SIERRA CLUB COMMENTS
Christian County Generation, LLC
Draft Prevention of Significant Deterioration Permit
Application No. 05040027

1. A Decision To Grant This Permit Must Consider Global Warming Impacts

The international scientific consensus has indicated that the earth's climate is changing and that human activity is a major factor. International Panel on Climate Change, *Climate Change 2007: The Physical Science Basis, Summary for Policy Makers*, hereinafter IPCC 2007 (attached and available at www.ipcc.ch). The 2007 IPCC report goes on to note that:

- The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 279 ppm in 2005.
- The atmospheric concentration of carbon dioxide in 2005 exceeds by far the natural range over the last 650,000 years (180-300 ppm) as determined from ice cores.
- The annual carbon dioxide concentration rate was larger during the last ten yerrs (1995-2005 average: 1.9 ppm) than it has since the beginning of continuous direct atmospheric measurements (1960 – 2005 average: 1.4 ppm per year). IPCC 2007.

Fossil fuel burning is the primary contributor to increasing concentrations of CO2 (IPCC 2007).

"Warming of the climate system is now unequivocal." IPCC 2007. Eleven of the past twelve years (1995 – 2006) rank among the 12 warmest years in the instrumental record of global surface temperatures (since 1850). Id.

There can be no doubt that accelerating global warming will pose a serious danger to humans and the environment. Emissions of global warming pollutants have already doubled the risk of extreme heat waves, according to a team of scientists led by Peter Stott at the British Met Office.[1] As the scientific journal *Nature* reported, global warming pollution is linked to the European heat wave of 2003 that killed more than 15,000 people. Similarly, the U.S. EPA concludes that "[a] few degrees of warming increases the chances of more frequent and severe heat waves, which can cause more heat-related death and illness,"[2] as well as "more frequent droughts, … greater rainfall,

[1] Stott, *et al.*, Human Contribution to the European Heatwave of 2003, *Nature* (432:610), Dec. 2, 2004.

[2] U.S. Environmental Protection Agency, climate change web site, last updated on April 6, 2001, http://www.epa.gov/globalwarming/faq/fundamentals.html.

Exhibit 2

and possibl[e] change[s in] the strength of storms."[3] These are only a few of the threats posed by global warming. The IPCC identified the following impacts as either "likely" or "very likely" to occur as CO2 concentrations in the atmosphere increase:

- Higher maximum temperatures over most land areas;
- Higher maximum temperatures and more hot days over nearly all land areas;
- Higher minimum temperatures and fewer cold days and frost days over nearly all land areas;
- Reduced diurnal temperature range over most land areas;
- More intense precipitation events over many areas; and
- Increased summer dry conditions and associated risk of drought over most mid-latitude continents.

TAR: The Scientific Basis, 15. The NAS and EPA make similar predictions. *Climate Change Science*; *CAR*, 106. The IPCC quantifies these predictions as between 66 and 99% probable, depending on the specific environmental impact. *TAR: The Scientific Basis*, 2. By any measure, global warming will cause serious negative impacts for humans and the environment.

The extent of negative global warming impacts will depend on the amount of CO2 emitted into the atmosphere. The NAS similarly found that the "risk [to human welfare and ecosystems] increases with increases in both the rate and the magnitude of climate change." *CAR*, 254. Simply put, the more CO2 humans release into the atmosphere, the more serious the impacts on the environment.

In 2001, the US Global Change Research Program released *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change,*[4] (*National Assessment*) predicting effects of climate change for each region in the U.S. According to the National Assessment, effects on Illinois are expected to be significant and severe. Increased average temperatures and increased evaporation are expected—leading to net soil moisture declines, particularly in the southern part of the region. In other words, drought conditions in Southern Illinois are expected to worsen.

These types of weather conditions, which will increase as global warming worsens, have already caused serious health, welfare, and economic problems in the region. For example, "[a] short-term heat wave in July 1995 caused the death of over 4,000 feedlot cattle in Missouri. The severe drought from Fall 1995 through Summer 1996 in the agricultural regions of the southern Great Plains resulted in about $5 billion in damages." *Id.* at 61.

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[3] U.S. Environmental Protection Agency, climate change web site, last updated on April 6, 2001, http://www.epa.gov/globalwarming/faq/moredetail.html.

[4] National Assessment Synthesis Team, Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change, US Global Change Research Program, Washington DC, 2000 (National Assessment Overview).

The *National Assessment* also predicts that "a reduced risk of life-threatening cold and an increased risk of life-threatening heat are likely to accompany warming." *National Assessment Overview*, 55. With the increased heat, air pollution is also likely to worsen. *TAR: Impacts*, 764. "Without strict attention to regional emissions of air pollutants, the undesirable combination of extreme heat and unhealthy air quality is likely to result." *National Assessment Overview*, 55. In other words, bad air quality will accompany the droughts predicted for Illinois as a result of global warming. Additionally, increases in global temperature may also cause flooding, which poses a direct threat to human health. *TAR: Impacts*, 762. Such floods pose a danger due to rising flood waters, but also due to the health threat posed by the agricultural and other non-point source pollution washed into surface water and groundwater supplied during floods. *National Assessment Overview*, 54.

Illinois agriculture is particularly sensitive to the degree of warming because of the existing threats of heat waves, flooding and drought. Unless releases of global warming pollution are curbed and then significantly decreased, global warming pollution will pose significant threats to the health, welfare, and economy of Illinois.

The IEPA must do its part to prevent these dire health and environmental threats by prohibiting, or at a minimum mitigating, the 3-4,000,000 tons of CO2 pollution that would result from the proposed project annually. Said another way, this project would add the carbon emissions from adding approximately 500,000 cars per year for each of the next fifty years.[5]

There are at least four ways in which IEPA must consider the global warming impacts associated with this proposed project: (1) as part of the endangered species act consultation process; (2) as a non-regulated criteria pollutant in the BACT analysis, (3) as a public nuisance under the State Implementation Plan; (4) and in the alternatives analysis under CAA Section 165.

a. The ESA Consultation Must Consider Global Warming Impacts

The federal Endangered Species Act, 16 U.S.C. § 1531 et seq., was enacted, in part, to provide a means whereby ecosystems upon which endangered species and threatened species depend may be conserved ...[and] a program for the conservation of such endangered species and threatened species ..." 16 U.S.C. § 1531(b). The ESA is the most comprehensive legislation for the preservation of species ever enacted by any nation." *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 180 (1978). The Supreme Court's review of the ESA's language, history, and structure" convinced the Court "beyond a doubt" that "Congress intended endangered species to be afforded the highest of priorities." Id. at 174. "[T]he plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost." *Id.* at 184.

[5] See EPA Office of Air and Radiation. Factsheet EPA420-F-00-013 "Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks: Emission Facts

Section 2(c) of the ESA establishes that it is "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of the Act." 16 U.S.C. § 1531(c)(1). The term "conservation" is defined to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary."' 16 U.S.C. § 1532(3).

Section 7 consultation is required for "any action [that] may affect listed species or critical habitat." 50 C.F.R. § 402.14. "Agency "action" is defined in the implementing regulations to include:

> all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples, include, but are not limited to: (a) actions intended to conserve listed species or their habitat; (b) the promulgation of regulations; (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits or grants-in-aid; or (d) action directly or indirectly causing modifications to the land, water, or air.

50 C.F.R. § 402.02.

The most significant environmental issue associated with IEPA's decision to grant or deny the proposed project and that may affect listed species is the enormous amount of global warming pollution that this project would, if approved, release annually. In short, the action of granting this permit will cause directly and indirectly the emissions of 3-4,000,000 tons of carbon dioxide per year for the foreseeable future. According to the Oak Ridge National Laboratory there are over seventy (70) countries that emit, in total, less carbon dioxide annually than would be emitted from this proposed project. Countries that emit less than 4 million tons of carbon dioxide annually include Iceland, Georgia, Democratic Republic of Congo Tibet, Cameroon, and Nicaragua.[6]

Global warming emissions are already having direct and indirect impact on numerous listed species and the additional pollution associated with this project will further exacerbate this problem. Therefore, the global warming pollution associated with the proposed project "may affect" multiple listed species, and thereby triggering the consultation requirement. While virtually every listed species is likely to be affected to some degree by global warming, these comments focus on two listed coral species, the elkhorn and staghorn corals, as the final listing rule for these species specifically discussed the impacts of global warming and global warming emissions on the species. *See* 71 Fed. Reg. 26,852. As such, EPA/IEPA cannot claim they are outside of the "action area" or that such impacts are unforeseen. Other species that could be reasonably

[6] http://cdiac.ornl.gov/trends/emis/top2003.tot

affected by global warming include all listed species that rely on the prairie potholes in the Dakotas, and cold-water dependant species in the Upper Midwest.

Coral reefs are among the first ecosystems to show significant adverse impacts of global warming. An estimated 30 percent are already severely degraded and as much as sixty percent may be lost by 2030. The primary cause of coral reef degradation is the bleaching associated with the expulsion of symbiotic algal zooxanthellae from coral due to elevated sea temperatures. As the authors of the journal *Science* put it:

> The link between increased greenhouse gases, climate change, and regional-scale bleaching of corals, considered dubious by many reef researchers only 10 to 20 years ago, is now incontrovertible. Moreover, future changes in ocean chemistry due to higher atmospheric carbon dioxide may cause weakening of coral skeletons and reduce the accretion of reefs, especially in higher latitudes. The frequency and intensity of hurricanes (tropical cyclones, typhoons) may also increase in some regions, leading to a shorter time for recovery between recurrences. The most pressing impact of climate changes, however, is episodes in coral bleaching and disease that have already increased greatly in frequency and magnitude over the past 30 years.

Hughes et al. (2003).

Elkhorn and staghorn coral were as recently as thirty years ago the dominant reef building corals in the Caribbean and Gulf of Mexico (Precht and Aronson, 2004). They have subsequently declined by upwards of 90 percent. *Id.* The primary drivers of the decline have been disease and temperature-induced bleaching. 71 Fed. Reg. 26,852; (Pandofi et al, 2005). The coral diseases impacting the species have also been linked to elevated water temperatures. (Harvell et al. 2002). As the National Marine Fisheries Service stated: "The major threats to these species' persistence (i.e. disease, elevated sea surface temperatures, and hurricanes) are severe, unpredictable, have increased over the past 3 decades, and at current levels of knowledge, the threats are unmanageable." 71 Fed. Reg. at 26,858. Each of these threats is directly linked to global warming pollution.

Carbon dioxide emissions are also causing ocean acidification, and further inhibiting coral growth:

> Along with elevated sea temperatures, atmospheric carbon dioxide levels have increased in the past century, and there is no apparent evidence the trend will not continue. As atmospheric carbon dioxide is dissolved in surface seawater, seawater becomes more acidic, shifting the balance of inorganic carbon away from carbon dioxide and carbonate to bicarbonate. This shift reduces the ability of the corals to calcify because corals are thought to use carbonate, not bicarbonate, to build their aragonite skeletons. Experiments have shown a reduction or coral calcification in response to elevated carbon dioxide levels; therefore, increased carbon

dioxide levels in seawater may be contributing to the status of the two species.

71 Fed. Reg. at 26,858-9. The impacts of global warming pollution and global warming on the elkhorn and staghorn corals are well established. USEPA/IEPA cannot ignore these impacts and abrogate their ESA responsibilities.

There are numerous opportunities for mitigating the carbon dioxide emissions associated with the proposed project. First, the project could be designed to expeditiously capture and attempt to store underground in geologic formations a significant portion of the project's proposed CO2 emissions. The current proposal to have the project "capture ready" does nothing to advance the critical question facing the entire coal industry – whether coal can have a future in a carbon-constrained world.

Second, this new source of carbon dioxide could be conditioned on the closure of existing sources of carbon dioxide, similar to the recent Springfield settlement. Third, the project's efficiency (and reduce the need for fossil fuels generally) could be improved by co-locating an industry that could utilize the waste heat/steam, such as a new ethanol or bio-diesel plant.

b. Carbon Dioxide Must Be Considered In the BACT Collateral Impacts Analysis

Even in the absence of USEPA regulating carbon dioxide, IEPA must still consider carbon dioxide as a non-regulated pollutant in the BACT analysis. This "collateral impacts" analysis is intended to target pollutants that are otherwise unregulated under the PSD provisions.

i. A Stringent Output-Based Standard Would Minimize CO2 Emissions

Carbon dioxide emissions are directly related to the amount of coal burned. The more coal (or syngas) burned to produce a megawatt of electricity, the more carbon dioxide emitted. Similarly, the less coal burned the lower the emissions of regulated pollutants.

In the top-down BACT analysis for each regulated pollutant IEPA must consider output based limits.

As part of the new NSPS standards USEPA adopted output-based standards as a step towards minimizing inefficient and unnecessarily polluting boilers. In the analysis for the new NSPS standards USEPA identified that boiler efficiency can vary enormously. See Memo from Christian Fellner USEPA to Utility, Industrial and Commercial NSPS File, *Gross Efficiency of New Units* (February 2005). The following table from that same memo and identified as Table 2 describes the range of efficiencies:

Table 2: EIA 2003 Annual Efficiency Values

Percent of Units Operating at or Above Gross Efficiency	Net Efficiency
Top 10%	35.0%
Top 20%	34.0%
Top 25%	33.6%
Top 33%	33.2%
Top 50%	32.0%

USEPA further explained that the highest efficiency subbituminous, bituminous, and lignite facilities are 43, 38, 37 percent respectively.

In a paper presented by three USEPA combustion experts at the 2005 Pittsburgh Coal Conference they detailed the enormous difference in the efficiency (i.e. the CO2 emissions per ton of coal burned) between sub-critical, super-critical, ultra-supercritical and IGCC coal plants. See Sikander Khan et al, *Environmental Impact Comparisons IGCC vs. PC Plants* (Sept. 2005) (attached). Following is Table 2 from that paper:

TABLE 2

THERMAL PERFORMANCE COMPARISONS, IGCC VS. PC PLANTS

Plant Configuration	IGCC Bit Coal	IGCC Sub-Bit Coal	IGCC Lignite	PC Sub-Crit. Bit Coal	PC Sub-Crit. Sub-Bit Coal	PC Sub-Crit. Lignite	PC Sup-Crit. Bit Coal	PC Sup-Crit. Sub-Bit Coal	PC Sup-Crit. Lignite	PC Ultra Sup-Crit. Bit Coal	PC Ultra Sup-Crit. Sub-Bit Coal	PC Ultra Sup-Crit. Lignite
Net Thermal Efficiency, % HHV	41.8	40.0	38.4	35.9	34.8	33.1	38.3	37.9	35.9	42.7	42.1	37.9
Heat Rate, Btu/kWh (HHV)	8,167	8,520	8,897	9,500	9,800	10,300	8,900	9,000	9,500	8,000	8,100	9000
Gross Power, MWe	564	575	591	540	541	544	540	541	544	543	543	546
Internal Power, MWe	64	75	91	40	41	44	40	41	44	43	43	46
Fuel required, lb/h	349,744	484,089	741,083	497,143	687,331	857,954	331,418	539,384	791,288	342,863	485,445	743,624
Net Power, MWe	500	500	500	500	500	500	500	500	500	500	500	500

Legends:		
	IGCC	Integrated gasification combined cycle
	PC:	Pulverized coal
	Bit Coal:	Bituminous Coal
	Sub-Bit. Coal.	Sub-bituminous Coal
	Sub-Crit.	Sub-critical boiler
	Sup-Crit.	Supercritical boiler
	Ultra Sup-Crit.	Ultra-supercritical boiler
	HHV	Higher heating value of coal

To minimize the emissions of carbon dioxide IEPA should insert a permit provision requiring the project proponent to maintain a net thermal efficiency at or above 41 percent. Such a term would minimize both the emissions of regulated pollutants and the collateral emissions of carbon dioxide.

ii. Clean Fuels Can Reduce Regulated Pollutants and CO2

Contrary to the plain language of the Act, the agency has not considered clean fuels in its BACT analysis. For some inexplicable reason the agency sets two BACT limits, one for syngas and one for natural gas. If the proposed facility can burn natural gas then it must be considered an available clean fuel in a top-down BACT analysis and may only rejected in favor of syngas in accordance with the procedures detailed in the 1990 NSR Manual. Similarly, there is no discussion of the feasibility of blending biomass into the fuel mix as a way to mitigate the emissions of criteria pollutants and "non-regulated pollutants," such as carbon dioxide. Every increment of additional natural gas or biomass that displaces syngas means less regulated pollutant emissions associated with the burning of syngas and less carbon dioxide emissions. Governor Blagojevich has committed to moving the state forward with investments in bio-fuels.

> Last summer, I unveiled an ambitious plan to meet our energy needs by investing in clean, homegrown energy sources that will cut our greenhouse gas emissions. My plan calls for investing in pollution-free wind power and cleaner burning renewable fuels made from crops like corn and soybeans. It also calls for a significant increase in energy saving technologies that will reduce greenhouse gases while cutting utility bills for families and businesses.[7]

IEPA must require a lawful top-down BACT analysis for each regulated pollutant, including SO2, NOx, PM and SAM, that considers the use of cleaner fuels (natural gas and gasified biomass) as a way to minimize emissions of regulated pollutants and the collateral benefits associated with reducing overall CO2 emissions as well.

c. IEPA May Not Increase Emissions of Global Warming

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.

Governor Blagojevich has recognized that global warming is a serious threat to Illinois and its residents.[8]

[7] http://www.illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=3&RecNum=5697
[8] http://www.illinois.gov/PressReleases/ShowPressRelease.cfm?SubjectID=3&RecNum=5697

> ... we can cut greenhouse gases that contribute to global warming, rising sea levels, and deadly storms like Hurricane Katrina, while also conserving energy and preserving the environment for our children and all future generations. I urge the President and Congress to follow the lead of states like ours by acting on the latest global warming report and taking aggressive steps to curb this looming problem.

Based on the discussion above and the actions of the state of Illinois, carbon dioxide constitutes air pollution and adding more global warming pollution will accelerate global warming and cause further harm human, plant and animal life. IEPA may not issue a permit that will cause additional injury to human health and the health of animal and plant life.

As demonstrated in the recent Springfield settlement, it is possible to approve the construction of a new source of carbon dioxide conditioned on achieving overall carbon reductions through strategic investments in the retiring of existing sources, adding large amounts of clean wind power and boosting spending on energy efficiency measures.

d. IEPA Must Consider Global Warming Under the Alternatives Analysis

CAA Section 165(a)(2) provides that a PSD permit may be issued only after an opportunity for a public hearing at which the public can appear and provide comment on the proposed source, including "alternatives thereto" and "other appropriate considerations." 42 U.S.C. § 7475(a)(2).

There are numerous options to building a new coal plant. As the City of Springfield has demonstrated, it is possible to build new coal and through a combination of closing old, inefficient boilers, large investments in wind power and energy efficiency, curb overall carbon dioxide emissions.

If IEPA does elect to issue this permit, we urge the agency to condition approval of the proposed permit on agreement by the project proponent to curb overall CO2 emissions associated with providing electricity to its customers by 25 percent below 2005 levels by 2012 (i.e. meet the Kyoto Protocol reductions). This approach is consistent with the Governor's stated goal for his new Global Warming Task Force: Identify strategies to curb global warming emissions to 1990 levels by 2020 and 60 percent by 2050.

2. Particulate Matter BACT

The draft permit proposes a PM filterable limit of 0.0090 lb/MMBtu and a total PM limit of 0.022 lb/MMBtu, both limits based on a 3-hour block average. The proposed filterable PM limit is identical to the filterable PM limit in the final PSD permit for the EKPC Spurlock 4 CFB unit in Kentucky. The proposed total PM limit is higher than the total PM limit for that same Kentucky facility (0.012 lb/MMBtu). IEPA does indicate

that the proposed input-based PM limits for the proposed project cannot be compared to the limits for other coal boilers (project summary at 8), but does not explain why.

a. Cleaner Fuels

There are at least two fuels that are cleaner than synfuel that must be considered in the top-down BACT determination for each of the regulated pollutants, including particulate matter. The draft permit sets PM limits for when the facility is burning natural gas (0.007 lb/MMBtu filterable and 0.011 lb/MMBtu for total PM). These proposed PM limits when the project is firing natural gas are lower than the PM limits for firing synfuel. Therefore, the top-down BACT analysis must consider the use of cleaner fuels, including natural gas, as available clean fuels. Since the facility is specifically designed to be able to fire natural gas, alone or in combination with syngas, there is no argument that burning gas would "redefine the source."

Similarly, by burning a mix of natural gas with syngas, the source could lower both the pound-per-MMBtu emission rate and the hourly emission rate for each of the regulated pollutants, including PM. While natural-gas fired generation must be considered, as noted above, a BACT analysis must also consider mixing natural gas with syngas. If the cost effectiveness of combusting gas, or a combination of gas and syngas, is within the range generally accepted as cost-effective for similar sources (i.e., under $10,000 per ton of pollutant removed), the BACT limit for PM must be established based on a BACT analysis that factors in natural gas.

Another available clean fuel that has received no discussion in the agency's top-down BACT analysis is biomass. There are numerous examples of coal plants co-firing biomass that should be considered in the top-down BACT analysis. For example, the St. Paul heating plant burns approximately sixty percent biomass and forty percent coal.[9] The biomass is primarily waste wood from tree trimmings in the Twin Cities and other industrial activities. The Xcel Bay Point power plant in Ashland, Wisconsin, also burns large amounts of wood waste, consisting primarily of saw dust. This is also consistent with Governor Blagojevich's recent commitment to expanding the use of locally-grown bio-fuels.

The U.S. Department of Energy has urged federal facility managers to consider co-firing up to 20 percent biomass in existing coal-fired boilers.[10] In the Netherlands, the four electricity generation companies (EPON, EPZ, EZH and UNA) have all developed plans to modify their conventional coal fired installations to accommodate woody biomass as a co-fuel.[11] The types of available biomass include wood wastes, agricultural waste, switchgrass and prairie grasses.[12]

[9] http://www.districtenergy.com/
[10] http://www1.eere.energy.gov/biomass/pdfs/33811.pdf
[11] http://www.ecci.net/archive/biobase/B10252.html
[12] http://www.nsf.gov/news/news_summ.jsp?cntn_id=108206

The PM BACT analysis must consider the burning of biomass, natural gas, and syngas.

b. Post-Combustion Controls

IEPA rejected consideration of post combustion PM controls for this proposed project, including an electrostatic precipitator or filtration, on the grounds that their use in combination with pre-combustion controls would be "a theoretical approach to emission control that should not be attempted at the proposed plant." Project Summary at 8. This is not a legitimate basis for rejecting post-combustion controls. Electrostatic precipitators and baghouses are widely used as post-combustion controls on new and existing coal plants. IEPA has not identified any technical reason why such controls could not be used on an IGCC plant. The PM BACT analysis must be redone with, at a minimum, a consideration of an ESP and/or baghouse. IEPA may only reject post-combustion controls if does so in accordance with a legitimate top-down BACT analysis.

c. PM CEMS

In 2004, EPA promulgated final performance specifications, PS-11, for installation, operation, maintenance, and quality assurance of continuous particulate matter emission monitoring systems (PM-CEMS). Since the PSD program is supposed to be technology forcing, requiring a PM-CEMS to ensure compliance with the PM permit limits would be consistent with that goal. Moreover, utilities can emit large amounts of particulate matter when pollution sources and/or control devices are not function properly and PM-CEMS can help identify such compliance issues. *See* USEPA Region 7 Sunflower PSD Comments.

Kentucky recently required the use of a PM CEMS in the PSD permit for the EKPC Spurlock 4 CFB project. There is extensive experience of PM CEMS on coal plants as a result of numerous NSR settlements around the country, including in Illinois. We urge IEPA to require the use of a PM CEMS and that a PM CEMS is required for determining compliance with the permit's PM filterable limit.

d. Bulk Handling, Storage, Processing and Loadout Operations

For some inexplicable reason IEPA failed to set BACT limits for each of the bulk handling facilities. In fact, the bulk handling provisions of this permit are really odd and look nothing like the bulk storage requirements IEPA has established in other coal plant PSD permits, including the permits for Indeck, Prairie State and the City of Springfield. This section of the permit needs significant work. In short, IEPA needs to identify each of the emission units (coal handling, coal storage, etc) and establish through a lawful top-down BACT analysis appropriate BACT limits for each unit.

The problems with the draft permit are extensive. For example, the draft permit establishes the following coal handling requirements: "For receiving and storage of coal, for which total enclosure is not practicable, measures must be used to very effectively reduce the generation of emissions." Draft Permit at 43. This is unenforceable language and cannot represent BACT.

The top-down BACT analysis must start with the limits IEPA has required in other permits, including the limit of no greater than 0.005 grains/dry standard cubic foot and no visible emissions, based on the permit IEPA issued for the proposed Indeck-Elwood facility. See Indeck Permit at 27. The top-down analysis must also include enclosure as a viable control option as was required in Indeck and other PSD permits.

IEPA also needs to set BACT limits for bulk materials other than coal, including for slag handling. In its project summary IEPA states that given the size of the plant property and location in an agricultural area "the BACT determination need not require storage of bulk dry materials in building or silos." Project Summary at 15. In contrast, the draft permit states "bulk materials other than coal or slag that have the potential for PM emissions shall be stored in silos, bins, and building, without storage of such materials in outdoor piles except on a temporary basis." Draft Permit at 45. Neither requirement constitutes BACT.

e. Cooling Towers

The Draft Permit establishes a limit that requires the cooling tower to "utilize 0.0005% Drift Eliminators." Draft Permit, at 54. This is not BACT, and it is not an enforceable emission limit. First, a drift efficiency control rate, by itself, does not correspond to a PM emission rates. PM is formed by dissolved solids in the circulating water. The drift is emitted from the cooling towers, the water is evaporated, leaving the solids that become particulate matter. The percent of the circulating water that is emitted (drift rate), by itself, is not a measure of particulate emissions.

Second, an emission rate, calculated from the drift fraction, TDS, and circulating water flow rate should be established as the permit limit for the cooling tower, based on a top-down BACT analysis. The draft permit sets a drift rate and requires that TDS be measured, but it falls short as it does not set an emission rate or maximum TDS level in the circulating water flow. Absent a limit on the dissolved solids in the circulating water, a 0.0005% drift efficiency rate does not limit total PM emissions. If IEPA relies on cooling tower drift eliminators to establish BACT, the Permit must include a limit on the dissolved solids and circulating water flow rate based on the lowest concentration achievable.

Third, the permit does not require any emissions testing. Draft Permit at 55. The permit must require monitoring of dissolved solids and an initial test and periodic testing of drift rates.

Fourth, a cooling tower with drift eliminators is not the least polluting technology, and does not constitute BACT. Use of an air cooled condenser ("ACC"), an alternative method, system or technique of cooling within the definition of BACT, is available and has lower PM emissions than a cooling tower with drift eliminators. ACCs have been used on large coal-fired power plants for over 25 years. The 330 MW Wyodak coal-fired power plant in Wyoming has successfully operated with an ACC for over 25 years. The largest ACC-equipped coal fired power plant in the world, the 4,000 MW Matimba facility in South Africa, has been operating successfully for over 10 years. Two coal-fired

units in Australia with condenser heat rejection rates nearly identical to that proposed for Weston Unit 4 have been operational since 2002. A number of new coal-fired power plants have been proposed in New Mexico over the last three years. In all cases the project proponents have voluntarily incorporated ACC into the plant design to minimize plant water use. A 36 MW pulverized coal unit in Iowa, Cedar Falls Utilities Streeter Station Unit 7, was retrofit with dry cooling in 1995 due to highway safety concerns caused by the wet tower plume in winter. The use of dry cooling is well established.

The application of an AAC would eliminate nearly all of the PM emissions from the cooling process. Therefore, unless AAC can be rejected in a top-down BACT analysis, based on site-specific collateral impacts, it must be used to establish BACT. AAC cannot be eliminated based on cost, especially because it must be compared to the total cost of a cooling tower, including the towers, raw water clarification system, and intake structures. Moreover, use of AAC has additional environmental benefits, including no water withdrawals for cooling, no brine discharge to river, no aesthetic issues related to visible vapor plumes, no cooling tower drift emissions or particulate deposition.

Other potential options to reduce PM/PM10 emissions from the cooling process include a plume abated tower and a wet/dry system. Like ACC, these alternative processes result in lower emissions and, therefore, must be considered in a top-down BACT analysis. The applicant's analysis fails to identify, much less consider these options for reducing PM/PM10 emissions. A revised BACT analysis must be conducted for the cooling process.

3. Nitrogen Oxide BACT

a. No BACT For Natural Gas

The draft permit does not limit the use of natural gas as a fuel. As explained elsewhere, BACT requires the consideration of natural gas as an available clean fuel control measure in the top-down BACT determination for each regulated pollutant. Given that the applicant can use natural gas exclusively – and BACT may require as much – the NOx BACT determination must also include consideration of low-NOx combustion controls. In its project summary IEPA rejects the use of low-NOx combustion controls on the basis that such controls are allegedly only effective when burning natural gas and natural gas will only be used as a back up fuel. However, because there is no permit limit restricting the use of natural gas IEPA cannot simply allege that natural gas will be used as a back-up fuel and fail to conduct a top-down BACT analysis that considers low-NOx combustion controls in combination with natural gas.

b. The NOx Limit Does Not Protect NAAQS & Increments

The permit sets a NOx BACT limit for syngas at 0.034 lb/MMBtu and for natural gas at 0.025 lb/MMBtu, both based on a 24-hour average. NOx is a precursor for ozone and the current ozone NAAQS is 0.08 ppm based on an 8-hour averaging time. The permit does

not explain how the proposed 24-hour NOx limits adequately ensure that the proposed project does not cause a violation of the 8-hour ozone standard. It must.

4. Sulfur Dioxide BACT for Combustion Turbines

The permit limits the use of fuel to syngas that has been processed by the syngas cleanup system. Draft permit at 25. However, the only limitation on the sulfur content of the syngas is the requirement that it meet a SO2 limit of 10ppm by volume. Draft Permit at 26. There does not appear to be any clean fuel consideration applied to this standard. For example, as described above in the PM BACT discussion, there does not appear to have been any consideration of the use of natural gas and/or biomass either in whole or in part as a clean fuel control method to minimize the emissions of criteria pollutants, including sulfur dioxide. The SO2 top-down BACT determination for the CTs must include consideration of natural gas and gasified biomass. The use of natural gas is consistent with Draft Permit Condition 4.2.2.a.i that lists natural gas as a control technology to limit emissions of SO2 and PM.

5. Sulfuric Acid Mist BACT

The Draft Permit contains a SAM limit of 0.0035 lb/MMBtu on a three-hour block average. Draft Permit at 26. This purports to be a BACT limit, but appears high given the related SO2 emission rate. In 2002 the AES Puerto Rico permit for a coal-fired CFB plant had a SAM emission limit of 0.0024 lb/MMBtu.

We urge IEPA to consider a lower SAM limit and the use of a Wet Electrostatic Precipitator in a top-down BACT determination. The use of WESPs are now common on new coal plants burning high-sulfur coal (see e.g. Prairie State) and we are not aware of any obvious technical reasons why a WESP could not be used on an IGCC plant as well.

6. Visible Emission (Opacity)

The permit contains an opacity limit of 20%, except that a maximum of twenty-seven percent for not more than 1 six-minute per hour. Draft Permit at 27. This emissions limit is based on the NSPS standard, and not on BACT level control. See Draft Permit at 27. The Draft Permit is therefore deficient. The permit must contain a visible emission limit for regulated pollutants (i.e., PM and SAM)[13] that is based on the maximum degree of reduction achievable with the best pollution control option for the proposed facility.

A PSD permit must require BACT for all regulated pollutants. BACT is defined as an "emissions limitation, including a visible emission standard..." 42 U.S.C. § 7479(3); 40 C.F.R. § 52.21(b)(12). Although a BACT limit for PM or SAM typically includes an

[13] A visible emission standard is a limit on "light scattering particles," which include both fine particulate matter ("PM") and sulfuric acid mist ("SAM") aerosols. Both PM and SAM are regulated under PSD and, therefore, a complete PSD permit must contain a BACT limit which includes a visible emission limit based on BACT for PM and SAM.

emission rate limit (i.e., pounds per hour or pounds per million Btu heat input), a BACT limit must nevertheless also "includ[e] a visible emission standard." Id. Other recent coal plant permits include visible emission as part of the BACT limits for those facilities. For example, the Springerville facility in Arizona has a BACT limit of 15% opacity, and the Mid-America facility in Council Bluffs has an opacity limit of 5 percent. See Iowa DNR Permit No. 03-A-425-P, §10a (Permit available online at http://aq48.dnraq.state.ia.us:8080/psd/7801026/PSD_PN_02-258/03-A-425-P-Final.pdf, last visited October 28, 2005). The Wisconsin Department of Natural Resources set a 10% opacity limit as BACT for the Fort Howard (Fort James) Paper Company's 500 MW CFB boiler. The Minnesota Pollution Control Board also considered the issue and determined that a 5% opacity limit should be established based on BACT. The maximum achievable visible emission reduction for a combustion turbine, however, is much lower than 20% opacity. For example, the JEA Northside CFB in Jacksonville, Florida, conducted a compliance test during the summer of 2002, while burning high-sulfur coal, and measured opacity of less than 2%. William Goodrich, et al., Summary of Air Emissions from the First Year Operation of JEA's Northside Generating Station, Presented at ICAC Forum '03, p. 16. Testing done by Black & Veatch for the Department of Energy showed visible emissions at the JEA facility of 1.1% and 1.0% opacity. See Black & Veatch, Fuel Capability Demonstration Test Report 1 for the JEA Large-Scale CFB Combustion Demonstration Project, DOE Issue Rev. 1 p. 12 (Sept. 3, 2004). Also, the City of Springfield agreed to a lower opacity limit.

The final permit must contain BACT limits that include a visible emission standard for the combustion turbines. The BACT limits for PM and SAM must include a visible emission limit of no more than 2% opacity based on the results of testing at the JEA Northside facility. See Goodrich, *supra*, p. 16. In other words, if opacity at a CFB plant can be limited to less than 2 percent opacity, the project applicant must explain why it cannot meet such a limit when firing syngas, a fuel with lower particulate matter emissions than solid coal.

7. Start up and shutdown BACT

    a. Sulfur Recovery Unit.

The draft permit sets a startup, shutdown and malfunction limit of 201 lbs of SO2/hour for the sulfur recovery unit. Draft Permit at 13. This is problematic. First, IEPA cannot set a limit for periods of malfunction. The project proponent has an obligation at all times to minimize the time and degree of any malfunction. IEPA cannot create a blanket amnesty for a certain degree and period of malfunction. Second, there are no obvious reasons why the permit could not require the use of natural gas during periods of startup and shutdown of the sulfur recovery unit and thereby avoid the firing of high-sulfur syngas during these periods. In Condition 4.1.2.1.c.iii the draft permit does require the use of natural gas during periods of gasifier startup. Accordingly, the use of natural gas must be considered in setting a top-down SO2 BACT limits for the sulfur recovery unit during periods of start up and shutdown. The existing limit does not constitute BACT.

b. Combustion Turbines Lack Startup & Shutdown Limits

The draft permit does not appear to have any meaningful start up or shutdown limits for the combustion turbines for any pollutants, except SO2. Proposed Condition 4.2.2 exempts periods of start up and shutdown from any input-based limits for PM (both filterable and total), NOx, CO and sulfuric acid mist. The only other applicable limits to these pollutants appear to be the annual limits in Table 1 of Attachment 1. Annual limits are not sufficient to meet the requirement that a PSD permit include BACT startup and shutdown limits for each regulated pollutant and protect air quality standards. In setting lawful startup and shutdown BACT limits IEPA must consider the use of cleaner fuels, *i.e.* other than syngas, such as natural gas and/or gasified biomass. If IEPA issues a new permit with startup and shutdown BACT limits for each regulated pollutant – as we believe it must -- the agency should explain why the public should not get an opportunity to comment on such new limits prior to being finalized.

c. Terms Should Be Defined

The term "startup" should be defined as "the period beginning with ignition and lasting until the equipment has reached a continuous operating level and operating permit limits." The term "shutdown" should be defined as the period beginning with the lowering of equipment from base load and lasting until fuel is no longer added to the combustion turbine and combustion has ceased."

8. Timing of the ESA Consultation.

The federal Endangered Species Act applies to this permit proceeding. The Environmental Appeals Board has warned that it expects that "ESA consultation would ordinarily be completed, at the very latest, prior to the issuance of the permit and, optimally, prior to the comment period on the permit, where the flexibility to address ESA concerns is the greatest." *See Indeck* (EAB, 2006). The Board cautioned IEPA not to wait until after the permit is issued because it would "tolerate an ESA violation whenever an appeal is not taken." *Id.* Despite this admonition from the Board, IEPA is now proposing to issue the second PSD permit post-*Indeck* without providing any of these procedural safeguards and without finalizing the ESA Consultation prior to the issuance of the draft permit. We urge IEPA to allow EPA to finalize the ESA consultation process and provide an additional period for public review of the consultation findings before closing the comment period on this draft permit.

As described above, the ESA consultation must consider the global warming impacts associated with building a large new source of carbon dioxide and further accelerating global warming.

9. Commencement of Construction

The draft permit provides that should the applicant fail to commence construction within 18 months of receipt of the final permit that IEPA may extend the expiration timeline.

We urge that IEPA clarify that if the permit applicant does not commence construction within 18 months that the permit is automatically void. The only exception to this hard rule is if the applicant submits a timely extension request to IEPA that includes an updated BACT and modeling analysis and that there be an opportunity for public (and USEPA) review and comment prior to IEPA acting on the extension request. This is consistent with the practice in other states, including North Dakota. In a November 9, 2006 Letter from USEPA Region 7 to Kansas Department of Health & Environment regarding the proposed PSD permit for the Sunflower coal plant proposal in West Kansas the agency wrote:

> "[A]ny ... permit extension ... should benefit from public and EPA peer review. Therefore, we recommend that KDHE add this additional clarification.
>
> Lastly, if Sunflower does not commence construction on one or more of the units and does not provide the analysis required by the permit in a time frame prior to the close of the 18 months period, KDHE should make clear that authorization to construct any subsequent units automatically becomes void. It is essential that Sunflower submit the reanalysis in a timely fashion or they must begin a new PSD permitting review. Again, KDHE may provide any clarification in a permit, or associated record, so there is no confusion later on.

10. New Mercury Standard Must Be Included

IEPA does not explain how the state's new landmark mercury rule would apply to this facility. We urge it to do so.

11. Permit Must Include A PM2.5 BACT Limit

The Draft Permit does not include a BACT limit for PM2.5 emissions. Nor does it appear that IEPA even considered such a limit. This is unlawful and must be corrected before a PSD permit can issue. The federal PSD program 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). PM2.5 is "a pollutant subject to regulation under the Act" because EPA established a NAAQS for PM2.5 in 1997. 62 Fed. Reg. 38711; 40 C.F.R. § 50.7. Moreover, PM2.5 will be emitted from this facility in a "significant" amount because it will be emitted at "any emission rate." 40 C.F.R. § 52.21(b)(23)(ii). For these reasons a BACT limit for PM2.5 is required. 42 U.S.C. § 7475(a)(4); 40 C.F.R. § 52.21(j). Nevertheless, the Draft Permit does not contain a BACT limit for PM2.5 emissions. This is a deficiency that must be corrected before a final PSD permit can issue.