Ill. Admin. Code § 201.141. The term “air pollution” means “the presence in the atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as to be injurious to human, plant, or animal life, to health . . . .” 35 Ill. Admin. Code § 201.102. Notably, there has been no analysis of PM<sub>2.5</sub> impacts from the proposed plant. More importantly, it is clear that PM<sub>2.5</sub> concentrations below the federal NAAQS, which have been remanded to the EPA as insufficient to protect health and the environment,<sup>88</sup> are insufficient to prevent “sufficient quantities . . . and duration as to be injurious to human, plant, or animal life.” In short, merely complying with the remanded federal PM<sub>2.5</sub> NAAQS (even if IEPA or the applicant had done this analysis) is insufficient to satisfy the Illinois ambient air standard set forth in 35 Ill. Admin. Code § 201.141. Before issuing a PSD permit, IEPA must, first, identify the PM<sub>2.5</sub> concentration that will satisfy § 201.141, then determine that emissions from the PH facility “either alone or in combination with other sources” will not exceed that standard. *See* 42 U.S.C. § 7475(a)(3)(A), (C). That has not been done for the proposed Power Holdings facility.<sup>89</sup>

Scientific consensus exists that the current PM<sub>2.5</sub> NAAQS are not sufficiently protective of public health, especially in areas with populations of older residents and young children. According to the U.S. EPA, the PM<sub>2.5</sub> fraction of particulate matter is distinguishable from the coarse fraction, as the smaller particles pose the “largest health risks.”<sup>90</sup> In fact, in a 1996 report on the need to revise the PM ambient air quality standards, EPA staff found that the epidemiological data more strongly support fine particles as the surrogate for the fraction of PM most clearly associated with health effects at levels below the standards in place at that time.<sup>91</sup> Disturbingly, PM<sub>2.5</sub> has been linked to premature death, in addition to aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions for asthma, emergency room visits, absences from school or work, and restricted activity days), changes in lung function and increased respiratory symptoms, and more subtle indicators of cardiovascular health.<sup>92</sup> U.S. EPA also has identified lung cancer deaths, infant mortality and development problems (such as low birth weight in children) as possibly linked to PM<sub>2.5</sub>.<sup>93</sup>

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<sup>88</sup> *American Farm Bureau Federation v. EPA*, Case No. No. 06-1410, Slip Op. (D.C. Cir. Feb. 24, 2009).

<sup>89</sup> Additionally, BACT limits for PM<sub>2.5</sub> must consider Lowest Achievable Emission Rates, which include the most stringent standards found in any SIP. Therefore, the PM<sub>2.5</sub> BACT limits must also consider PM<sub>2.5</sub> emission rates that comply with 35 Ill. Admin. Code § 201.141.

<sup>90</sup> *See* US EPA, “PM<sub>2.5</sub> NAAQS Implementation,” available at [http://www.epa.gov/ttnnaqs/pm/pm25\\_index.html](http://www.epa.gov/ttnnaqs/pm/pm25_index.html); *see also* U.S. EPA Office of Air Quality Planning and Standards, “Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information.” Staff Paper (July 1996) (“PM<sub>2.5</sub> Staff Paper”), available at [http://www.epa.gov/ttn/naqs/standards/pm/s\\_pm\\_1997\\_sp.html](http://www.epa.gov/ttn/naqs/standards/pm/s_pm_1997_sp.html), at V-58 to V-77 (discussing health studies of fine versus coarse particles)

<sup>91</sup> PM<sub>2.5</sub> Staff Paper at V-77.

<sup>92</sup> Clean Air Fine Particle Implementation Rule, 72 Fed. Reg. 20586, 20586-20587 (Apr. 25, 2007) (to be codified at 40 C.F.R. Part 51)

<sup>93</sup> *See* National Ambient Air Quality Standards for Particulate Matter, Proposed Rule, 71 Fed. Reg. 2620, 2627 (Jan 17, 2006).

Children are especially susceptible to the harms from PM<sub>2.5</sub>. According to the American Academy of Pediatrics, children and infants are among the most susceptible to many air pollutants, including PM<sub>2.5</sub>. Exposure to high levels of fine particulates impacts the ability of children's lungs to grow.<sup>94</sup> This damage is irreversible, and subjects children to greater risk of respiratory problems as adults. Children also have increased exposure compared with adults because of higher minute ventilation and higher levels of physical activity, and thus face serious health problems from PM<sub>2.5</sub> pollution. This susceptibility is evidenced by a recent study of PM<sub>2.5</sub> and asthmatic children in Detroit, which emphasizes "the continued need for enforcement of existing standards."<sup>95</sup>

Older adults also are particularly susceptible to PM<sub>2.5</sub> because of their weaker lungs and hearts. For example, studies have suggested that serious health effects, such as premature mortality, are greater among older groups of individuals.<sup>96</sup> Older adults also are more likely than younger ones to have preexisting respiratory and/or cardiovascular conditions that become aggravated with exposure to PM<sub>2.5</sub>.<sup>97</sup>

Fine particle pollution from coal plants spreads over a wide area, with the majority occurring within a 500-mile radius of a plant<sup>98</sup> and the greatest concentrations seen nearby and within a moderate distance of a coal plant.<sup>99</sup> Numerous studies have linked fine particle pollution from coal plants in particular with the negative health effects described above.<sup>100</sup> For example, one study found PM<sub>2.5</sub> pollution from the J.H. Campbell plant (located in West Olive, Michigan, and owned by Consumers Energy) in 2001 alone to be associated with 91-105 premature deaths (from all causes, with 12 due to cancer and 66 due to cardiopulmonary effects), 63 cases of chronic bronchitis, 33 hospital admissions, 24 asthma-related emergency room visits, 17,415 lost days of work, and 2,054 asthma attacks.<sup>101</sup>

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<sup>94</sup> See Statement of Katherine M. Shea, MD, MPH, FAAP, On Behalf of the American Academy of Pediatrics, Before the Clean Air Scientific Advisory Committee to the U.S. Environmental Protection Agency, Regarding National Ambient Air Quality Standards for Particulate Matter, available at <http://www.cleanairstandards.org/article/2005/04/390>.

<sup>95</sup> See, e.g., T. Lewis, et al., Pollution-Associated Changes in Lung Function among Asthmatic Children in Detroit, *Environ Health Perspect* 113:1068–1075 (2005).

<sup>96</sup> See, e.g., 71 Fed. Reg. at 2637.

<sup>97</sup> *Id.*

<sup>98</sup> L Deck (Abt Associates), "Particulate-Related Health Impacts of Emissions in 2001 From 41 Major US Power Plants," Nov. 2002, available at <http://www.environmentalintegrity.org/pub80.cfm>.

<sup>99</sup> See 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* 110:1253–1260 at 1257 (2002) (Figure 2 showing combined concentration reductions from emissions controls at power plants, in terms of primary PM<sub>2.5</sub>, secondary PM<sub>2.5</sub>, and total PM<sub>2.5</sub>).

<sup>100</sup> See, e.g., *id.*; J; J Levy et al, Using CALPUFF to Evaluate the impacts of power plant emissions in Illinois: model sensitivity and implications, *Atmospheric Environment* 36 (2002) 1063–1075; J Levy and J Spengler, Modeling the Benefits of Power Plant Emissions Controls, *J. Air & Waste Manage. Assoc.* 52:5-18 (2002).

<sup>101</sup> Deck, *infra*, at Table C.

Moreover, the costs of PM<sub>2.5</sub> are staggering. The serious health impacts and accompanying costs from PM<sub>2.5</sub> pollution will burden not only individuals, but also the state through expenditure of public and employer health care dollars, lost productivity, and strains on the education system from missed school days. Luckily, the benefits from control of PM<sub>2.5</sub> are significant. For example, a cost-benefit study completed by the U.S. EPA for the agency's recent revision of 24-hour PM<sub>2.5</sub> standard showed from \$9 billion to \$76 billion in health and visibility benefits, compared to a cost of \$5.4 billion for achieving the standard.<sup>102</sup> In all, Illinois will benefit greatly from protecting its citizens through stringent control of fine particles from coal plants and major new sources of air pollution.

We note that the U.S. EPA staff and the Clean Air Scientific Advisory Committee ("CASAC") have suggested an annual PM<sub>2.5</sub> ambient air standard lower than 15 ug/m<sup>3</sup>.<sup>103</sup> EPA staff has also recommended a daily PM<sub>2.5</sub> standard at the "middle to lower end" of a 25-35 ug/m<sup>3</sup> range (i.e., 25-30 ug/m<sup>3</sup>).<sup>104</sup> Because some areas have "relatively high annual PM concentrations" but would "rarely" exceed ambient concentrations of 35 ug/m<sup>3</sup>, it is necessary to limit annual air concentrations below 15 ug/m<sup>3</sup> to provide sufficient protection of human health on short term bases.<sup>105</sup> Moreover, there are associations between irreversible lung damage in children and long-term exposure to PM<sub>2.5</sub> at levels below 15 ug/m<sup>3</sup>.<sup>106</sup> EPA staff has noted that this study indicates a need to limit annual PM<sub>2.5</sub> concentrations below 13 ug/m<sup>3</sup>.<sup>107</sup> Moreover, the EPA has noted that short-term studies are relevant to determining the annual air concentrations protective of health and that "the strongest evidence for short-term PM<sub>2.5</sub> effects occurs at concentrations near the long-term (e.g., annual) average." *See* Final Rule: National Ambient Air Quality Standards for Particulate Matter, 62 Fed. Reg. 38,652, 38,676/1 (1997). IEPA's analysis under 35 Ill. Admin. Code § 201.141 must account for this overwhelming scientific evidence that concentrations well below 15 ug/m<sup>3</sup> are dangerous to health.

### **III. Comments on Flaring, Fugitives, and BACT Analyses**

#### **A. The Analysis of Flaring is Inadequate and Flawed.**

Maximum hourly flaring emissions have not been modeled. The applicant acknowledges this fact, yet notes that "nevertheless; showing the maximum possible combination of SO<sub>2</sub> that

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<sup>102</sup> *See* National Ambient Air Quality Standards for Particulate Matter; Proposed Rule, 71 Fed. Reg. 2620, 2627 (Jan. 17, 2006)

<sup>103</sup> *See* Office of Air Quality Planning and Standards, U.S. Env'tl. Prot. Agency, Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information (Staff Paper) § 5.3.1.1, at 5-7 (2005); Letter from Dr. Rogene Henderson, CASAC, to Administrator Stephen L. Johnson, EPA 3-4 (Mar. 21, 2006) ("Studies described in the PM Staff Paper indicate that short term effects of PM<sub>2.5</sub> persist in cities with annual PM<sub>2.5</sub> concentrations below [15 ug/m<sup>3</sup>]").

<sup>104</sup> Staff Paper § 5.3.7, at 5-46; *see also id.* § 5.3.5.1, at 5-32 ("[S]taff continues to believe that an annual standard cannot be expected to offer an adequate margin of safety against the effects of all short-term exposures").

<sup>105</sup> Letter from Dr. Rogene Henderson, CASAC, to Administrator Stephen L. Johnson, EPA at 7 (June 6, 2005).

<sup>106</sup> W. James Gauderman et al., Association Between Air Pollution and Lung Function Growth in Southern California Children, 162 Am. J. Respiratory & Critical Care Med. 1383 (2000).

<sup>107</sup> *See* Staff Paper § 5.3.4.1, at 5-22-23.

could possibly occur during any one, single hour in any year may not be helpful or indicative of a realistic condition and overly conservative.”<sup>108</sup> That the applicant does not want to show the public its air impacts under worst-case conditions is not surprising. However, modeling worst-case conditions is required. Unless and until air impact analyses are done with hourly maximum flaring emissions, or the permit is revised to prohibit flaring, the permit cannot be issued. *See* 70 Fed. Reg. 68,218, 68,240 (Nov. 9, 2005) (codified at 40 C.F.R. pt. 51 app. W § 8.1.2.a) (“As a minimum, the source should be modeled using the design capacity (100 percent load).”); *In re Northern Michigan University*, 14 E.A.D. \_\_\_, PSD Appeal No. 08-02, Slip. Op. at 48-49, 53 (E.A.B. Feb. 18, 2009) (attached as Exhibit 11); U.S. EPA, *New Source Review Workshop Manual*, C.44-46 (Draft October 1990) (“NSR Manual”).

Moreover, H<sub>2</sub>S and COS emissions that occur during flaring are not included in the air toxics analysis.<sup>109</sup> The air toxics analysis also fails to consider, or include, any other regulated HAP that may be emitted from the flares. As such, the calculation of the potential emissions of HAPs is underestimated, and IEPA’s conclusion that the plant is a synthetic minor source for HAPs is unsupported and most-likely incorrect. For this reason, and for others to be discussed below, the facility appears to be a major source of HAPs for which MACT limits are required.

Additionally, Flare Minimization Plans have not been developed for the facility, reviewed by IEPA, subjected to public review and comment, or included in the permit record. The applicant clearly recognizes that such plans may be developed,<sup>110</sup> and appears to rely on the future, possible, existence of these plans to limit emissions from the flares. However, if the plans are to be used in any way in the permitting process, they must be developed prior to a draft permit, reviewed by IEPA, provided for public review, and part of the permit record. 40 C.F.R. § 124.10(d)(vi); *In re RockGen Energy Center*, 8 E.A.D. 536, 552-55 (EAB 1999) (holding that provisions requiring a post-permit plan to be submitted were invalid and requiring the permitting agency to subject any provisions relied upon for permitting to public notice and comment).

Moreover, development of such Plans at this time (*i.e.*, when the plant is in the design stages), is appropriate since minimization of flaring is not simply an operational issue to be addressed after the plant is built. Rather, minimizing flaring requires changes in plant design and philosophy, material selection, instrumentation and controls, and other factors that must be designed and planned for now—before the plant is built—to truly minimizing flaring from the plant.

Power Holdings assumes a flare efficiency (pollutant destruction efficiency) of 99%.<sup>111</sup> However, there is no basis for this assumption and nothing in the record to support it. Such a high efficiency is not only highly unlikely, but the record here contains no design or operational details of the type necessary to calculate and ensure that the plant will continuously achieve this exceptionally high level of flare destruction efficiency. It should be noted that flares are not typical control devices. They do not continuously assure a specified, measurable, control

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<sup>108</sup> November 5, 2008 submittal relating to Flare Emissions - Evaluations

<sup>109</sup> *See* Emissions Summary, Plantwide Summary, updated October 21, 2008.

<sup>110</sup> *See* submittal on Off-Normal Operations, August 22-28, 2008, page 6.

<sup>111</sup> *See* submittal on Off-Normal Operations, August 22-28, 2008, page 7.

efficiency because they cannot assure a minimum residence time and minimum temperature, which are both critical for pollutant destruction. In other words, flares cannot assure a minimum level of destruction efficiency, which would represent an enforceable “worst case” emission rate. Therefore, the applicant’s assumption that the flares proposed for the PH facility will *always* achieve a minimum 99+% control efficiency is not enforceable, is unreasonable, and results in vastly under-calculating the emissions that will actually be produced from flaring from the plant.

Power Holdings also claims that the flares at the facility will be nitrogen-assisted.<sup>112</sup> Thermal NO<sub>x</sub> formation is significantly increased by the presence of nitrogen at high temperatures. Power Holdings’ emission estimates from the flares do not appear to account for the additional NO<sub>x</sub> formation due to nitrogen assistance; therefore, it appears that Power Holdings significantly underestimated the NO<sub>x</sub> emissions from flaring for this reason too. We have not been able to calculate exactly how much Power Holdings’ estimates are undercalculated, however, because Power Holdings failed to provide the technical basis for NO<sub>x</sub> emissions from nitrogen-assisted flaring. This omission undermines the public review and comment process, and indicates that IEPA’s review has been incomplete. At a minimum, the technical basis must be requested from Power Holdings, reviewed by IEPA, and renoticed for public comment.

The SO<sub>2</sub> emissions from the flares have also been significantly underestimated. Power Holdings appears to recognize that significant flaring SO<sub>2</sub> emissions can result from malfunction periods.<sup>113</sup> However, the application dismisses the value of continuous monitoring of flare gases,<sup>114</sup> such as the sulfur contents, which are necessary to assess the actual emissions of SO<sub>2</sub> during such events. The necessity of monitoring of sulfur content, and other gas parameters, to determine emissions has been recognized by regulatory agencies. For example, such monitoring is required at flares in refineries in California, as part of assessing flaring emissions, which in turn is used for the development of flare minimization strategies. In short, the SO<sub>2</sub> emissions from the flares are understated, and the assumed emission rates for purposes of setting BACT limits and modeling air impacts are unenforceable and do not represent worst-case conditions. Moreover, to the extent that Power Holdings proposes to develop a so-called “Flare Management Plan,” such a plan would be meaningless unless critical data quantifying emissions from malfunctions is known.

## **B. The Application, SOB, and Draft Permit Fail To Accurately Account For Fugitive Emissions**

The application purports to provide updated fugitive emissions calculations in summary fashion.<sup>115</sup> For example, total VOC fugitive emissions are estimated to be 2.46 tons/year, of which methanol emissions are 1.79 tons/year. These summary emission calculations seem to be based on the SOCFI average (Table 4.5-1 in the referenced EPA document).<sup>116</sup> This is inappropriate for calculating the Potential to Emit. If actual emission data are not used, at a

<sup>112</sup> See submittal on Off-Normal Operations, August 22-28, 2008, page 7.

<sup>113</sup> See November 5, 2008 submittal. Maximum hourly emissions of SO<sub>2</sub> from the Syngas flares is 9510 lb.hr and from the Acid gas flares is 9508 lb.hr.

<sup>114</sup> See Submittal on Off-Normal Operations, August 22-28, pages 9-10.

<sup>115</sup> See Exhibit 391-1b, updated October 20, 2008.

minimum, emission factors should be based on the appropriate screening values provided in the same EPA reference that the applicant references, (see Table 4.4-3).

Furthermore, the application and SOB fail to account for certain categories of fugitive emissions; for example, pumps in light liquid service. Although the calculation includes valves and pumps in heavy liquid service, only valves in light liquid service are included, but not pumps. There is no justification provided for omitting these emission sources. Including pumps in light liquid service (even using an average SOCFI emission factor of 0.0199 kg/hr/source) would increase the estimate of fugitive emissions. Other types of components that are missing include sampling connections. Further still, the application and SOB fail to accurately identify the number of fugitive emission sources to even enable an accurate calculation of emissions. It also appears from the record that the number of components in each category represents only a guess, with no basis. For example, round numbers (such as 150 for flanges, 150 for valves in light liquid service, etc.) indicate that these are likely guesses.

The application should provide the basis for these estimates such as Piping and Instrumentation Diagrams (P&IDs) or similar documents so that these assumptions can be verified. There is also no basis in the record for the assumption of only 5% VOC in the total organic stream (TOC) for pressure relief valves. It is likely that TOC concentrations can be much higher—at least on a worst-case basis for calculating potential emissions. Finally, the calculation of methanol emissions is not transparent. The basis for the 1.79 tons/year of methanol, out of the total TOC of 2.46 tons/year, is not provided.

For each of the foregoing reasons, IEPA has significantly underestimated the potential to emit VOC emissions from fugitive sources as well as the potential to emit methanol emissions from fugitive sources.

Lastly, while compression of CO<sub>2</sub> for enhanced oil recovery (or other sequestration) is contemplated, neither the application nor IEPA have included emissions from compression—including both criteria pollutants and HAPs. Here again, emissions have been underestimated. Although it is not the public's obligation to provide the analysis that Power Holdings and IEPA failed to do, the lack of actual information about the emission sources that will be present at the plant prevents us from doing so. IEPA must recalculate all emission rates, including all sources of fugitive emissions, and redo all related analyses for a new public review period.

While all of IEPA's errors resulting in underestimation of emissions are concerning—IEPA's errors related to HAPS emissions are perhaps most concerning. Since methanol is estimated to be the single highest hazardous air pollutant (HAP) emitted from the facility,<sup>117</sup> and Power Holdings' estimates that it will be emitted at 9.71 tons/year—only slightly lower than the major source threshold (*i.e.*, 10 tons/year)—a proper calculation of methanol PTE would show that the PTE is greater than 10 tons/year and that the facility is a major source of HAPs. Only small changes to the application's erroneous emission estimate results in the proposed Power

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<sup>116</sup> See <http://www.epa.gov/ttn/chief/eiip/techreport/volume02/ii04.pdf>.

<sup>117</sup> See Exhibit 215, updated on October 20, 2008. Incidentally, this updated exhibit contains hand-corrected entries and does not appear to be accurate. For example, on the same line showing methanol emissions of 9.7 tons/year, the last summed column shows a value of 8.13 tons/year.

Holdings plant being a major source. For example, if instead of 1.79 tons/year, the methanol PTE from fugitives alone were to increase by just 0.3 tons/year, which more closely represents the emission rate, it would make the facility a major source of HAPs.

### **C. IEPA's BACT Analysis is Flawed.**

As an initial matter, BACT is not provided for each pollutant subject to regulation. Notably missing are BACT limits for PM<sub>2.5</sub>, CO<sub>2</sub>, N<sub>2</sub>O, and methane. Also, missing are BACT limits for fluorides, sulfuric acid mist, and total reduced sulfur.

For the Auxiliary Boiler NO<sub>x</sub> emissions, Power Holdings declares that over-fire air (OFA) is inapplicable because of space limitations. There is no basis for this assertion in the record. Nor is this conclusion based on valid reasoning. Power Holdings has not provided any vendor data, or other documentation, to show that installing OFA on this type of boiler is technically infeasible. No engineering drawings have been provided, for example, along with appropriate dimensions, locations of the likely OFA, etc. Without such documentation or support, simply asserting that space limitations preclude OFA is improper.

#### **1. PM<sub>2.5</sub> emissions**

Power Holdings assumes that BACT for PM<sub>2.5</sub> is the same as the BACT for the other PM size fractions, such as PM<sub>10</sub>.<sup>118</sup> This is technically incorrect and invalid. PM<sub>2.5</sub> and PM<sub>10</sub> are different pollutants in so far as the size fraction affects control equipment and efficiencies differently. Thus, assuming that equipment designed and deemed appropriate as BACT for PM<sub>10</sub> is also the same as BACT for PM<sub>2.5</sub> is erroneous. Power Holdings should conduct a separate BACT analysis for PM<sub>2.5</sub>.

#### **2. Clean fuels**

The entire BACT analysis omits the necessary consideration of clean fuels. For example, the superheaters and auxiliary boiler will burn either synthetic gas (*i.e.*, gasified coal prior some or all processing steps) or SNG (*i.e.*, after processing steps). These processes could use natural gas, however, which may result in lower emissions. Neither the application nor IEPA's SOB discusses the use of natural gas, nor even cleaner fuels such as waste biomass, which if gasified would provide significant greenhouse gas benefits as compared to coal gasification, given the manner in which greenhouse gas emissions from biomass are accounted for as opposed to greenhouse gas emissions from coal. Gasified biomass would also produce fewer hazardous air pollutants, sulfur dioxide, sulfuric acid mist, and other pollutant emissions. A proper top-down BACT analysis must consider biomass inputs into the gasification process as opposed to coal alone, and the use of natural gas in the superheater and auxiliary boiler.

It is not clear why product SNG or natural gas alone or in combination with syngas is not proposed to be used as fuel for all combustion sources. It is our understanding that natural gas is "cleaner"—meaning it will result in fewer emissions of at least one pollutant subject to BACT—compared to these coal-based SNG. Moreover, it is our understanding that SNG is cleaner than pre-processed synthetic gas. However, the relative cleanliness of potential fuels for combustion

<sup>118</sup> See Submittal titled PM<sub>2.5</sub> Permit Input, dated August 30, 2008, page 2.

sources at the facility has not been documented. In order to make a proper evaluation of the combustion products from the proposed syngas to be used versus SNG or natural gas, product compositions for SNG and syngas must be provided. Additionally, exhaust gas compositions for the combustion products of these three fuels must also be provided. BACT requires that clean fuels be considered as part of the top control option. IEPA has not done so for the combustion sources at the proposed plant. In order to even begin evaluating the potential use of clean fuel as the basis of BACT, IEPA must, at a minimum, identify the relative products of combustion of synthetic gas, SNG, and natural gas in the record.

### **3. Omission of basis in the permit record**

In general, the BACT analysis makes numerous references to reliance on vendor data in addition to EPA's RBLC. However, the application only contains RBLC information. No vendor data could be found. In order to provide a transparent basis for the BACT analysis, all vendor consultations and documentation received from vendors should be included. This includes all vendor cost data.

### **4. NO<sub>x</sub> BACT**

In the application,<sup>119</sup> Power Holdings dismisses the need for NO<sub>x</sub> BACT for the thermal oxidizers, which it notes are to be used as the control devices for CO and VOC reduction. This is incorrect. The choice to use the regenerative thermal oxidizers themselves is not defended in the application. CO and VOC reductions can be accomplished by other means, such as catalytic oxidizers, which can also provide much lower NO<sub>x</sub> emissions.

### **5. Auxiliary Boiler BACT**

The applicant asserts that over-fire air (OFA) is not a feasible control option for controlling NO<sub>x</sub> because of space limitations. There is no basis in the record for this assertion. For example, Power Holdings has not provided any vendor or other documentation to show that installing OFA on this type of boiler is technically infeasible. No engineering drawings have been provided, along with appropriate dimensions, locations of the likely OFA, nor any of the other information necessary to make a determination that OFA is not feasible. Without such documentation or support, simply asserting that space limitations preclude the consideration of OFA for auxiliary boilers, is inappropriate and fails to comply with the BACT determination process.

## **IV. Power Holdings' PSD Analysis is Flawed and Incorrectly Concludes there are no Significant Impacts.**

The proposed Power Holdings plant, if built, would create a synthetic gas ("SNG") from approximately 5,000,000 tons (10 billion pounds) of coal feedstock annually. The proposed plant would be located near Blissville, Illinois. This would be a huge industrial chemical facility that would house its own power plant and other supporting facilities. Nevertheless, IEPA's preliminary analysis suggests that the project's impacts on air quality will not be significant.

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<sup>119</sup> See Section 5.1 of the Application.

The preliminary impact analysis showed maximum concentrations for all emissions that are less than applicable significant impact levels. Therefore, no further analysis with modeling of either the proposed plant or existing sources in the area is necessary

IEPA, Statement of Basis, p. 20 (“SOB”).

In effect, IEPA has decided not to conduct the full air quality impact analysis required by the Clean Air Act’s Prevention of Significant Deterioration (PSD) program. Instead, IEPA purports to waive such air quality analysis based on the theory that the project will not exceed “applicable significant impact levels.”

IEPA’s analysis is legally and factually flawed. The application shows that the plant’s emissions will have adverse and significant impacts. Our review of the permit application and supporting documents finds:

- The “applicable significant impact levels” used by IEPA are inappropriate and are not supported by applicable law.
- The modeling inventory used in the air quality impact analyses omits several key PM<sub>10</sub> (PM and PM<sub>2.5</sub>) emission sources.
- PM<sub>10</sub> (PM and PM<sub>2.5</sub>) emissions and resulting air impacts from project roadway emissions are significantly underestimated.
- The Paducah, Kentucky meteorological data used in the modeling is not representative of the project site. Also, the data are of poor quality and do not include wind speeds less than three knots. Using the Paducah data underestimates modeled impacts.
- Although the IEPA refers to Class I impact modeling in their Statement of Basis (stating no significant impacts), we were not able to locate and review such a report.

Each of these points is discussed in greater detail below.

We also note that that the public notice, review, and comment process has been made overly difficult because of the continuous changes made to the project and the lack of a single, coherent “application.” The documents provided for our review, and purporting to be part of the “application” include some for a project proposed to be built in Mt. Vernon, Illinois.

Additionally, the air impact analysis for this version of the project was prepared in November 2005, by Huff & Huff, Inc.<sup>120</sup> Another revision, for Blissville, Illinois, was analyzed in October 2007, by Mostardi Platt Environmental.<sup>121</sup> Yet another revision included a completely different coal delivery, receiving, and storage system. This more recent revision is

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<sup>120</sup> Huff & Huff, Inc., Draft Dispersion Modeling Report for Power Holdings Mt. Vernon, Illinois, November 2005 (attached as Exhibit 62).

dated November 2008, but includes only piecemeal revisions, drafted by yet another consultant: ENSR Corporation.<sup>122</sup>

The latest project revision, and accompanying air quality impact analysis, required review and interpretation of the previous versions of the project—the November 2008 analysis only covered the change in the coal delivery, receiving, and storage system. Thus the difference between the ENSR and Mostardi Platt analyses are unclear. It is not clear which analysis constitutes the “application,” and which are no longer part of the “application.” More confusing still, Mostardi Platt sued PH for “not paying their bill,”<sup>123</sup> and it appears that PH is not authorized to continue using Mostardi Platt’s work product—which appears to include most of the “application” that PH is still relying on.<sup>124</sup> As a result, documents purportedly part of the “application” have been withheld from the public, or have been redacted, preventing the public from having a complete application to review for purposes of providing public comments. This, alone, prohibits IEPA from issuing the permit. 40 C.F.R. § 52.21(q), 124.10(d)(iv), (vi) (providing that the permit application and entire record must be available for public inspection).

**A. IEPA’s Reliance on “Significant Impact Levels” to Avoid The Requirements of the PSD Program Is Not Supported By Fact or Law.**

IEPA’s air quality review for the proposed plant consists, almost entirely, of IEPA’s conclusion that the “maximum concentrations for all emissions that are less than applicable significant impact levels.” SOB , p. 20. Based on this conclusion that SILs were not exceeded, neither the applicant nor IEPA did further analysis of air impacts, including impacts on increments. However, “SILs” are not a legal exemption from analysis and compliance with all air quality standards, especially increments. IEPA incorrectly attempts to insert SILs into the applicable PSD rules:

The starting point for determining the extent of the modeling necessary for this facility was evaluating whether the proposed plant would have a “significant impact”. The PSD rules identify Significant Impact Levels, which represent thresholds triggering a need for more detailed modeling. These thresholds are specified for all criteria pollutants, except ozone and lead. The significant impact levels do not correlate with health or welfare thresholds for humans, nor do they correspond to a threshold for effects on flora or fauna.

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<sup>121</sup> Mostardi Platt Environmental, PSD Construction Permit Application for the Southern Illinois Coal Gasification to Synthetic Natural Gas (SNG) Facility, October 17, 2007 (attached as Exhibit 63).

<sup>122</sup> ENSR Corporation, AERMOD Addendum Report, Southern Illinois Coal to SNG Facility: Including Coal Receiving and Storage, Document Number 12730-001-0400, November 2008.

<sup>123</sup> Email from Joseph Macak, Mostardi Platt Environmental, to Robert Smets, IEPA, March 24, 2008 (attached as Exhibit 64).

<sup>124</sup> *Id.*

SOB, p. 19. PH's application contains a similar unlawful attempt to replace applicable standards—including increments—with "SILs":

The PM<sub>10</sub> PSD Class II significance levels are 5 µg/m<sup>3</sup> for the 24-hour average and 1 µg/m<sup>3</sup> for the annual average. Predicted impacts below those values are interpreted by EPA to mean that the impacts from a proposed project are so low that they would not affect the compliance status of the local area. In that case, no additional modeling is required to demonstrate the cumulative project and background impact on PSD increments and the National Ambient Air Quality Standards (NAAQS)

AERMOD Addendum Report, Nov. 2008, p. 3-8. There is no legal basis for this attempted use of so-called "SILs" to avoid all air quality analyses, and neither IEPA nor PH identifies one. Moreover, to the extent that any regulations use SILs, they apply only to NAAQS. For example, 40 CFR 51.165(b)(2) provides:

A major source or major modification will be considered to cause or contribute to a violation of a national ambient air quality standard when such source or modification would, at a minimum, exceed the following significance levels at any locality that does not or would not meet the applicable national standard

Section 40 CFR 51.165(b)(2) also includes a table setting forth NAAQS SILs. For example, the significance level is 5 µg/m<sup>3</sup> for the 24-hour average PM<sub>10</sub> NAAQS. Notably, these SILs apply only to NAAQS, and not for the PSD increments. While we believe that SILs for any purpose are unlawful, the distinction in the regulations by providing SILs for NAAQS but not increments makes some sense. Increments are much lower values than NAAQS and are not protected with regional ambient air monitoring networks and other SIP-planning requirements in the same way that NAAQS should be monitored and protected. NAAQS violations can be detected and corrected through the CAA, whereas without full modeling analysis, increment violations are never detected nor prevented.

The use of SILs to avoid increment analysis cannot be justified by the USEPA's, New Source Review Workshop Manual (Draft), October 1990.<sup>125</sup> The Manual, while valuable for some purposes, is not a final agency action and is not law. Moreover, the Manual is helpful when it explains how to implement the CAA and regulations, but it does not, cannot, and is not intended to supersede regulatory statutes and requirements.<sup>126</sup> Additionally, because it has not

<sup>125</sup> USEPA, New Source Review Workshop Manual (Draft), October 1990, p. C. 28 (available at <http://www.epa.gov/region7/programs/artd/air/nsr/nsrmemos/1990wman.pdf>).

<sup>126</sup> As the preface to the Manual notes:

This document was developed for use in conjunction with new source review workshops and training, and to guide permitting officials in the implementation of the new source review (NSR) program. *It is not intended to be an official statement of policy and standards and does not establish binding regulatory requirements; such requirements are contained in the regulations and approved state implementation plans.* Rather, the manual is designed to (1) describe in

been updated for almost 20 years, the Manual is also outdated in some ways. For example, the 1990 Draft NSR Workshop Manual discusses significant impact levels for PM<sub>10</sub>, even though there were no PM<sub>10</sub> PSD increments in existence at the time—only total suspended particulates (TSP) increments.<sup>127</sup> PSD increments for PM<sub>10</sub> were not established until 1993.<sup>128</sup> Therefore, the Manual could not have made any conclusions as to the appropriate SILs for PM<sub>10</sub> increments. Further still, the 1990 Draft NSR Workshop Manual merely copies the NAAQS SILs at the time. They were not established based on any analysis of increments, or the need to protect increments. Nor do they account for the fact that increments are much smaller values than the respective NAAQS and a SIL may represent an insignificant percentage of NAAQS, while representing a larger percentage of the increment.

The effect of the unofficial and unsanctioned practice that has developed by some permitting agencies—to use the NAAQS SILs to exempt sources from increment analysis—is concerning. It is particularly troublesome for PM<sub>10</sub>, for which the 24-hour NAAQS is five times the allowable PSD increment and the NAAQS SIL represents *greater than 16 percent of the increment*. In other words, just seven sources could consume the entire increment, while reliance on the SILs would exempt all of them from increment analysis and none would be required to reduce emissions and none would be denied a permit.

	<b>Regulatory Standard</b>	<b>SIL</b>	<b>Statute or Rule for SIL</b>	<b>SIL as % of Regulatory Standard</b>
<b>24-hr PM<sub>10</sub> NAAQS</b>	150 µg/m <sup>3</sup>	5 µg/m <sup>3</sup>	40 CFR 51.165	3.3%
<b>24-hr PM<sub>10</sub> Increment</b>	30 µg/m <sup>3</sup>	5 µg/m <sup>3</sup>	none	16.7%

Applied to the permit at issue here—IEPA’s attempt to use SILs to avoid analysis of increment compliance ignores the real possibility that Power Holdings, in conjunction with surrounding emission sources, are consuming the available PSD increments (as well as potentially contributing to unidentified NAAQS violations).<sup>129</sup> This undermines key aspects of the Clean Air Act.

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general terms and examples the requirements of the new source regulations and pre-existing policy; and (2) provide suggested methods of meeting these requirements, which are illustrated by examples. *Should there be any apparent inconsistency between this manual and the regulations (including any policy decisions made pursuant to those regulations), such regulations and policy shall govern.* This document can be used to assist those people who may be unfamiliar with the NSR program (and its implementation) to gain a working understanding of the program.

(Emphasis added.)

<sup>127</sup> *Id.*, p. C.7.

<sup>128</sup> See 58 Fed. Reg. 31622-31638 (June 3, 1993).

<sup>129</sup> We are unable to run a full increment analysis because the applicant and IEPA have not identified the increment consuming sources, nor their emission rates, locations, stack heights, etc.

**B. Power Holdings Failed to Assess Air Impacts from all Project Emission Sources.**

In addition to applying an inappropriate SIL value for their PSD compliance analysis, the applicant failed to include a complete inventory of PM<sub>10</sub> emission sources when it conducted screening modeling. Among other emission sources that were omitted from modeling are:

- Conveyer Fugitive PM<sub>10</sub> Emissions;
- Slag Handling and Removal Fugitive PM<sub>10</sub> Emissions;
- Offsite Coal Crushing Fugitive PM<sub>10</sub> Emissions.

Had these emission sources been included in the PSD analysis, it is very likely that the modeled impacts would have exceeded both the 24-hour and annual-average SILs used by the IEPA. IEPA is required to include these emission sources to accurately assess whether the proposed Power Holdings facility will comply with applicable PSD increments and the NAAQS.

**1. Conveyer fugitive PM<sub>10</sub> emissions were not assessed.**

Revised coal receiving and storage operations were included in ENSR’s November 2008 AERMOD Addendum Report. The report lists additional PM<sub>10</sub> emission sources associated with this project revision, which are summarized in the following table:

ID	Baghouse & Dust Collection Description	Part. Inlet Loading (grains/scf)	Inlet Flow Rate (scfm)	PM <sub>10</sub> Emission Rate (lb/hr)	PM <sub>10</sub> Emission Rate (tpy)
DCO-101A	Train dump dust collector fan 1	0.001	85000	0.729	3.191
DCO-101B	Train dump dust collector fan 2	0.001	85000	0.729	3.191
DCO-102	Transfer building dust collector	0.001	17000	0.146	0.638
DCO-103	Coal storage silos dust collector	0.001	88000	0.754	3.304
DCO-201	Below coal silos dust collector	0.001	32000	0.274	1.201
DCO-202	Transfer building dust collector	0.001	8600	0.074	0.323
DCO-203	Transfer building near gasifier dust collector	0.001	8600	0.074	0.323
DCO-204	Gasifier coal storage silo dust collector	0.001	57000	0.489	2.140
Totals:			381200	3.267	14.311

These PM<sub>10</sub> sources represent baghouse-controlled emissions for coal drop points along the material handling process stream. The applicant’s AERMOD Addendum Report, however, failed to quantify and assess the emissions associated with the belt conveyors that connect each of these control points.<sup>130</sup> There is no indication in the record that all of these emission points are covered and directed to one of the emission points identified above. Nor does the permit include any control equipment for the conveyors. Therefore, it appears that the belt conveyors are uncontrolled fugitive PM<sub>10</sub> emission sources that were not quantified and assessed in the permit application.

<sup>130</sup> Power Holdings Coal Handling Forms, November 7, 2008 (attached as Exhibit 65).

## **2. Slag handling and removal fugitive PM<sub>10</sub> emissions were not assessed.**

Converting coal to synthetic natural gas will produce a significant amount of solid waste, known as slag. The maximum amount of slag produced is not identified in the application, even though the application acknowledges that the plant will produce significant amounts of it:

During the gasification process, slag is produced. This slag is primarily the ash contained in the Herrin coal feedstock. Dewatered slag will go to a slag day tank for temporary storage at the Facility site prior to sale or disposal or for reuse by the Facility. Syngas produced in the gasifiers is processed in a gasification quench and syngas scrubbing systems. From these processes a side stream of “black water” will be depressured, clarified, and filtered to remove slag fines and soot.

Part of the slag fines from these slag streams will return to the coal grinding units, where they will then move through the gasifiers again, the remainder may be returned to the mine. Power Holdings anticipates other third parties may use this inert slag for road bed materials.

Slag not recycled back into the Gasifier will be sent as slurry back to the coal mine for disposal by the third party coal mine operator or sent to the construction industry. This will be accomplished by utilizing a slag day tank, agitator and slag slurry transfer pumps.

Power Holdings will require by contract that any Third Party receiving slag to utilize and/or dispose of slag off-site will be done in accordance with all applicable Environmental Regulations.<sup>131</sup>

Handling and disposal of this slag will inevitably create PM emissions. Nevertheless, PH’s application does not quantify, nor model the air emissions and resulting air impacts from the handling and disposal of the project’s slag. Instead, IEPA and the applicant completely ignore these emissions and impacts. This is particularly concerning in light of the fact that the application has been revised to replace the slurry transport system with train delivery, yet omits any mention of solid waste handling emissions. Excluding all emissions associated with waste slag removal is part of that inappropriate process. Accordingly, IEPA’s Statement of Basis for approving the permit is flawed and incomplete.

## **3. Offsite Coal Crushing Fugitive PM<sub>10</sub> Emissions were not Assessed.**

In addition to ignoring slag waste handling and disposal emissions, the applicant also fails to quantify the emissions associated with coal crushing and delivery to the facility site. If

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<sup>131</sup> Mostardi Platt Environmental, PSD Construction Permit Application for the Southern Illinois Coal Gasification to Synthetic Natural Gas (SNG) Facility, October 17, 2007, pp. 1-10, 1-11 (attached as Exhibit 63).

any amount of coal crushing will take place on the facility site, the emissions resulting from that process will be significant. (Pulverizing the coal offsite, yet nearby, will also create air impacts that must be identified.) There is no basis for ignoring the emissions associated with the almost-certain coal crushing operations that will occur either at or in the vicinity of the PH facility.

The AERMOD Addendum Report states:

The proposed CG to SNG facility will use approximately 5 million tons of Illinois Herrin No. 6 coal per year on a wet basis (4.35 million tons per year on a dry basis) that will first be processed at the coal mines to reduce up to 50% of the sulfur content in the coal as well as to reduce the ash content of the coal. The coal will then be pulverized and converted into slurry at a facility near the mines.

AERMOD Addendum Report, p. 2-1. It is not clear whether this is still the intended process, in light of other changes in the applicant's proposal to receive coal by train rather than (or in addition to) through slurry. If the coal is not received in slurry form, we assume that some crushing and/or pulverizing will occur at the facility or very nearby. However, even if coal will be received as a slurry, the project will create air impacts in the vicinity where the coal is pulverized. Yet, IEPA has not identified, quantified, nor taken any steps to ensure that the PM and PM<sub>10</sub> emissions from coal preparation and crushing will not interfere with applicable PSD increments and NAAQS. Such impacts must be accounted for before a PSD permit can be issued.

### **C. Fugitive PM<sub>10</sub> Emissions from Roads, and Resulting Air Impacts, are Drastically Underestimated**

The applicant purports to have modeled fugitive PM<sub>10</sub> emissions from vehicle travel on onsite paved roads. See AERMOD Addendum Report, p. 2-13. These emissions were calculated by Mostardi Platt Environmental in the earlier project permit application, and they assumed 90% dust control efficiency from water sprays and/or sweeping.<sup>132</sup> A 90% dust control efficiency is virtually unachievable during best-case conditions, and is impossible to ensure during worst-case conditions. Neither the applicant nor IEPA can point to a single basis for assuming 90% control as a worst-case condition.

Achieving significant dust control—above that already achieved and accounted for through paving—is extremely difficult. More realistic paved road dust control efficiencies, under *good conditions*, will be on the order of 50%, unless the applicant continuously sweeps and applies waters.<sup>133</sup> The practice of continuous sweeping and watering is impractical or impossible (especially during winter when watering is prevented by ice formation and sweeping is replaced by the application of additional particulate/silt such as salt or sand to the roadways), rendering the 90% dust control efficiency unattainable on a continuous basis. In any event, continuous sweeping and watering is not required by the permit or enforceable as a practical

<sup>132</sup> Fugitive Emissions Data and Information Forms, Application Ch. 17, p. 17-12 (attached as Exhibit 66).

<sup>133</sup> C. Cowherd, G. E. Muleski, and J. S. Kinney, Final Report: Control of Open Fugitive Dust Sources, Midwest Research Institute, September 1988, pp. 2-6, 2-7 (attached as Exhibit 68).

matter and, therefore, 90% control cannot represent the worst-case conditions that must be assumed for modeling.

We also note that ENSR, the applicant’s consultant for the final phase of the permit application, is familiar with calculating fugitive dust emissions from paved roads. For a recent coal-fired boiler permit application, ENSR assumed 75% control efficiency for paved roads using water washing and cleaning.<sup>134</sup> While this control percentage figure is also vastly over-optimistic, even for best-case conditions, it is still more realistic than the 90% used by PH and IEPA .

We recalculated onsite road dust fugitive PM<sub>10</sub> emissions assuming 75% controls, and remodeled the air impacts using the exact same methodology used by ENSR in their AERMOD Addendum Report. In other words, the only change involved recalculating the road dust fugitive PM<sub>10</sub> emissions assuming 75% control (despite the fact that this still represents unrealistically optimistic conditions, rather than worst case conditions). Our modeling results for 24-hour and annual-average PM<sub>10</sub> impacts are presented in the following tables and included as Exhibit 67 (provided in electronic format only).

Year of Meteorological Data	Highest 24-hr PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )	Easting Coordinate (meters)	Northing Coordinate (meters)
2002	6.66	312690.00	4234243.50
2003	6.39	312100.31	4234251.00
2004	6.11	312091.69	4234060.50
2005	7.52	312089.50	4234013.00
2006	6.53	312690.00	4234243.50

Year of Meteorological Data	Annual PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )	Easting Coordinate (meters)	Northing Coordinate (meters)
2002	1.60	312640.81	4234244.00
2003	1.51	312542.50	4234245.50
2004	1.52	312640.81	4234244.00
2005	1.50	312640.81	4234244.00
2006	1.63	312640.81	4234244.00

As can be seen in the tables, both the 24-hour and annual-average PM<sub>10</sub> concentrations exceed the SILs IEPA used for PSD purposes. In other words, even using IEPA’s inappropriate SILs as a benchmark, and a better-than-worst-case condition of 75% control, the project will

<sup>134</sup> Toquop Energy Project, Class I-B Operating Permit to Construct Application, Document Number 10784-004-400, Submitted to Nevada Division of Environmental Protection, Bureau of Air Pollution Control, July 2007, Appendix 5, Attachment 5A (attached as Exhibit 69).

easily exceed the threshold needed for preparing complete PSD increment and NAAQS analyses. The Basis for which IEPA is issuing this permit is therefore flawed. Moreover, as noted below, the emission factors and assumptions used to estimate the pre-control emission rates were understated. Therefore, when true worst-case conditions are modeled, the impacts are even higher.

**D. Emissions From Road Hauling Used For Air Impact Analysis Did Not Represent Worst-Case Conditions.**

Some of the largest air impacts from the proposed project for particulate matter are from paved road vehicle traffic and hauling. The application uses an emission factor from U.S. EPA's AP-42 to calculate the emission rates. That emission factor, however, depends on certain variables that must be provided for the equation. One of those variables is silt loading on the road surface. The application assumes 5 g/m<sup>2</sup> (which is incorrectly labeled as 5 grains/ft<sup>2</sup>). There is no basis for this value in the record, nor any analysis to support a finding that the facility can always achieve this rate of silt loading or lower.

Moreover, 5 g/m<sup>2</sup> does not represent a worst-case silt loading. Table 13.2.1-4 in AP-42 contains data from studies of silt loading on industrial paved roads. The silt loading value used to estimate emission rates for Power Holdings, 5 g/m<sup>2</sup>, is below any of the mean values provided in the Table. Additionally, a mean value does not represent worst-case conditions. The range of values in the Table include silt loading of 400 g/m<sup>2</sup>—80 times the value assumed by IEPA to be “worst case.” Unless the permit can ensure, through enforceable and measurable limits, that silt loading will never exceed 5 g/m<sup>2</sup> (which is highly unlikely given the values actually representative of industrial paved roads), the air impact analysis must be redone using worst-case conditions.

Furthermore, worst case emissions must match the air standards and increment for which the emission rates are being used to model. Here, Power Holdings uses Equation 2 in AP 42 section 13.2.1 (page 13.2.1-6). However, that equation estimates emission rates over 30-day, or longer, periods of time. It is not to be used for shorter-term periods, such as 24-hours. For example, Equation 2 accounts for periods with rainfall within a 30-day period. Worst-case conditions during a 24-hour period, however, would involve no rainfall during that period. To analyze 24-hour worst-case air impacts, Equation 1 of section 13.2.1 must be used. If that equation is used, it results in a 29% increase in PM emissions than used in the modeling for the application.

**E. The Applicant and IEPA Inappropriately Used Filterable-Only Permit Limits as The Basis for Modeling PM10 Impacts From Total PM Emissions.**

The Draft Permit states that particulate matter emission limits in the permit are for filterable fraction only. *See* Draft Permit page 8 § 3.6.a. However, the air quality modeling done for the application assumes that the filterable-only PM limits are restrictions on total PM emissions, including condensable fraction. There was no effort to quantify the condensable

fraction PM/PM<sub>10</sub> to analyze the air impacts.<sup>135</sup> For example, the air modeling analyzed short-term PM<sub>10</sub> emissions based on an assumed emission rate of 1.638 g/sec, which equals 13 pounds per hour. This corresponds to the permit limit in section 4.6.2 of the draft permit, which is 12.8 pounds per hour of filterable fraction PM only. Similarly, short-term PM<sub>10</sub> impacts assumed an emission rate of 0.378 g/sec from the superheaters which equals 3.0 pounds per hour. This corresponds to the permit limit of 3.0 pounds per hour PM of filterable PM only. There is no doubt that condensable fraction PM/PM<sub>10</sub> has ambient air impacts. However, those impacts have been completely ignored in the air quality analysis done for this application. The permit must either limit total PM/PM<sub>10</sub> (on the same or shorter time period as the NAAQS and increment), or IEPA must determine the condensable fraction PM/PM<sub>10</sub> and include those emissions in the ambient air modeling.

**F. The Paducah, Kentucky Airport Meteorological Data are Unreliable for Class II PSD Compliance Air Dispersion Modeling.**

PH proposes to measure compliance with the Class II PSD increments by using five years of meteorological data (2002 through 2006) from the Paducah, Kentucky Airport. However, the proposed Paducah Airport data are flawed and unacceptable for a number of reasons, including:

- The proposed data are not site-specific;
- The airport data have not been shown to be representative of the project site;
- The proposed data do not meet EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications;
- The airport data excludes all low wind speed conditions, which are critical for verifying compliance with the NAAQS and Class II PSD increments;
- Using the airport measurements results in an AERMOD profile data set with only surface level winds. This is unacceptable for a facility with a 300 foot tall stack.

Because of these critical defects, any Power Holdings AERMOD modeling using these data is not representative and, therefore, does not accurately demonstrate compliance with NAAQS and PSD increments. Our detailed comments follow.

**1. The Paducah Airport data are not site-specific for Power Holdings.**

The Paducah Airport data, collected at a location roughly 67 miles (110 km) from Power Holdings' proposed Blissville facility, is neither site-specific, nor the quality of data that is acceptable for air dispersion modeling. The permit application submitted to IEPA, which proposes using these data for air modeling, therefore fails to demonstrate compliance with applicable standards to justify issuance of the permit.

The Paducah Airport data are not appropriate for the proposed PH plant in Blissville. The distance between the Paducah Airport and the PH site (about 67 miles) makes the airport data clearly not site-specific, with numerous land use classifications existing between Power

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<sup>135</sup> The Draft Permit states that condensable particulates may be accounted in the sulfuric acid limits. Draft Permit p. 8, § 3.6.a. However, the sulfuric acid mist rates were not added to the PM rates for modeling. Moreover, section 4.2.2 of the Draft Permit includes no sulfuric acid limits for the superheaters or auxiliary boilers.

Holdings and the airport. Equally important, however, are the differences in land uses between the PH site and the airport. The Paducah Airport is comprised of concrete runways, parking lots, passenger terminals, and other structures associated with air travel activities. These surface and building characteristics, in turn, affect the boundary layer meteorology present at the airport.<sup>136</sup> In addition, landings, takeoffs, and idling of airplanes affect the site-specific conditions at the airport such that the meteorological conditions are not representative of the area surrounding the Power Holdings facility. The modeling done to determine compliance with applicable air standards must be done with more representative meteorological data.

## **2. The applicant fails to show that the Paducah Airport data are representative of the Blissville site.**

Power Holdings also performed supplemental AERMOD air dispersion modeling to assess PM<sub>10</sub> impacts from a revised coal delivery procedure. As part of that modeling analysis, Power Holdings' consultant, ENSR, prepared AERMOD input meteorological data using surface characteristics surrounding the Paducah, Kentucky, airport.<sup>137</sup> ENSR, however, only examined the surface characteristics at the airport, and ignored the conditions at the project site. This fails to ensure that the surface characteristics of the Paducah Airport are representative of the proposed Blissville site.

The AERMOD Implementation Guide clearly provides:

### **3.1.1 Meteorological data representativeness considerations (01/09/08)**

When using National Weather Service (NWS) data for AERMOD, data representativeness can be thought of in terms of constructing realistic planetary boundary layer (PBL) similarity profiles and adequately characterizing the dispersive capacity of the atmosphere. As such, the determination of representativeness should include a comparison of the surface characteristics (i.e.,  $z_0$ ,  $Bo$  and  $r$ ) between the NWS measurement site and the source location, coupled with a determination of the importance of those differences relative to predicted concentrations. Site specific meteorological data are assumed by definition to be representative of the application site; however, the determination of representativeness of site-specific data for AERMOD applications should also include an assessment of surface characteristics of the measurement and source locations and cannot be based solely on proximity. The recommendations presented in this section for determining surface characteristics for AERMET apply to both site-specific and non-site-specific (e.g. NWS) meteorological data.

The degree to which predicted pollutant concentrations are influenced by surface parameter differences between the application site and the meteorological measurement site depends on the nature of the application (i.e., release height,

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<sup>136</sup> Oke T.R., Boundary Layer Climates, Halsted Press, 1978, pp. 240-241 (attached as Exhibit 70).

<sup>137</sup> ENSR Corporation, AERMOD Addendum Report, Southern Illinois Coal to SNG Facility: Including Coal Receiving and Storage, Document Number 12730-001-0400, November 2008, pp. 3-1 to 3-7.

plume buoyancy, terrain influences, downwash considerations, design metric, etc.). For example, a difference in  $z_0$  for one application may translate into an unacceptable difference in the design concentration, while for another application the same difference in  $z_0$  may lead to an insignificant difference in design concentration. If the reviewing agency is uncertain as to the representativeness of a meteorological measurement site, a site-specific sensitivity analysis may be needed in order to quantify, in terms of expected changes in the design concentration, the significance of the differences in each of the surface characteristics.

If the proposed meteorological measurement site's surface characteristics are determined to NOT be representative of the application site, it may be possible that another nearby meteorological measurement site may be representative of both meteorological parameters and surface characteristics. Failing that, it is likely that site-specific meteorological data will be required.<sup>138</sup>

Surface roughness, shown in shorthand as  $z_0$ , is an essential parameter in estimating turbulence and diffusion. Technically, it is the height above the ground that the log wind law extrapolates to zero;  $z_0$  can also be thought of as a measure of how much the surface characteristics interfere with the wind flow. Very smooth surfaces, like short grass or calm ponds, have very low values of  $z_0$ —on the order of 0.01 meter or less. Tall and irregular surfaces, which are a greater obstacle to wind flow, have higher values of  $z_0$ —up to 1.0 meter or more for forests. When using NWS data, such as from the Paducah Airport, the applicant must determine whether the surface characteristics are representative of the project location they are modeling with AERMOD. Equally important, the applicant must determine how sensitive the modeled impacts are to differences in the chosen surface parameters, for example  $z_0$ .

Furthermore, in the Guidelines USEPA states that if data comes from a site with surface characteristics that are *not* representative of the application site, better data will be required. In practice, this typically means that an application site that is not in proximity to an existing weather station with the same surface characteristics, the applicant must collect site-specific pre-construction meteorological data prior to modeling project impacts. Here, however, Power Holdings did not prepare any analyses to determine whether the Paducah surface characteristics are representative of their Blissville site, nor collect site-specific data. This failure is particularly alarming here, where the applicant used monthly weather conditions and segment-averaged surface characteristics representative of the Paducah, Kentucky Airport, which are very unlikely to be the same weather and sector-specific surface conditions as those at the Blissville site. Since modeled impacts are highly dependent on surface characteristics, the failure here to use representative meteorological conditions means that the modeling done is unconnected to anything at the PH site—and virtually useless in assessing whether the PH facility complies with NAAQS and increment.

### **3. The proposed data do not meet EPA's meteorological monitoring guidance for regulatory modeling applications.**

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<sup>138</sup> USEPA, AERMOD Implementation Guide, Last Revised: January 9, 2008, pp. 3-4 (attached as Exhibit 71).

For air dispersion modeling purposes, airport data are the least desirable because they suffer problems related to location and quality. The USEPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications, notes the general concern about airport data:

For practical purposes, because airport data were readily available, most regulatory modeling was initially performed using these data; however, one should be aware that airport data, in general, do not meet this guidance.<sup>139</sup>

Antiquated airport data was initially used for simpler Gaussian dispersion models such as ISCST, ISCST2, and even ISCST3. It was also sometimes used for older, less-refined models such as MPTER, CRSTER, and COMPLEX-I/II. Times have changed, as have the air impact models. Unrefined airport data used with the more advanced models of today cause problems and is not representative of actual air impacts.

In this case, Power Holdings conducted modeling with the more recent AERMOD dispersion model. AERMOD requires specific parameters to characterize boundary layer and upper air dispersion in a meaningful fashion. The data collected at the Paducah Airport are simply inadequate to provide AERMOD with the required parameters needed for realistic dispersion calculations. It should be noted that, as a technical matter, AERMOD can be run with airport data—meaning that the raw numbers from such data can be input to the model. However, the results of AERMOD run with airport data are not the most representative of real conditions. In other words, just because one can run AERMOD with airport data does not imply that one should do so.

It is important to remember that airport data (including the data used by Power Holdings here) are not collected for purposes of air dispersion modeling. For example, the data used by Power Holdings here are reported once per hour, based on a single visual observation (usually) taken in the last ten minutes of each hour. However, this once-per-hour sampling fails to meet USEPA's recommended sampling rate of 60 to 360 times per hour, at a minimum, to calculate hourly-averaged meteorological data.<sup>140</sup>

Additionally, data collected at the Paducah Airport are not subject to the system accuracies required for meteorological data collected for air dispersion modeling. The USEPA recommends that meteorological data collection for purposes of for dispersion modeling be done with equipment sensitive enough to measure all conditions necessary for verifying compliance with the NAAQS and PSD increments. For example, low wind speeds (less than or equal to 1.0 meter per second) are usually associated with peak air quality impacts—*i.e.*, modeled impacts are *inversely* proportional to wind speed. Following USEPA guidance, wind speed measuring devices (anemometers) should have a starting threshold of 0.5 meter per second or less.<sup>141</sup> And

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<sup>139</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, p. 1-1 (available at <http://www.epa.gov/scram001/guidance/met/mmgrma.pdf>).

<sup>140</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, p. 4-2.

<sup>141</sup> *Id.*, p. 5-2.

the wind speed measurements should be accurate to within plus or minus 0.2 meter per second, with a measurement resolution of 0.1 meter per second.<sup>142</sup> Here, however, the Paducah Airport data used by Power Holdings were not measured in 0.1 meter per second increments, but instead are based on wind speed observations reported in whole knots. This is evidenced by examining the meteorological data files for the Paducah Airport. We confirmed that the data used was originally measured in whole knots. The once-per-hour observations at the Paducah Airport (in whole knots, no fractions or decimals) are simply converted from knots to meters per second and, therefore, can be back-converted to the whole knot measurements originally reported by the airport. Data meeting EPA's standards, if converted to knots, would not result in whole knot values for each hour. In short, the once-per hour measurements in whole knots does not meet minimum data requirements and also fails to account for (indeed hides) the lower wind speeds that are associated with the highest peak air impacts.

**4. The Airport data excludes all low wind speed conditions, which are critical for verifying compliance with the NAAQS and Class II PSD increments.**

To further exemplify the problem of using airport data, the meteorological data files from the Paducah Airport include an unacceptably large percentage of calm hours. Out of a possible 43,824 hours in the Paducah five-year modeling data set (2002 through 2206), there are 8,009 calm hours. This represents 18.28% of the total data set. Typically, when properly measured with modern anemometers, there are only a few calm hours in a meteorological data base per year.<sup>143</sup> The use of a data set including such a high number of calm hours means that the modeling disregards periods where the air impacts will be the greatest.

The AERMOD model disregards calm hours, identified as those periods when the reported wind speed is 0.0 meter per second. However, at airports any wind speed less than three knots (1.54 meters per second) are automatically regarded as calm, even if the wind speed is greater than 0.0. While this might make sense for aviation (winds less than three knots do not pose a concern for pilots), low wind speeds are of great concern for regulators and the environment. The worst air impacts generally occur during the lowest wind speeds. In short, using airport data with no wind speeds less than three knots prejudices the model in ways that avoid identifying the highest air pollution impacts.

Sensitive and accurate measurements of wind speeds are necessary for measuring winds down to 0.5 meter per second (about one knot), which can then be used as valid hours in the air dispersion modeling analyses. There would be no need to label such low wind speed hours as calm, which will greatly increase the number of hours included in the modeling analyses.

The prejudice in PH's model in this case is even further exacerbated by the fact that PH's wind speed data were inappropriately rounded up when converted from whole knots to meters

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<sup>142</sup> *Id.*, p. 5-1.

<sup>143</sup> For example, the pre-construction monitoring data set for the Newmont Nevada proposed coal-fired power plant has five calm hours (10 meter winds) in the one-year period from 9/1/2003 through 8/31/2004 (see attached Exhibit 72).

per second. For example, the lowest wind speed reported by the Paducah Airport is three knots, which is 1.54 meters per second. The data modeled by Power Holdings, however, reports these minimum wind speeds as 1.60 meters per second. Again, since modeled impacts are *inversely* proportional to wind speed, by rounding wind speeds up, Power Holdings has under-predicted air pollution impacts. If any rounding was to be done, three knots should have been modeled as 1.50 meters per second.

In summary, the applicant has submitted biased modeling to claim compliance with the NAAQS and PSD increments. The lowest wind speeds that would show the highest pollution impacts were excluded from the modeling analysis.

Further yet, in addition to excluding the 8,009 worst-case air quality conditions (calm hours), the Paducah data set used by PH also includes 1,642 missing hours. Together, the calm and missing hours make up over 22% of the total Paducah data set. In other words, IEPA is processing a permit application based on only 78% of the possible data (which we know excludes the 18% that would show the highest concentrations). The low-quality, non-representative airport meteorological data used for the modeling submitted by Power Holdings fails to realistically estimate air impacts from the facility. The applicant and IEPA have failed to ensure that, based on representative conditions, the plant would comply with NAAQS and increments.

#### **5. Using the Paducah Airport measurements results in an AERMOD profile data set with only surface level winds.**

The meteorological data proposed for Power Holdings' NAAQS and PSD modeling must include both surface and upper air data, the latter being stored in the AERMOD vertical profile data file. The AERMET User's Guide states:

The second file contains one or more levels (a profile) of winds, temperature and the standard deviation of the fluctuating components of the wind. Generally, this latter file contains the data from an (sic) site-specific measurement program. In the absence of such data, a single level using NWS hourly surface observations may be used for this profile.<sup>144</sup>

Using NWS hourly surface observations for the vertical wind and turbulence profile, as Power Holdings has done here, may be acceptable for specific low-level releases (less than the anemometer height), but is certainly not for elevated effective stack heights such as those proposed for the Power Holdings project. The data proposed by Power Holdings completely lacks both the vertical profile of winds and any measurements of the fluctuating components of the wind. Examining the applicant's AERMOD profile data, it is clear that the "upper air" observations that Power Holdings will use are not upper air at all, but are instead the surface winds measured near ground level—there is no other possibility given the data set Power Holdings proposes to use. Power Holdings' AERMOD profile data will contain only one "upper

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<sup>144</sup> USEPA, User's Guide for the AERMOD Meteorological Preprocessor (AERMET), EPA-454/B-03-002, November 2004, p. 1-5. ([http://www.epa.gov/scram001/metobsdata\\_procaccprogs.htm](http://www.epa.gov/scram001/metobsdata_procaccprogs.htm)).

air” profile, and it will use the exact same values as the surface data collected at the Paducah Airport. In other words, the Power Holdings Blissville modeling will use Paducah Airport surface data instead of upper air profile data, thus completely invalidating the upper air transport and dispersion needed to assess the air impacts from Power Holdings’ 300 foot tall flare stacks.

Using this non-representative data for expediency means that there are no meaningful wind data for transporting and dispersing pollutants from the proposed boiler stacks, thermal oxidizers, cooling towers, baghouse vents, and the other sources with effective stack heights much higher than the available wind measurements.

There will be no vertical profile (which implies data at more than one level) whatsoever in Power Holdings’ profile data. What should be a vertical profile of data is actually a horizontal data profile, with only limited data measurements taken solely at 10 meters (33 feet).

Furthermore, PH’s profile data contains no measurements of fluctuating components of the wind. These are measured as standard deviations of either wind speed or wind direction, in both the vertical and horizontal planes. These data (along with other parameters such as wind speed, direction, and temperature) are necessary to characterize plume dispersion, and must be measured at various vertical levels to give any meaningful depiction of Power Holdings’ elevated emission plumes. Instead of using this type of representative data necessary to conduct a representative model, Power Holdings’ vertical profile data contains only measurements of wind speed, direction, and temperature measured at 33 feet above the ground at an airport 67 miles away—and nothing else. The data are unreliable for use in a sophisticated boundary layer characterization model, such as AERMOD, which means that the model results are meaningless. Power Holdings should have collected at least one-year of pre-construction meteorological data consistent with USEPA Meteorological Monitoring Guidance for Regulatory Modeling Applications. The pre-construction meteorological data should include both surface and profile measurements up to the effective stack height of the tallest point source.

Here, Power Holdings’ use of distant, low-quality data from Paducah, instead of collecting on-site data that meet the EPA minimum requirements, renders all of the modeling results in the record unreliable and flawed. There is no basis in the record that complies with EPA’s modeling guidelines to demonstrate that the plant will not cause or contribute to NAAQS or increment violations. The permit, therefore, cannot be issued without correcting these flaws.

#### **E. The Applicant’s Class I Modeling Was Not Available for Public Review.**

IEPA stated that Power Holdings submitted a Class I air impact analysis for their project, and based on that report concluded that there will be no Class I air quality violations. However, we have not been able to locate and review this report, despite our numerous records requests for all information comprising the permit record. We are particularly concerned about the project impacts, alone and cumulatively, at the Mammoth Cave National Park and the Wilderness Area at the Mingo Wildlife Refuge.

IEPA’s Construction Permit – PSD Approval states:

Power Holdings also submitted an analysis evaluating the impacts of the proposed project on air quality in Mammoth Cave National Park and the Wilderness Area at the Mingo Wildlife Refuge, which are located approximately 160 kilometers southwest and 270 kilometers southeast, respectively, of the site of the proposed plant. This analysis shows that the plant will not violate the Class I air quality increments applicable in these areas. The Illinois EPA has determined based on the assessment submitted by Power Holdings that the proposed plant would not have an adverse impact on air quality values in these areas.

IEPA, Construction Permit – PSD Approval, p. 4. Since IEPA uses the applicant’s Class I modeling report as a basis for issuing a permit, the report should have been available for public review and comment. On the other hand, if no such report exists, then IEPA’s basis for approving Power Holding’s permit is without merit.

### CONCLUSION

For all of the above reasons, we respectfully request that the Illinois Environmental Protection Agency fulfill its duty to protect the health and environment of Illinois’s residents by denying this permit.

Submitted this 4th day of May, 2009.



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## EXHIBIT LIST

No.    Name

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