



JAMES L. TURNER
President and Chief Operating Officer
U.S. Franchised Electric and Gas

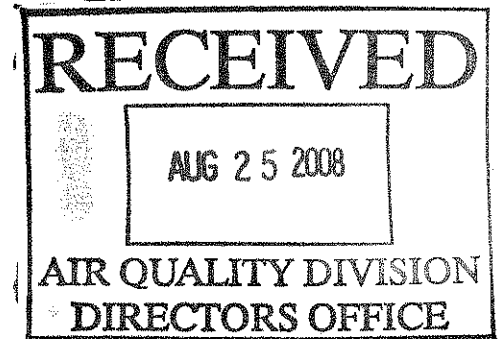
Duke Energy Corporation
526 South Church Street
Charlotte, NC 28202-1802

Mailing Address:
EC3XE / P.O. Box 1006
Charlotte, NC 28201-1006

704 382 2005

August 22, 2008

B. Keith Overcash, Director
Division of Air Quality
Department of Environment and Natural Resources
Parker-Lincoln Building
1641 Mail Service Center
Raleigh NC 27699-1641



Dear Mr. Overcash:

As a follow up to our July 3, 2008, submittal ("July 3rd MACT Submittal") proposing MACT-like standards for Cliffside Steam Station Unit 6 ("CSS6"), this letter provides supporting and corroborating information and data. The letter also addresses several other pertinent topics by providing some relevant legal analysis, data and information regarding:

1. the role of sub-categorization in making a MACT assessment consistent with CAA § 112(g);
2. coal properties data;
3. mercury removal efficiency that is achieved in practice;
4. the expected thermal efficiency of CSS6;
5. compliance determination techniques; and
6. supporting calculations for the proposed MACT-like limit.

This information, when taken with the information contained in the July 3rd MACT Submittal, constitutes a complete request for a MACT-like assessment, and we await your response regarding the completeness of our submittal, as well as a written proposal of the remaining steps in the process of implementing this voluntary MACT, as described in your letter to us of June 2, 2008.

The substantive standards for a MACT determination are relatively well established and understood, so Duke has not addressed them in its submittals for the MACT-like process. Nevertheless, in light of opponents to the plant who believe that the MACT

standard requires the lowest conceivable emission limit without regard to the regulatory requirements, Duke Energy believes that there is some need to set out that legal framework in detail so the record is clear on the approach Duke Energy has taken. That is provided in **Attachment A**. Below is a discussion of the additional data and analysis that Duke provides in support of the July 3 submittal.

1. **Source Subcategorization in the MACT determination**

An important aspect of a MACT determination is an evaluation of the emission limit achieved in practice by the best controlled similar source. Regarding the proper role of sub-categorization in determining what is a similar source, the Clean Air Act (the "Act") provides, and legislative history makes clear, that a MACT determination should be closely tailored to the particular type of source. *See* CAA § 112(d)(1); S. Rep. No. 228, 101st Cong., 1st Sess. 166. Thus, the state is authorized by the Act to develop **appropriate categories and subcategories** for sources and to distinguish among types and sizes of sources within a category or subcategory when these differences affect the feasibility of air pollution control technology, the effectiveness of the technology and the cost of control. *Id.*; *see also*, *NRDC v. EPA*, 489 F.3d 1364, 1372 (D.C. Cir. 2007); H.R. Rep. 101-490 at 328.

In its proposed MACT rule for EGUs, the Environmental Protection Agency ("EPA") sub-categorized standards according to coal rank and unit design type. Coal properties, and in particular mercury and chlorine content, are critical to determining the ultimate emissions of mercury and other HAPs from electric generating units ("EGUs"). 69 Fed. Reg. 4651, 4672 (Jan. 30, 2004). The characteristics of a given coal are also the driving force in the design of boilers. *Id.* at 4665. For these reasons, EPA's proposed sub-categorized MACT standards for EGUs are based on coal rank (*e.g.*, lignite, bituminous and sub-bituminous). *Id.* at 4666, 4667. EPA also addressed coal properties as a site-specific factor in setting a MACT requirement.

Coal-fired units are designed and constructed with different process configurations partially because of the constraints, including the properties of the fuel to be used, placed on the initial design of the unit. Accordingly, these site-specific constraints dictate the process equipment selected, the component order, the materials of construction, and the operating conditions.

Id. at 4665. While EPA sub-categorized its proposed MACT standards for EGUs based on coal rank, it decided not to require coal switching (*i.e.*, requiring use of a different or “better” coal in determining MACT). *Id.* at 4669.

The EPA feels that the intent of the CAA is to develop standards that, to the greatest extent reasonably possible, are consistent across the industry and avoid actions that create regional disparities. The EPA further feels that requiring all plants to combust coal from a specific seam is not a viable long-term solution because the supply of coal from that seam would be rapidly depleted.

Id. at 4669. Thus, while DAQ neither may mandate the use of specific coal, nor base its MACT determination on the use of specific coal, it can subcategorize based on coals and unit characteristics to establish an achievable MACT limit.

Since that time, court decisions reviewing EPA’s promulgation of MACT standards for other industries have made it clear that subcategories need finer division if they are to account for differences among unit design and raw material quality. Without sufficient sub-categorization, the MACT definition might be internally inconsistent because it might require a limit that is “achieved in practice by the best controlled source” but, due to site specific factors, that limit might not be achievable (taking into account cost, energy requirements or environmental impacts as required by statute) for a particular source.

This issue of appropriate sub-categorization has been addressed in a case involving the MACT standard for the brick and structural ceramic manufacturing industry in which one of the issues was whether or not EPA could distinguish performance levels based on raw material quality - *i.e.* use of “clean clay.” *Sierra Club v. EPA*, 479 F3d 875, 881 (D.C. Cir. 2007). EPA found that such manufacturing plants were located near suitable local clay deposits, that transportation of clean clays was prohibitively expensive and that a given process could not use different raw materials without altering product characteristics. *Id.* at 883. Although it acknowledged that clay quality affected emissions, EPA contended it did not have sufficient data to quantify those effects and that a MACT floor based on clean clay would be unachievable at a kiln using another clay because of the inability of kilns to switch clays. *Id.* The court held that it was impermissible for EPA to consider only control technology and ignore such non-control technology factors as clay quality. In addressing this potential internal conflict between limits “demonstrated in practice” and limits that are “achievable” (and the possibility that interpreting the statute might require “judicial surgery”), a D.C. Circuit Court

judge provided helpful guidance by recognizing EPA's broad authority to make reasonable sub-categorizations in setting MACT limits:

Section 112(d) authorizes the Administrator to "distinguish among classes, types and sizes of sources within a category or subcategory," and the language of subsections 112(d) (2) and (3) persuasively refers to standards for sources in each "category or subcategory." The authority to generate subcategories is obviously not unqualified: at least it must be limited by the usual ideas of reasonableness. And there is not necessarily any guarantee that, even with suitable subcategorization, every source will be able to achieve standards that meet a lawful application of § 112(d)(3) to reasonably defined subcategories. Nonetheless, one legitimate basis for creating new subcategories must be the interest in keeping the relation between "achieved" and "achievable" in accord with common sense and the reasonable meaning of the statute.

Id. at 885 (Williams, Senior Judge, concurring). Specifically with respect to CSS6, as explained below, it will burn a broader range of coals than currently in use at the station and it is capable of burning bituminous, sub-bituminous and foreign coals. Therefore it does not fit into the subcategories identified by EPA in its proposed rule.

In addition to CAA § 112(d)(2) and (3) authority to subcategorize sources in setting MACT standards, CAA § 112(g) expressly requires a **case-by-case** MACT determination; therefore, the MACT-like analysis for CSS6 should draw further distinctions in making comparisons to other units to account for site-specific factors without setting precedent for further MACT-related deliberations. In sum, DAQ has latitude to set a reasonable MACT-like standard for CSS6 that takes into account the coal properties and operational variability expected at CSS6. Duke believes that characterizing CSS6 as a unit burning a wide-range of eastern bituminous coals, including Northern Appalachian, Central Appalachian, and Illinois Basin coals could be viewed as an appropriate subcategory under the Preamble to the MACT rule. In any event, it would be inappropriate for DAQ to establish a MACT that, in effect, mandates that CSS6 could use only one type of coal.¹ DAQ is clearly authorized to set a MACT for CSS6 based on the coals reasonably anticipated to be burned there.

¹ As indicated in the preamble to the EGU MACT rule, such a MACT that had the effect of mandating the use of one type of coal would constitute an impermissible subcategorization. 69 Fed. Reg. 4651, 4669 (Jan. 30, 2004).

2. Coal Properties Data

In setting MACT for EGUs, EPA will take into account the difference in coal properties, but will not require the use of a particular coal within that rank in setting a MACT standard. The same should be true for a case-by-case MACT determination, which serves as a stop-gap measure pending EPA's promulgation of the final industry MACT. In the context of these regulatory and judicial developments, Duke Energy submits that the following information about coal is relevant in developing a reasonable case-by-case MACT standard for CSS6.

- a. **Data on coal previously and currently burned at CSS does not represent future coal supplies for the modernized facility.**

There is data available on both the coal previously consumed (circa 1999) and the coal currently being consumed at Cliffside ("CSS"). However, those data are inapplicable when considering the nature of the coal to be burned in CSS6. In fact, basing a case-by-case MACT on that number would be inappropriate. Since DAQ is conducting this MACT-like review as if CSS6 is a new unit, what other units have burned in the past has no bearing on CSS6. Instead, it is the mercury content (and other aspects) of the coal that will likely be burned (or is reasonably foreseeable that it will be burned) in CSS6 that should be considered in making that MACT determination; here, because of transportation, market and other considerations, as discussed below, that coal that should be considered is composed of certain types of United States ("US") and South American coals. We note that the chloride content of the coal influences the performance of mercury control systems as discussed in Section 4 below, and the MACT determination should consider the performance across the range of chloride values, both within a coal producing region and across the broader various types of coals the facility may reasonably be expected to burn.

The coal that was being burned -- and is being currently burned -- in CSS units 1-5, was chosen in view of the fact that those are unscrubbed units, and, as such have to burn low-sulfur coal. That is, within the constraints of the coals that were available at the time, Duke Energy purchased low-sulfur coals because of the limitations of those units. While this coal was chosen for its sulfur characteristics, this choice of coal makes their mercury content data inapplicable and irrelevant to the coal that will be used in CSS6. With the retirement of Units 1-4, the installation of the scrubber on Unit 5 and a full train of state-of-the-art controls on Unit 6, CSS will have the flexibility to burn a more diverse variety of coal. CSS will need this flexibility to meet its stated objective -- to provide reliable, affordable base-load power and, in fact, the North Carolina Utilities Commission ("NCUC") assumed and relied on this coal flexibility in determining that CSS6 was appropriate and necessary to meet those base-load electric power needs.

CSS6 was approved and is designed to burn eastern bituminous coal with a possible blend of sub-bituminous coals; the Unit is not expected to burn purely sub-bituminous coals. This assumed fuel mix and the supporting data on the design coal as presented to our vendors designing the boiler are reflected in **Attachment B**. Specifically, this attachment contains data on eastern bituminous coal with a possible blend of sub-bituminous coal, and information from our fuels group on likely scenarios for fuel blending in order to address what is "achievable" removal as that term is defined by relevant case law.

The factors that demonstrate the reasonableness and appropriateness of this assumed mixture of coals for use and consideration in the case-by case MACT assessment are discussed below.

b. **Factors for selection of coal at CSS6**

i. *Environmental Protection*

CSS6 has been designed as a highly efficient supercritical boiler with an unprecedented suite of emission control equipment to allow the flexibility to burn a wide range of coals in an environmentally friendly manner to meet its objectives. More specifically, fuel flexibility results from the construction of pollution control systems (in particular the wet and dry flue gas desulfurization ("FGD") systems) to comply with the NC Clean Smokestacks Act by relieving a constraint on Duke Energy facilities to burn low sulfur Central Appalachian coal. With the retirement of CSS Units 1-4 and the addition of wet FGD on Unit 5 as well as the completion of Unit 6, past fuel procurement practices for CSS will not represent future fuel procurement. As an example, Duke Energy has already begun to incorporate greater fuel flexibility as practical and cost effective at other stations where wet FGD has been installed.

...the Company will continue to deliver growing volumes of higher SO₂ Northern Appalachian coal (leveraging Agreements from prior years) to the Marshall Steam Station, which utilizes flue gas desulfurization equipment at the plant. In 2007, approximately 1,000,000 tons of high SO₂ Northern Appalachian coal was delivered to Marshall, increasing to 1,500,000 tons in 2008 and potentially up to 2,000,000 tons into the Carolinas in 2009.

Testimony of M. Elliott Batson, filed July 28, 2008, ("Batson Testimony"), p.13, lines 88-14, in Annual Review of Base Rates for Fuel Costs, Docket No. 2008-3-E (S.C. Pub. Serv. Comm'n).²

ii. *Transportation*

The coal supplies for use at Duke Energy Carolinas facilities including the CSS are subject to the limitations of the transportation network. Rail delivery of coal is the only practical transportation option. The rail infrastructure within the Eastern United States provides reliable access to sources in the major eastern coal supply regions, including Central Appalachia, Northern Appalachia, and the Illinois Basin. CSS is served by CSX Transportation line, which has maintained reasonable coal supply to CSS since the 1940's.

The reliability for timely delivery of coal from west of the Mississippi is much less certain for the Duke Energy Carolinas region because of limited cross-region rail infrastructure that results in bottlenecks. Areas of the Eastern US that have barge access to the Mississippi River basin have greater accessibility to western coal supplies, but this alternative is not available to Duke Energy Carolinas. However, due to the significant reserves of western sub-bituminous coal and the potential future resolution of the transportation bottlenecking issues, it is important that Duke have the ability to consume fuel from those markets within these constraints on transportation. The constraints on delivery are generally manageable through proper procurement practices and authorized flexibility to use alternative coals and coal blends.

Coal from South America is also an available resource through offloading ships to rail cars along Eastern US ports. However, the availability of overseas coal is subject to demands on the international market coupled with a high transportation cost. While recent world events have affected coal production as well as demand for coal, currently rendering the international market an unreliable source of fuel, international coal is a long-term potential source of fuel for CSS.

iii. *Dynamics of the Coal Market*

Historically, Central Appalachia coal has been the dominant fossil fuel source for Duke Energy Carolinas generating stations. This is largely because of both the closer distance

² The Batson Testimony is at the South Carolina Public Service Commission ("SCPSC") website at: <http://dms.psc.sc.gov/attachments/6B49E628-991A-2A08-C06AD5456F2C5165.pdf>. The complete docket detail for this annual review of Duke base rates for fuel costs is found at: <http://dms.psc.sc.gov/dockets/dockets.cfc?Method=DocketDetail&DocketID=102326>.

as compared to other eastern coal sources and the availability of low sulfur fuel that has allowed operation of the units in compliance with environmental regulations. Going forward, Duke Energy has determined that increased demand for and limitations on supply of the Central Appalachia coal may result in significant shifts in its coal supply region. The following excerpts from testimony of Elliott Batson, Director Coal Procurement, Regulated Fuels, to the Public Service Commission of South Carolina discusses the challenges the company is currently facing to secure coal supplies and manage its costs.

At this time, the market prices for Central Appalachia coal to be delivered in 2008 and 2009 are at an all-time high. The market has increased from the mid \$40s per ton in the summer of 2007 to \$120 to \$150 per ton by July 2008. The primary reason for the dramatic increase in coal prices is the rapid change in global coal market conditions, particularly unanticipated world coal supply disruptions and increasing world coal demand. This increasing global demand has resulted in heightened demand for all United States ("US") coal supply regions, particularly those that supply Duke Energy. After a period of declining and stable Eastern coal prices over the last two years, US coal prices are now being impacted by growing demand and supply issues in China, Australia, South Africa, and Europe

The supply of coal in the Eastern US has become largely inelastic, *i.e.*, higher market prices have not led to increasing production. The primary reasons for the inelasticity are (i) stringent environmental regulations, (ii) lengthy permitting requirements for new coal production, (iii) very significant economic barriers to entry, and (iv) uncertainty surrounding future demand in the US as a result of possible carbon legislation.

It is important to note that as coal consumers seek alternative coal sources, options are limited. Transportation complexities associated with moving coal over new, longer and more expensive routes, as well as the challenges new and different coal qualities bring to coal plant handling, operations and environmental compliance, make finding alternatives very difficult. Duke Energy Carolinas continues to have periodic discussions with rail transporters regarding

future sourcing plans to ensure as much supply reliability and sourcing flexibility as possible

Duke Energy Carolinas will continue to maintain a comprehensive coal procurement strategy, the success of which has been demonstrated over the last several years by limiting average annual coal price increases and maintaining average coal costs at or well below those seen in the marketplace. Although [currently operating] Duke Energy Carolinas' steam stations are designed to consume a typical Central Appalachia coal, we will continue to evaluate the options for coal supply delivered into the Carolinas from all US and international sources."

Batson Testimony, p.6, l.15 - p.7, l.2; p.8, l.15 p.9, l.5; p.12, ll.11-17.³

Because operating constraints at existing Duke Energy units in the Carolinas will continue to favor coal typical of Central Appalachia sources even as Central Appalachia supplies are under increasing pressure, it is even more important that CSS have the ability to burn fuel from a broader region to avoid even further constraints on coal supply.

iv. *Regulatory Requirements*

As a regulated utility, Duke Energy is accountable to the public utilities commissions in North Carolina and South Carolina. Because cost of fuel is such an important factor in the cost of electricity, the company must act prudently to manage its fuel costs and the utilities commissions require that the company report on fuel supply and cost before the commissions will allow for recovery of costs. To meet its regulatory requirements, it is critical for Duke Energy to be able to purchase coal from a wide range of sources due to the variability over time of coal source pricing.

c. **Coal data for CSS6**

CSS6 was designed with these market conditions, regulatory obligations and environmental requirements in mind. It will be a baseload plant designed for high capacity factor and reliable service for the life of the plant (expected life of at least 40 years). Fuel availability and reliability of delivery are critical to the business case (as approved by the N.C. Utilities Commissions) to build the plant. For these reasons, the

³ See footnote 2.

design for CSS6 includes numerous features that assure the ability to burn a wide range of coal. This includes the choice of a super-critical pulverized coal boiler and the specifications of all equipment to provide for efficient operation over a range of expected fuel properties and also the design of the advanced pollution control systems that will assure effective capture of all regulated pollutants. These design considerations included high efficiency control of mercury, which was incorporated into the specifications to address state and federal regulations that were in effect at the time the construction permit was issued.

In consideration of the above factors, Duke Energy concludes that CSS and Unit 6 can reasonably expect to procure significant quantities of coal from the various coal mining regions accessible through the rail transportation system in the Eastern US. Because of this, Duke Energy proposed in its MACT assessment to base the mercury content on the statistical assessment of bituminous coal as determined by the EPA in its CAMR rulemaking document for its Best Demonstrated Technology assessment. In that document, EPA concluded a mercury content of 0.20 ppm or 14.3 lb/TBtu represented the upper end of the coal that could reasonably be expected for use based on an annual average.

Duke Energy has further assessed the available fuel markets for CSS and has attached two spreadsheets of coal properties. First, we have provided the coal characteristics presented to our vendors early in the procurement process that included all the fuels mentioned previously (Central Appalachia, Northern Appalachia, Illinois Basin, Powder River Basin and South American). (**Attachment B**, referred to previously.) The range of mercury values used in this design coal was based on typical values from coal received at Duke Energy sources as well as limited vendor information for other coal. It does not represent a conclusion that these values fully address the coal characteristics of each individual fuel supply region. The range of values, regardless of the fuel region, was expected to reasonably address the requirement to demonstrate compliance with the CAMR NSPS requirements in effect at the time. Note that Duke Energy did specify that the control systems should meet our vendor requirement of 90% mercury removal for coal that included up to 0.18 ppm mercury and chlorine content as low as 183 ppm for unblended coals (excluding sub-bituminous (PRB) coals). The specification assumes that any use of sub-bituminous coal will be in a blend of at least 50% bituminous.

Second, we have included coal data from our analysis of fuels delivered to Duke Energy's coal-fired plants in the Carolinas and in the Midwest. (**Attachment C**) This includes spreadsheets that represent each individual fuel supply region as well as the combined data for the Carolinas stations only and the combined data for all fuels received. Duke Energy has been collecting samples for mercury analysis from each shipment of coal received in the Carolinas over the past two years. Coal shipments in

both the Carolinas and the Midwest are periodically analyzed for a wider range of constituents including chloride content.

In presenting information from both of these databases, Duke used the same statistical equations that DAQ typically uses to account for variations in the database. For the data collected by Duke, we assumed the proper design value to use in establishing an emissions limit was the average plus 1.65 times the standard deviation, to represent the range including 95% of the population of data. For mercury, we are including the upper range of the 95% population distribution and for chloride we are including the lower range of the distribution. We are also providing the average of the data and the maximum and minimum values for each parameter.

Moreover, we have concluded that for the foreseeable operation of the plant, we can reasonably expect to burn significant quantities of Northern Appalachian coal from the Pennsylvania and Ohio coal mining regions, as well as Central Appalachian and Illinois Basin coals. Because of short term and long-term market dynamics that may limit the cost or availability of coal from any specific region over the course of a year or more, it is reasonable to conclude that these Northern Appalachian coals may be the dominant fuel during the course of any given 12-month period. **Attachment D** is an excerpt of a study by the Electric Power Research Institute ("EPRI") of the mercury data collected in the 1999 ICR. EPRI provided a detailed evaluation of the coal characteristics of coal delivered to each facility. Of particular interest, EPRI has provided an analysis of the state-by-state average for mercury, chlorine, and heat content, sorted by the rank of coal.

Based on review of the ICR database, coal from Pennsylvania and Ohio has been demonstrated to average a mercury content of 14.3 lb/TBtu or greater, and therefore use of the EPA statistical analysis cited above is valid and may even be conservative. Also note that for bituminous coal from Eastern states (east of the Mississippi), the chlorine content ranges from 287 ppm to 2,023 ppm, with the lowest value for coal supplies from Illinois. Because it is also reasonable that the Illinois Basin may be the dominant coal supply region in a given year, we believe that consideration of any effects of chlorine on control performance must account for the lower range of this coal chlorine content.

3. Thermal Efficiency of CSS6

While most emission limits have been expressed in terms of a mass emission per unit of heat input (e.g., lb/MMBTU), in setting New Source Performance Standards for EGUs, EPA expressed a preference for output based emission limits (e.g., lb/MWhr) in order to promote energy efficiency and pollution prevention. 69 Fed Reg 4652, 4667 (Jan 30, 2004). EPA selected a gross output basis for ease of monitoring. *Id.* In order to

promote efficiency EPA recognized the need to base its proposed MACT standard on a baseline efficiency; it selected a 35 % thermal efficiency or 9833 BTU/kWhr for new units. *Id.* at 4668. Use of such a baseline with an output-based standard creates incentives for units that can operate more efficiently than the baseline. Similarly, encouraging energy efficiency in setting the CSS6 limit requires use of an energy efficiency standard that represents a typical efficiency that can be achieved by all similar sources. Moreover, selection of that efficiency should reflect the standard of “achievability” -- what can be achieved over the life of the plant under reasonably foreseeable worst-case circumstances. *Sierra Club v. EPA*, 167 F.3d 658, 665 (D.C. Cir. 1999), quoting *National Lime Ass’n v. EPA*, 627 F.2d 416, 431 n. 46 (D.C. Cir. 1980). While Duke Energy fully expects CSS6 to initially perform at a higher efficiency than that assumed by EPA, it expects that thermal performance to deteriorate over time. Moreover use of an assumed heat rate that is significantly better than EPA’s assumption would penalize Duke Energy for its efforts to be more efficient in the design of CSS6. For these reasons, Duke Energy recommends the use of 9833 BTU/KWhr heat rate for calculating an output-based MACT-like limit.

To the extent that DAQ believes that the use of the benchmark heat rate proposed by EPA and used by Duke Energy is not appropriate, we suggest the use of a heat input based MACT-like limit in order to avoid penalizing Duke Energy for its commitment to improved energy efficiency.

4. Mercury Removal Efficiency

There is no accepted standard for an “achievable” level of mercury removal efficiency, especially for the levels that can be regularly achieved in practice, which is the pertinent consideration for purposes of a case-by-case MACT. In fact, the analyses of the most commonly referenced database regarding mercury removal, which was generated by a 1999 Information Collection Request, produce widely varying results and conclusions as to mercury removal efficiency. EPA relied on this database regarding mercury removal when in 2005 and 2006 it issued its Best Demonstrated Technology demonstration that was referred to in the Clean Air Mercury Rule (“CAMR”). That determination concluded that for bituminous coals, BDT for new units was represented by either wet or dry FGD with effective particulate control and SCR or SNCR.

In its analysis of that database, EPA found that, while the mean removal efficiency might range as high as 94.7%, the demonstrated or achievable removal efficiency is only 86.7%. Memorandum from William H. Maxwell, Energy Strategies Group, Office of Air Quality Planning and Standards, U.S. EPA concerning the “Revised new source performance standard (NSPS) statistical analysis for mercury emissions.” (May 31, 2006) at p. 4 (**Attachment E**). This demonstrated or achievable removal efficiency of 86.7% is well below the 90% removal efficiency that Duke Energy relied on in its MACT

submittal. Duke Energy felt it could utilize an assumed level better than that found by EPA to be demonstrated or achievable in practice, because the company has received a guarantee from its vendor reflecting that 90% assumption, under specified conditions, as discussed below.

Of course, others have looked at mercury removal data and reached different conclusions from EPA regarding removal higher efficiencies. For example, in 2003, the consulting firm ENSR produced a chart purporting to show higher mercury removal efficiencies. However, that chart and its conclusions were actually based on a small sample of sources during the 1999 Information Collection Request. ENSR has indicated that the chart was prepared to demonstrate a correlation between chlorine content and mercury removal efficiency. ENSR has also indicated that there are two significant limitations that prevent use of the curves in setting emission limitations: (1) the data set is small; and (2) it does not account for variability in the emission levels. Such data is not an appropriate basis for setting an achievable emissions limitation with which a unit might comply under reasonably foreseeable worst-case conditions.

Notwithstanding this, ENSR's analysis does not mandate a higher emission rate or limit lower than Duke Energy proposed in our July 3rd MACT-like Assessment. Based on the 2003 ENSR chart, for the bituminous coal group, the 95th percentile emissions level was 2.262 LB/tBTU. Looking at the three best performing units (Mecklenburg Cogeneration Unit 1, Dwayne Collier Battle Cogeneration Facility 2B and SEI Birchwood Facility 1) the resulting average mercury emission rate is 1.70 lb/TBtu. Using the conversion factor of 9833 MMBtu/hr for new generation used by EPA in establishing CAMR, the comparable emission limit is 0.0167 lb/GW_{hr}, which is higher than the number Duke derived for CSS6 in its July 3 MACT-like Assessment.

We note that in 2003, when the ENSR chart was prepared, it was not possible to obtain any guarantee for mercury emissions from EGUs. 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. Today, Duke Energy has a guarantee from our vendor, Alstom, as part of the Company's contract with Alstom; the portions of that contract that contain the performance guarantee are provided in **Attachment F**.⁴

⁴ The attached portions of the contract between Duke Energy and Alstom contain information that is a confidential trade secret within the meaning of Chapters 132 and 66 of the General Statutes and has been designated as such in accordance with Section 132-1.2 and other provisions of the Public Records Act. The contract contains data and other information that is

5. Compliance Determination Techniques

In making a MACT (or MACT-like) determination, the choice of compliance determination techniques is an integral part of the process, since the means of measurement can impact on what can be shown to be achievable in practice. Here, Duke Energy believes that the compliance method should be based on a periodic stack test. We are aware that the current permit for CSS6 requires that the unit be equipped with a continuous emission monitor system ("CEMS") for mercury, and we anticipate that the CEMS will be operated as required by that permit. However, it is not appropriate to use that CEMS data directly to determine compliance.

A given limit that is measured by CEMS is more stringent than the same limit measured by a stack test. The reason is that CEMS operate continuously, every operating hour, while a stack test is a snap-shot of operating conditions. Moreover, there are limits to the ability to detect and quantify mercury emissions at low levels using CEMS. Currently, the accuracy of mercury CEMS measuring at the very low rates expected from CSS6 is not the same high quality found in measurements of sulfur dioxide or nitrogen oxides. At 1-2 ug/Nm³ (the approximate range of the Alstom guarantee), the accuracy is +/- 0.5 ug/Nm³. The 40 CFR 75 specifications for certifying CEMS at low concentrations allows a difference of 1 ug/Nm³. The now vacated mercury CEMS program under Part 75 is based primarily on providing data for a market-based allowance system.

In fact, there are a number of Quality Assurance issues with the Part 75 CEMS program that were to be addressed before compliance with CAMR was to be required, and EPA has not taken steps to resolve those concerns. A key issue is the lack of any NIST traceable standards for routine calibration of mercury CEMS. In addition, mercury CEMS that have been used to date have had significant reliability issues that may affect the ability to gather reliable data for purposes of measuring an annual average mercury concentration. With CAMR vacated, it is not clear that sufficient effort will be expended by EPA, monitoring vendors, or industrial sources to further develop the mercury monitoring technology. In fact, EPA may choose not to require monitoring in a final MACT determination for coal-fired electric utility boilers. MACT standards for

the property of Alstom as a private person within the meaning of G.S. 132-1.2(1)b; is not required for submittal under 132-1.2(1)c.; and does not contain information pertaining to the air contaminants to be emitted, which cannot be claimed to be confidential under Section 143-215.65 or other provisions of Chapter 143. Thus, these contract terms contain confidential information within the meaning of Section 132-1.2 and other provisions of the Public Records Act and cannot be disclosed to persons outside of DAQ.

many sources include provisions such as periodic stack testing and adherence to operation and maintenance practices as an indicator of continuous compliance.

The problems with mercury measurement techniques are well documented. *See, e.g., Guidance for Mercury Measurement Using the Ontario Method*, EPRI, Palo Alto, CA 2007 (**Attachment G**). All of the source testing conducted for the ICR was performed using the Ontario-Hydro Method which is known to be very sensitive to testing technique and skill, and which requires the use of laboratory procedures in a field environment. In fact, in developing the proposed MACT, EPA calculated negative removal efficiencies across pollution control equipment (i.e. the test results suggest that that equipment actually produced mercury because more was measured in the emissions than in the coal burned). EPA recently approved the use of a sorbent trap test method (Method 30B) which promises to be less vulnerable to variations in testing technique. However, there is limited long-term experience with this test method. These limitations on equipment and techniques must be considered in setting a MACT limit so that it is practically enforceable.

In summary, Duke Energy proposes that compliance with a MACT standard be demonstrated on an annual basis through use of a reference method test (likely using Method 30B). Mercury CEMS should only be used as an indicator of any changes in relative mercury emissions because of the imprecision and reliability concerns with monitoring. Duke Energy would propose to develop a Compliance Assurance Monitoring protocol based on the use of CEMS or other parameters where the information gathered can be used to trigger either additional stack tests or actions to correct any apparent performance issues.

6. Calculations Supporting the MACT Assessment

To illustrate Duke Energy's use of this information in developing its MACT Assessment and its proposed MACT limit of 0.014 lbs/GWH, we provide the following calculation.

Inputs:

- Mass of mercury per heat value of coal measured in pounds per trillion British thermal units (lb/TBtu)
- Mercury removal efficiency (%)
- Gross heat rate for the unit or class of units measured in British thermal units per kilowatt-hour (Btu/KWh)

Result (output based standard):

- Mass of mercury per unit of electricity generated measured in pounds per gigawatt-hour (lb/GWh)
- Sample equation

$$\text{Lb/GWh} = (\text{XX lb/TBtu}) \times (\text{YY Btu/KWh}) \times (1 \text{ TBtu}/10^{12} \text{ Btu}) \times (10^6 \text{ KWh}/1\text{GWh}) \times (1-\text{ZZ}\%)$$

- Calculation for CSS6

$$\begin{aligned} &= (14.3 \text{ lb/TBtu}) \times (9833 \text{ Btu/KWh}) \times (1 \text{ TBtu}/10^{12} \text{ Btu}) \times (10^6 \\ &\text{KWh}/1\text{GWh}) \times (1-.90) \\ &= 0.014 \text{ lb/GWh} \end{aligned}$$

Result (input based standard)

- Mass of mercury per unit of heat input measured in pounds per trillion British thermal units (lb/TBtu)

Sample equation

$$\text{Lb/TBtu} = (\text{XX lb/TBtu}) \times (1-\text{ZZ}\%)$$

- Calculation for CSS6

$$\begin{aligned} &= (14.3 \text{ lb/TBtu}) \times (1-.90) \\ &= 1.43 \text{ lb/TBtu} \end{aligned}$$

7. Conclusion

In establishing a fair MACT limit, the following four issues are critical:

- (1) Knowing the fuel that will be burned and determining the appropriate mercury content in the fuel on which to base the limit;
- (2) Setting the percent removal in accordance the guarantee provided by the vendor;
- (3) Establishing a thermal efficiency that will not penalize more efficient units; and
- (4) Establishing an appropriate and accurate method to determine compliance.

CSS6 is not a "modified, constructed or reconstructed source unit" subject to the requirements of § 112(g)(2) of CAA. However, as DAQ pointed out in its June 2 request letter, the purpose of the voluntary MACT Assessment is to avoid litigation surrounding this and potentially related issues. Given the effort that has already been expended in addressing the MACT issue for CSS6, it is appropriate to note that MACT regulations contemplate that when EPA promulgates an applicable industry-wide MACT limit, the permitting agency must place the promulgated categorical standard in the Title V permit for any facility that already has a case-by-case MACT limit in that facility's permit. Given the four years required to construct a coal-fired EGU, and despite the diligence that DENR and Duke Energy exercise in developing this or any case-by-case MACT-like limit, this current effort is an integral but interim measure. Therefore, when considering the long-term effect of any additional mercury limit that might be proposed in this process, DAQ should consider the interim nature of any case-by-case derived limit.

In summary, Duke Energy submits that the information in this letter provides supporting data and documentation supporting the Company's July 3 MACT Submittal.

Sincerely,



James L. Turner

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ATTACHMENT A

**LEGAL FRAMEWORK FOR A CASE-BY-CASE MACT
DETERMINATION UNDER CAA § 112(g)**

Legal Framework for a Case-by-Case MACT Determination Under CAA § 112(g)

The 1990 Clean Air Act (CAA or the Act) Amendments established a new program to regulate emissions of hazardous air pollutants (HAPs) from particular industrial sources. Section 112 of the Act requires the U.S. Environmental Protection Agency (EPA) to regulate those emissions by developing and promulgating national technology-based emissions standards --called maximum achievable control technology (MACT) standards. CAA § 112; H.R. Rep. No. 101-490, pt. 1 at 144 (1990). The applicable regulations set out the following definition of a case-by-case MACT under Section 112(g):

Maximum achievable control technology (MACT) emissions limitations for new sources means the emission limitation which is not less stringent than [sic] the emissions limitation achieved in practice by the best controlled similar source, and which reflects the maximum degree of deduction [sic] in emissions that the permitting authority, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable by the constructed or reconstructed major source.

40 C.F.R. § 63.41.

This definition is firmly based in the statutory language requiring MACT and the case law interpreting it. Section 112(g), and EPA's MACT regulations promulgated to implement the statutory § 112(g) provisions, contain the requirements that apply to the construction or reconstruction of major sources of HAPs that occurs after the effective date of a Title V permit program in a state, but before EPA has promulgated national MACT standards for that source category of plants. *See generally* 40 C.F.R. Part 63 Subpart B. In this situation, MACT is determined by a state on a case-by-case basis and is intended to result in a requirement for the source to utilize the standard that is currently in use by the "best-controlled similar source." 61 Fed. Reg. 68384, 68394 (Dec. 27, 1996). Thus, if properly implemented, a § 112(g) determination is intended to, and will in fact, result in limits that reflect the state-of-the-art in air pollution control for a new or reconstructed source.

Section 112(g) is intended to serve as a "gap filling" program in that it assures MACT limits will be implemented on new major HAP sources even if a national MACT standard for the applicable category has not been established by EPA. Specifically, § 112 (g)(2) prohibits the commencement of construction on a source unless the state has determined that the source will meet the MACT limit for new sources that EPA will eventually promulgate for such sources. *See* 61 Fed. Reg. at 68394. As a transitional

program designed to operate until national MACT standards are in effect, the case-by-case determination is required to be "consistent with what would have been required under section 112(d) of the Act." *Id.* Thus, the purpose of the case-by case analysis is to predict what EPA would impose in that categorical standard.

When developing a case-by-case MACT standard for a particular source category pursuant to the § 112(g) statutory scheme, a state is directed to use a two-step process. First, it must look at the current level of emissions *limitation* that is "*achieved in practice* by the best-performing similar source." CAA § 112(d)(3) (emphasis added); *see also* 15A NCAC 2D.1112(d)(1); 40 C.F.R. § 63.55(a)(3); *Sierra Club v. EPA*, 353 F.3d 976, 980 (D.C. Cir. 2004). These emissions levels set a baseline, often referred to as the "MACT floor" for the new standard for that individual source. Second, § 112(g) allows a state to "consider whether 'beyond-the-floor standards' -- i.e., standards more stringent than the 'floor' -- are necessary . . . to augment the minimum standard . . ." and whether such standards are "achievable . . . through application of measures, processes, methods, systems or techniques." CAA § 112(d)(2); *see also* 15A NCAC 2D.1112(d)(2); 40 C.F.R. § 63.55(a)(3). In making that determination, the state must consider and balance such factors as "the cost of achieving such emission reduction, and any non-air quality health and environmental benefits and energy requirements." *Id.*

In establishing a case-by-case MACT standard for an individual source, the Act and EPA's regulations give a state some, but not unfettered, discretion. For example, the list of best-performing similar sources developed by a state in order to establish a "MACT floor" must encompass the full range of best performers and include only those technologies that have been demonstrated in practice. *See* CAA § 112(d)(3). The D.C. Circuit, for example, has found that

if a [MACT standard] is as stringent as "the emissions control that is achieved in practice" by a particular unit, then that particular unit will not violate the standard. **This only results if "achieved in practice" is interpreted to mean "achieved under the worst foreseeable circumstances."**

Sierra Club v. EPA, 167 F.3d 658, 665 (D.C. Cir. 1999), quoting *National Lime Ass'n v. EPA*, 627 F.2d 416, 431 n. 46 (D.C. Cir. 1980)(emphasis added). In other words, **the case-by-case standard set by a state pursuant to § 112(g) is not intended to be a hypothetical or aspirational limit that has not actually been met or that may not be achieved under all circumstances. It is expected to be the level of performance that the best plants achieve virtually all of the time.**

Section 112 is one part of a comprehensive program that assures no significant risk to human health and the environment. As stated earlier, the § 112(g) program, is a "gap filling" program and the case-by-case limit will necessarily not be less stringent than a national standard. EPA is expected to promulgate a national MACT standard for coal

fired power plants within 2-3 years. If the promulgated national standard is more stringent than the determination made by a state pursuant to § 112(g), the promulgated MACT will be incorporated into the source's Title V operating program, and the plant will be put on a schedule to meet the national limit. 40 C.F.R. § 63.56(b). Moreover, within 8 years after promulgating a national MACT standard, EPA must determine if any significant risk to health or the environment remains. CAA § 112(d)(6). This same requirement is contained in the North Carolina rules applicable to DAQ. 15A NCAC 2D.1112(i). Thus, under both federal and North Carolina requirements, if this risk remains, the more stringent standards must be imposed and enforced.