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January 22, 2009

Mr. Patrick Butler  
N.C. Division of Air Quality  
3800 Barrett Drive, Suite 101  
Raleigh, North Carolina 27609

*VIA FEDERAL EXPRESS AND ELECTRONIC MAIL (Patrick.Butler@ncmail.net)*

**Re: Draft Air Quality Permit No. 04044T29 (Draft Revised Air Quality Permit for Duke Energy Carolinas LLC's Cliffside Steam Station)**

Dear Mr. Butler:

On behalf of itself, Environmental Defense Fund, National Parks Conservation Association, Natural Resources Defense Council, Sierra Club, and Southern Alliance for Clean Energy (collectively, "Commenters"), the Southern Environmental Law Center ("SELC") respectfully submits the following comments on the Draft Air Quality Permit No. 04044T29 (the "Draft Revised Permit") for Duke Energy Carolinas' ("Duke") Cliffside Steam Station, which has been placed on public notice by the North Carolina Department of Environment and Natural Resources' Division of Air Quality ("DAQ"). We also attach a new report from our consultant, Dr. Ranajit Sahu, who has reviewed Duke's claims and supporting materials, as well as DAQ's analysis and Draft Revised Permit.<sup>1</sup> We appreciate the opportunity to submit these comments.<sup>2</sup>

DAQ proposes to issue a modified air quality permit for Duke Energy Carolinas, LLC's ("Duke's") Cliffside Steam Station Unit 6 ("Unit 6"), inserting into the existing permit blanket emissions limitations for hazardous air pollutants ("HAPs") tied to the "major source" thresholds for the applicability of section 112(g) of the federal Clean Air Act ("CAA"). DAQ's proposal to treat Unit 6 as a "minor source" of HAPs and issue the

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<sup>1</sup> With the exception of Dr. Sahu's report, a paper copy of which is attached, all attachments to this letter are on the enclosed compact disc.

<sup>2</sup> These comments reinforce and supplement those sent to DAQ on behalf of Commenters on November 7, December 12, and December 19, 2008. SELC has also previously submitted comments, on behalf of Commenters and other organizations, on Draft Air Quality Permit No. 04044T28 for Duke's Cliffside Steam Station. See SELC Comments submitted on October 31, 2007, November 15, 2007, and January 16, 2008. We also submitted comments on the Final Air Quality Permit No. 04044T28, urging DAQ to reopen and modify or revoke the permit. See SELC Comments submitted on March 5, 2008. Additionally, we have submitted comments on the draft Title V renewal permit (also entitled Draft Air Quality Permit No. 04044T29), which the current Draft Revised Permit proposes to modify. See SELC Comments submitted on October 30, 2008. We incorporate by reference all of our previous comments.

modified permit without HAP emission limits based on a determination of the maximum achievable control technology (“MACT”), is legally and technically deficient.

As discussed in detail below, DAQ’s proposal to confer minor source status on Cliffside Unit 6 suffers from several fatal flaws. First, DAQ’s proposal is based on incomplete, unverifiable, and flawed assumptions in Duke’s permit application—many of which are contrary to its own earlier statements in the record. Contrary to Duke’s recent claims, Unit 6 unquestionably is a natural major HAP source subject to the requirements of CAA § 112(g). Indeed, a properly performed engineering analysis demonstrates that Unit 6 cannot qualify as a minor source of HAPs because, in light of its design and operational limits, Unit 6 has the potential to emit well above the 10- and 25-tons-per-year major source thresholds. Further, Duke would not be able to qualify Unit 6 as a “synthetic minor” source of HAPs by modifying its permit to include enforceable emission limits because Duke would not be able to show compliance with those conditions through monitoring as required by the Clean Air Act. As a result of these flaws, it would be unlawful for DAQ to issue the permit modification as proposed.

## **I. BACKGROUND**

On January 29, 2008, DAQ issued Duke Air Quality Permit No. 04044T28, authorizing construction and operation of Unit 6. DAQ did not perform a MACT analysis or include in the permit MACT emissions limits for the HAPs that would be emitted from Unit 6, as required by section 112(g) of the Clean Air Act, 42 U.S.C. § 7412(g). According to Duke, the company began construction on Unit 6 the day after it received the permit. Nine days later, on February 8, 2008, the U.S. Court of Appeals for the D.C. Circuit issued a decision vacating as unlawful the regulations on which DAQ had based its decision to exempt Unit 6 from section 112(g). New Jersey v. EPA, 517 F.3d at 583 (holding that coal- and oil-fired EGUs “remain listed [as sources of HAPs] under section 112.”). On March 5 and 18, 2008, several Commenters sent letters asking DAQ to reopen the permitting process in light of the New Jersey decision, and to order Duke to cease construction pending DAQ’s MACT determination pursuant to section 112(g). DAQ declined to do so, and Duke continued to construct Unit 6. On July 16, 2008, after providing Duke, the State of North Carolina, and the federal government 60 days notice, Commenters filed a lawsuit against Duke in federal court in the Western District of North Carolina, seeking a determination that CAA § 112(g) applied to Duke’s construction of Unit 6 and that Duke was violating its requirements.

Meanwhile, on June 2, 2008, DAQ wrote to Duke, expressing uncertainty whether section 112(g) applied to Unit 6 but requesting that Duke agree voluntarily to undertake an assessment of its HAP emissions, “consistent with the analyses that would apply under [CAA] § 112.” DAQ did not ask Duke to stop construction during this voluntary process, but did request that Duke (1) affirm DAQ’s authority “to modify the existing permit to include the limits ultimately determined by the process,” and (2) “express[ly] commit[ ]” not to contend “that any ongoing construction must or should be considered when determining appropriate [air permit HAP] limits. . . .”

Duke responded to DAQ on June 13, 2008, asserting that a section 112(g) case-by-case MACT determination was not required for Unit 6, but agreeing to undertake a “MACT-like” analysis, without ceasing construction and “without waiving any of its rights.” On July 3, 2008, Duke submitted its “MACT-like” assessment to DAQ and reiterated its position that Unit 6 was not subject to the requirements of CAA § 112(g).

Throughout the permitting process for Unit 6 and the MACT-like process in which Duke voluntarily participated at DAQ’s request, Duke consistently represented that HAP emissions at Unit 6 would exceed the major source threshold (i.e., 10 tons/year of any one HAP and/or 25 tons/year of all HAPs, calculated based on the unit’s “potential to emit”). Duke’s original December 16, 2005 construction and operation permit application for Cliffside Unit 6, as well as the subsequent applications, revisions, and supporting documents that Duke submitted to DAQ, showed that total HAP emissions from Unit 6 would exceed 217 tons/year. Specifically, Duke’s calculations showed that controlled emissions of hydrogen chloride (“HCl”) would be 171.9 tons/year ND controlled emissions of hydrogen fluoride (“HF”) would be 22.4 tons/year.

Then, in an abrupt about-face on October 14, 2008—just two days before a hearing in the federal district court case and three days before DAQ had previously indicated that it would issue its Draft MACT-like Determination—Duke submitted to DAQ a letter and attachments,<sup>3</sup> claiming that “Cliffside Unit 6 is not a major source of HAPs, which means that Section 112(g) does not apply . . .” to Unit 6. Duke asked DAQ to concur with that claim and to “so conclude th[e] voluntary” MACT-like process.

More recently, on October 23, 2008, Duke submitted supplemental application materials based on the same underlying data contained in Duke’s October 14 submission. While maintaining that Unit 6 is a minor source of HAPs and that Duke does not need to modify its permit to confirm that status, Duke nevertheless requested an amendment to its permit application to include enforceable permit terms to limit emissions of HAPs below the major source threshold of 10 tons/year for any single HAP and 25 tons/year for all HAPs.

On December 2, 2008, U.S. District Judge Lacy H. Thornburg issued a “Memorandum and Order” (“Order”) and “Judgment” in the federal court case, finding that “Unit 6 is an EGU under construction which has the potential to emit in excess of ten tons per year of an individual HAP (hydrochloric acid) and over 25 tons of a combination of other HAPs,” that CAA § 112(g) applied to Unit 6, and that Duke was violating its requirements. Order, at 21-22, 24. Judge Thornburg held that DAQ “has the authority and duty to enforce the requirement of a full MACT proceeding,” and ordered that Duke

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<sup>3</sup> Those attachments were: (1) a May 29, 2007 “Report on FGD Feedback Test Program” at Duke’s Marshall Steam Station (without the report’s appendices); (2) unspecified excerpts from unattributed documents relating to hazardous air pollutant (“HAP”) emissions from Cliffside Unit 6, with two pages dated October 14, 2008, one page dated September 10, 2008, and one page undated; (3) an October 14, 2008 letter from Phil Rader, Business Sales Manager, Alstom Power, Inc., to Duke; and (4) undated, revised portions of Duke’s air permit application (Forms A1 and B).

complete a “case-by-case type MACT public process” before DAQ within 60 days. Judgment ¶¶ 4, 5. On December 4, in response to Judge Thornburg’s Order and Judgment, Duke sent a letter to DAQ reiterating its request for concurrence in its minor source claim and resubmitting materials it had previously submitted to DAQ in October in support of that claim. Duke also resubmitted materials it had submitted to DAQ as part of the MACT-like process “to indicate what MACT limits would be appropriate if CAA § 112(g) did apply.” Duke Dec. 4, 2008 letter to DAQ at 5.

DAQ issued the present proposal in response to Duke’s October 23, 2008 minor source application submissions.<sup>4</sup>

## **II. UNIT 6 IS A MAJOR SOURCE BASED ON ITS “POTENTIAL TO EMIT”**

As explained in detail below, Unit 6’s “potential to emit” renders it a major source of HAPs.<sup>5</sup> Unit 6 would remain a “major source” of hazardous air pollution under the conditions of DAQ’s proposed permit modification, which does not include practicably enforceable permit conditions that will restrict HAP emissions below the major source threshold. Thus, DAQ may not lawfully exempt Unit 6 from section 112(g)’s MACT requirements and issue the Draft Revised Permit as proposed.

### **A. Definition of “Potential to Emit”**

The Clean Air Act and North Carolina regulations define a major source of HAPs as any stationary source that has “the potential to emit considering controls . . . 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants.” 42 U.S.C. § 7412(a)(1); *see* 15A N.C. Admin. Code 02D.1112(c)(4) (defining “Construct a major source”); 40 C.F.R. § 63.41 (same). The concept of “potential to emit” HAPs, as defined by EPA and North Carolina and as interpreted by the courts, is fundamental to determining Unit 6’s major source status. *See United States v. Louisiana-Pacific Corp.*, 682 F. Supp. 1122, 1133 (D. Colo. 1987) (“The

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<sup>4</sup> On October 31, 2008, Duke sent DAQ an additional email in support of the minor source claim.

<sup>5</sup> It is worth noting that two recently-permitted coal-fired power plants that have a smaller generating capacity than does Cliffside Unit 6 easily surpass the major source threshold based on their potential to emit HAPs. In Virginia, the Department of Environmental Quality issued to Virginia Electric and Power Company a permit to construct and operate a coal-fired steam electric generating plant in Wise County, Virginia. The Wise County plant will consist of two coal-fired circulating fluidized bed (CFB) boilers that have a combined gross electrical output of 668 megawatts. These CFB boilers have a potential to emit over 240 tpy of HAPs, including 181 tpy of HCl and 48.86 tpy of Organic HAPs, taking into account the following control technology: furnace limestone injection, dry flue gas desulfurization, fabric filter baghouse, good combustion practices and activated carbon injection. In South Carolina, the Department of Health and Environmental Control issued to Santee Cooper a permit to construct and operate the Pee Dee Generating Station in Florence County, South Carolina, consisting of two 660 megawatt pulverized coal boilers. Each 660 MW boiler has the potential to emit 90.53 tpy of total HAPs, including 68.1 tpy of HCl, and will contain flue gas desulfurization, a fabric filter baghouse, low NOX burners, two-level separated overfire air, and a Selective Catalytic Reduction system.

concept of ‘potential to emit’ is the cornerstone of the entire [preconstruction permitting] program.”).

North Carolina and federal air pollution control regulations define “[p]otential emissions” as follows:

[T]he rate of emissions of any air pollutant that would occur at the facility’s *maximum capacity to emit any air pollutant under its physical and operational design*. Any physical or operational limitation on the capacity of a facility to emit an air pollutant shall be treated as a part of its design *if the limitation is federally enforceable*. Such physical and operational limitations include air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed. Potential emissions include fugitive emissions as specified in the definition of major source in 40 CFR 70.2.

15A N.C. Admin. Code 02Q.0103(28) (emphasis added); see 40 C.F.R. § 63.2 (defining “potential to emit” in same fashion).

These regulations make clear that a source’s “potential to emit” is determined based on its “maximum capacity to emit” and only takes into account pollution controls or operational limitations if and to the extent they are enforceable. As the U.S. Court of Appeals for the Second Circuit has explained:

[A] proposed facility that is physically capable of emitting major levels of the relevant pollutants is to be considered a major emitting facility under the Act *unless there are legally and practicably enforceable mechanisms in place* to make certain that the emissions remain below the relevant levels.

Weiler v. Chatham Forest Prod., Inc., 392 F.3d 532, 535 (2d Cir. 2004) (emphasis added).

As discussed below, in light of Unit 6’s physical and operational design—the range of fuels Duke claims Unit 6 is physically capable of burning, the potential rates and hours of operation of Unit 6, the variability of the effectiveness of the planned pollution control equipment, and the expectation of decreased plant efficiency over time—it is clear that Unit 6 is physically capable of emitting HAPs well above the major source threshold. Indeed, this fact is apparent from Duke’s earlier emissions estimates for Cliffside Unit 6, which consistently stated that, even with pollution controls, Unit 6 would emit over 171 tons of hydrochloric acid (HCl), over 22 tons of hydrofluoric acid (HF), and over 217 tons of all HAPs combined.

**B. Duke’s Claim of Minor Source Status Is Based on Flawed Assumptions.**

In contrast to its earlier submittals to DAQ, Duke claimed in its October 14, 2008 letter to DAQ and its October 23, 2008 Application that Cliffside Unit 6 is a minor source of HAPs. According to Duke, certain new assumptions about Unit 6 will bring its “potential to emit” below the major source threshold, an 85% decrease in combined HAP emissions without any changes to the pollution control equipment at Cliffside. In particular, Duke’s claim relies on the following three assumptions: (1) Unit 6 will exclusively burn coal with a 33% higher heating value than previously stated; (2) Unit 6 will only burn coal with a chlorine content less than maximum levels for the types of coal Unit 6 is capable of burning; and (3) Unit 6’s pollution controls will be far more effective than previously stated and these controls will consistently operate at peak levels of efficiency.

We requested that our consultant, Dr. Ranajit Sahu, review Duke’s technical assertions and the supporting materials. On November 7, 2008, SELC provided to DAQ Dr. Sahu’s report as well as a cover letter reviewing the applicable legal standards and summarizing the technical deficiencies. We resubmitted Dr. Sahu’s report on December 12, 2008, again with a cover letter discussing the law and the technical flaws in Duke’s application. Both of these letters, as well as Dr. Sahu’s previous report are hereby incorporated by reference. After DAQ issued the Draft Revised Permit, we requested that Dr. Sahu also review it and DAQ’s analysis. Dr. Sahu has identified three primary technical flaws in Duke’s claim that Unit 6 is or can qualify as a minor source of HAPs, as well as with and DAQ’s acceptance of this claim. These flaws are summarized below, and Dr. Sahu’s report discussing these flaws is attached. Dr. Sahu focuses on HCl because it is the HAP that will be emitted in the largest quantity. As Dr. Sahu explains, the HCl emissions from Unit 6 are a function of (1) the amount of HCl that will be formed, which is itself a function of the amount of coal that will be burned and the amount of chlorine in that coal; and (2) the amount of HCl that will be captured by Unit 6’s pollution controls.

#### 1. Heat Content of the Coal

In its minor source application (“Application”), Duke has improperly changed its assumptions regarding the heat content of the coal it will burn. The effect of this change is to significantly reduce the amount of coal that Duke projects will be burned by Unit 6 and correspondingly to allow Duke to assume that less HCl will be formed. Duke previously assumed a heat content of 9,376 Btu/lb. See May 29, 2007 PSD Permit Application Addendum, Appendix B, at 4. In its Application, however, Duke assumes a heat content of 12,777 Btu/lb—an assumption that DAQ reiterates in its Air Permit Review. See DAQ Air Permit Review (December 15, 2008) at 2. This 36% increase in heat content reduces the amount of coal that Unit 6 is assumed to burn by more than 26%.

Duke and DAQ’s adoption of a higher heat content is improper because there is no enforceable requirement that would prevent Duke from burning coals with a lower heat content. For purposes of calculating potential to emit, Duke must select the coal blend that would result in the highest HCl emissions projections. By assuming a higher heat content, Duke has improperly minimized its projection of potential emissions. As

Dr. Sahu indicates in his review, a blend of coals with a lower heat content would result in higher emissions of HCl.

## 2. Chlorine Content of the Coal

Similarly, Duke, and DAQ, have relied on an unjustifiably low coal chlorine content. In its Application, Duke assumes the maximum chlorine content will be 3209 ppm. See DAQ Air Permit Review (December 15, 2008) at 2. However, as Dr. Sahu indicates, the USGS Coal Quality Database reports that some coals from the regions where Duke is permitted to and intends to purchase coal have chlorine contents as high as 8800 ppm. Therefore, Duke's submission, and DAQ's acceptance thereof, is improper because, by selecting a chlorine content far lower than the maximum chlorine content among the coals it is permitted to burn, Duke has grossly underestimated the amount of HCl that will be formed.

The flaws in Duke's assumptions regarding heat content and chlorine content alone show that Unit 6 has the potential to emit significantly above the 10-tons-per-year threshold for a single HAP. DAQ's review wrongly accepts those flawed assumptions.

## 3. Projected Removal of HCl at Unit 6

In its submissions to DAQ between December 2005 and August 2008, Duke reported that Unit 6's pollution control equipment would remove 98% of the HCl that will be created during combustion. However, in its Application, Duke asserts, and DAQ accepts, that the same equipment will actually remove 99.9% of the HCl. *Id.* Dr. Sahu identifies several problems with Duke's assertion. Before summarizing these problems, it is important to recognize that, even putting aside the questions regarding coal heat and chlorine content discussed above, Unit 6's HCl emissions would exceed 10 tons if the removal efficiency were to drop just a small fraction of a percent from the 99.9% figure Duke and DAQ now assume. Dr. Sahu calculated that to keep HCl emissions under 10 tons, Duke would have to achieve an average removal rate of at least 99.8874%, even accepting its flawed assumptions regarding coal heat and chlorine content. In other words, the slightest reduction in performance could cause Duke to exceed the major source threshold.

The first and most remarkable flaw in Duke's claims regarding removal efficiency is the fact that the very company that manufactures the control equipment, Alstom, disagrees with Duke's claim. Duke claims that the report by Alstom supports its potential-to-emit calculations. To the contrary, Alstom's letter directly contradicts the claims Duke makes. Duke's central basis for claiming that it can achieve a continuous removal efficiency of 99.9% is its assertion that the new equipment at the Marshall Steam Station has achieved this reduction. However, Alstom itself states that the HCl removal efficiency demonstrated at Marshall ranged between 99.7 and 99.9% removal of HCl, with an average of 99.87%. Most of this range, including the average, falls below the level that would be required for Unit 6 to emit less than 10 tons per year of HCl. Nowhere in Alstom's letter does the company provide any assurance that the control

equipment that will be used at Unit 6 could remove 99.9% of HCl on average over the course of a year. The most that Alstom states is that the removal control at Unit 6 will be better than at Marshall. However, given the 99.7-99.9% range of performance at Marshall, this does not mean that the performance will maintain HCl emissions below the 10-ton threshold. Furthermore, Alstom explicitly disavows any performance guarantee, stating that its letter does “not constitute a specific performance guarantee or warranty by Alstom for HCl or HF removal.”

Second, the data Duke presented from the Marshall plant also fail to support Duke’s claim. Rather than showing a consistent removal rate of at least 99.9%, the data show that on six of the 16 runs presented, the removal efficiency was below 99.8874%, the level Unit 6 would have to maintain in order to avoid major source status.

Third, as Dr. Sahu explains, Duke’s claims that the controls at Unit 6 will be even better than at Marshall are entirely speculative. Duke provides no data in support of its claims that the design elements of its various control systems will improve efficiencies and ensure 99.9% HCl removal. As noted, Alstom in its letter fails to provide any quantified estimate of the improvement in HCl removal that the additional controls at Unit 6 may provide.

Finally, Duke adopts two positions in its Application that directly contradict positions it took in its “MACT-like” submissions to DAQ on July 3, 2008 and August 22, 2008. The first inconsistency is Duke’s prior rejection of reliance on short-term stack tests as a reasonable indicator of expected pollution control performance. Duke specifically pointed to HCl, stating “[a]s an example, hydrogen chloride (“HCl”) . . . emissions are directly related to the amount of the pollutant in the fuel, which also varies even within the same coal seam. Short-term stack test results do not adequately account for that variability.” See Duke’s MACT-like Assessment, July 3, 2008 at 10. In its Application, however, Duke relies on just this type of short-term stack test when it cites short-term tests from the Marshall Steam Station.

The second inconsistency concerns reliance on statements from pollution control vendors. Duke previously asserted that pollution control effectiveness predictions by vendors like Alstom could only be relied on when the vendor provided a guarantee of the system’s performance. “As you likely are aware, what vendor and consultant literature say about projected performance often overestimate what is eventually guaranteed. That is because the literature is based on speculation about what might happen; whereas a guarantee is based on hard engineering data and demonstrated performance with binding commercial repercussions.” See Letter from J. Turner to K. Overcash, Aug. 22, 2008, at 13. However, Duke now relies on statements by its vendor, Alstom, which expressly disavows any guarantee.

**C. The Draft Revised Permit’s Conditions Will Not Render Unit 6 a “Minor” Source of HAPs.**



In its Application, Duke claimed that its proposed permit modifications would assure the public that Unit 6 is a “minor source.” In other words, even if Unit 6 were not a “natural” minor source, the permit modifications would render it a “synthetic” minor source. DAQ wholly adopted Duke’s proposal and amended the Permit terms to require that combined HAPs emissions are less than 25 tpy and that total emissions of any single HAP are less than 10 tpy. See Draft Revised Permit at 51 and Duke’s Application at 1. As demonstrated above, Unit 6 currently is a major source of HAPs based on its potential to emit HAPs above the major source thresholds. For similar reasons, the sole modification contained in the Draft Revised Permit will not render Unit 6 a “minor” HAP source.

The Draft Revised Permit does not contain restrictions that explicitly prevent Unit 6 from violating any of the assumptions and claimed efficiencies Duke’s relies on for its minor source claim, as discussed immediately above. The new assumptions regarding coal heat and chlorine content and claimed HCl removal efficiencies, therefore, cannot be used to restrict Unit 6’s “potential to emit.” It is indisputable that Unit 6 is “physically capable” and allowed under the Draft Revised Permit to burn coal with a lower heat and higher chlorine content than Duke’s assumptions suggest, and to have pollution controls operate at lower removal efficiencies than required to support Duke’s claim. Thus, Unit 6 does not have “legally and practicably enforceable mechanisms in place to make certain that [its] emissions remain below the relevant levels.” Id. As a result, Unit 6 currently is a major source based on the unit’s potential to emit HAPs.

As explained above, only physical and operational restrictions that are legally and practically enforceable may be used to limit a source’s potential to emit for purposes of the major source determination. This requirement may not be satisfied by the type of blanket restriction on emissions contained in the Draft Revised Permit, even though it is presented as an “enforceable” limit. In Louisiana-Pacific, a federal court considering the type of physical and operational restrictions that can be used to limit a source’s potential to emit concluded:

[N]ot all federally enforceable restrictions are properly considered in the calculation of a source’s potential to emit. While restrictions on hours of operation and on the amount of materials combusted or produced are properly included, blanket restrictions on actual emissions are not.

682 F. Supp. 1122, 1133 (D. Colo. 1987). Of particular relevance here, the court in Louisiana-Pacific held that permit conditions which simply limited carbon monoxide emissions to 78 tons per year and volatile organic compounds to 101.5 tons per year should **not** be considered in determining “potential to emit” because these blanket emissions restrictions, unlike conditions such as limits on hours of operation, fuel consumption, or amount of production, “would be virtually impossible to verify or enforce.” Id.

The same applies here. As Louisiana-Pacific demonstrates, DAQ’s proposed modifications—which amount to nothing more than blanket restrictions on HAP

emissions—cannot stand. That is, Duke cannot avoid major source status simply by applying for and receiving a permit with “blanket restrictions” prohibiting HAP emissions at levels exceeding the major source threshold. Rather, any limits that DAQ seeks to count toward its major source determination must be in the form of enforceable and verifiable limits on rates or hours of operation, fuel or raw material types, or other practically enforceable aspects of design or operation that will make certain that emissions remain below the major source threshold.

The Draft Revised Permit does not contain limits that are measurable and enforceable as a practical matter and that will ensure Unit 6’s emissions remain below the major source threshold. Rather, the Permit simply provides a blanket restriction on emissions of the type rejected in Louisiana-Pacific, without explaining whether or how compliance would be verifiable or enforceable. Therefore, DAQ’s proposed modifications fail as a matter of law and the Draft Revised Permit is invalid. Indeed, Duke has provided no evidence that it could monitor the HCl emissions from Unit 6 with sufficient precision to make permit limitations practicably enforceable. Moreover, as mentioned above, Duke’s calculations presenting how it could bring its emissions below the major source threshold rely on several assumptions—about the minimum heat content and maximum chlorine content of the coal it will burn and the minimum efficiency its HCl pollution controls will achieve—none of which Duke and DAQ seek to make concrete with permit conditions. Duke’s reluctance to commit to these assumptions is not surprising given the technical deficiencies with them that Dr. Sahu has identified in his review, which are summarized below. But if DAQ is unwilling to require Duke to commit to these impracticable assumptions, it should also be unwilling issue blanket emissions restrictions that purport to render Unit 6 a minor source.

**D. The Draft Revised Minor Source Permit is Inconsistent with EPA’s Longstanding Policy.**

EPA policy is consistent with and reinforces the law described above. In a 1989 Memorandum regarding limits on “potential to emit,” EPA addressed “[t]he appropriate means of restricting potential to emit through permit conditions.” June 13, 1989 Memorandum from Terrell Hunt, EPA Office of Enforcement and Compliance Monitoring and John S. Seitz, Office of Air Quality Planning and Standards (“1989 PTE Memo”) at 2 (attached).<sup>6</sup> In particular, EPA “addressed three questions: what types of permit limitations can legally limit potential to emit; whether long averaging times for production limitations are enforceable as a practical matter; and whether sources may limit potential to emit to minor source levels as a means of circumventing the preconstruction review requirements of major source review.” *Id.* EPA describes what may qualify as PTE limits as including:

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<sup>6</sup> The 1989 PTE Memo was reaffirmed in the agency’s 1995 Memorandum, *Options for Limiting the Potential to Emit (PTE) of a Stationary Source Under Section 112 and Title V of the Clean Air Act (Act)* (“1995 PTE Memo”) (“The EPA has issued several guidance documents explaining the requirements of practicable enforceability (e.g., “Guidance on Limiting Potential to Emit in New Source Permitting,” June 13, 1989; memorandum from John Rasnic entitled “Policy Determination on Limiting Potential to Emit for Koch Refining Company’s Clean Fuels Project,” March 13, 1992”).

in addition to control equipment, any federally enforceable physical or operational limitation. The *Louisiana-Pacific*<sup>7</sup> court found that blanket limits on emissions did not fit within the concept of proper restrictions on potential to emit as set forth by *Alabama Power*.<sup>8</sup> Moreover, Judge Arraj found that:

...a fundamental distinction can be drawn between the federally enforceable limitations which are expressly included in the definition of potential to emit and (emission) limitations.... Restrictions on hours of operation or on the amount of material which may be combusted or produced ... are, relatively speaking, much easier to "federally enforce." Compliance with such conditions could be easily verified through the testimony of officers, all manner of internal correspondence and accounting, purchasing and production records. In contrast, compliance with blanket restrictions on actual emissions would be virtually impossible to verify or enforce.

*Id.* Thus, Judge Arraj found that blanket emission limits were not enforceable as a practical matter."

1989 PTE Memo at 4. Thus, as a general rule, "a limitation specifically recognized by the regulations as reducing potential to emit is a limitation on *production or operation*." *Id.* at 9. Indeed, according to EPA, the courts have concluded that "allowing blanket emission limitation[s] to restrict potential to emit would violate the intent of Congress in establishing the Prevention of Significant Deterioration (PSD) program." 1989 PTE Memo at 5.<sup>9</sup>

As a threshold matter, EPA explains in its 1989 Memo that "Potential emissions are defined as the product of a source's emission rate *at maximum operating capacity, capacity utilization, and hours of operation*." 1989 PTE Memo at 5. EPA specifically identified "capacity utilization" as an indicator of "the manner in which a source is run," including its raw materials, fuel, and any mandatory conditions on the performance of add-on control technologies.<sup>10</sup> *Id.* EPA explained:

Production limits are restrictions on the amount of final product which can be manufactured or otherwise produced at a source. Operational limits are all other restrictions on the manner in which a source is run, including hours of operation,

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<sup>7</sup> *United States v. Louisiana-Pacific Corporation*, 682 F. Supp. 1122, 1133 (D. Colo. Oct. 30, 1987).

<sup>8</sup> *Alabama Power v. Costle*, 636 F. 2d 323 (D.C. Circuit 1979).

<sup>9</sup> While the permit at issue here is intended to establish Cliffside as a minor source under section 112, and not the PSD program, the two regulatory programs use the concept of "potential to emit" identically as threshold criteria for program applicability.

<sup>10</sup> A permitting authority may also consider other "inherent limitations" (such as an inability in practice to operate 8760 hours per year), but it may do so only "[w]here such inherent limitations can be documented by a source and confirmed by the permitting agency." 1995 PTE Memo at 7.

amount of raw material consumed, fuel combusted, or conditions which specify that the source must install and maintain add-on controls that operate at a specified emission rate or efficiency. All production and operational limits except for hours of operation are limits on a source's capacity utilization.

1989 PTE Memo at 5. EPA went on to explain:

To appropriately limit potential to emit consistent with the opinion in *Louisiana-Pacific*, all PSD permits . . . *must contain a production or operational limitation in addition to the emission limitation in cases where the emission limitation does not reflect the maximum emissions of the source operating at full design capacity without pollution control equipment.* Restrictions on production or operation that will limit potential to emit include limitations on quantities of raw materials consumed, fuel combusted, hours of operation, or conditions which specify that the source must install and maintain controls that reduce emissions to a specified emission rate or to a specified efficiency level. Production and operational limits must be stated as conditions that can be enforced independently of one another. For example, restrictions on fuel which relates to both type and amount of fuel combusted should state each as an independent condition in the permit. This is necessary for purposes of practical enforcement so that, if one of the conditions is found to be difficult to monitor for any reason, the other may still be enforced.

When permits contain production or operational limits, they should also have recordkeeping requirements that allow a permitting agency to verify a source's compliance with its limits. . .

When permits require add-on controls operated at a specified efficiency level, permit writers should include, so that the operating efficiency condition is enforceable as a practical matter, *those operating parameters and assumptions which the permitting agency depended upon to determine that the control equipment would have a given efficiency.*

*Id.* at 5-7. Thus, as here, where the intent is to restrict through permit conditions the maximum capacity of a source to emit pollutants, and where the calculation of the facility's emissions depend on both the quantity and quality of the fuel and on the efficiency of the emission control devices, a minor source permit *must* include express limits on fuel quantity and/or quality as well as specific and enforceable conditions on the operation of the control equipment to ensure that it achieves the level of emissions reduction necessary to ensure minor source status. Moreover, for any production or operational limits, in order to ensure practical enforceability, "the time over which they extend should be as short term as possible and should generally not exceed one month . . . The requirement for a monthly limit prevents the enforcing agency from having to wait for long periods of time to establish a continuing violation before initiating an enforcement action." 1989 PTE Memo at 9. In the absence of such limits, PTE must be calculated assuming "operation at maximum design or achievable capacity (whichever is

higher) and continuous operation (8760 hours per year)” (*Id.* at 7) – that is assuming continuous use of the dirtiest available fuel that the source is capable of burning (highest chlorine content and lowest heat value) and the least effective HCl control efficiency possible using any required add-on control technology.

EPA has explained that emission limits may be used to restrict potential to emit in *very limited circumstance*. EPA states:

The particular circumstances of some individual sources make it difficult to state operating parameters for control equipment limits in a manner that is easily enforceable as a practical matter. Therefore, there are *two exceptions to the absolute prohibition on using blanket emission limits* to restrict potential to emit. *If the permitting agency determines that setting operating parameters for control equipment is infeasible* in a particular situation, a federally enforceable permit containing *short term emission limits* (e.g. lbs per hour) would be sufficient to limit potential to emit, *provided that such limits reflect the operation of the control equipment, and the permit includes requirements to install, maintain, and operate a continuous emission monitoring (CEM) system and to retain CEM data*, and specifies that CEM data may be used to determine compliance with the emission limit.

*Id.* at 7-8 (emphasis added). Accordingly, to the extent that blanket limits are available at all (they are generally *absolutely prohibited*), they are only available where operational limits are infeasible and where the blanket limits are accompanied by continuous emissions monitoring. Neither of these conditions has been met in this case. It is certainly *not* infeasible for Duke to adopt enforceable operational limits for its Cliffside plant. For example, Duke could accept, or DAQ could impose, limits on the quantity of fuel used at the facility on an annual basis, and/or limits on the quality of fuel used at the facility (such as chlorine and heat content). Moreover, to the extent that a certain level of control efficiency is necessary to assure minor source status, any minor source permit could (and should) include specific add-on control parameter monitoring, including but not limited to continuous emissions monitoring of HCl.

We note in this regard that under very similar circumstances the state of Florida is demanding just such emissions monitoring from one of its utilities.<sup>11</sup> Seminole electric has proposed a minor source permit for its new Unit 3 in Palatka, Florida. In so doing, it expressed its expectation that its control equipment could achieve a 99.7% reduction in CHL. In a letter requesting additional information, the Florida Department of Environmental Protection (“DEP”) states “uncontrolled HCl emissions from the coal-fired unit are estimated at nearly 2900 tons per year. Although the combination of proposed control equipment should provide excellent control of HCl emissions, if the actual control efficiency is 99.6% instead of 99.7%, HCl emissions will be 11.6 tons per year and the project will be a minor HAP source.” Florida DEP Letter at 1-2.

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<sup>11</sup> See Letter from Florida Department of Environmental Protection to Mike Roddy, Seminole Electric Cooperative (Jan. 16, 2009) (“Florida DEP Letter”) (attached)

Accordingly, the Florida DEP “intends to require the installation and operation of a CEMS to provide reasonable assurance that HCl emission do not exceed the major source threshold of 10 tons per year.” *Id* at 2. If Duke intends to rely on its control equipment achieving a level of efficiency of 99.9% HCl removal, at minimum, it must also install and operate an HCl CEMS to ensure ongoing control equipment effectiveness adequate to maintain minor source status (as discussed above, Duke must also obtain restrictions on fuel quantity and/or quality necessary to ensure that in light of its control equipment efficiency it will remain a minor source).<sup>12</sup>

Where a source is issued a faulty minor source permit, the source remains subject the major source requirements and will be in continuous violation of the CAA. As EPA explains with regard to NSR: “Failure by a permitting agency to adhere to these guidelines may result in a permit that does not legally restrict potential to emit, thereby subjecting a source to major new source review. If that source has not gone through preconstruction review, it is a significant violator of the Clean Air Act and is subject to enforcement for constructing or modifying without a major new source permit.” 1989 PTE Memo at 17.

**E. The Draft Revised Permit Does Not Require Monitoring Adequate to Assure Compliance.**

In its permit review, DAQ wrote: “DAQ has tentatively concluded that Cliffside Unit 6 does not have the potential to exceed the 10/25 tpy HAP thresholds. However, because HCl is the HAP with the highest potential emission rate (8.88 tpy using Duke’s calculations and 1.22 tpy using DAQ’s calculation) the NCDAQ is proposing to include an annual stack test requirement in order to confirm HCl removal efficiency is being achieved consistent with the assumptions used in calculations.” Permit Review at 6. As more fully discussed elsewhere in these comments, we emphatically disagree with the proposition that Cliffside Unit 6 is a minor source of HAPs.<sup>13</sup> Even assuming the validity of this unsupported proposition, however, the proposed monitoring protocol is unlawful because an annual stack test is not adequate to assure compliance with required emission limitations (i.e., either MACT limits or the major source threshold, as proposed in the minor source permit revision). Continuous Emission Monitors (“CEMS”) exist for HCl emissions and, at the very least, must be required to assure compliance with any emission limitations established for Cliffside Unit 6, regardless of whether DAQ deems Cliffside Unit 6 a minor or major source of HAPs. See 42 U.S.C. § 7661c(c) (requiring all

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<sup>12</sup> As Florida DEP acknowledges, “many facilities successfully monitor HCl on a continuous basis.” Florida DEP Letter at 2.

<sup>13</sup> Based on its “potential to emit” HAPs as defined under federal law, there is no doubt Cliffside Unit 6 easily fits the definition of a major HAP source. See 40 C.F.R. § 63.41 (defining “construct a major source”). Notably, Duke has not filed a request to qualify Cliffside Unit 6 as a “synthetic minor source” and the proposed permit revisions do not satisfy synthetic minor source requirements. See *United States v. Louisiana-Pacific Corporation*, 682 F. Supp. 1122, 1133 (D. Colo. Oct. 30, 1987) (holding “not all federally enforceable restrictions are properly considered in the calculation of a source’s potential to emit. While restrictions on hours of operation and on the amount of materials combusted or produced are properly included, blanket restrictions on actual emissions are not.”).

operating permits “shall set forth inspection, entry, monitoring, compliance certification, and reporting to assure compliance with the permit terms and conditions.”).

Without controls, Cliffside Unit 6 would emit 8,800 tons of HCl every year. In its minor source permit application, Duke claims based on the highest level of HCl control ever achieved during a series of short-term stack tests at Marshall Unit 4, that it will achieve a 99.9% removal of HCl emissions from Cliffside Unit 6. Aside from the fact that Duke has not demonstrated this level of control in practice under normal operating conditions—and even the Marshall stack test results varied from 99.7% up to 99.9%—even minute variations in HCl control efficiency would cause Cliffside Unit 6 to exceed the major source threshold. If Cliffside Unit 6 were able to continuously achieve an HCl control efficiency of 99.8874%, Cliffside Unit 6 would emit 10 tons/year of HCl a year, rendering it a major source. In other words, if the assumed control efficiency of 99.9000% drops to 99.8874% (a difference of only 0.000126%), then HCl emissions for Cliffside Unit 6 would equal the major source threshold of 10 tons/year, even assuming all of Duke’s unsubstantiated and unenforceable assumptions about the chlorine content and heat content of the coals that Cliffside Unit 6 will burn.

The proposed annual stack test is inadequate to demonstrate with requisite precision that the extremely high level of HCl control efficiency necessary to support Duke’s assumptions is being continuously maintained; it does not assure compliance with the assumptions used in Duke’s or DAQ’s calculations. See, e.g., Letter from Florida Department of Environmental Protection RE: Seminole Generating Station, at 1-2 (Jan. 16, 2009) (attached). To provide reasonable assurance that HCl emissions from Cliffside Unit 6 do not exceed the 10 ton per year major source threshold, DAQ must require the installation and operation of HCl CEMs. *Id.* Large industrial sources already successfully use CEMs to monitor HCl emissions on a continuous basis. *Id.* at 2. Thus, HCl CEMs are available, effective, and necessary to demonstrate the high level of continuous pollution control performance necessary to assure compliance with the emissions limitations in the proposed permit revision.

Furthermore, Duke’s minor source claims also depend on unsupported and unenforceable assumptions about the chlorine content and heat content of the coal Duke will burn at Cliffside Unit 6. These variables, in conjunction with continuous pollution control efficiency, are critical to Duke’s invalid minor source claims. Therefore, for the reasons discussed above, the proposed permit must include restrictions on the maximum chlorine content and minimum heat content of the coal burned at Unit 6 and require routine sampling and reporting of these parameters to assure compliance with the assumptions that underpin Duke’s minor source claims.

## **F. Conclusion**

In sum, Cliffside Unit 6 currently is a major source of hazardous air pollution due to its potential to emit HAPs in excess of the major source threshold, and will not become a minor source by virtue of the Draft Revised Permit. In fact, the Draft Revised Permit is fatally flawed because it unlawfully uses blanket HAP emissions restrictions to accord

Unit 6 minor source status. DAQ should have denied Duke's request to add these restrictions to its air quality permit in lieu of MACT-based HAP emission limits. The only lawful way for Unit 6 to be accorded minor source status is to incorporate the assumptions that Duke uses, and DAQ adopts, in its emissions calculations into the permit as legally and practicably enforceable permit conditions. However, even if DAQ were to implement permit limits restricting the heat and chlorine content in the coal Unit 6 burned and requiring Duke's claimed HCl and HF removal efficiency, Duke would still not be able to create a system of monitoring sufficiently precise to satisfy the Clean Air Act's requirement that any limitations be practicably enforceable in order to count towards the major source determination. Moreover, even if these unsupported assumptions could be transformed into practicably enforceable limitations, such conditions would likely be violated, as Dr. Sahu explains, immediately upon implementation. Therefore, Unit 6 is and will remain a major source of hazardous air pollution, and any air quality permit that DAQ issues to Duke for Unit 6 should reflect this reality.

### **III. DAQ MUST INCORPORATE THE RESULTS OF THE MACT ANALYSIS AND DUKE'S NEW INFORMATION REGARDING ENHANCED CONTROL OF ACID GASES INTO THE BACT ANALYSIS FOR UNIT 6**

As discussed in detail above, Duke has now provided DAQ with information that differs from what Duke provided in conjunction with its other recent air permit applications for Cliffside Unit 6. This information, which includes revised calculations of expected HAP emissions based on claims regarding enhanced acid gas control and the chlorine and heat contents of coal, is relevant not only to DAQ's consideration of Duke's bid to have Cliffside Unit 6 designated a minor source of HAPs, as discussed above, but also to DAQ's consideration of other permit limits and conditions for Unit 6.

Title V regulations provide that "any applicant who fails to submit any relevant facts or who has submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, submit, as soon as possible, such supplementary facts or corrected information." 15A NCAC 02Q .0507(f). Pursuant to 15A NCAC 02Q .0507(f), Duke must supplement its application for a modified Title V permit with a revised BACT analysis for sulfur dioxide and any other pollutants that may be implicated by this different information. DAQ should then re-evaluate the BACT emissions limitations for Unit 6 in light of that analysis, revise the Draft Permit accordingly, and re-notice it for public comment.

### **IV. DAQ FAILED TO MAKE PUBLIC RECORDS AVAILABLE IN A TIMELY MANNER, THEREBY DEPRIVING COMMENTERS OF THE OPPORTUNITY TO PARTICIPATE IN AN APPROPRIATE PUBLIC PROCESS**

DAQ has failed to respond in a timely manner to our request for records related to the proposed minor source determination. Because of DAQ's delay in providing these



documents, we and our partner groups have not had an adequate opportunity to participate fully in an appropriate public process with respect to the proposed minor source permit. We therefore reserve the right to submit supplemental written comments on the draft permit after the requested documents have been provided.

DAQ issued its draft revised permit on December 15, 2008. Two days later, on December 17, 2008, SELC submitted a letter pursuant to North Carolina public records law, N.C. Gen. Stat. §§ 132-1 to 132-10, requesting the right to inspect, examine, and copy all public records in the possession or control of DAQ related to DAQ's proposed issuance of the modified air permit for Cliffside. On January 9, 2009, having received no response, SELC attorney Gudrun Thompson called DAQ Public Relations Officer Tom Mather to inquire about the status of the records request. Mr. Mather stated that DAQ was close to having the documents ready but that SELC would need to obtain the documents through DAQ's attorney, Marc Bernstein. On January 13th, SELC attorney John Suttles spoke with Mr. Bernstein and confirmed that Mr. Bernstein had not yet received the documents from DAQ. On January 15, 2009, Mr. Bernstein sent an email to Mr. Suttles indicating that he had not yet received the documents from DAQ staff due to a problem collecting certain emails. As of today, SELC had not received the requested documents, despite diligent efforts to obtain them pursuant to state public records law. See N.C. Gen. Stat. §§ 132-1(b), 132-6 (requiring that copies of records be furnished "as promptly as possible") and DENR Public Records Policy (providing that "[r]esponses to requests for public information or records shall be made as promptly as possible.").

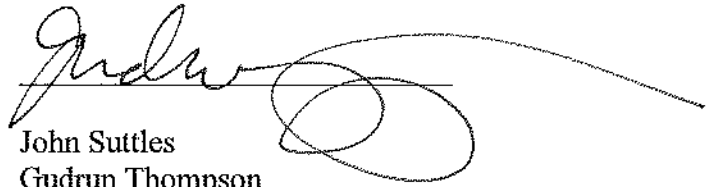
As stated in SELC's request, the requested public records are of central relevance to the proposed minor source permit for Cliffside Unit 6 and therefore critical to SELC's ability to analyze DAQ's proposal and to participate in the written comment period ending on January 22, 2009. In any event, we reserve the right to supplement these comments within two weeks of the date on which we either receive copies of the requested public records or such records are made available to us for inspection, examination, and copying. The opportunity to submit supplemental comments will be necessary to allow us and our engineering consultant to review and analyze the records and to incorporate the resulting analysis into our comments to DAQ on the proposed modified air permit.

## **V. CONCLUSION**

In light of the legal and technical deficiencies discussed above, DAQ must rescind its Draft Revised Permit and deny Duke's permit application. Unit 6 is not a minor source of HAPs, nor does the Draft Revised Permit make it one. Thus, a proper revised permit for Unit 6 must include MACT-based HAP emission limits.

Thank you for the opportunity to submit these comments. Please inform us in writing of any action taken on this permit application.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'John Suttles', with a long, sweeping horizontal line extending to the right.

John Suttles  
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Enclosure

Cc (w/encl.): Governor Bev Perdue  
Secretary Dee A. Freeman, DENR  
Mr. B. Keith Overcash, DAQ  
Mr. Donald van der Vaart, DAQ  
Mr. Marc Bernstein, NCDOJ

## **Review of Draft Minor Source Determination for Cliffside Unit 6: Potential to Emit and Hazardous Air Pollutant Source Status**

**Dr. Ranajit (Ron) Sahu, Consultant**

**January 21, 2009**

### **EXPERIENCE AND QUALIFICATIONS**

I have a Bachelor of Technology degree, with Honors, from the Indian Institute of Technology, and a Master of Science (Mechanical Engineering) and Ph.D. (Mechanical Engineering) from the California Institute of Technology.

I have over 18 years of experience in the fields of environmental, mechanical, and chemical engineering including program and project management services as well as design and specification of pollution control equipment. I have successfully managed and executed numerous projects relating to applied research, design, regulatory compliance, permitting, and risk assessment.

I am familiar with the design, operations, and technical aspects of coal-fired power plants, including air pollution related to coal combustion. I have completed consulting projects and reviewed numerous air quality permits relating to coal-fired power plants. I have evaluated and provided comments on several applications for case-by-case maximum achievable control technology ("MACT") determinations for coal-fired power plants.

I have provided and continue to provide consulting services to numerous private sector, public sector, and public interest group clients. My clients over the past 18 years have included steel mills, petroleum refineries, cement companies; aerospace companies, and power generators. As a consulting engineer for private sector clients, I have prepared or consulted on several applications for air permits that have included engineering analyses and demonstrations required to meet applicable best available control technology and MACT standards.

As a consulting engineer, my public sector clients have included the U.S. Environmental Protection Agency ("EPA"), the U. S. Department of Justice, California Department of Toxic Substances Control, and various municipalities. I have also performed work for non-governmental organizations. I have performed projects in over 45 states, numerous local jurisdictions, and internationally.

In addition to my consulting work, for the past 16 years I have taught and continue to teach courses in several Southern California universities including University of California Los Angeles (air pollution), University of California Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management).

## **MATERIALS REVIEWED**

I have reviewed the following documents relating to "Unit 6," a new, 800-megawatt, supercritical pulverized-coal electric utility steam generating unit ("EGU") which Duke Energy Carolinas, LLC ("Duke") is constructing at its Cliffside Steam Station in Rutherford County, North Carolina<sup>1</sup>:

- Prevention of Significant Deterioration ("PSD") Permit Application for Cliffside Steam Station, Units 6 and 7, Vol. 1, dated December 16, 2005;
- Letter from Duke to North Carolina Department of Environment and Natural Resources, Division of Air Quality ("DAQ") dated March 31, 2007, with attached amended "Application for Air Permit to Construct/Operate" for Unit 6 ("March 2007 Addendum");
- Letter from Duke to DAQ, dated June 13, 2007, with attached PSD Application – Corrected Application Forms;
- DAQ Final PSD Determination, dated January 28, 2008;
- Final Air Quality Permit (Final PSD Determination Appendix A), dated January 29, 2008;
- Letter from DAQ to Duke, dated June 2, 2008;

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<sup>1</sup> Unless otherwise indicated, all of these documents are available at <http://www.ncair.org/permits/psd/cliffside.shtml>.

- Letter from Duke to DAQ, dated July 3, 2008;
- “Case-by-Case Maximum Achievable Control Technology Assessment for Hazardous Air Pollutants, Unit No. 6, Cliffside Steam Station Project,” submitted by Duke to DAQ on July 3, 2008 (Duke’s “MACT-like Assessment”);
- Letter from Duke to DAQ, dated August 22, 2008, providing additional information for Duke’s MACT-Like Assessment;
- Letter from Duke to DAQ, dated October 14, 2008, claiming Unit 6’s status as a minor source of hazardous air pollutants (“HAPs”), with attachments (Duke’s “minor source application”);
- Letter from Duke to DAQ, dated October 14, 2008, providing additional information for Duke’s MACT-Like Assessment;
- Letter from Duke to DAQ, dated October 23, 2008, providing corrected application materials for Duke’s Air Quality Permit, with attachments;
- Letter from Duke to DAQ, dated December 4, 2008, responding to Judge Thornburg’s December 2, 2008 Order, with attachments<sup>2</sup>;
- Draft Revised Air Quality Permit (“draft minor source permit”), DAQ Air Permit Review, and Notice of Public Hearing, all dated December 15, 2008, with attachments;
- DAQ letter to Duke, dated December 17, 2008;
- Duke Letter to DAQ, dated December 23, 2008;
- United States Geological Survey (“USGS”) Coal Quality Database available at <http://energy.er.usgs.gov/products/databases/CoalQual/index.htm>.

## **PREVIOUS REVIEW CONCERNING UNIT 6**

In August 2008, I reviewed Duke’s “MACT-like Assessment” and prepared a declaration submitted to the Court on August 8, 2008. I have reviewed the materials that Duke has submitted since that time and have concluded that Duke’s current MACT application, presented in its December 4, 2008 letter to DAQ and attachments thereto, is substantively identical to what Duke submitted as part of the “MACT-like process.” Having reviewed the materials described above, my critique of Duke’s MACT-like assessment as set out in my

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<sup>2</sup> The Attachments to Duke’s December 4 letter are not available on DAQ’s website.

August 8, 2008 declaration remains valid and applies equally to Duke's December 4, 2008 MACT application.

## **FOCUS OF MY TECHNICAL REVIEW**

My technical review of Duke's minor source application and proposed permit focus on Duke's claims regarding hydrogen chloride ("HCl") emissions because HCl is the HAP that will be emitted from Unit 6 in the largest quantity.

## **DISCUSSION**

### **Factors Affecting HCl Emissions**

Broadly speaking, three factors determine the level of HCl emissions from a coal-fired EGU like Unit 6: (1) the amount of chlorine present in the coal that is burned; (2) the amount of coal that is burned; and (3) the efficiency of the pollution devices that control HCl emissions. While *actual* emissions of HCl will fluctuate over time depending on the variability in each of these factors, the *potential to emit* for HCl is based on Unit 6's maximum capacity to emit and thus represents the highest end of this range.

As I discuss in the following paragraphs, there are important contradictions among statements contained in Duke's MACT application (which incorporates its MACT-like Assessment) and its minor source application. For example, in its minor source application, Duke assumes the coal Unit 6 will burn will have the same characteristics as the coal it has burned at Cliffside Units 1-5 over the last five years, while in its MACT-like assessment, Duke repeatedly stated that Unit 6 was designed for maximum fuel flexibility and would not burn the same type of coal as Units 1-5 previously burned or currently burn. Similarly, Duke's minor source application does not reflect the chlorine and heat content characteristics of the range of coals that Unit 6 is designed to burn. This flaw is especially important because the draft minor source permit does not limit the range or characteristics of the coal Unit 6 could burn, nor does it require sampling and reporting the characteristics of that coal. These contradictions highlight the flaws in Duke's minor source application, as they

demonstrate that Duke has not properly accounted for the range of physical and operational parameters that could affect Unit 6's "potential to emit" HCl.

### **Chlorine Content of Coal**

The degree of HCl emissions depends on the chlorine contained in the coal that will be burned in Unit 6. When coal is burned, the chlorine present in the coal is released into the exhaust gas, where it combines with hydrogen to form HCl or hydrochloric acid gas. Thus, HCl emissions are a direct function of how much coal (i.e., tons) will be burned and the chlorine content present in the coal.

To calculate Unit 6's potential to emit HCl, Duke must use the maximum possible chlorine content of any coal it could burn based on its physical design and enforceable operational limits. In its minor source application, Duke calculated the potential chlorine emissions from Unit 6 based on the assumption that the maximum chlorine content of its input coal would not exceed 3209 ppm. This assumption is inappropriate for calculating Unit 6's potential to emit HCl. The USGS Coal Quality database reports chlorine contents for Eastern bituminous coals, including coals available from mines in Northern, Central, and Southern Appalachia, ranging between 3300 ppm and 8800 ppm. If Duke used an assumption for chlorine content within this range, as would be appropriate, then Unit 6's potential HCl emissions would very likely exceed the statutory threshold for a major source. As the USGS data show, however, it was inappropriate from a technical engineering standpoint for Duke to use a coal chlorine content value of 3209 parts per million ("ppm") in its potential-to-emit calculations, unless that value is required by a specific permit condition as well as a requirement for continuous compliance and regular monitoring.

### **Heat Content of Coal**

As with chlorine, calculating the potential to emit HCl for Unit 6 requires assuming the maximum quantity of coal the unit will burn in a given year. The quantity of coal needed to generate a desired heat input depends on the heat content of the coal that is burned. The

lower the heat content of the coal, the more coal Unit 6 must burn to reach a desired heat input which, in turn, will generate more HCl emissions.

In its prior submissions, Duke assumed the heat content of the coal that Unit 6 would burn to be 9,376 Btu/lb.<sup>3</sup> If Duke employed this assumption for heat content of coal, which is consistent with Duke's stated desire for Unit 6 to burn a blend of Eastern bituminous coals and sub-bituminous coals, then Unit 6's potential HCl emissions would very likely exceed the statutory threshold for a major source. In its minor source application, however, Duke assumes the heat content of the coal that Unit 6 would burn to be much higher, 12,777 Btu/lb. By calculating HCl emissions using a higher coal heat content value than previously represented, Duke's minor source application reduces the assumed amount of coal Unit 6 would burn by approximately 26.6%, with a corresponding reduction in the calculations of potential HCl emissions, even if all of Duke's other assumptions had remained the same. This assumption is inappropriate for calculating the potential HCl emissions from Unit 6 unless backed up by a permit condition limiting the coal supply for Unit 6 to Eastern bituminous coals with a minimum Heat Content of 12,777 Btu/lb, along with a requirement for continuous compliance and regular monitoring.

#### **Pollution Control Efficiency and Variability**

Throughout the permitting process for Unit 6 from December 2005 until October 2008, Duke reported that the HCl removal efficiency for its suite of pollution controls would be 98%. In its October 23, 2008 corrected application materials and in subsequent materials asserting its minor source status, Duke states that the HCl removal efficiency should be revised upward to 99.9%. Duke bases this claim on one short-term stack test conducted in March 2007 at the Marshall Steam Station. As explained below, however, the Marshall stack test data are insufficient to support Duke's minor source claim. Further, the results of these short-term tests have never been demonstrated in practice under normal operating conditions over the course of a year.

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<sup>3</sup> For example, see table entitled "Main Boilers - Potential Emissions of PSD Pollutants" in Appendix B, page 4 attached to Duke's Addendum to the Cliffside PSD Permit Application submitted on May 29, 2007.



Accepting Duke's assumptions regarding the maximum chlorine content and minimum heat content of the coals Unit 6 will burn, operating the Unit 6 pollution controls at a constant control efficiency of 99.8874% would yield HCl emissions of 10 tons/year. In other words, if Duke's assumed control efficiency of 99.9000% drops to 99.8874% (a difference of 0.000126%), then the potential to emit HCl for Unit 6 would equal the major source threshold of 10 tons/year, even if all of Duke's other assumptions held true. Thus, Duke's claim that Unit 6 is a minor HAP source depends on being able to continuously maintain a control efficiency greater than 99.8874% for HCl.

Duke relies on short-term "stack tests" conducted at the Marshall Steam Station in March 2007 to support its claim that the potential to emit HCl for Unit 6 falls below the 10 ton per year major source threshold. Short-term stack tests like those on which Duke relies are typically conducted under tightly controlled, optimal conditions. In the Marshall tests, the control efficiency that was obtained ranged from a high of 99.9% to 99.7%; neither the lower end of the range nor the average value would qualify Unit 6 as a minor source even accepting Duke's assumptions regarding coal chlorine and heat content. In other words, the Marshall results were not consistently above the 99.8874% control efficiency threshold required for Unit 6 to claim minor source status. It is extremely unlikely that the control efficiency would be maintained at greater than this level for all hours of unit operation under normal conditions over the course of a year. Therefore, it would be incorrect to infer that the Unit 6 control system can achieve 99.9% efficiency consistently based on the Marshall Unit 4 data.

#### **Additional Control Equipment at Unit 6**

In support of its claim that the pollution control equipment at Unit 6 can achieve 99.9 percent removal of HCl, Duke also points to additional control equipment that Unit 6 will employ. However, Duke fails to provide any data on the design elements of its control system components. For example, the baghouses which Duke claims are part of its control system are not designed for effective or consistent removal of acid gases such as HCl.

### **Monitoring to Assure Compliance**

The proposed permit would determine compliance with the minor source limit by using a once-a-year, short-term stack test. This type of test is not adequate to demonstrate that Unit 6 is a minor HAP source. Even accepting all of the unsupported, unverified, and practicably unenforceable assumptions in Duke's minor source application, Unit 6 has a high likelihood of exceeding the HCl potential to emit of 10 tons per year because extremely slight variations of any of the three critical variables (chlorine content, heat content, and, especially, control efficiency) for even short periods could cause Unit 6 to exceed the major source threshold. As Duke has stated in its MACT-like Assessment, short-term stack tests, do not account for this type of expected emissions variability under normal operating conditions. This is especially true when such tests are run only annually. Continuous HCl emissions monitors are available and would be necessary to demonstrate that Unit 6 actually keeps HCl emissions below the major source threshold in practice.

### **Startup, Shutdown, and Malfunction**

A proper potential to emit calculation takes into account startup, shutdown and other operating periods of the boiler. Duke has not accounted for emissions during these events. The omission is significant because emissions tend to be greater during such periods, when pollution removal is more difficult to optimize.

### **Other Emission Sources**

A proper potential to emit calculation also includes emissions of the pollutant in question (i.e., HCl) from all sources, not just the boiler. Duke has not provided a comprehensive list of all stack and fugitive emissions sources of HCl associated with Unit 6, much less a quantification of the potential to emit for each of these sources.

### **Inadequate Basis for Duke's Shift in Position**

Throughout the permitting process for Unit 6, including the voluntary MACT-like process Duke participated in from June through mid-October 2008, Duke indicated that Unit 6 was a major HAP source, projecting that, even with the proposed pollution controls, Unit 6 would emit over 171 tons of HCl, over 22 tons of hydrofluoric acid, and over 217 tons of all HAPs combined.

In Duke's Minor Source Application dated October 23, 2008, Duke claimed that Unit 6 will be a minor source of HAPs. The stated basis for this change was a single short-term stack test conducted in March 2007 at Duke's Marshall Steam Station Unit 4. Based on the documents I reviewed, it does not appear that this stack test was officially reviewed or witnessed by any regulatory agency personnel. To my knowledge, there is no documentation relating to the conditions at Marshall Unit 4 during the test, or describing whether and how such conditions may be representative either of normal conditions at Marshall or corresponding conditions at Unit 6.

In my opinion, and based on the documents authored by Duke and DAQ, I believe that the short-term stack test at Marshall Unit 4 is an inadequate basis on which to revise so radically projected HCl (and other HAP) emissions from Unit 6. This is especially true in light of my understanding of "potential to emit" and the various factors detailed above and in my other written analyses.

### **A Note on Expected Actual Emissions**

In the Permit Review, DAQ explained that it calculated expected actual emissions of HAPs based on information provided by Duke, and tentatively confirmed that they are expected to be "considerably less" than potential emissions. As noted by DAQ, expected actual emissions are not related to the potential to emit calculation. From the Permit Review document, it appears that DAQ calculated expected actual emissions to assure the public that Unit 6's HAP emissions will remain below the minor source threshold.

I conducted a simple Monte Carlo analysis<sup>4</sup> to determine the effect of changing the three key variables identified above (i.e., coal heat content, coal chlorine content and air pollution control efficiency for HCl) on HCl emissions. For the coal heat content and its chlorine content, I used data provided by Duke from the types of bituminous coals that can be burned in Cliffside Unit 6. Since there is no requirement in the proposed permit to burn a minimum level of any other type of coal (such as sub-bituminous coal), and based on Duke's earlier assertions that the most likely coal to be burned in Cliffside Unit 6 is Northern Appalachian, Central Appalachian, or Illinois Basin bituminous coals, I used these coals. For each of these two variables, I considered a range of values, with the low end of the range being the average and the high end of the range being the maximum that Duke itself has reported. I note that although I do not agree with Duke regarding its coal data presentation (i.e., why the data record is limited to a narrow window from 2006 – 2008), nonetheless I have used Duke's data. For the last variable, i.e., the control efficiency, I could not locate any document in the record from the vendor (Alstom), from Duke's engineers, or from Duke itself that the scrubbers would collectively be designed to eliminate 99.9% of the inlet HCl consistently. Absent this, I used a range of control efficiencies between 99.5% and 99.9%. Based on the range of demonstrated HCl pollution control efficiencies achieved in practice using similar controls, I believe that this range of control efficiency is generous to Duke.

The Monte Carlo analysis consists of randomly choosing combinations of the above variables within a specified range and then computing the HCl emissions based on these variables. Typically, many such "runs" are conducted in order to achieve stability in the calculated parameter. I used 500, 1000, and ultimately 2000 runs for my calculations. The results show that the likelihood that HCl emissions will exceed 10 tons per year is over 75%. This analysis indicates that minor variations to the assumptions used to calculate expected actual emissions can yield significantly different results.

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<sup>4</sup> The Monte Carlo method is a widely accepted statistical sampling analysis that is useful for obtaining numerical solutions to problems that are too complicated to solve analytically. It involves computing random samples of variables within a defined domain to determine the probability of different outcomes.

## CONCLUSION

Unit 6 is a major source of HAPs. The MACT major source threshold is based on a source's potential to emit HAPs. "Potential to emit" refers to the maximum emissions that a facility is physically capable of producing taking into consideration its design and enforceable operational limits. Based on my technical review, Unit 6 is a major source of HAPs because, in light of its physical design and operational limits, Unit 6 has the potential to emit above the 10 ton per year HAP threshold for HCl.<sup>5</sup>

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<sup>5</sup> I note that the conclusion expressed in this report is the same one I previously reached in my comments dated November 6, 2008. This is because Duke relies on the same information to support its minor source application that it submitted in October 2008, and which I reviewed to formulate my earlier opinion that Unit 6 is a major source of HAPs.