

STATE OF MINNESOTA
PUBLIC UTILITIES COMMISSION

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**In the Matter of Minnesota Power's Boswell
Energy Center Unit 4 Environmental
Retrofit Project**

MPUC Docket No. E-015/M-12-920

**COMMENTS OF IZAAK WALTON LEAGUE – MIDWEST OFFICE, FRESH
ENERGY, SIERRA CLUB, AND MINNESOTA CENTER FOR
ENVIRONMENTAL ADVOCACY**

I. INTRODUCTION

These comments, submitted on behalf of the Izaak Walton League – Midwest Office, Fresh Energy, Sierra Club and Minnesota Center for Environmental Advocacy (collectively, “Environmental Intervenors”), concern Minnesota Power’s proposed Boswell Energy Center Unit 4 Environmental Retrofit Project (“BEC4 Retrofit Project”). As a general matter, Environmental Intervenors certainly welcome improvements to air and water quality, and we of course agree that the Minnesota Mercury Emissions Reduction Act (“MERA”) and federal Mercury Air Toxics Standard (“MATS”) are important public health measures with which Minnesota Power should plan to comply. Environmental Organizations, however, maintain that the “bigger picture” of the pollution created by extended BEC4 operations far into the future requires much more careful attention.

Minnesota Power’s proposal extends the operating life of BEC4 another 12 years from previous company expectations, to 2035. During that time BEC4 would emit around 4 million tons of carbon dioxide each year for the life of the plant. With national atmospheric reports showing record-setting and increasingly dangerous carbon dioxide levels, Minnesota must prioritize rapid reductions in greenhouse gas pollution. The long-term environmental impacts of the BEC4 life extension move Minnesota in the opposite direction from the imperative to stabilize and reduce the effects of climate change. Environmental Intervenors believe that clean energy alternatives are better for ratepayers and the environment than paying hundreds of millions of dollars to retrofit aging plants.

Here, the Commission is called upon to determine whether spending money on control technologies to meet MATS and MERA at BEC4 is a worthwhile investment for ratepayers. But these comments show that the plan before the Commission is not designed to establish MATS and MERA compliance -- our analysis shows those standards can potentially be met with much simpler and more cost-effective measures. Yet Minnesota Power left such measures unexamined. These facts strongly suggest that, contrary to Minnesota Power's assertions, MERA and MATS compliance is not actually the driving purpose of the BEC4 Retrofit Project. Instead, the retrofits proposed are more likely designed to: a) satisfy the 2008 EPA Notice of Violation against Minnesota Power and/or b) cement cost recovery for the plant's operations until at least 2035.

Both of those scenarios are inappropriate for this proceeding, a proceeding ostensibly about MATS and MERA compliance only.

First, it is shareholders, not ratepayers, who should be responsible for the costs of scenario a). And second, if the scenario b) goal is to continue the operating lifespan of the plant indefinitely, then Minnesota Power must do a full and comprehensive analysis of all alternatives for Commission review. Using the MATS/MERA deadline to force the Commission to make a myopic determination in lieu of comprehensive lifespan analysis and alternatives is clearly not in the ratepayers' interests.

Environmental Intervenors submit that the BEC4 Retrofit Project that Minnesota Power has proposed is a Trojan horse that conceals massive unnecessary capital investment in coal, and significantly delays the fundamental transition to cleaner, low-carbon energy alternatives. The record Minnesota Power has placed before the Commission does not support approval of the BEC4 Retrofit Project.

II. THE BEC4 RETROFIT PROJECT IS NOT NEEDED FOR MATS OR MERA COMPLIANCE.

Minnesota Power represents that MATS and MERA are the only regulatory requirements driving the BEC4 Retrofit Proposal. On this basis, Minnesota Power claims that the entire \$350 million cost of its share of the BEC4 retrofit should be allocated to compliance with MATS and MERA alone.¹ As the technical analysis below shows, however, it is essential for the Commission to recognize that BEC4 does not need the proposed massive capital investment to achieve MATS and MERA pollutant reductions.²

¹ "Minnesota Power believes that all BEC4 project costs are appropriately allocated to achieving compliance with the requirements of the Minnesota Mercury Emissions Reduction Act ("MERA") and the EPA-issued Mercury and Air Toxics Standard ("MATS" Rule)." See, MP Response to OAG IR 105, included within Exhibit 1 to these comments.

² The Environmental Intervenors retained technical engineering analysis from Dr. Ranajit Sahu, whose expertise is detailed in Exhibit 2.

A. Requirements of the Mercury Air Toxics Standard and Mercury Emissions Reduction Act.

Mercury and Air Toxics Standard (“MATS”)

On December 16, 2011, the Environmental Protection Agency (“EPA”) signed its mercury and air toxics standards (“MATS”) rule for power plants, which is applicable to new and existing coal and oil-fired electric utility steam generating units (“EGUs”).

MATS applies to EGUs larger than 25 megawatts (“MW”) that burn coal or oil for the purpose of generating electricity for sale and distribution. These include investor-owned units, as well as units owned by the Federal government, municipalities, and cooperatives. All operating coal and oil powered EGUs are required to limit their toxic air emissions. Thus, MATS applies to each of the four BEC units.

For all existing and new coal-fired EGUs, the rule establishes numerical emission limits for mercury, filterable PM (as a surrogate for toxic non-mercury metals), and hydrogen chloride (“HCl”) (a surrogate for all toxic acid gases). The rule establishes alternative numeric emission standards, including SO₂ (as an alternate to HCl), individual non-mercury metal air toxics (as an alternate to PM), and total non-mercury metal air toxics (as an alternate to PM) for certain power plants.³

Existing sources generally will have until 2015 (or possibly 2016 with request for extension) to comply with MATS. This includes the 3 years provided to all sources by the Clean Air Act, as well as one additional year that may be granted by state permitting authorities if needed for technology installation. Reliability-critical units may be granted up to one additional year for compliance.

The MATS Rule emission limits applicable to BEC4 are provided below.

	HCl	PM	Mercury
		Lb/mmbtu	Lb/Tbtu
Mercury and Air Toxic Standards (MATS), existing coal boilers	0.002	0.030	1.2

While MATS requires compliance with these limits at each applicable unit, it is important to note that the MATS rule provides compliance flexibility via the use of averaging emissions of these pollutants at multiple units at a plant. Thus, the BEC plant can and will likely use these averaging provisions for MATS compliance.⁴

³ Note that in addition to meeting the mercury requirements for MATS, Minnesota Power has stated that it will use filterable PM (as the surrogate for non-mercury metals) and either SO₂ or HCl for acid gases. See MP Response to OAG IR 106, included in Exhibit1 to these comments.

⁴ See the discussion of averaging in Section H, “Emissions Averaging,” 77 FR 9384, Feb. 16, 2012.

Mercury Emissions Reduction Act

MERA requires utilities with the largest coal plants in Minnesota to obtain Commission approval of mercury reduction plans,⁵ and for Minnesota Power in particular, the option to file a plan “designed to achieve total mercury reduction at targeted and supplemental units owned by the utility equivalent to a goal of 90 percent [mercury] reduction.”⁶ Minnesota Power lobbied for the 2010 amendments that gave the utility more compliance flexibility, that is, extending the deadline to implement mercury reduction plans, and establishing the 90 percent mercury reduction goal as one that Minnesota Power can meet through a combination of emissions reductions at both “targeted units” and “supplemental units.” (*E.g.*, Boswell 3 and 4).⁷

In addition, MERA states that to encourage utilities to address multiple pollutants, a utility required to submit mercury reduction plans “may also propose plans for investments and related expenses in pollution control equipment . . . to comply with state or federal emission-control statutes or regulations that became effective after December 31, 2004.”⁸ MERA allows utilities to petition for a rider pursuant to Minn. Stat. § 216B.1692 to recover the costs of the pollution control upgrades for mercury and other pollutants⁹ and, if approved, to begin recovering the project costs (including the shareholders’ rate of return) before completing the projects.¹⁰

Here, Commission review is authorized by Minn. Stat. § 216B.6851, Subd. 6., and the standards for this review are contained in Minn. Stat. § 216B.6851, Subd. 6(b):

⁵ Minn. Stat. § 216B.685.

⁶ Minn. Stat. § 216B.6851, Subd. 3. Although Minn. Stat. § 216B.6851 does not expressly state that it applies exclusively to Minnesota Power, the conditions contained in Subdivision 1 make clear that Minnesota Power is the only utility that benefits from the increased regulatory flexibility provided by this section.

⁷ *Id.*

⁸ Minn. Stat. § 216B.686.

⁹ Various belt and suspenders provisions in MERA authorize use of Minn. Stat. § 216B.1692 to recover costs related to pollution emission reductions, including: Minn. Stat. § 216B.683, Subd. 1 (“A public utility . . . may also file for approval of emissions-reduction rate riders pursuant to section 216B.1692, subdivision 3, for its mercury control and other environmental improvement initiatives under sections 216B.68 to 216B.688.”); Minn. Stat. § 216B.683, Subd. 3 (“Section 216B.1692 applies to plans and emissions-control riders proposed under sections 216B.68 to 216B.688”); *See also* Minn. Stat. § 216B.682, Subd. 3(c) (“The utility may submit an emissions rate rider to the commission under section 216B.683 to recover the costs associated with plans filed under this section.”); Minn. Stat. § 216B.6851, Subd. 1 (“Plans under this section are subject to section 216B.682, subdivision 3.”); Minn. Stat. § 216B.686, Subd. 2 (“A public utility that files a plan under this section may also file for approval of an emissions-reduction rate rider under section 216B.683, subdivision 1.”).

¹⁰ Minn. Stat. § 216B.683, Subd. 1(b).

In its review, the commission shall consider [1] the environmental and public health benefits, [2] the agency's determination of technical feasibility, [3] competitiveness of customer rates, and [4] cost-effectiveness of the utility's proposed mercury-control initiatives

* * *

[T]he commission shall approve a . . . plan that the commission reasonably expects will come closest to achieving total mercury reductions at targeted and supplemental units owned by the utility equivalent to a goal of 90 percent reduction of mercury emissions at the utility's targeted units . . . in a manner that provides for increased environmental and public health benefits without imposing excessive costs on the utility's customers. If the commission is unable to approve the utility's . . . plan . . . , the commission . . . shall order the utility to implement the most stringent mercury-control alternative proposed by the utility . . . that provides for increased environmental and public health benefits without imposing excessive costs on the utility's customers.

Thus, MERA requires that the Commission approve the mercury-control alternative that comes closest to a 90% reduction in mercury emissions without imposing excessive costs on ratepayers. In contrast, the portions of Minnesota Power's plan related to controlling emissions of pollutants other than mercury are subject to the standard contained in Minn. Stat. § 216B.686, Subd. 1(b) and Subd. 4:

[T]he utility must show that the investments in pollution control equipment to be installed at facilities in Minnesota under the plan will provide for increased environmental and public health benefits, do not impose excessive costs on the utility's customers, and will achieve at least the pollution control required by applicable state or federal regulations.

* * *

The commission shall consider the overall environmental and public health benefits, total costs, and competitiveness of customer rates. [T]he commission shall approve the plan and associated emissions-reduction rider if the commission finds that it meets the requirements of subdivision 1, paragraph (b).

Thus, the review standard for emissions control plans for pollutants other than mercury is broader in that it requires the Commission to consider “overall” benefits, impacts to costs and rates, and compliance with state and federal pollution control requirements.

B. NEITHER MATS NOR MERA COMPLIANCE REQUIRES THE BEC4 RETROFIT PROJECT.

Minnesota Power has not included in its Petition the whole factual story that the Commission needs to consider before taking action on the BEC4 Retrofit Project proposal. Facts related to BEC4 emissions data show that current BEC4 equipment is already capable of meeting both MATS and MERA.¹¹ We discuss first the facts that show there is no basis for Minnesota Power’s insistence that MATS compliance requires a major BEC4 retrofit, and second the BEC4 operational scenarios Minnesota Power has already tested that could provide MERA compliance without the BEC4 Retrofit.

MATS

1. BEC4 already meets the emissions rates for acid gases that MATS requires.

In response to Environmental Intervenors’ information request for Boswell emissions test data, it is apparent that current operations at BEC4 amply satisfy MATS requirements for emissions of acid gases. Actual test data for BEC4 shows that the unit emissions were substantially below the MATS Hydrochloric acid (“HCl”) standard, with an ample margin. See Exhibit 3 hereto. This is also true for the other BEC units for which test data is available. In addition a review of the coal chlorine content data for Minnesota Power’s expected future coals¹² indicates that HCl emissions are expected to be similarly low in the future as well. Quite clearly, MATS does not require further reductions in BEC4 emissions of acid gases.¹³

2. The most recent testing at BEC4 shows that it can meet the MATS limit for filterable particulate matter as well.¹⁴

Minnesota Power’s Petition overstates BEC4’s actual PM emissions prior to applying the MATS rule that sets a 0.03 lbs/MMbtu standard for filterable PM emissions. This means that

¹¹ As discussed further herein, Minnesota Power has also failed to investigate lower cost methods to supplement its MATS and MERA pollutant reductions.

¹² See MP Response to MCEA IR No. 23, included in Exhibit 1.

¹³ MATS allows a surrogate method for measuring acid gases through SO₂ proxies. However, it is clear that there will be no need to use a surrogate approach in this case since MP can and has shown compliance with the HCl limit directly.

¹⁴ The MATS limit only applies to filterable particulate matter, i.e., that fraction of particulate that is captured on a Method 5 (or similar) filter. It does not include particulate matter that is only formed upon condensation of precursor gases at lower temperatures (so-called “condensable” PM).

Minnesota Power overstated reductions in PM emissions that are necessary for BEC4 to reach MATS requirements. On the other hand, Minnesota Power *understated* or disregarded alternative and lower cost means by which BEC4 could meet the MATS particulate standard.

Minnesota Power states in Table 7 of its Petition that its current baseline for BEC4 PM emissions is 0.06 lb/MMBtu.¹⁵ The most recent testing at BEC4, however, shows that BEC4 PM emissions rates are between 0.0352 and 0.0405 lb/MMBtu. In other words, the necessary BEC4 reductions in PM to meet the MATS limit of 0.03 lb/MMBtu are much smaller than Minnesota Power maintains in the BEC4 Petition.¹⁶

Moreover, the MATS rule allows site-wide averaging to establish compliance with the PM emissions limit, as discussed above. Using the approved calculation methods under MATS, and the test data Minnesota Power has completed for each of its four BEC units, it is clear that Minnesota Power can easily rely upon current plant-wide particulate controls to achieve the small PM reductions that MATS requires. According to our expert's calculations, Minnesota Power could meet the PM standard with a 22% compliance margin without the BEC4 Retrofit Project. See, Exhibit 3 to these comments.

It should be noted also that, all of the above notwithstanding, Minnesota Power has not analyzed two additional approaches that might further reduce filterable PM emissions at BEC4 – which would also further lower the site-wide PM average and enhance the compliance margin for the MATS rule limit. The first is exploring the option (or the ramifications) of using all four existing BEC4 scrubbers (as opposed to the usual current mode of operating three out of the four scrubbers and leaving the fourth one as spare). Since excess scrubber capacity currently exists, the ability to use it should be fully fleshed out in the record. The second is the option of lowering the bypass gas stream (which passes through a small electro-static precipitator) to less than 5%, which is the typical bypass amount. Again, the record is silent as to the ramifications of this option.

Finally, we note that the MATS limit is a 30-day rolling average limit and that, of course, provides additional flexibility, especially coupled with the site-wide averaging and the ability to use more scrubber capacity and less bypass.

At a minimum, it is premature to justify the enormous expense associated with the BEC4 Retrofit Project in order to meet MATS compliance.

¹⁵ Petition, p. 37.

¹⁶ It is important to note that BEC4 has 4 venturi scrubbers, and only 3 were running during emissions testing. Although the presence of the fourth scrubber as a “spare” is how BEC4 is normally operated now, Minnesota Power did not consider the option of running all 4 venturi scrubbers at some level and the additional emissions reductions that that option could provide.

NERA

3. Neither Does Minnesota Power Need A Project of The Scope or Expense Proposed in this Docket To Satisfy NERA Mercury Reduction Standards.

Environmental Intervenors recognize that NERA – not MATS - is in the driver’s seat for mercury reductions at BEC4. MATS is not controlling for BEC4 mercury reductions because NERA’s 90 percent mercury reduction goal is more stringent. Yet Minnesota Power’s massive and expensive BEC4 Retrofit Project scope is unnecessary to meet the Minnesota mercury reduction law. Quite simply, Minnesota Power has already tested low-cost mercury controls that can achieve the statutory goals without the BEC4 Retrofit’s significant capital investment.

Minnesota Power’s Petition states that Mer-Cure and KNX Powdered Activated Carbon (“PAC”) injection system is a component of the BEC4 Retrofit Project. Petition, Exhibit 1, p. 22. It is apparent, however, that operating BEC4 with the Mer-Cure/KNX system is likely *all* that is required to meet NERA’s mercury reduction goals. In March 2012, Minnesota Power tested the Mer-Cure/KNX PAC carbon injection system at BEC4, with results in a range of 80 to 90 percent mercury reduction with existing particulate controls and *without* an added fabric filter.¹⁷ These tests show that mercury emissions as low as [TRADE SECRET BEGINS...
...TRADE SECRET ENDS] were achieved at an injection rate of [TRADE SECRET BEGINS...
... TRADE SECRET ENDS]¹⁸ Although Mer-Cure PAC carbon injection rates were varied in this testing and can be adjusted lower or higher over a range of [TRADE SECRET BEGINS...
... TRADE SECRET ENDS] Minnesota Power has stated that its projected injection rate is [TRADE SECRET BEGINS...
...
TRADE SECRET ENDS]. It is not clear why and how this “projected” rate was established.¹⁹

¹⁷ While there are unanswered questions about the baseline for mercury emissions that PCA will establish to measure the pollutant reductions, in testing and in the Petition Minnesota Power used 2011 mercury emissions as the baseline from which to measure its projected mercury reductions. It should be kept in mind that since the NERA baseline has not yet been established, it is quite likely that a system-wide baseline for mercury will require less than 90% reduction of mercury at BEC4, given planned shutdown or repowering prior to the NERA compliance date of the Laskin and Taconite Harbor 3 coal plants.

¹⁸ See **TRADE SECRET** test data summary provided as a Trade Secret response to MCEA IR 21.

¹⁹ Minnesota Power mentions its concern that a higher Mer-Cure injection rates *might* have a negative impact on BEC4’s ability to meet its permitted opacity limits. Minnesota Power, however, appears not to have explored solutions to prevent opacity problems other than its proposal to spend \$350 million on the BEC4 Retrofit Project. For example, the various options discussed earlier for additional PM control – such as fully utilizing scrubbers, lowering bypass, and likely other optimization of the current control system can provide further opacity reductions. Minnesota Power has an obligation to fully and thoroughly explore the lower-cost enhancement of existing controls before attempting to justify the BEC4 Retrofit Project.

Clearly, its own tests show that at slightly higher PAC injection rates, greater mercury reductions – i.e., 90% reduction or 0.5 lb/Tbtu – can be achieved.²⁰

Further, MERA expressly allows Minnesota Power to rely on “supplemental units” to provide mercury reductions to supplement those technically feasible at a “targeted unit” such as BEC4. Minn. Stat. § 216B. 6851. Minnesota Power did not examine using supplemental units’ “over-compliance” with mercury reductions to reduce control costs and technology feasibility at BEC4, due to its “preference” not to do so. The Commission should require Minnesota Power to submit a complete record of compliance options before taking action in this docket.

Finally, the Commission should keep in mind that other mercury reductions are planned with Minnesota Power’s announcement to convert Laskin Energy Center to a gas peaking unit and to retire Taconite Harbor 3. Ceasing coal combustion at Laskin and Taconite Harbor 3 reduces Minnesota Power’s system-wide mercury emissions by another 50-60 lbs per year. Even though Laskin and Taconite Harbor 3 are not “supplemental units” as MERA defines the term, the Commission should consider the environmental impact of those plant changes.

C. Minnesota Power’s flawed assessment of BEC4’s present capabilities to meet MATS and MERA strongly suggests that those regulatory requirements are *not* the primary objectives of the BEC4 Retrofit Project.

Although Minnesota Power asserts that the BEC4 Retrofit Project is needed for MATS or MERA compliance, it appears that the opposite is true. Minnesota Power’s flawed assessment of BEC4’s present capabilities to meet MATS and MERA strongly suggests that those regulatory requirements are *not* the primary objectives of the BEC4 Retrofit Project. Environmental intervenors submit that Minnesota Power’s proposal more likely relates to extending BEC4’s operating life until 2035 and/or to resolving EPA-identified violations of the Clean Air Act alleged to have taken place at the Boswell facility between the years 1981 and 2001. See, Exhibit No. 3. The standards under MERA were not established to consider twenty-year life extension projects for coal, nor to weigh the prudence of imposing on ratepayers hundreds of millions of dollars to make up for a utility’s prior environmental infractions. The Commission should not allow Minnesota Power to use this MERA proceeding for either purpose.

²⁰ Id.

III. The Record of PCA’s Review of the BEC4 Retrofit Project Strongly Indicates a Direct Link between the Proposal and Anticipated EPA settlement requirements to resolve the 2008 NOV.

Minnesota Power refuses to provide information in this docket regarding corrective measures that may be included in a settlement with EPA to resolve the 2008 NOV. In fact, Minnesota Power states that *no portion* of its proposed retrofit is or should be allocated to settlement terms that may have been reached between EPA and the utility. See Exhibit 1 MP response to OAG R 102,105. Minnesota Power’s choice to shield information about, and disclaim any connection with, the scope of the proposed project and the EPA NOV leaves the Commission with a woefully incomplete record. Yet the potential link to a pending EPA enforcement action is relevant to stakeholders in this case.

The Commission is charged with deciding whether the proposed project imposes excessive costs on ratepayers. Environmental Intervenors submit that costs to resolve the utility’s past conduct that ran afoul of the Clean Air Act – and the associated return to shareholders on such capital investments – would be an excessive cost burden on ratepayers. Minnesota Power “blames” MATS and MERA for the need to make an unprecedented level of investment that extends BEC4’s operating life another 20 years; however, this claim is neither supported by the actual MATS and MERA compliance requirements (discussed above), nor the statutory purpose of MERA.

To evaluate the likelihood of the connection of the BEC4 to EPA negotiations of NOV settlement terms, Environmental Intervenors made a request to PCA on March 7, 2013 under the Minnesota Data Practices Act for all of its files concerning PCA’s analysis of the Boswell 4 retrofit project. That document review showed us that PCA’s recommendation in its final report to the Commission to investigate further the Minnesota Power’s emissions limits on SO₂ (and consequently the proposed CDS scrubber investment) was, at best, restrained. Although the last paragraph of the PCA Report states that one of the benefits of the BEC4 project is “resolving environmental violations,” PCA states that it cannot describe the violations to which it refers.²¹ The PCA document review confirms, however, that the record Minnesota Power has put before the Commission is anything but transparent, and prevents Commission review of relevant details.

²¹ The PCA Report suggests that the Commission attempt to use other discovery means “to ensure this data is part of the record.” PCA Final Report, p. 27. The Office of the Attorney General and the DOC attempted to follow up with the PCA suggestion, submitting information requests to Minnesota Power. Minnesota Power provided extremely limited responses. See, for example, MP Response to OAG 102, 105 included in Exhibit 1.

Despite the lack of transparency in the Commission record, certain documents and information in the PCA's project review files allow the Commission to reasonably determine that the SO₂ emissions rates (and the associated scrubber investment) for BEC4 are key to resolving EPA's enforcement action against Minnesota Power. The most obvious evidence in the PCA record is a draft version of PCA's report to the Commission that states the "proposed SO₂ limit is intended to reflect BACT [Best Available Control Technology] level of performance – resolution of the alleged NSR violations involves installing pollution equipment that meets or exceeds present day BACT." Exhibit 4. Indeed, PCA also considered including in its Report the statement "MP's proposal is clearly a BACT proposal, and is considerably below existing permit limits for BEC4." Jackson files FOIA 2/27/2013 Boswell 4 Upgrade Review, pg. 29. However, this sentence was also removed from the final report submitted to the Commission.

Although Minnesota Power states at page 36 of its Petition that "BEC4 is not required to meet BACT," that statement does not appear genuine. Indeed, it appears likely that EPA would – at least in part - require BEC4 to meet present day BACT for SO₂.

In Environmental Intervenors' view, it is a reasonable conclusion from the foregoing that the scope of the proposed BEC4 Retrofit Project is driven in large part (and expense) by Minnesota Power's desire to fix in place cost recovery for its Clean Air Act "penance" to EPA. In any event, however, the Commission should not accept an attempt to wedge a 20 year life extension project into a mercury reduction proceeding; a life extension project docket demands a more rigorous record than Minnesota Power has provided on the costs and environmental effects of all of its alternative electric generation options.

IV. Minnesota Power's Consideration of Low Carbon Alternatives Is Inadequate

Given that practical, lower cost options exist to comply with MERA and MATS, Minnesota Power's alternatives analysis is insufficient. The Petition considered the following three alternative paths:

- Path a – the proposed BEC4 Project;
- Path b – delaying the BEC4 Project by temporarily shutting down BEC4 and building a 213 MW combustion turbine natural gas unit in the interim to help with replacement power; and
- Path c – shutting down BEC4 in 2016 and replacing it natural gas-fired generation.²²

Each of the two alternatives to the proposed project assume that BEC4 cannot comply with MERA other than through the proposed retrofit, thereby necessitating a near-term shutdown of BEC4 to avoid non-compliance with regulatory requirements.²³ In particular, Path b assumes

²² Petition App. A at 6.

²³ See discussion of alternatives in Petition App. A at 8-12.

market purchases for a period of 5 years, between 2016 and 2021, at an estimated cost of \$43/MWh (energy) and \$1/Mwh (capacity). Path c assumes replacement in 2016 to avoid non-compliance with MERA. Since Minnesota Power can comply with MERA at far lower cost, it also has substantially more flexibility with regard to the timing of its transition to cleaner fuel alternatives, and this flexibility would impact the Petition's alternatives cost analysis.

The Petition's alternatives analysis is defective because it fails to consider:

- the financial impacts of the lower cost mercury control options presented herein;
- the impact of re-fueling of Laskin 1 and 2 and closure of Taconite Harbor 3, as proposed in Minnesota Power's IRP; the modeling assumes these units continue to run on coal;
- the option of accelerating construction of a new combined cycle unit in the early 2020s to replace smaller coal units, which is proposed by the IRP;
- the impacts of mid-range CO₂ costs on the base case; and
- increased use of renewable energy to meet customer demands.

We discuss some of the changes necessary to make Minnesota Power's modeling more reflective of reality.

First, Laskin 1 & 2 and Taconite Harbor 3 must be properly modeled, i.e. retired or converted to peaking. Second, the Company should size the CC slightly larger. Since the Company already assumes it is purchasing a portion of the CC, it can simply increase that portion. There is no reason to limit the size just so it is comparable to BEC 4. The Company itself is forecasting a need for additional capacity in the years to come and additional energy from the CC could compare favorably to existing units, which must run more in the absence of more CC capacity.

In addition, the minimal cost differences between the alternatives proposed by Minnesota Power also indicate that the Commission should require a revision of the Petition's alternatives analysis. Petition App. A, Table 1, shows the present value cost differences over the 23 year study period, but does not express these differences in terms of percentages, nor does it estimate the average per-ratepayer impact of choosing a lower-carbon alternative on an annual or monthly basis. The following table is based on Table 1, but it also shows the percent difference among the alternatives studied given various sensitivities.

Strategist PVRP power supply cost comparison The BEC4 Project vs. Natural Gas Resource Alternatives					
	With the Energy Market Outlook				
	*Power Supply Costs for the BEC4 Project Alternative	Change in Cost with the “Direct Replacement” Option Additional Cost (Less Cost)	% Difference	Change in Cost with the “Ownership Share” Replacement Option Additional Cost (Less Cost)	% Difference
Base	\$8,093,506	\$373,160	4.61%	\$209,821	2.59%
High Capital Cost	\$8,205,945	\$406,793	4.96%	\$228,274	2.78%
Low Capital Cost	\$7,981,068	\$339,525	4.25%	\$191,371	2.40%
CO2-\$40 Start in 2021	\$9,378,273	\$89,498	0.95%	(\$58,624)	-0.63%
CO2-\$0	\$7,501,205	\$480,026	6.40%	\$320,155	4.27%
High Coal Forecast	\$8,615,016	\$231,830	2.69%	\$67,212	0.78%
Low Coal Forecast	\$7,668,684	\$513,217	6.69%	\$349,724	4.56%
High Externality Values	\$8,077,939	\$407,188	5.04%	\$246,442	3.05%
Low Externality Values	\$7,557,853	\$477,724	6.32%	\$315,998	4.18%
Plus 50% Natural Gas Forecast	\$8,183,541	\$679,227	8.30%	\$530,343	6.48%
Minus 50% Natural Gas Forecast	\$8,046,904	(\$101,094)	-1.26%	(\$292,355)	-3.63%
High Load Forecast	\$8,371,828	\$359,524	4.29%	\$197,164	2.36%
Low Load Forecast	\$6,944,126	\$369,296	5.32%	\$206,258	2.97%
Plus 50% Wholesale Mkt Forecast	\$8,573,016	\$355,967	4.15%	\$153,475	1.79%
Minus 50% Wholesale Mkt Forecast	\$7,572,637	\$291,041	3.84%	\$152,997	2.02%
DSM Alternative 2 Combination	\$8,093,506	\$362,640	4.48%	\$199,179	2.46%
Stringent EPA	\$8,161,524	\$305,142	3.74%	\$141,804	1.74%
* Power supply costs modeled in Strategist for the 2012-2035 study period - Dollar amounts are shown in thousands and represent the present value of power supply cost is 2012 dollars over the study period					

As can be seen, the cost difference between Minnesota Power's preferred coal option is not substantially different from cleaner alternatives. However, the differences in costs in Table 1 may be overstated, because the costs provided to Intervenor in response to their IR1, indicate that the cost differences may be lower than that provided in Appendix A.

Even assuming that Minnesota's Power alternatives analysis is not defective, the difference between the proposed project and replacement with cleaner, lower carbon fuel sources is only 2.59%, and many of the sensitivities show similar or lower costs.

Finally, with regard to carbon costs, it appears that the Petition fails to include CO₂ costs appropriately, because it considers only CO₂ externality values and not regulatory costs within its base case. At page 1 of Attachment 2 of Appendix A to the Petition, the Company states "the base forecasts utilized for market energy prices, market capacity prices, CO₂ costs, and natural gas prices over the study period [include]: (a) Carbon cost range: \$10/tonne starting in 2021 to \$25/tonne in 2035..." However, the CO₂ externality values are the only CO₂ costs shown in the Strategist outputs, with the exception of three sensitivities using the Commission's low, mid and high CO₂ cost range. There are no CO₂ regulatory costs in the base case or in twenty-one of the other scenarios modeled by the Company.

Given the unique risk posed by carbon dioxide regulation and the Commission's emphasis on examining this risk, we believe a more prudent course of action would have been to conduct a matrix of runs similar to that made by Ottertail Power for purposes of its Baseload Diversification Study. Conducting additional runs looking at a range of CO₂ costs in addition to sensitivities on other base case variables would give a much more complete picture of the risks of the BEC 4 retrofit and its alternatives.

At present, the modeling done by Minnesota Power in support of its Petition to retrofit BEC 4 does not support moving forward with the project. In fact, the modeling largely reflects a system the Company already knows will not be in place for the next twenty-two years (because it has decided to retire TH3 and repower Laskin) and one in which carbon regulation will have no impact. This simply does not make sense and is in contravention to Commission orders regarding resource planning.

Given the deficiencies in Minnesota Power's alternatives analysis and the small cost differences among the alternatives considered, the Commission must order Minnesota Power to re-analyze these cost differences and do so in light of the following factors:

- the Commission's standard of review under MERA, which requires that it consider "overall" health benefits, total costs, and customer rates and then select an option whose costs are not "excessive,"²⁴ and

²⁴ Minn. Stat. § 216B.686, Subd. 1(b), Subd. 4.

- the state's clear policy preference for cleaner energy and its carbon emission reduction goals.

Cost increases for cleaner energy of approximately 2-3% are not "excessive," particularly when considered over the 23 year planning period and in light of the substantial future regulatory risk faced by coal power and the increasing impacts to Minnesota's health and welfare caused by climate change.

IV. CONCLUSION

For the foregoing reasons Minnesota Power has failed to provide a record on which the Commission can take action to approve the BEC4 Retrofit Project.

Dated: May 14, 2013

Respectfully submitted,

/s/Elizabeth Goodpaster

Elizabeth Goodpaster
Minnesota Center for Environmental Advocacy
26 E. Exchange Street, Ste. 206
St. Paul, MN 55101
(651) 287-4880

*Attorney for Izaak Walton League of America –
Midwest Office, Fresh Energy, Sierra Club,
and Minnesota Center for Environmental
Advocacy*

**State of Minnesota
Office Of the Attorney General
Utility Information Request**

Requested from:

**MPUC Docket No.
E015/M-12-920**

Christopher D. Anderson
Associate General Counsel
Minnesota Power
30 West Superior Street
Duluth, MN 55802

*Application of Minnesota Power's Petition for Approval of the Rider for Boswell Energy Center
Unit 4 Emission Reduction*

By: Ian Dobson
Telephone: (651) 757-1432

Date of Request: March 15, 2013
Due Date: March 25, 2013

For all responses provide the Total Company (Allete) and Minnesota retail regulated amounts. Total Company is the amount that would be reported in consolidated financial reports. Minnesota retail regulated amounts are amounts that would be designated as reportable in Minnesota jurisdictional annual reports.

Reference: Page 28 of the March 1, 2013 MPCA report provided as follows: "The MPCA believes that this project is appropriate for accomplishing the objectives of reducing emissions of mercury and other pollutants under Minn. Stat. §§ 216B.68 to 216B.688, bringing the Boswell Unit 4 into compliance with federal air emission standards, resolving environmental violations, and avoiding additional regulatory requirements related to coal combustion residuals." Page 14 of Minnesota Power's March 7, 2013 Petition for Cost Recovery also refers to this statement in the MPCA report.

- a. Please identify all environmental violations that will be resolved due to implementation of the proposed project.
- b. For the proposed project, please identify the cost of each specific upgrade, retrofit, or addition to Boswell Unit 4, and identify whether each upgrade will bring the unit into compliance with a federal air emission standard, resolve an environmental violation, and and/or avoid an additional regulatory requirement related to coal combustion residuals. In the instance that a specific upgrade, retrofit, or addition to Boswell Unit 4 will achieve two or more of these stated goals, please identify each goal that will be achieved by the upgrade, retrofit, or addition.

Response by: Jodi Johnson
Title: Policy Manager
Department: Regulatory Affairs
Telephone: (218)355-3432

- c. Please identify each upgrade, retrofit, or addition to Boswell Unit 4 referred to in your response to subpart (b) of this request that is being proposed to comply with a state or federal rule or regulation that is anticipated or is otherwise not yet final.

Minnesota Power Response:

- a. Minnesota Power assumes that the Minnesota Pollution Control Agency ("MPCA") is referring to the alleged environmental violations contained in the NOV (see Page 5 of Exhibit 1 to Minnesota Power's August 31, 2012 BEC4 Plan Petition and Minnesota Power's response to OAG IR 103). Minnesota Power disagrees with MPCA's characterization of these allegations as violations. Minnesota Power believes that the items identified in the NOV were in full compliance with the Clean Air Act, New Source Review requirements and applicable permits. Because there have been no environmental violations, there are not any violations for the BEC4 Project to resolve.
- b. Minnesota Power is required by the Minnesota Mercury Emissions Reduction Act ("MERA") and the EPA-issued Mercury and Air Toxics Standard ("MATS") Rule to reduce mercury and other pollutants on BEC4. The \$431.5 million total project capital cost of the BEC4 Project, \$350 million of which is Minnesota Power's 80% share of the project cost, is attributable to achieving compliance with the requirements of MERA and MATS. While Minnesota Power based its technology selection on current regulations such as MERA and MATS, consideration was given to potential future regulations to ensure the Company is positioned to meet the requirements when and if they become law. Thus, there is no cost included in the total project cost to avoid an additional regulatory requirement related to coal combustion residuals. Additionally, as noted in (a) above, because no violations have occurred, no project costs are associated with resolution of environmental violations.
- c. Refer to response (b) above.

Response by:	Jodi Johnson
Title:	Policy Manager
Department:	Regulatory Affairs
Telephone:	(218)355-3432

State of Minnesota
Office Of the Attorney General
Utility Information Request

Requested from:

MPUC Docket No.
E015/M-12-920

Christopher D. Anderson
Associate General Counsel
Minnesota Power
30 West Superior Street
Duluth, MN 55802

Application of Minnesota Power's Petition for Approval of the Rider for Boswell Energy Center Unit 4 Emission Reduction

By: Ian Dobson
Telephone: (651) 757-1432

Date of Request: April 1, 2013
Due Date: April 10, 2013

For all responses provide the Total Company (Allete) and Minnesota retail regulated amounts. Total Company is the amount that would be reported in consolidated financial reports. Minnesota retail regulated amounts are amounts that would be designated as reportable in Minnesota jurisdictional annual reports.

Reference: MP's response to OAG IR 102 (b):

"Additionally, as noted in (a) above, because no violations have occurred, no project costs are associated with resolution of environmental violations."

For the proposed project, please identify the cost of each specific upgrade, retrofit, or addition to Boswell Unit 4, and identify whether each upgrade will resolve an alleged environmental violation, including but not limited to violations alleged in the NOV referred to in MP's response to OAG IR 102.

Minnesota Power Response:

Minnesota Power's settlement discussions with Environmental Protection Agency ("EPA") and MPCA are subject to a confidentiality agreement and are subject to Federal Rule of Evidence 408. The EPA will not consent to disclosure of the requested information. Minnesota Power believes that all BEC4 project costs are appropriately allocated to achieving compliance with the requirements of the Minnesota Mercury Emissions Reduction Act ("MERA") and the EPA-issued Mercury and Air Toxics Standard ("MATS") Rule.

Response by: Lyssa Supinski
Title: Senior Attorney
Department: Legal Services
Telephone: (218) 723-3982

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
1.	In machine-readable, electronic format, provide the input and output Strategist files produced for purposes of this Petition. In addition to the reports produced in the Baseload Diversification Study, i.e., Information Request Nos. 98 and 99, please provide the Tunnel Report, Significantly Different Plans, Project Revenue Requirements, Busbar Costs, System Revenue Requirements and Project Profitability.

Response:

Per discussions with MCEA, Minnesota Power is providing its latest Strategist files that were used in the BEC4 Plan Petition and are the starting point for its 2013 Integrated Resource Plan ("2013 Plan").¹ Minnesota Power evaluated the BEC4 Project under its 2013 Plan set of assumptions and base case and all the input and output files are provided for the analysis.

The Strategist software was updated to be synchronized with the 2013 Plan and had the following changes incorporated.

Updates for the BEC4 Project with IRP Analysis	Description of update
Boswell 4 base capital and O&M projections	• Updated BEC4 revenue requirements with most recent capital, O&M and fuel outlook used in the

¹ See Docket No. E015/RP-13-53

Response by: Julie Pierce

Title Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

	2013 Plan Added BEC4 share of station fuels capital cost and fuel O&M cost to the revenue requirement
Natural gas fired alternatives	Capital and O&M cost for the natural gas fired alternatives used to replace BEC4 in the shutdown scenario were updated to align with the 2013 Plan capital assumptions.
Wholesale market prices and fuels cost	The projected prices for market energy, capacity, natural gas and coal were updated with Minnesota Power's current outlook utilized in 2013 Plan.
Carbon regulation assumptions	- Carbon mid-externality value from the State Externality Docket published on June 13, 2012 under docket Nos. E-999/CI-93-583 and E-999/CI-00-1636 was utilized. - The sensitivity analysis for the BEC4 Project includes a carbon regulation penalty sensitivity at three different levels starting in 2017 - \$11, \$21.50 and \$42 per ton. - The carbon regulation values for the sensitivities are from the 2012 Order Establishing 2012 Estimate of Future Carbon Dioxide Regulation Costs, pursuant to Minn. Stat. §216H.06, in Docket No. E-999/CI-07-1199.
Load and Capability	Load outlook and capacity resources were updated to reflect 2013 Plan base case.

On the accompanying **TRADE SECRET** CD there are text files that include all the inputs and outputs to the strategist model for all cases used in the *BEC 4 Project Analysis to Incorporate IRP Assumptions*. The text files are broken out by the BEC 4 Project ("Retrofit Models"), Share of 2x1 CC Replacement Option ("2x1 CC Models") and the direct replacement option ("1x1 CC Models").

Also on the accompanying **TRADE SECRET** CD there are Strategist FSV files with the model ran for all cases used in the *BEC 4 Project Analysis to Incorporate IRP Assumptions*. The FSV files are broken out by BEC 4 Project ("Retrofit Models"), Share of 2x1 CC Replacement Option ("2x1 CC Models") and the Direct Replacement Option ("1x1 CC Models").

Finally, on the accompanying **TRADE SECRET** CD there is a folder titled "Macros" with the Base Strategist model (0-2013IRP_DEC 2012_R0_BASE RATE CASE.FSV) along with the macros required to run all Strategist cases used in the *BEC 4 Project Analysis to Incorporate IRP Assumptions*.

Response by: Julie Pierce

Title: Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

- The macro file named "RUN PETITION ALL.INP" will set-up and run all cases (including sensitivities) used in the *BEC 4 Project Analysis to Incorporate IRP Assumptions*.

Note that the input/output files and Strategist case files include sensitivities for biomass fuel pricing. The results from the cases ran with the biomass fuel pricing sensitivities is not reported in the *BEC 4 Project analysis to incorporate IRP Assumptions* document because this sensitivity had no impact to the results of the analysis. This sensitivity was included in the 2013 Plan analysis therefore was included in the modeling set-up for the *BEC 4 Project analysis to incorporate IRP Assumptions*.

Regarding the request for additional reports:

The Tunnel Report and Significantly Different Plans reports are part of the Strategist Proview software. As Minnesota Power did not utilize Proview for the BEC4 Project evaluation these reports are not available.

The Project Revenue Requirements, Busbar Costs, System Revenue Requirements and Project Profitability are part of the Capital Expenditure Report (CER) module in the Strategist software. Minnesota Power does not utilize this module in the software for its long-term planning so these reports are not available.

Response by: Julie Pierce
Title Manager Resource Planning
Department: Strategy and Planning
Telephone: 218-355-3829

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
2	Reference page 55 of the Petition—What are the terms of the power sales agreement with Basin Electric? What portion of the BEC4 Project costs can be passed on to Basin? Response: October 2009, Minnesota Power entered into an agreement to sell 100 MW of capacity and energy to Basin for a ten-year period which began in May 2010. The capacity charge is based on a fixed monthly schedule with a minimum annual escalation provision. The energy charge is based on a fixed monthly schedule and provides for annual escalation based on the cost of fuel. The agreement allows Minnesota Power to recover a pro rata share (based on the 100 MW sale compared to Boswell 4's capacity) of increased costs related to emission control additions that may occur during the last five years of the contract. Minnesota Power is passing the benefits of this agreement directly to customers through crediting the jurisdictional revenue requirements by Basin's specified share of the costs.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
3	In electronic machine-readable, Excel or text format, with all cells and links active, provide the Load and Capability calculation referenced at page 71 of the Petition. Response: Per discussions with MCEA, Minnesota Power is providing its latest Load and Capability calculation. This calculation includes all the latest capacity resources that Minnesota Power is utilizing for its forward planning period and the MISO reserve margin requirement (11.3%) in its 2013 Integrated Resource Plan (Docket #E015/RP-13-53). The chart on page 71 of the Petition has been updated to reflect Minnesota Power's current Summer Season load and capability that it utilizes for planning evaluations. As shown in the chart below, Minnesota Power expects some minimal capacity surpluses in its Base Case outlook, with capacity need starting to grow in the post-2020 time period. [TRADE SECRET BEGINS . TRADE SECRET ENDS] The Excel file attached "MCEA IR3.xls" contains the Trade Secret data and associated chart.

Response by: Julie Pierce

Title Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
4	Provide in electronic machine-readable, Excel or text format, with all cells and links active, the workpapers for Figure 2 on page 72 of the Petition. Response: Please see the response to MCEA IR No. 3.

Response by: Julie Pierce

Title Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request
No.

5 Regarding page 6 of Appendix A, what "share of the ash system capital cost" was used in the "Stringent and More Stringent EPA Scenario from the baseload diversification study"? What is the total cost of the ash system and is it included in Tables 8 and 9 of the Petition?

Response:

The statement included on page 6 of Appendix A regarding the capital cost includes:

"The capital cost for the ash system used in the BEC4 Project analysis represents a share of the ash system capital cost used in the Stringent and More Stringent EPA Scenario from the baseload diversification study."

This statement does not correctly represent the treatment of the ash system capital cost used in the Petition. To clarify the statement it should indicate

"The capital cost for the ash system used in the BEC4 Project analysis is incremental to the Stringent and More Stringent EPA Scenario from the baseload diversification study."

Therefore there is no share of the ash system capital that was also utilized in the Stringent and More Stringent EPA scenario.

The total cost of the ash handling systems as included in Table 8 & 9 is \$66.3 million. This amount reflects both the "pre-silo" portion included in the retrofit financial project and the "post-silo" portion reflected in the separate ash project.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: October 18, 2012

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA); 26 East Exchange Street, Suite 206; St. Paul, MN 55101-1667; bgoodpaster@mncenter.org; (651) 287-4880

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
6	Provide in electronic machine-readable, Excel or text format, with all cells and links active, the workpapers for Table 2 on page 18 of Appendix A.

Response:

Minnesota Power is providing its latest electronic Excle file, BEC4 Project Evaluation with 2013 IRP Assumptions, which reflects the analysis as presented in Table 1 on page 18 of Appendix A that has been synchronized with the 2013 Integrated Resource Plan assumptions presented in Table 6 on page 36 of the Company's Petition for Approval of the Rider for Boswell Energy Center Unit 4 Emission Reduction (BEC4 Rider) and in the Company's response to MCEA's IR No. 1 in Docket No. E015/M-12-920.

Response by: Lori Hoyum
Title: Policy Manager
Department: Regulatory and Legislative Affairs
Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: October 18, 2012

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA); 26 East Exchange Street, Suite 206; St. Paul, MN 55101-1667; bgoodpaster@mncenter.org; (651) 287-4880

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request
No.

7	Provide in electronic machine-readable, Excel or text format, with all cells and links active, the workpapers for Table 2 on page 19 of Appendix A.
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Response:

Please see the response to MCEA IR No. 6.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
8	<i>Reference page 3 of Appendix A – Attachment 2.</i> Provide the ICAP values for each generator. Response: The ICAP values for each generator are included in the Trade Secret designated Excel file “MCEA IR3.xls attached to the response to MCEA IR No. 3. Minnesota Power utilizes ICAP values for its long term planning evaluation.

Response by: Julie Pierce

Title Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
9	Provide the basis for the capital costs presented in Section B of Appendix A – Attachment 2. Response: Per discussions with MCEA, Minnesota Power is providing its latest capital cost outlooks that were presented as resources in Section B of Appendix A – Attachment 2, and are the starting point for its 2013 Integrated Resource Plan (Docket #E015/RP-13-53). The attached Trade Secret Excel spreadsheet “MCEA_IR9.xls” provides the basis for the capital costs for the resource alternatives in Section B of Appendix A – Attachment 2. Each Excel tab contains one of the resource alternatives.

Response by: Julie Pierce

Title: Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA);

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
10.	At page 34 of the Petition, it states that WPPI is expected to file its application for a Certificate of Authority from the PSCW with 30 days of the MP petition. a. Provide the docket number of WPPI's filing. b. If WPPI has not yet filed with the PSCW, please explain why. c. Provide any agreement between WPPI and Minnesota Power regarding cost sharing and/or pursuit of the BEC4 Project. Response: a. The PSCW docket number for the WPPI Certificate of Authority filing is: Docket No. 6685-CE-110. A copy of WPPI's filing (redacted version) is provided on a CD being sent under separate cover. b. On October 11, 2012, WPPI filed with the PSCW its <i>Application of WPPI Energy for a Certificate of Authority and Any Other Authorization to Participate in the Upgrade of Boswell Energy Center Unit 4 Air Quality Control System</i>. On January 24, 2013, the PSCW voted unanimously to issue a Certificate of Authority (CA) authorizing WPPI's participation in the Boswell 4 environmental retrofit project. PSCW staff was directed to prepare a written CA order, which will be approved by the Commission at a future meeting; likely in the next several weeks.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

- c. Minnesota Power's response (Note 4) is as reflected in ALLETE's 2011 SEC 10-K. The full 10-K can be viewed at:
<http://www.sec.gov/Archives/edgar/data/66756/000006675612000026/ale12312011-10k.htm>

Note 4. Jointly-owned electric facilities

Following are our investments in jointly-owned facilities and the related ownership percentages as of December 31, 2011:

	Plant In Service	Accumulated Depreciation	Construction Work in Progress	% Ownership
Millions				
Boswell Unit 4	\$406.9	\$177.4	\$8.8	80
CapX2020	11.9	---	15.9	9.3-14.7
Total	\$418.8	\$177.4	\$24.7	

We own 80 percent of the 585 MW Boswell Unit 4. While we operate the plant, certain decisions about the operations of Boswell Unit 4 are subject to the oversight of a committee on which we and WPPI Energy, the owner of the remaining 20 percent of Boswell Unit 4, have equal representation and voting rights. Each of us must provide our own financing and is obligated to pay our ownership share of operating costs. Our share of direct operating expenses of Boswell Unit 4 is included in operating expense on our consolidated statement of income.

Response by: Lori Hoyum
Title: Policy Manager
Department: Regulatory and Legislative Affairs
Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
11	Provide the annual natural gas and coal prices used in the modeling analysis and provide the source documents which formed their basis. This request includes the low, mid, and high forecasts. Response: Per discussions with MCEA, Minnesota Power is providing its latest annual natural gas and coal prices, which is an update to the natural gas and coal prices used in the BEC4 Plan Petition and the starting point for its 2013 Integrated Resource Plan (Docket #E015/RP-13-53). The attached Trade Secret Excel workbook "MCEA_IR11.xls" contains the coal and gas outlooks. The attached Trade Secret file "MCEA_IR11_Coal Support Document.pdf" contains support for Minnesota Power's coal outlook. Minnesota Power utilizes a proprietary third party outlook from IHSGlobal Insight for its natural gas outlook and obtains the annual values on a subscription basis:

Response by: Julie Pierce

Title: Manager Resource Planning

Department: Strategy and Planning

Telephone: 218-355-3829

STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
12.	In electronic format provide all reports documenting the 2009 and 2010 first, second, and third phase full scale mercury removal testing referenced in the Mercury Emission Reduction Plan Petition, Exhibit 1, 2011, Mercury Emission Reduction Plan Report, pages 22 to 25 Response: The following Trade Secret documents are provided on a CD that is being sent under separate cover. Report prepared by Alstom dated March 16, 2010: ENHANCED MERCURY REMOVAL – COMBINING ALSTOM’S MER-CURE™ AND KNX™ TECHNOLOGIES AT MINNESOTA POWER BOSWELL ENERGY CENTER, UNIT NO. 4: FINAL REPORT Report prepared by Alstom dated June 2, 2010: ENHANCED MERCURY REMOVAL – COMBINING ALSTOM’S MER-CURE™ AND KNX™ TECHNOLOGIES AT BOSWELL ENERGY CENTER UNIT: TEST #2 SEPT-OCT 2009 Appendices prepared by Alstom dated June 2, 2010: ENHANCED MERCURY REMOVAL – COMBINING ALSTOM’S MER-CURE™ AND KNX™ TECHNOLOGIES AT BOSWELL ENERGY CENTER UNIT 4 - TEST #2 SEPT-OCT 2009

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

Final report prepared by Alstom dated September 24, 2010: **ENHANCED MERCURY REMOVAL – COMBINING ALSTOM’S MER-CURE™ AND KNX™ TECHNOLOGIES AT MINNESOTA POWER BOSWELL ENERGY CENTER UNIT No. 4: TEST #3 – FEBRUARY 2010**

Report (Paper # 128) prepared in 2012 by Minnesota Power and Alstom: **Latest Advancements in Mer-Cure™ Technology for Utility MATS Compliance**

PowerPoint presentation by Richard LaFlesh for the EPA/DOE/EPRI/A&WMA Mega Symposium, August 20-23, 2012: **Latest Advancements in Mer-Cure™ Technology for Utility MATS Compliance**

Response by: Lori Hoyum
Title Policy Manager
Department: Regulatory and Legislative Affairs
Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: October 18, 2012

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
13	In electronic format provide the engineering studies listed in Table 1 of the Mercury Emission Reduction Plan Petition, page 23. Response: The engineering studies listed in Table 1 of the Mercury Reduction Plan Petition, page 23, are included on a cd which will be sent separately. The studies consist of numerous files and have been organized into three main folders which correspond to the studies listed in Table 1. The documents include proprietary business information and have been designated as Trade Secret.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
14.	In electronic format provide a detailed cost breakout for costs identified in Table 12 of the Mercury Emission Reduction Plan Petition, page 51, and all consultant communications, vender proposals, internal MP worksheets, and correspondence related to the costs in Table 12. Response: Shown in the table below are the detailed project costs for the Boswell 4 Environmental Retrofit Project reflected on a Pollutant Controlled basis consistent with the Company's initial Petition:

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

Cost Estimate Allocated by Pollutant Controlled

	Capital Cost (\$000s)		
	Total	SO2	Mercury
CDS/Fabric Filter and PAC	\$48,602	\$13,789	\$34,814
Fly Ash Handling and Silo	\$23,902	\$6,781	\$17,121
Structural Steel	\$4,414	\$1,252	\$3,162
Flue Gas Ductwork	\$6,496	\$1,843	\$4,653
Piling	\$8,839	\$2,508	\$6,331
Switchgear and MCCs	\$9,653	\$2,739	\$6,914
VFD and ID Fan Motors	\$7,765	\$2,203	\$5,562
Distributed Control System (DCS)	\$1,706	\$484	\$1,222
Site Preparation and Finishing	\$13,073	\$3,709	\$9,364
Foundations and Substructures	\$12,946	\$3,673	\$9,273
Mechanical Construction	\$116,166	\$32,957	\$83,209
Electrical Construction	\$31,719	\$8,999	\$22,720
Misc. Subcontracts	\$1,822	\$517	\$1,305
Total Direct Cost	\$287,104	\$81,454	\$205,650

Construction Management	\$15,063	\$4,273	\$10,789
Engineering	\$21,377	\$6,065	\$15,312
Startup	\$2,636	\$748	\$1,888
Escalation	\$18,971	\$5,382	\$13,588
Project Contingency	\$59,222	\$16,802	\$42,420
Owner Cost	\$27,152	\$7,703	\$19,449
Total Indirect Cost	\$144,420	\$40,973	\$103,447

Total Retrofit Project Cost	\$431,524	\$122,427	\$309,097
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Per Petition - Rounded	\$431,500	\$122,400	\$309,100
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In February 2012, Minnesota Power issued a Request for Quotation ("RFQ") for the circulating dry scrubbers ("CDS") and activated carbon injection system to prospective bidders. The initial proposals from prospective bidders for this equipment were received in April 2012. Based on the results of the RFQ, Front End Planning Level 2 estimates (FEP-2

Response by: Lori Hoyum

Title: Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

level estimates), which are conceptual level project cost estimates and are reflected in the table above, were developed by Burns & McDonnell and by Barr Engineering. Consistent with utility industry construction estimate standards, the FEP-2 level estimate can range from +/- 20-25% accuracy and contain an approximate 10% contingency. As Minnesota Power continues the process of detailed engineering, construction contracts will be bid and secured allowing the Company to further refine the accuracy of the estimate.

The CDS system was chosen because of the favorable pollutant removal efficiency to desired levels in comparison to other technologies such as an spray dry absorber. Due to the multi-emission nature of the CDS technology selected, we did not attempt to separate costs by pollution (removal) device, as the CDS is an integrated scrubber and fabric filter as opposed to separate devices.

Further, the following documents, prepared by Burns & McDonnell, for Contract 1310 – Semi-Dry FGD System are provided in their entirety as **Trade Secret**:

Boswell Unit 4 Retrofit Project Bid Evaluation Tabulation Summary
Boswell Unit 4 Retrofit Project Commercial Bid Summary
Boswell Unit 4 Retrofit Project Technical Summary
Boswell Unit 4 Retrofit Project Bid Recommendation Letter

The contract included the supply only of a semi-dry flue gas desulfurization (FGD) system. Bids for two types of semi-dry FGD technologies, CDS and transport reactors, were evaluated. Each technology includes the sulfur dioxide (SO₂) reactor vessel and a fabric filter to collect the products of reaction generated by the FGD system. The equipment and materials provided under this contract will be installed by a construction contract that will be issued and awarded later.

Response by: Lori Hoyum
Title: Policy Manager
Department: Regulatory and Legislative Affairs
Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
15.	In electronic format provide a detailed cost breakout for costs identified in Table 12 of the Mercury Emission Reduction Plan Petition, page 51, and all consultant communications, vender proposals, internal MP worksheets, and correspondence related to the costs in Table 12. Response: The following documents, prepared by Burns & McDonnell, for Contract 1310 – Semi-Dry FGD System are provided in their entirety as Trade Secret: Boswell Unit 4 Retrofit Project Bid Evaluation Tabulation Summary Boswell Unit 4 Retrofit Project Commercial Bid Summary Boswell Unit 4 Retrofit Project Technical Summary Boswell Unit 4 Retrofit Project Bid Recommendation Letter The contract included the supply only of a semi-dry flue gas desulfurization (“FGD”) system. Bids for two types of semi-dry FGD technologies, circulating dry scrubbers (“CDS”) and transport reactors, were evaluated. Each technology includes the sulfur dioxide (“SO₂”) reactor vessel and a fabric filter to collect the products of reaction generated by the FGD system. The equipment and materials provided under this contract will be installed by a construction contract that will be issued and awarded later.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: January 24, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
16.	In electronic format provide a copy of Minnesota Power's Annual Electric Utility Forecast Report ("AFR"). Response: Minnesota Power is providing the following documents on a CD that is being sent under separate cover: • A Trade Secret designated copy of Minnesota Power's 2012 AFR in pdf format • Cover letter for the 2012 AFR • Individual files of the written sections of the 2012 AFR in pdf format • The required AFR forms in excel format. Please note that each excel file contains information that has been designated as Trade Secret.

Response by: Lori Hoyum

Title Policy Manager

Department: Regulatory and Legislative Affairs

Telephone: 218-355-3601

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
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|-----|--|
| 17. | Please provide copies of all Minnesota Power responses to other parties' and participants' information requests in his docket. This is an ongoing request. |
|-----|--|

Minnesota Power Response:

Minnesota Power will provide requested responses.

Response by: Jodi Johnson
Title Policy Manager
Department: Regulatory Affairs
Telephone: (218) 355-3432

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
18.	Please provide copies of evaluations, analyses, or other documents in Minnesota Power's possession that consider or examine potential measures that would be required to reduce Boswell 4 emissions upon future results of air dispersion modeling of criteria pollutants, e.g. short term SO ₂ or PM _{2.5} standards.

Minnesota Power Response:

Minnesota Power does not have any documents responsive to this request.

Response by: Lyssa Supinski
Title: Senior Attorney
Department: Legal Services
Telephone: (218) 723-3982

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
19.	Please provide Minnesota Power's projections for the remaining useful life of the Boswell 4 unit following the retrofit proposed in this docket? Provide and explain the basis for different projected plant remaining life used for depreciation, engineering, or rate recovery purposes.

Minnesota Power Response:

As reflected in Exhibit B-2 in the BEC4 Plan and Rider filings (filed August 31, 2012 and March 7, 2013, respectively) in the instant Docket, the remaining useful life of the BEC4 Project is 24 years beginning as of 2012.

As reflected in Minnesota Power's filed 2012 Remaining Life Depreciation Petition (Docket No. E015/D-12-378) filed on April 16, 2012, the remaining useful life of BEC4 is 24 years beginning as of 2012. The 2012 Remaining Life Depreciation Petition was compared to the 2010 Integrated Resource Plan (Docket No. E015/RP-09-1088), which is the latest approved resource plan.

Response by: Debbra Davey
Title: Supervisor - Accounting
Department: Accounting – Property & Construction
Telephone: (218) 355-3714

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request
No.

20. Provide Minnesota Power's annual peak demand and sales since 2000.

Minnesota Power Response:

The table below contains MP's annual peak demand and sales since 2000. The data from 2002-2011 can be found on page 51 of Minnesota Power's 2012 Advanced Forecast Utility Report.

	Minnesota Power System Peak MW
2000	1,784
2001	1,595
2002	1,634
2003	1,671
2004	1,721
2005	1,727
2006	1,754
2007	1,763
2008	1,719
2009	1,545
2010	1,789
2011	1,779

Response by: Julie Pierce

Title Manager – Resource Planning

Department: Strategy & Planning

Telephone: (218) 355-3829

STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
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21. Provide copies of all available stack test data and reports since 2008 for Boswell 4 for:
- (a) HCl
 - (b) mercury
 - (c) non-mercury metals as defined in the MATS Rule
 - (d) SO₂
 - (e) Filterable PM, Filterable PM₁₀, Filterable PM_{2.5}
 - (f) Condensable PM, Condensable PM₁₀, Condensable PM_{2.5}

Minnesota Power Response:

The below referenced reports will be provided separately on a cd:

(a) Refer to *draft* report, 2011 BEC4 Draft Report Acid Gases – TS, dated August 2, 2011 for HCl testing completed on June 14 and 16, 2011. This report contains proprietary business information and is considered **TRADE SECRET** in its entirety.

(b) The following final reports for Alstom Enhanced Mercury Removal Combining Alstom's MER-CURE™ and KNX™ Technologies at BEC4:

- BEC4 Test #1 Mer-Cure, KNX 04-09-2010 - TS
- BEC4 Test #2 Mer-Cure, KNX 06-02-2010 - TS

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

- BEC4 Test #3 Mer-Cure, KNX 09-24-2010 - TS
- 2012 BEC4 Mer-Cure Test Results - TS

These reports contain proprietary business information and are considered **TRADE SECRET** in their entirety.

Beyond this engineering testing, BEC4 has a mercury continuous emissions monitor system ("CEMS") therefore has not completed compliance mercury stack testing since 2008. The accuracy of the mercury CEMS is verified through routine required relative accuracy test audits ("RATAs").

(c) None.

(d) None. BEC4 has a SO2 CEMS and as such has not conducted SO2 stack testing since 2008. The accuracy of the SO2 CEMS is verified through routine required RATAs.

(e) Refer to the report, 2012 BEC4 PM Test Report, for particulate matter compliance stack testing performed on April 3, 2012 at Boswell Unit 4. Testing is not inclusive of all cited parameters in the request because only required parameters are tested.

(f) Refer to the report, 2012 BEC4 PM Test Report, for particulate matter compliance stack testing performed on April 3, 2012 at Boswell Unit 4. Testing is not inclusive of all cited parameters in the request because only required parameters are tested.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
22.	Confirm that the retrofit project schedule is April2013-April2016. If the company expects a different project schedule, please explain.

Minnesota Power Response:

Yes, April 2013 - April 2016 is the current BEC4 Project schedule.

Response by: Lester Flem
Title Supervising Engineer
Department: Generation Operations
Telephone: (218) 313-4463

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
23.	For coal used at Boswell 4, please provide the mercury and chlorine composition data for 2008-2012, and for expected future coals to be used at Boswell 4.

Minnesota Power Response:

Data for coal used at Boswell 4 is reflected below:

	<u>Coal Origin</u>	<u>Chlorine ppm</u>	<u>Hg ppm</u>
2008	WECO	54.00	0.05
	Decker	< 0.01%	0.09
	Spring Creek	9.15	0.07
2009	WECO	86.00	0.03
	Decker	< 0.01%	0.09
	Spring Creek	9.15	0.07

Response by: Amanda Kluge
Title: Fuel Business Operations Manager
Department: Fuel Handling
Telephone: (218) 313-4412

2010	WECO	141.00	0.05
	Spring Creek	9.15	0.07
2011	Black Thunder	0.08	0.08
	NARM	< 0.01%	0.05
	Spring Creek	9.15	0.07
2012	Black Thunder	0.08	0.08
	NARM	< 0.01%	0.05
	Spring Creek	9.15	0.07

The data below provides mercury and chlorine composition data for expected future coals to be used at Boswell 4. Please note that the basis for the design of the Boswell Unit 4 environmental Retrofit Project was based on a blend of various coals from 13 potential mines in the Powder River Basin. A couple of these coals are unlikely to be burned at Boswell due to a number of factors and have been omitted because of that.

	<u>% Chlorine</u>	<u>Hg ppm</u>
Antelope	0.01	0.065
Belle Ayr	0.01	0.08
Black Thunder	0.00	0.07
Caballo	0.01	0.11
Coal Creek	0.00	0.08
Cordero Rojo	0.01	0.073
Eagle Butte	0.01	0.09
Jacobs Ranch	0.01	0.09
NARM	0.01	0.06
Rawhide	0.01	0.08
Spring Creek	0.00	0.07

Response by: Amanda Kluge

Title Fuel Business Operations Manager

Department: Fuel Handling

Telephone: (218) 313-4412

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
24.	For coal used at Boswell4, provide coal heating value, ash content, and moisture content data for 2008-2012, and for expected future coals to be used at Boswell 4.

Minnesota Power Response:

Data for coal used at Boswell 4 is reflected below:

	<u>Coal Origin</u>	<u>Btu/lb</u>	<u>Ash %</u>	<u>Moisture %</u>
2008	WECO	8,636	9.07	25.67
	Decker	9,325	4.34	24.58
	Spring Creek	9,325	4.23	25.39
2009	WECO	8,662	9.11	25.58
	Decker	9,379	4.56	24.38
	Spring Creek	9,379	4.43	25.29

Response by: Amanda Kluge
Title: Fuel Business Operations Manager
Department: Fuel Handling
Telephone: (218) 313-4402

2010	WECO	8,650	8.80	25.68
	Spring Creek	9,283	4.39	25.36
2011	Black Thunder	8,796	5.02	26.87
	NARM	8,796	4.48	27.36
	Spring Creek	9,290	4.44	25.57
2012	Black Thunder	8,814	5.38	26.88
	NARM	8,814	4.50	27.39
	Spring Creek	9,312	4.43	25.30

The data below provides coal heating value, ash content, and moisture content for expected future coals to be used at Boswell 4. Please note that the basis for the design of the Boswell Unit 4 environmental Retrofit Project was based on a blend of various coals from 13 potential mines in the Powder River Basin. A couple of these coals are unlikely to be burned at Boswell due to a number of factors and have been omitted because of that.

Data for expected future coals to be used at Boswell 4 is reflected below:

	<u>Btu/lb</u>	<u>Ash %</u>	<u>Moisture %</u>
Antelope	8800	5.25	26.70
Belle Ayr	8550	4.53	29.50
Black Thunder	8850	5.25	26.65
Caballo	8500	5.10	29.70
Coal Creek	8438	6.07	29.72
Cordero Rojo	8400	5.43	29.59
Eagle Butte	8330	4.90	30.50
Jacobs Ranch	8800	5.30	27.43
NARM	8750	4.50	27.50
Rawhide	8300	5.50	30.30
Spring Creek	9350	4.12	25.40

Response by: Amanda Kluge

Title Fuel Business Operations Manager

Department: Fuel Handling

Telephone: (218) 313-4402

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
25.	Please provide the utility's current contracts for coal supply to Boswell 4.

Minnesota Power Response:

Minnesota Power has coal supply agreements providing for the purchase of a significant portion of its coal requirements with expiration dates through 2014. Contracts cannot be disclosed without the consent of the suppliers, which Minnesota Power requested and was denied.

Response by: Maggie Thickens
Title Senior Attorney
Department: Legal Services
Telephone: (218) 723-3950

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
26.	Please provide all of Minnesota Power's current power sales contracts.

Minnesota Power Response:

Minnesota Power's current power sales contracts include the following:

Firm Sales

Basin Electric Power Cooperative – 100 MW – May 1, 2010 to April 30, 2020

Minnkota Power Cooperative – 50 MW – January 1, 2013 to December 31, 2013

Energy Only Sales

Cargill Power Markets – 50 MW – January 1, 2013 to December 31, 2013

Response by: Kevin Lindstrom
Title Energy Supply Planning Manager
Department: Energy Supply Asset Optimization
Telephone: (218) 723-3986

STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)
Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
☐ Engineering ☐ Forecasting ☐ Conservation
☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
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27. Reference: Response to MCEA IR 2.

Minnesota Power states that its October 2009 agreement with Basin allows Minnesota Power to recover from Basin a pro rata share of increased costs related to emission control additions during the last five years of the contract.

Please provide the costs Minnesota Power expects to be passed on to Basin for the period May 2015-May 2020 (last 5 years of contract), and supporting documents'.

Minnesota Power Response:

Calculated as reflected in Exhibit B-2 to Minnesota Power's BEC4 Rider filing submitted March 7, 2013, and in accordance with the provisions of the October 2009 agreement with Basin, the following table reflects the revenue requirements expected to be collected:

Response by: Jodi Johnson
Title: Policy Manager
Department: Regulatory Affairs
Telephone: (218) 355-3432

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
28.	Provide details (i.e., the source/vendor, specifications, usage rate, and unit cost) and supporting documents for dry lime for the CDS.

Minnesota Power Response:

The contract to provide dry lime for Alstom's CDS system has not yet been bid or the vendor selected. Thus, the unit cost has not yet been determined.

Per Alstom vendor guarantee, the maximum lime stoichiometry is 1.77 lbmol CaO/lbmol SO₂ removed.

Response by: Lester Flem
Title Supervising Engineer
Department: Generation Operations
Telephone: (218) 313-4463

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

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Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
29.	Provide the net consumptive water usage rate for the CDS.

Minnesota Power Response:

Per Alstom vendor guarantee, the maximum gross water consumption rate is 420 gallons per minute ("gpm"). Based on Alstom process flow drawings, during normal plant operations, 358 gpm is expected to come from waste water sources and 25 gpm from service water.

Response by: Lester Flem
Title: Supervising Engineer
Department: Generation Operations
Telephone: (218) 313-4463

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

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Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
30.	Provide details (i.e., source/vendor, specifications, usage rate, unit cost) and supporting documents for PAC for mercury removal.

Minnesota Power Response:

Minnesota Power contracted with Alstom for the MerCure PAC system. The MerCure system is proprietary to Alstom and is designed to use less PAC than a traditional PAC injection system. The projected usage rate is 210 lb/hr.

The contract to provide PAC for Alstom's CDS system has not yet been bid or the vendor selected. Thus, the unit cost has not yet been determined.

Response by: Lester Flem
Title: Supervising Engineer
Department: Generation Operations
Telephone: (218) 313-4463

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

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Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
31.	Confirm whether Boswell 4, with the proposed retrofit, will meet the SO ₂ , HCl, Acid Gas compliance requirements of MATS (as opposed to the SO ₂ surrogate limit). Explain the basis for your answer, or reference where in the record or discovery responses this explanation is located.

Minnesota Power Response:

After the BEC4 Project is completed, we anticipate demonstrating compliance with the acid gas MATS standard by meeting the HCl emissions limit. The Alstom vendor guarantee for HCl is 0.0010 lb/mmbtu as referenced in Table 11 on page 48 of the BEC4 Plan filing submitted on August 31, 2012.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.

- | | |
|-----|---|
| 32. | Admit that Boswell4 requires a 50% reduction from the unit's 2011 filterable PM baseline (0.06lb/MMBtu) to meet the MATS requirement of 0.03 lb/MMBtu. If your response is other than a complete admission, please explain your response in detail. |
|-----|---|

Minnesota Power Response:

Minnesota Power used a PM emission rate of 0.06 lb/MMBtu in the BEC4 Plan filing filed on August 31, 2012, because it was the most recent full calendar year of data available.

Minnesota Power acknowledges the MATS PM filterable emission limit is 0.03 lb/MMBtu.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

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Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
33.	Admit that Boswell 4 needs to reduce mercury emissions from the 2011 baseline of 5.283 lb/TBtu to 1.2 lb/TBtu to meet MATS, a reduction of 78%. If your response is other than a complete admission, please explain your response in detail.

Minnesota Power Response:

Minnesota Power used a mercury emission rate of 5.283 lb/TBtu in the BEC4 Plan filing filed on August 31, 2012, because it was the most recent full calendar year of data available.

Minnesota Power acknowledges the MATS mercury emission limit is 1.2 lb/MMBtu.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

Docket Number: E-015/M-12-920

Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
34.	Confirm whether Boswell 4 needs to reduce mercury emissions from the a 2011 baseline of 5.283 lb/TBtu to 0.6 lb/TBtu to meet the MERA requirement of 90% mercury reduction. Please explain your response in detail.

Minnesota Power Response:

Minnesota Power used a mercury emission rate of 5.283 lb/TBtu in the BEC4 Plan filing filed on August 31, 2012, because it was the most recent full calendar year of data available.

MERA expresses a goal of 90% of mercury reduction from a baseline that has not yet been established.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

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Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
35.	Admit that the proposed Boswell 4 project cannot assure any compliance with CSAPR requirements, since no such requirements are currently applicable, and any future requirement under CSAPR or similar rules is currently unknown and unknowable. If your response is other than a complete admission, please explain your response in detail.

Minnesota Power Response:

Minnesota Power acknowledges that it is impossible to assure compliance with an unknown future regulation. However, improved SO₂ emissions control performance achieved through the proposed BEC4 Project could reduce dependence on allowances for future compliance.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

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Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
36.	Admit that the project is not designed to meet any specific condensable PM or total (condensable plus filterable) PM requirements. If your response is other than a complete admission, please explain your response in detail.

Minnesota Power Response:

The BEC4 Project is designed to meet MATS PM emission limits.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

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Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
37.	Admit that the project is not designed to meet any specific SO ₂ NAAQS requirements. If your response is other than a complete admission, please explain your response in detail.

Minnesota Power Response:

The BEC4 Project is not designed to meet any specific SO₂ NAAQS requirements. The proposed project will reduce emissions of SO₂ from BEC4, improving performance relative to the SO₂ NAAQS generally.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

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Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
38.	Admit that the project is not designed to meet any specific PM2.5 NAAQS requirements. If your response is other than a complete admission, please explain your response in detail.

Minnesota Power Response:

The BEC4 Project is not designed to meet any specific PM2.5 NAAQS requirements. The proposed project will reduce emissions of PM2.5 from BEC4, improving performance relative to the PM2.5 NAAQS generally.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

Utility Information Request

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Date of Request: March 28, 2013

Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.

- | | |
|-----|--|
| 39. | Admit that the project is not designed to meet any specific ozone NAAQS requirements. If your response is other than a complete admission, please explain your response in detail. |
|-----|--|

Minnesota Power Response:

The BEC4 Project is not designed to meet any specific ozone NAAQS requirements.

Response by: Melissa Weglarz

Title Air Quality Manager

Department: Environmental Services

Telephone: (218) 355-3321

**STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION**

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Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.

40.	<i>Reference: WPPI application at page 14, "BEC 4 is not currently subject to a NAAQS attainment plan. If that were to change, the Project would help address any NAAQS issues that might arise in the future in Minnesota given its impact on reducing emissions of SO2 and PM "</i>
-----	---

Provide details on how the Project "would help address" any future PM and/or SO2 NAAQS requirements. Provide all supporting analyses or studies, including any modeling studies, for your response.

Minnesota Power Response:

Minnesota Power cannot predict the requirements of future PM and/or SO2 NAAQS attainment plans, if any. However, we anticipate that reducing PM and SO2 emissions through the BEC4 Project, will improve performance relative to NAAQS generally.

Response by:	<u>Melissa Weglarz</u>
Title	<u>Air Quality Manager</u>
Department:	<u>Environmental Services</u>
Telephone:	<u>(218) 355-3321</u>

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*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
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Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
41.	<i>Reference: WPPI application (p. 14) to the WPSC states that "BEC4 is not subject to the BART requirements. However, every 10 years, states must review the Regional Haze plan and put in place additional requirements to achieve further reductions in PM, SO2 and NOX, which contribute to haze. The next review of the Regional Haze Rule is expected to take place in 2018. The reduction in emissions of SO2 and PM provided by the Project would help ensure compliance with any future restrictions placed on these emissions as a result of rule changes to meet Regional Haze Rule requirements."</i>

Provide details on how the Project "would help ensure compliance" with "any future" requirements that are not presently known.

Minnesota Power Response:

Minnesota Power cannot predict the requirements of future Regional Haze Rule requirements, if any. However, we anticipate that reducing emissions through the BEC4 Project, will improve performance relative to the Regional Haze Rule generally.

Response by: Melissa Weglarz
Title Air Quality Manager
Department: Environmental Services
Telephone: (218) 355-3321

**STATE OF MINNESOTA
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Type of Inquiry: ☐ Financial ☐ Rate of Return ☐ Rate Design
 ☐ Engineering ☐ Forecasting ☐ Conservation
 ☐ Cost of Service ☐ CIP ☐ Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
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42.	<i>Reference: WPP1 application (p. 19) to the WPSC states that "However, the installation of a fabric filter completely changes the operation of the existing spray tower absorber, by removing the fly ash that is currently utilized for SO2 capture."</i>
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Provide details on how fly ash is currently utilized for SO2 capture in Boswell 4's current scrubber, or reference where in the record or discovery responses this detailed explanation is located.

Minnesota Power Response:

BEC4 currently deploys a venturi scrubber for particulate removal and a spray tower absorber for SO2 removal. These modules treat 95% of the flue gas, while the remaining 5% is treated by an electrostatic precipitator. Cooled gas from the modules and hot gas from the precipitator are then brought back together before entering the stack to ensure adequate temperature upon exiting to atmosphere.

The current scrubber system uses and recycles flyash pond return water in a closed loop process. Flyash particles captured in the removal process are entrained in that return water. This water is reused and intimately mixed with the flue gas again and again during removal of both particulate and SO2. Unsettled fly ash particles and unreacted alkali related to the constituents and minerals inherent in the fuel supply are critical in this

Response by: Josh Skelton

Title Thermal Business Operations Manager

Department: Boswell Business Unit 4

Telephone: (218) 313-4694

emission reduction process. SO₂ is removed by physical and chemical absorption into the constituents of the water. Most of the SO₂ and a small portion of the remaining fly ash is removed through the action of the absorber tower sprays. The chemical interaction is complex and driven by gaseous SO₂ undergoing a transfer to liquid through an ionic reaction with the alkali within the return water.

Response by: Josh Skelton
Title Thermal Business Operations Manager
Department: Boswell Business Unit 4
Telephone: (218) 313-4694

**STATE OF MINNESOTA
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Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
43.	Please provide the Burns and McDonnell study that is referenced in App. A of the WPPI project application to the WPSC.

Minnesota Power Response:

As noted in Appendix A of WPPI's project application to the PSCW (Docket No. 6685-CE-110), the Burns and McDonnell study referenced was completed at the request of WPPI. As such, Minnesota Power does not have a copy of the study.

Response by: Jodi Johnson
Title Policy Manager
Department: Regulatory Affairs
Telephone: (218) 355-3432

**STATE OF MINNESOTA
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Utility Information Request

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Requested From: Minnesota Power

Requested By: Beth Goodpaster; Minnesota Center for Environmental Advocacy (MCEA)

*Attorney for Izaak Walton League of America – Midwest Office (IWLA), Fresh
Energy, Sierra Club, and Minnesota Center for Environmental Advocacy (MCEA)*

Type of Inquiry: ☐.....Financial ☐.....Rate of Return ☐.....Rate Design
 ☐.....Engineering ☐.....Forecasting ☐.....Conservation
 ☐.....Cost of Service ☐.....CIP ☐.....Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
44.	Please provide copies of each of the 18 studies listed in the Burns/Mac Report (Option 5 Conceptual Engineering) dated November 16, 2011 which was provided in response to MCEA IR 13.

Minnesota Power Response:

The 18 studies as listed on page 1-4 under "Project Study Reports" in the Burns & McDonnell Boswell Energy Center Unit 4 Environmental Improvement Project Conceptual Engineering - Option 5 Report dated November 16, 2011, are included on a cd which will be sent separately. The documents include proprietary business information and have been designated as **TRADE SECRET**.

Response by: _____

Title _____

Department: _____

Telephone: _____

RANAJIT (RON) SAHU, Ph.D, QEP, CEM (Nevada)

CONSULTANT, ENVIRONMENTAL AND ENERGY ISSUES

311 North Story Place

Alhambra, CA 91801

Phone: 626-382-0001

e-mail (preferred): sahuron@earthlink.net

EXPERIENCE SUMMARY

Dr. Sahu has over twenty two years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment; soils and groundwater remediation; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over nineteen years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public. Notably, he has successfully managed a complex soils and groundwater remediation project with a value of over \$140 million involving soils characterization, development and implementation of the remediation strategy, regulatory and public interactions and other challenges.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past twenty one years include various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in over 44 states, numerous local jurisdictions and internationally.

In addition to consulting, Dr. Sahu has taught numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management) for the past seventeen years. In this time period he has also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.) public sector (such as the US Department of Justice) and public interest group clients with project management, air quality

consulting, waste remediation and management consulting, as well as regulatory and engineering support consulting services.

- 1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for Air Quality/Geosciences/Hazardous Waste Groups**, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.
- Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.
- 1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.
- 1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.
- 1989-1990 Kinetics Technology International, Corp. **Development Engineer**. Involved in thermal engineering R&D and project work related to low-NO_x ceramic radiant burners, fired heater NO_x reduction, SCR design, and fired heater retrofitting.
- 1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

- 1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.
- 1984 M. S., Mechanical Engineering, Caltech, Pasadena, CA.
- 1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

"Thermodynamics and Heat Transfer," Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

- "Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.
- "Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.
- "Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.
- "Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.
- "Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.
- "Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.
- "Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.
- "Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

- "Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.
- "Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.
- "Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.
- "Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

University of Southern California

- "Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.
- "Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

- "Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

- "Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.
- "Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.
- "Air Pollution Planning and Management," IEP, UCR, Spring 1996.
- "Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, since 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2011.

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R. Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "Combustion Measurements" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

"From Purchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada," with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Annex A

Expert Litigation Support

1. Matters for which Dr. Sahu has have provided depositions and affidavits/expert reports include:

- (a) Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill
- (b) Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.
- (c) Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the US Department of Justice in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (S.D. Ohio).
- (d) Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the US Department of Justice in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (S.D. Ill.).
- (e) Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the US Department of Justice in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (M.D.N.C.).
- (f) Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the US Department of Justice in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (S.D. Ohio).
- (g) Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.
- (h) Expert reports and depositions (10/31/2005 and 11/1/2005) on behalf of the US Department of Justice in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc.*, 5:04-cv-00034-KSF (E.D. KY).
- (i) Deposition (10/20/2005) on behalf of the US Department of Justice in connection with the Cinergy NSR Case. *United States, et al. v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (S.D. Ind.).
- (j) Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

- (k) Expert report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.
- (l) Expert report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.
- (m) Expert report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.
- (n) Expert report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.
- (o) Expert testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).
- (p) Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.
- (q) Expert reports and deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (W.D. Pennsylvania).
- (r) Expert reports and pre-filed testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.
- (s) Expert reports and deposition (October 2007) on behalf of MTD Products Inc., in connection with General Power Products, LLC v MTD Products Inc., 1:06 CVA 0143 (S.D. Ohio, Western Division)
- (t) Experts report and deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.
- (u) Expert reports, affidavit, and deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.
- (v) Affidavits (May 2010/June 2010 in the Office of Administrative Hearings)/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

- (w) Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy et al., v Duke Energy Carolinas, LLC. in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).
- (x) Dominion Wise County MACT Declaration (August 2008)
- (y) Expert Report on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis (June 13, 2008).
- (z) Expert Report on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas (February 2009).
- (aa) Expert Report and deposition on behalf of MTD Products, Inc., in the matter of Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al. (June 2009, July 2009).
- (bb) Expert Report on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina (August 2009).
- (cc) Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.
- (dd) Expert Report (August 2009) and Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
- (ee) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coletto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (October 2009).
- (ff) Expert Report, Rebuttal Report (September 2009) and Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.
- (gg) Expert Report (December 2009), Rebuttal reports (May 2010 and June 2010) and depositions (June 2010) on behalf of the US Department of Justice in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).
- (hh) Prefiled testimony (October 2009) and Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
- (ii) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

- (jj) Written Direct Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions*, No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.
- (kk) Expert report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the US Department of Justice in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.
- (ll) Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the US EPA and US Department of Justice in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (US District Court for the Eastern District of Michigan).
- (mm) Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.
- (nn) Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).
- (oo) Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).
- (pp) Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).
- (qq) Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of Public Service Company of New Mexico (PNM)'s Mercury Report for the San Juan Generating Station, CIVIL NO. 1:02-CV-0552 BB/ATC (ACE). US District Court for the District of New Mexico.
- (rr) Comment Report (October 2010) on the Draft Permit Issued by the Kansas DHE to Sunflower Electric for Holcomb Unit 2. Prepared on behalf of the Sierra Club and Earthjustice.

- (ss) Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.
- (tt) Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.
- (uu) Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Case No. 5:10-cv-00156-DF-CMC (US District Court for the Eastern District of Texas, Texarkana Division).
- (vv) Comment Report (December 2010) on the Pennsylvania Department of Environmental Protection (PADEP)'s Proposal to grant Plan Approval for the Wellington Green Energy Resource Recovery Facility on behalf of the Chesapeake Bay Foundation, Group Against Smog and Pollution (GASP), National Park Conservation Association (NPCA), and the Sierra Club.
- (ww) Written Expert Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).
- (xx) Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.
- (yy) Expert Report (March 2011), Rebuttal Expert Report (June 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).
- (zz) Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority*, Civil Action No. 4:11-cv-00791 (US District Court for the Southern District of Texas, Houston Division).
- (aaa) Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.
- (bbb) Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).
- (ccc) Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club*,

Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P., Civil Action No. A-08-CA-648-LY (US District Court for the Western District of Texas, Austin Division).

- (ddd) Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.*, Case No. 3:10-cv-747 (TJM/DEP) (US District Court for the Northern District of New York).
- (eee) Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association*, Case No. 11-417-MJP (US District Court for the Western District of Washington).
- (fff) Expert Report (March 2012) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).
- (ggg) Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency*, Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).
- (hhh) Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment*, Case No. 11-105,493-AS (Holcomb power plan) (Supreme Court of the State of Kansas).
- (iii) Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality*, Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261st Judicial District).
- (jjj) Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.*, Civil Action No. 07-CV-5298 (JKG) (US District Court for the Eastern District of Pennsylvania).
- (kkk) Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project
- (lll) Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.
- (mmm) Expert report (August 2012) on behalf of the US Department of Justice in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.

2. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:

(nnn) In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

3. Occasions where Dr. Sahu has provided oral testimony at trial or in similar proceedings include the following:

(ooo) In February, 2002, provided expert witness testimony on emissions data on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

(ppp) In February 2003, provided expert witness testimony on regulatory framework and emissions calculation methodology issues on behalf of the US Department of Justice in the Ohio Edison NSR Case in the US District Court for the Southern District of Ohio.

(qqq) In June 2003, provided expert witness testimony on regulatory framework, emissions calculation methodology, and emissions calculations on behalf of the US Department of Justice in the Illinois Power NSR Case in the US District Court for the Southern District of Illinois.

(rrr) In August 2006, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Western Greenbrier) on behalf of the Appalachian Center for the Economy and the Environment in West Virginia.

(sss) In May 2007, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Thompson River Cogeneration) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) before the Montana Board of Environmental Review.

(ttt) In October 2007, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Sevier Power Plant) on behalf of the Sierra Club before the Utah Air Quality Board.

(uuu) In August 2008, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Big Stone Unit II) on behalf of the Sierra Club and Clean Water before the South Dakota Board of Minerals and the Environment.

(vvv) In February 2009, provided expert witness testimony regarding power plant emissions and BACT issues on a permit challenge (Santee Cooper Pee Dee units) on behalf of the Sierra Club and the Southern Environmental Law Center before the South Carolina Board of Health and Environmental Control.

(www) In February 2009, provided expert witness testimony regarding power plant emissions, BACT issues and MACT issues on a permit challenge (NRG Limestone Unit 3) on behalf of the Sierra Club and the Environmental Integrity Project before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

- (xxx) In November 2009, provided expert witness testimony regarding power plant emissions, BACT issues and MACT issues on a permit challenge (Las Brisas Energy Center) on behalf of the Environmental Defense Fund before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
- (yyy) In February 2010, provided expert witness testimony regarding power plant emissions, BACT issues and MACT issues on a permit challenge (White Stallion Energy Center) on behalf of the Environmental Defense Fund before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
- (zzz) In September 2010 provided oral trial testimony on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (W.D. Pennsylvania).
- (aaaa) Oral Direct and Rebuttal Expert Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).
- (bbbb) Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions*, No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.
- (cccc) Oral Testimony (October 2010) regarding mercury and total PM/PM10 emissions and other issues on a remanded permit challenge (Las Brisas Energy Center) on behalf of the Environmental Defense Fund before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.
- (dddd) Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.
- (eeee) Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.
- (ffff) Deposition (December 2010) on behalf of the US Department of Justice in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).
- (gggg) Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).
- (hhhh) Oral Expert Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

- (iii) Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).
- (jjj) Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.
- (kkk) Oral Testimony at Hearing (March 2012) on behalf of the US Department of Justice in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).
- (lll) Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Exhibit 3

AUG 05 2008

REPLY TO THE ATTENTION OF:

AE-17J

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Warren L. Candy
Vice President, Generation Operations
Minnesota Power Company
Division of Allete, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093

RE: Notice and Finding of Violation issued to Allete Incorporated, d/b/a Minnesota Power Company

Dear Mr. Candy:

The U. S. Environmental Protection Agency is issuing the enclosed Notice of Violation and Finding of Violation (NOV/FOV) to Allete Inc., d/b/a Minnesota Power Company. This NOV/FOV is issued in accordance with Section 113(a) of the Clean Air Act (the Act), 42 U.S.C. § 7413(a).

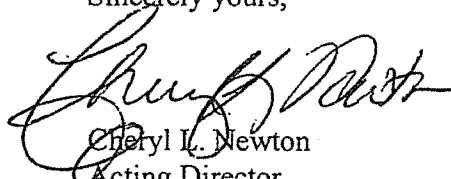
EPA has determined that Allete is violating the Prevention of Significant Deterioration requirements under Section 165 of the Act, 42 U.S.C. § 7475 and the Operating Permit requirements under Title V of the Act, 42 U.S.C. §§ 7661 – 7661e at its Boswell and Laskin Generating Stations located in Cohasset and Hoyt Lakes, Minnesota, respectively.

EPA is offering you an opportunity to confer with us about the violations cited in the NOV/FOV. The conference will give you an opportunity to present information on the specific findings of violations, and the steps you will take to bring the facilities into compliance. Please plan for your technical and management personnel to attend the conference to discuss compliance measures and commitments. You may have an attorney represent you at this conference.

The EPA contact in this matter is Ethan Chatfield. You may call him at (312) 886-5112, to request a conference. You should make your request for a conference no later than 10

calendar days after you receive this letter, and we should hold any conference within 30 calendar days of your receipt of this letter.

Sincerely yours,



Cheryl L. Newton
Acting Director
Air and Radiation Division

Enclosure

cc: Jeff T. Connell, Manager
Compliance and Enforcement Section
Industrial Division
Minnesota Pollution Control Agency

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5**

IN THE MATTER OF:

Allete, Inc.

d/b/a Minnesota Power Company

Duluth, Minnesota

**Proceedings Pursuant to
Section 113(a)(1) and (a)(3) of the
Clean Air Act,
42 U.S.C. §7413(a)(1) and (a)(3)**

EPA-5-08-MN-26

NOTICE AND FINDING OF VIOLATION

This Notice and Finding of Violation (Notice) is issued to Allete, Inc. d/b/a Minnesota Power Company, (Allete) Duluth, Minnesota, for violations of the Clean Air Act (Act), 42 U.S.C. §§ 7401 *et seq.*, at its Boswell and Laskin Generating Stations, located in Cohasset and Hoyt Lakes, Minnesota, respectively. From 1981 to the present, Allete or its predecessors has modified and operated the electric utility steam generating units identified below without installing pollution control equipment able to achieve the Best Available Control Technology (BACT) as would be required under a PSD permit.¹ Thus, these violations of the CAA and Minnesota State Implementation Plan have resulted in significant net emission increases of nitrogen oxides (NO_x), particulate matter (PM), and sulfur dioxide (SO₂), having been and still being released into the environment.

This Notice is issued pursuant to Sections 113(a)(1) and (a)(3) of the Act, 42 U.S.C. § 7413(a)(1) and (3). The authority to issue this Notice has been delegated to the Regional Administrator of U.S. EPA Region 5, and redelegated to the Director, Air and Radiation Division.

A. STATUTORY AND REGULATORY BACKGROUND

Prevention of Significant Deterioration

1. When the Act was passed in 1970, Congress exempted existing facilities, including the coal-fired power plants that are the subject of this Notice, from many of its requirements. However, Congress also made it quite clear that this exemption would not last forever. As the United States

¹ All units in the NOV have been in attainment areas from October 5, 1978 to present. Therefore, the regulations in 40 C.F.R. § 52.24 do not apply to any of the modifications in this NOV.

Court of Appeals for the D.C. Circuit explained in *Alabama Power v. Costle*, 636 F.2d 323, 400 (D.C. Cir. 1979), “[t]he statutory scheme intends to ‘grandfather’ existing industries; but...this is not to constitute a perpetual immunity from all standards under the PSD program.” Rather, the Act requires grandfathered facilities to install modern pollution control devices whenever the unit is proposed to be modified in such a way that its emissions may increase.

2. The Prevention of Significant Deterioration (PSD) provisions of Part C of Title I of the Act require preconstruction review and permitting for modifications of stationary sources. *See* 42 U.S.C. §§ 7470-7492. Pursuant to applicable regulations, if a major stationary source located in an attainment area is planning to make a major modification, then that source must obtain a PSD permit before beginning actual construction. *See* 40 C.F.R. § 52.21(i). To obtain this permit, the source must, among other things, undergo a technology review and apply BACT; perform a source impact analysis; perform an air quality analysis and modeling; submit appropriate information; and conduct additional impact analyses as required.

3. U.S. EPA incorporated the provisions of 40 C.F.R. § 52.21(b) through (w) into the Minnesota SIP, 45 *Fed. Reg.* 52741, and codified at 40 C.F.R. § 52.1234. U.S. EPA delegated to the Minnesota Pollution Control Agency (MPCA) the authority to review and process PSD permit applications, and to implement the federal PSD program. 46 *Fed. Reg.* 9580.

4. 40 C.F.R. § 52.21(i)(1) provides that “no stationary source or modification to which the requirements of paragraphs (j) through (r) of this section apply shall begin actual construction without a permit that states that the stationary source or modification would meet those requirements.”

5. 40 C.F.R. § 52.21(i)(2) provides that “the requirements of paragraphs (j) through (r) of this section apply to any major stationary source and any major modification with respect to each pollutant subject to regulation under the Act”

6. The PSD regulations define “major modification” as “any physical change in or change in the method of operation of a major source that would result in a significant net emissions increase” of a regulated pollutant. 40 C.F.R. § 52.21(b)(2)(i).

New Source Performance Standards

7. Under Section 111 of the Act, 42 U.S.C. § 7411, the Administrator promulgated the New Source Performance Standards (NSPS) General Provisions, at 40 C.F.R. Part 60, Subpart A, and the “Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978,” codified at 40 C.F.R. Part 60, Subpart Da. Subpart Da applies to each electric utility steam generating unit capable of combusting more than 73 megawatts (250 million Btu per hour) heat input of fossil fuel (alone or in combination with any other fuel). 40 C.F.R. § 60.40a(a)(1).

8. 40 C.F.R. § 60.14(a) provides that “...any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies shall be considered a modification within the meaning of section 111 of the Act.

Upon modification, an existing facility shall become an affected facility for each pollutant to which a standard applies and for which there is an increase in the emission rate to the atmosphere.”

Title V Requirements

9. Section 502(d)(1) of the Act, 42 U.S.C. § 7661a(d)(1) requires each State to develop and submit to U.S. EPA an operating permit program which meets the requirements of Title V. Pursuant to Appendix A of 40 C.F.R. Part 70, on December 4, 2001, U.S. EPA granted Minnesota final approval of its Title V Clean Air Act Permit Program, effective December 1, 2001. 66 *Fed. Reg.* 62967.

10. 40 C.F.R. § 70.3 provides that the requirements of Part 70 apply to any major source located in a state that has received whole or partial approval of its Title V program.

11. 40 C.F.R. § 70.5(a) requires the owner or operator of a Part 70 source to submit a timely and complete permit application.

12. 40 C.F.R. § 70.5(a)(2) defines “complete application” to include information that is “sufficient to evaluate the subject source and its application and to determine all applicable requirements.”

13. 40 C.F.R. § 70.1(b) requires the owner or operator of a Part 70 source to have a permit to operate that assures compliance by the source with all applicable requirements.

14. 40 C.F.R. § 70.7(b) provides, in part, that no Title V source may operate after the time that it is required to submit an application, except in compliance with its Title V permit.

B. FACTUAL BACKGROUND

15. Allete is incorporated in Minnesota.

16. Allete is a “person”, as that term is defined in Section 302(e) of the Act, 42 U.S.C. § 7602(e).

17. At all times relevant to this Notice, Allete has been and is the owner and/or operator of the Boswell and Laskin Electric Generating Stations located in Minnesota.

18. During all times relevant to this Notice, the Boswell and Laskin Generating Stations were located in areas classified as attainment PM (as total suspended particulates (TSP) and/or particles with an aerodynamic diameter less than or equal to a nominal 10 microns (PM₁₀)), sulfur dioxide (SO₂) and nitrogen oxide (NO_x).

19. The Boswell Energy Center is a fossil fuel-fired electric utility steam generating station located near Cohasset, Minnesota, in Township 55 North, Range 26 West (commonly known as Bass Brook Township), in Itasca County and has the potential to emit more than 100 tons per year each of NO_x, SO₂, and particulate matter (PM). The Station consists of the

following coal-fired boilers for electric generation with total generating capacity of 1029 megawatts net (MW_{net}), each of which has a heat input greater than 250 million BTU/hour: Boswell Unit 1 began operating in 1958; Unit 2 in 1960; Unit 3 in 1973; and Unit 4 in 1980.

20. The Boswell Station is a "fossil fuel-fired steam electric plant of more than 250 million British thermal units per hour." Therefore, the Boswell Station constitutes a "major stationary source" within the meaning of 40 C.F.R. § 52.21(b)(1)(i)(a); and a "major emitting facility" within the meaning of Section 169(1) of the Act, 42 U.S.C. § 7479(1).

21. Between 1981 and 2001, various physical changes or changes in the method of operation were made at the Boswell Station. These changes include, but are not limited to, the following projects on Units 1 through 4:

Unit 1 1988 Project

- Replaced air heater
- Retubed condenser
- Replaced superheater
- Overhauled turbine/generator
- Improved flyash disposal system

The combined cost of this project was \$4,844,590.

Unit 2 1992 Project

- Replaced air heater

The cost of this project was \$1,943,722.

Unit 3 1981 Project

- Replaced economizer and boiler Coutant bottom

The cost of this project was \$4,306,600.

Unit 3 1994 Project

- Replaced burner corner panel tubes

The cost of this project was \$1,758,300.

Unit 4 1999 Project

- Replaced reheat surface tubes

The cost of this project was \$432,874.

Unit 4 2000 Project

- Overhauled turbine

22. On June 16, 1977, U.S. EPA Region 5 issued an Approval to Construct (permit no. EPA-5-77-A-6) for Boswell Unit 4. The permit granted approval to construct a "500 megawatt generating unit at its Clay-Boswell Generating Station." From a period beginning in 2001 to at least 2005, Boswell Unit 4 net generation exceeded 500 megawatts.

23. On June 21, 1976, Minnesota Power submitted "Air Pollutant Emission Report"

forms as a supplement to its PSD application for Boswell Unit 4. These forms proposed the constructed of a 500 megawatt net generation station with a maximum heat input capacity of 5,174 million British Thermal Units (mmBtu) per hour and a maximum coal consumption of 304.4 tons per hour. Further, in its Preliminary Determination issued with Permit EPA-5-77-A-6, U.S. EPA stated Minnesota Power proposes to construct a 500 MW unit with a maximum continuous heat input of 5,112 mmBtu per hour. Beginning in 2001, Boswell Unit 4 operated at maximum heat input of greater than 5,600 mmBtu per hour (on a monthly average basis) and a maximum coal input of greater than 310 tons per hour (on a monthly average basis). Based on these monthly average heat and coal input values, peak hourly heat input (mmBtu per hour) and peak hourly coal consumption (tons per hour) are at a level even greater than these indicated monthly averages.

24. The Laskin Energy Center is a fossil fuel-fired electric utility steam generating plant located near Hoyt Lakes, Minnesota, in Township 58 North, Range 14 West (commonly known as Hoyt Lakes Township), in St. Louis County; and has the potential to emit more than 100 tons per year each of NO_x, SO₂, and PM. The Station consists of the following coal-fired boilers for electric generation, each of which has a heat input greater than 250 million BTU/hour and a total generating capacity of 110 MW_{net}: Laskin Unit 1 began operating in 1953 and Unit 2 in 1958.

25. The Laskin Station is a "fossil fuel-fired steam electric plant of more than 250 million British thermal units per hour." Therefore, the Laskin Station constitutes a "major stationary source" within the meaning of 40 C.F.R. § 52.21(b)(1)(i)(a); and a "major emitting facility" within the meaning of Section 169(1) of the Act, 42 U.S.C. § 7479(1).

26. In approximately 1997, various physical changes or changes in the method of operation were made at the Laskin Station. These changes include, but are not limited to, the following project on Unit 2:

1997 Unit 2 Project

– Replaced economizer

The cost of this project was \$382,790.

C. NOTICE AND FINDING OF VIOLATIONS

Violations of the Prevention of Significant Deterioration Provisions

27. The projects identified in paragraphs 21 and 26, above, each caused a significant net emissions increase, as defined at 40 C.F.R. §§ 52.21(b)(3)(i) and (b)(23)(i), of SO₂, NO_x and/or PM.

28. The projects identified in paragraphs 21 and 26, above, each constituted a "major modification," as that term is defined at 40 C.F.R. § 52.21(b)(2)(i).

29. For the modifications listed in paragraphs 21 and 26, above, Allete failed to obtain a PSD permit as required by 40 C.F.R. § 52.21(i)(1).

30. None of the modifications listed in paragraphs 21 and 26, above, fall within the exemptions to the definition of "major modification" found at 40 C.F.R. §52.21(b)(2)(iii).

31. Allete violated and continues to violate Section 165(a) of the Act, 42 U.S.C. § 7475(a), and 40 C.F.R. § 52.21(i)(1) by constructing major modifications to existing major sources at the above-listed facilities without applying for or obtaining PSD permits and operating the modified facilities without installing the best available control technology or going through PSD review, and installing appropriate emission control equipment in accordance with a BACT analysis.

32. Each of the violations exists from the date of the start of construction of each modification and continues until the appropriate PSD permit is obtained and the necessary pollution control equipment is installed and operated.

33. Allete violated and continues to violate its Approval to Construct Permit no. EPA-5-77-A-6 by exceeding the Boswell Unit 4 heat input, coal input, and net generating capacity limitations stated in the permit and permit application.

Violations of the Standards of Performance for Electric Utility Steam Generating Units

34. Allete made a "physical or operational change" as defined by 40 C.F.R. 60.14 at Boswell Unit 4 that resulted in an increase in net generating capability from a maximum boiler design rate of 500 MW to at least 550 MW and an increase in heat input from 5,112 mmBtu per hour to at least 5,600 mmBtu per hour, resulting in hourly emission increases of PM, SO₂, and NO_x.

Violations of the Title V Provisions

35. Each of the two facilities identified, above, is a "major source" as defined by Section 501(2) of the Act, 42 U.S.C. § 7661(2) and 40 C.F.R. § 70.2.

36. Respondent's Title V permit applications for the two facilities identified above failed to include the citation and description of all applicable requirements and other specific information that may be necessary to implement and enforce applicable requirements of the Act or to determine the applicability of such requirements, including, but not limited to, the requirement to apply/install BACT for SO₂, NO_x and/or PM for each of the units for which a project is described in paragraphs 21 and 26 above, as required by 40 C.F.R. § 70.5(c).

37. Allete violated and continues to violate 40 C.F.R. § 70.5 by failing to supplement or correct the Title V permit applications for the two facilities. *See* 40 C.F.R. § 70.5(b).

38. Allete exceeded the Boswell Unit 4 heat input, coal input, and net generating capacity PSD limitations in its Title V permit in violation of 40 C.F.R. § 70.7(b).

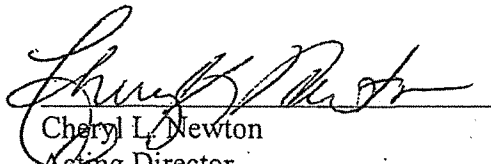
D. ENFORCEMENT

Section 113(a) (1) of the Act, 42 U.S.C. § 7413(a)(1), provides that at any time after the expiration of 30 days following the date of the issuance of a Notice of Violation, the Administrator may, without regard to the period of violation, issue an order requiring compliance with the requirements of the state implementation plan or permit, issue an administrative penalty order pursuant to Section 113(d), or bring a civil action pursuant to Section 113(b) for injunctive relief and/or civil penalties.

Section 113(a)(3) of the Act, 42 U.S.C. § 7413(a)(3), provides in part that if the Administrator finds that a person has violated, or is in violation of any requirement or prohibition of any rule...promulgated...under...[Title I or Title V of the Act], the Administrator may issue an administrative penalty order under Section 113(d), issue an order requiring compliance with such requirement or prohibition, or bring a civil action pursuant to Section 113(b) for injunctive relief and/or civil penalties.

E. EFFECTIVE DATE

Dated: 8/5/08


Cheryl L. Newton
Acting Director
Air and Radiation Division

CERTIFICATE OF MAILING

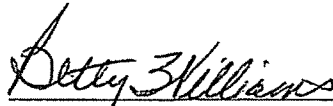
I, Betty Williams, certify that I sent a Notice of Violation and Finding of Violation, No. **EPA-5-08-MN-26**, by Certified Mail, Return Receipt Requested, to:

Warren L. Candy
Vice President, Generation Operations
Minnesota Power Company
Division of Allete, Inc.
30 West Superior Street
Duluth, Minnesota 55802-2093

I also certify that I sent copies of the Notice of Violation and Finding of Violation by first class mail to:

Jeff T. Connell, Manager
Compliance and Enforcement Section
Industrial Division
Minnesota Pollution Control Agency

On the 6th day of August, 2008



Betty Williams
Administrative Program Assistant
AECAS IL/IN

CERTIFIED MAIL RECEIPT NUMBER: 70010320000601861177

**MPCA Review of Minnesota Power's
Boswell 4 Environmental Improvement Plan**

March 1, 2013

Minnesota Pollution Control Agency

6.0 Appropriateness of the Proposed Project

The MPCA is required by Minn. Stat. § 216B.684 (3) and Minn. Stat. § 216B.686 subd. 3(a)(3) to describe the overall appropriateness of a utility's plan for reducing mercury and other pollutants. We describe in this part our assessment of the applicable federal power plant emission control programs and how Minnesota Power's Boswell 3-4 plan addresses those program requirements. We also describe why the project qualifies for the rate ~~consideration-recovery~~ provided by the Mercury Emissions Reduction Act.

Mercury Reductions

Minnesota Power's proposed project will meet the statutory goal of reducing mercury emissions from ~~Boswell 4~~Boswell Unit 4 by 90 percent. Minnesota utilities are well on their way to helping Minnesota meet its goal of reducing statewide mercury emissions. As currently scheduled, ~~Boswell 4~~Boswell Unit 4 will be the final retrofit project to be completed under the Mercury Emissions Reduction Act, and will bring statewide electric utility boiler emissions to under 200 pounds per year. The commissioning of this control project will result in a total reduction of 1300 pounds a year of mercury since 2006 ~~from when the Mercury Emissions Reduction Act of 2006~~act, this project's enabling legislation, was adopted.

Mercury emissions reductions from all sources are necessary to address water quality impairments. Minnesota's fish are contaminated with mercury. The plan to address those impairments, Minnesota Total Maximum Daily Load (TMDL) for mercury seeks a statewide reduction of mercury. The reduction of 200 pounds of mercury at Boswell will complete the scheduled reductions by Minnesota's utility sector according to the TMDL's implementation plan.

Federal Rules

This project will bring Minnesota Power's largest electricity generating unit~~er~~ into compliance with EPA's Mercury and Air Toxics Standard~~MATS rule~~. This air pollution control requirement for utilities has accelerated the time table to accomplish the mercury reductions. The project is needed to address mercury and particulate matter emission limits of the MATS rule ~~is standard at Boswell 4~~Boswell Unit 4.

However, meeting MATS will not bring the Boswell Unit 4 into compliance with all air quality standards~~is not enough~~. Minnesota Power must resolve alleged NSR violations at the ~~Boswell 4~~Boswell Unit 4 unit. EPA has issued a Notice of Violation (NOV) to Minnesota Power asserting violations of NSR requirements at the Boswell station. Minnesota Power identified the NOV in the introduction of its 2011 compliance filing under Minn. Stat. § 216B.6851, subd. 5. ~~WHAT MORE SHOULD BE SAID HERE?~~ Resolution of alleged NSR violations involves installing air pollution control equipment that meets or exceeds present-day Best Available Control Technology (BACT). According to EPA, several newly installed SO2 scrubbers are achieving emission rates well below that reported in the BACT clearing house, and the proposed SO2 limit for this project is intended to reflect that level of performance.²³BACT?

Pending federal regulations intend to manage the risks to human health and the environmental from mismanagement of coal combustion residuals. EPA's intent is to phase out the use of existing surface impoundments of wet ash. Implementing this project will help avoid remove uncertainties regarding future regulations that may apply ~~ory actions at Boswell 4 related to Boswell Unit 4 to reconstructing~~

²³ E. Chatfield; U.S EPA Region V, electronic mail, February 21, 2013.