IN THE OFFICE OF STATE ADMINISTRATIVE HEARINGS
STATE OF GEORGIA

FALL-LINE ALLIANCE FOR A CLEAN ENVIRONMENT, OGEECHEE RIVERKEEPER, SIERRA CLUB, and SOUTHERN ALLIANCE FOR CLEAN ENERGY, Petitioners, v. F. ALLEN BARNES, DIRECTOR, ENVIRONMENTAL PROTECTION DIVISION, GEORGIA DEPARTMENT OF NATURAL RESOURCES, Respondent, POWER4GEORGIANS, LLC Intervenor-Respondent.	DOCKET NO: OSAH-BNR-AQ-1031707-98-WALKER (PSD Air Permit)

PETITIONERS' PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW

Petitioners Fall-Line Alliance for a Clean Environment, Ogeechee Riverkeeper, Sierra Club, and Southern Alliance for Clean Energy (collectively "Petitioners") respectfully file these Proposed Findings of Fact and Conclusions of Law, pursuant to this Court's Revised Scheduling Order dated October 12, 2010, and Office of State Administrative Hearings ("OSAH") Rule 616-1-2-.04, as follows:

I. INTRODUCTION

A. <u>Procedural Background</u>

Petitioners challenge the issuance of permit 4911-3-3-0051-P-01-0 by Respondent Director of the Environmental Protection Division ("EPD") to Respondent-Intervenor Power4Georgians, LLC ("P4G"), for the construction and operation of a coal-fired power plant ("Plant Washington") in Washington County, Georgia. Petitioners allege that EPD issued the Prevention of Significant Deterioration ("PSD") air quality permit ("PSD permit" or "Permit") in violation of the Georgia Air Quality Act, O.C.G.A. §§ 12-9-1, *et seq.*, the Georgia Rules for Air Quality Control, Ga. Comp. R. & Regs. r. 391-3-1-.01, *et seq*., the Georgia State Implementation Plan, 391-3-1-.01, *et seq*. and the federal Clean Air Act ("CAA" or "Act"), 42 U.S.C. §§ 7401, *et seq.*

The Petition for Hearing originally set forth seven grounds upon which Petitioners contend the PSD permit should be invalidated. On July 28, 2010, the undersigned Administrative Law Judge issued an Order dismissing Count I of the Petition, in which Petitioners had alleged that the PSD permit was invalid because a professional engineer did not conduct the best available control technology ("BACT") or maximum achievable control technology ("MACT") analyses. *See*

Fall Line Alliance for a Clean Environment v. Barnes, No. OSAH-BNR-AQ-1031707-98-WALKER (July 28, 2010) (Order Denying Petitioners' Motion for Summary Determination and Granting Respondent's and Respondent-Intervenor's Motion for Summary Determination). On August 2, 2010, Petitioners amended their Petition to delete Count III, which had asserted that the emission limit for hydrogen chloride ("HCl") failed to meet MACT emission limit requirements.

This case subsequently came for an evidentiary hearing on the merits on September 13 – 16, 20 – 22, and 27 – 29, 2010. At the time of the merits hearing, the Petition, as amended, set forth five grounds on which Petitioners contend the PSD permit should be invalidated. In Count II, Petitioners assert that the PSD permit is invalid because the emission limit for sulfuric acid mist ("SAM" or "H_2SO_4") does not meet BACT emission limitation requirements. Count IV alleges that the PSD permit is invalid because the filterable particulate matter ("PM")/coarse particulate matter ("PM_{10}") emission limit used as a surrogate for controlling non-mercury metal hazardous air pollutants ("HAPs") does not meet MACT requirements. In Count V, Petitioners claim that the PSD permit is invalid because it does not set MACT emission limits directly for dioxins and furans. Count VI asserts that the PSD permit is invalid because the carbon monoxide ("CO") emission limit used as a surrogate for controlling non-dioxin/furan organic HAPs does not meet MACT requirements. Finally, in Count VII, Petitioners claim that the PSD permit is invalid because it is based on flawed air dispersion modeling that fails to adequately demonstrate that Plant Washington will not cause or contribute to violations of the 24-hour average PM_{10} air pollution increments or National Ambient Air Quality Standards ("NAAQS"). For the reasons which follow, Petitioners' claims as to Counts II, IV, V, VI, and VII are **GRANTED** and the PSD permit is **REMANDED** to EPD for further proceedings consistent with this Decision.

B. Background On Proposed Facility

1. P4G submitted an application to EPD on January 17, 2008, to receive a PSD permit to construct and operate a pulverized coal-fired electric power generation facility to be called Plant Washington and to be located north of the city of Sandersville in Washington County, Georgia. Ex. J003.

2. The proposed plant site would be bisected by Mayview and Mathis Roads. Ex. P-0046-a. Mayview and Mathis Roads are currently open to the public. Tr. 964; 1449.

3. The January application was revised and updated on November 26, 2008, and P4G provided additional information on numerous occasions throughout 2009 and 2010. Ex. J016 at 000002; Exs. J005 – J010.

4. The final Permit was issued on April 8, 2010. Ex. J016-000001.

5. The facility is designed to include one supercritical pulverized coal-fired 8300 MMBtu[1]/hr boiler, one 240 MMBtu/hr auxiliary boiler, a steam turbine and associated generator, and a thirty-four cell cooling tower. The net output capacity of the coal-fired power plant will be 850 megawatts ("MW"). Ex. J016 at 000001; Ex. J015 at 000003.

6. The facility is designed to burn sub-bituminous coal (Powder River Basin or "PRB" coal) or up to a 50/50 blend (by weight) of eastern bituminous coal (Illinois #6) and sub-bituminous coal. Ex. J015-000003; Ex. J016-000001. The preference for the facility will be use of western low sulfur sub-bituminous coal (*i.e.*, PRB coal) but P4G will also retain the capability to use bituminous coals (i.e., Illinois #6). Ex. J005-000174; INT-ST-3 ¶ 28; INT-ST-1 ¶ 58.

7. Plant Washington would emit more than 100 tons per year of several pollutants including PM, volatile organic compounds ("VOCs"), nitrogen oxide ("NOx"), carbon monoxide ("CO"), and sulfur dioxide ("SO_2"), and was therefore permitted as a major source under the PSD Program. Ex. J005 at 00040.

8. Plant Washington would emit 113 listed hazardous air pollutants ("HAPs") including dioxins/furans, beryllium, vinyl chloride, mercury, arsenic, and other heavy metals. For the purpose of establishing permit limits, the Permit divides these HAPs into four categories: mercury, non-mercury metal HAPs (for

[1] The designation "lb/MMBtu," is shorthand for "pounds of emissions of the pollutant in question per million British thermal units of heat input." *See* PET-ST-2 ¶ 22.

which filterable PM is used as surrogate), acid gases (for which SO_2 is used as surrogate monitoring pollutant); and organic HAPs (for which CO is used as surrogate). Ex. P-050 at 000009-10.

C. Legal Framework

(i) The Clean Air Act

1. This case arises under two of the major Clean Air Act programs for large stationary air pollution sources, and the federal and state regulations implementing those programs. The first is the Prevention of Significant Deterioration ("PSD") program, which addresses "criteria pollutants" and appears in Part C of the Act. 42 U.S.C. §§ 7470-7492. The second is the Hazardous Air Pollution ("HAP") program, which establishes highly protective standards for specific toxic pollutants listed by Congress in section 112 of the Act. 42 U.S.C. § 7412. The relevant aspects of each of these programs are discussed more fully below.

2. Congress enacted the Clean Air Act "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." 42 U.S.C. § 7401(b)(1).

3. The Clean Air Act directs the U.S. Environmental Protection Agency ("EPA") to establish health-based National Ambient Air Quality Standards ("NAAQS") for certain air pollutants, which are known as "criteria" pollutants

because EPA uses human health-based and environment-based criteria when setting the standards. 42 U.S.C. § 7408(a)(1)(A) (criteria pollutants are regulated because their presence in the atmosphere "may reasonably be anticipated to endanger public health or welfare").

4. EPA has designated six criteria pollutants: SO_2, NO_X, ozone (including precursor pollutants), particulate matter (including "PM_{10}" and "$PM_{2.5}$" and constituent pollutants), CO, and lead ("Pb"). 40 C.F.R. Pt. 50.

5. Areas within a state that meet the NAAQS for a pollutant are said to be in "attainment" for that pollutant. Areas that do not meet the NAAQs for a pollutant are deemed "nonattainment" areas for that pollutant. 42 U.S.C. § 7407.

6. Congress established a separate program in section 112 of the Act to protect people and the environment from HAPs. 42 U.S.C. § 7412. In section 112(b), Congress listed nearly 200 HAPs and directed EPA to establish, on a strict schedule, stringent "maximum achievable control technology" ("MACT") emission standards for each listed HAP emitted by "major sources." 42 U.S.C. § 7412(b)-(e).

(ii) Cooperative Federalism

7. States are primarily responsible for achieving NAAQS through state implementation plans ("SIPs"), which must meet or exceed federal Clean Air Act requirements in order to obtain EPA approval. *See* 42 U.S.C. §§ 7410, 7416. A

SIP is a set of regulations first promulgated by the state and then submitted to EPA for approval. *See Alaska Department of Environmental Conservation v. Environmental Protection Agency*, 540 U.S. 461, 469-70 (2004); *see also* 42 U.S.C. § 7410(a)(1).

8. EPA has approved Georgia's SIP, comprising the Georgia Air Quality Act ("Georgia Act"), O.C.G.A. § 12-9-2, et seq., and its implementing regulations. Among other things, Georgia's SIP charges EPD with administering and enforcing air quality regulations. O.C.G.A. §§ 12-9-6, et seq.

9. EPA also has delegated to Georgia authority to implement and enforce § 112 of the Act. As with the PSD program, EPA's delegation to Georgia of authority to implement the HAP program "shall not include authority to set standards less stringent than those promulgated by [EPA] under [the Clean Air Act]." 42 U.S.C. § 7412(l)(1).

10. To the extent that EPD or P4G attempt to interpret Georgia's SIP in a manner that is inconsistent with the Clean Air Act, the Supremacy Clause of the United States Constitution requires that federal law pre-empt an inconsistent state law "when the state law 'stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress,'' which occurs when implementation of a state law "interferes with the methods by which the federal

statute was designed to reach this goal." *International Paper Co. v. Ouellette*, 479 U.S. 481, 491-92 (1987) (internal citations omitted).

11. Accordingly, the Supremacy Clause pre-empts and forecloses any interpretation of Georgia's SIP that would deviate below the minimum standards of or otherwise interfere with the Clean Air Act's PSD or MACT programs. *See, e.g., Clean Air Mkts. Group v. Pataki*, 338 F.3d 82, 87 (2d Cir. 2003) (invalidating New York law that "interfere[d] with the method selected by Congress for regulating SO_2 emissions."); *Her Majesty the Queen in Right of the Province of Ontario v. City of Detroit*, 874 F.2d 332 (6th Cir. 1989) (Clean Air Act displaces state law to extent that state law is less strict than the Act's limitations).

(iii) The Prevention of Significant Deterioration Program

12. Congress enacted the PSD program to maintain clean air quality in areas that already meet federal air quality standards for criteria pollutants. *Envt'l. Def. v. Duke Energy Corp.*, 127 S. Ct. 1423, 1429 (U.S. 2007) ("[T]he Clean Air Act Amendments of 1977, 91 Stat. 685, included the PSD provisions, which aimed at giving added protection to air quality in certain parts of the country 'notwithstanding attainment and maintenance of' the NAAQS."); *see* 42 U.S.C. § 7470(1) & (3) (stating the program will "protect public health and welfare from any actual or potential adverse effect" from air pollution and ensure that

"economic growth will occur in a manner consistent with the preservation of existing clean air resources").

13. The purpose of the PSD program is "to ensure that the air quality in attainment areas, *i.e.*, areas that are already clean, will not degrade" as a result of any new or enlarged sources of air pollution in the area. *Alaska Dep't of Envt'l. Conservation*, 540 U.S. at 471 (2004) (internal citations omitted).

14. EPD administers the PSD program in Georgia pursuant to the provisions of Georgia's approved SIP, which incorporates by reference the requirements of the federal PSD program. Ga. Comp. R. & Regs. r. 391-3-1-.02(7) (incorporating 40 C.F.R. § 52.21). Tr. 1387.

15. Under Georgia's PSD program, a major new source of air pollution, like Plant Washington, may not be constructed without first undergoing a preconstruction review and obtaining a PSD permit. 42 U.S.C. § 7475(a)(1). Pursuant to Georgia's SIP, "[n]o person shall construct or operate any facility from which air contaminants are or may be emitted in such a manner as to fail to comply with . . . [a]ny applicable increment, precondition for permit, or other requirement established for the Prevention of Significant Deterioration pursuant to Part C, Title I of the Federal Act." Ga. Comp. R. & Regs. r. 391-3-1-.02 (1)(c).

16. New major sources of PSD pollutants must obtain a permit that satisfies all of the requirements of the PSD program prior to commencing

construction "[b]ecause a key purpose of PSD is 'to assure that any decision to permit increased air pollution . . . is made only after careful evaluation of all the consequences of such a decision' . . . [thus,] polluters 'are required to . . . obtain a permit before constructing or modifying facilities.'" *Nat'l Parks Conservation Ass'n v. TVA*, 480 F.3d 410, 412 (6th Cir. 2007); *see United States v. Ohio Edison Co.*, 276 F. Supp. 2d 829, 864-865 (S.D. Ohio 2003) (explaining that "[i]t would be both bad law and bad public policy to intentionally require or even allow construction before determining whether the [project] was permissible under the Clean Air Act"); *see also Calvert Cliffs' Coordinating Comm., Inc. v. U.S. Atomic Energy Comm'n*, 449 F.2d 1109, 1128 (D.C. Cir. 1971) (noting that if the agency waited to apply newly enacted environmental protection requirements until plants then under construction had been completed, "[e]ither the licensee will have to undergo a major expense in making alterations in a completed facility or the environmental harm will have to be tolerated" and "[i]t is all too probable that the latter result would come to pass").

17. The PSD permit must ensure that emissions from a permitted facility (1) will not cause or contribute to a violation of the NAAQS, 42 U.S.C. § 7475(a)(3)(B); (2) will not cause or contribute to air pollution in excess of the "maximum allowable increase," or "increment," of a pollutant, 42 U.S.C. § 7475(a)(3)(A); (3) will be controlled to the maximum degree achievable by the

"best available control technology" ("BACT") for each criteria pollutant, 42 U.S.C. § 7475(a)(4); (4) will not exceed the maximum allowable increases, or increments, in any Class I area, 42 U.S.C. § 7475(d)(2)(C)(i); and (5) will not cause adverse impacts on air quality or related values, including visibility, in Class I areas, 42 U.S.C. § 7475(d)(2)(B).

18. There are two key PSD provisions at issue in this proceeding: (a) the BACT requirements for sulfuric acid mist ("SAM" or "H_2SO_4"), which is a major component of fine particulate matter ("$PM_{2.5}$") pollution; and (b) the required demonstration that Plant Washington will not cause or contribute to a violation of the 24-hour average PM_{10} NAAQS or the 24-hour average PM_{10} pollution increment.

(a) Best Available Control Technology

19. The Clean Air Act defines the term "best achievable control technology" as:

> an emissions limitation based on the maximum degree of reduction for each pollutant subject to regulation [under the Clean Air Act] emitted from any or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of "best available control technology" result in emissions of any pollutant which will exceed the emissions allowed

> by any applicable standard established pursuant to section 7411 or 7412 of [the Act] . . . .

42 U.S.C. § 7479(3).

20. Georgia's SIP adopts the federal regulatory definition of "BACT," which defines the standard in substantially the same manner as Congress defined BACT in section 169(3) of the Clean Air Act:

> Best available control technology means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the [Director of EPD], on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61 . . . .

40 C.F.R. § 52.21(b)(12) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(7)); *Cf.* 42 U.S.C. § 7479(3) (defining BACT).

21. New major sources of "criteria" pollutants, such as Plant Washington, may not commence construction unless they first obtain a permit setting forth emission limitations that meet BACT requirements for each pollutant subject to regulation under the Act. 42 U.S.C. § 7475(a)(1), (3).

(b) <u>Demonstrating Compliance with NAAQS and Increments</u>

22. EPA has promulgated primary and secondary NAAQS for 24-hour average PM_{10} concentrations in the ambient air. The primary and secondary 24-hour average PM_{10} NAAQS is 150 micrograms per cubic meter of air ("$\mu g/m^3$"). 40 C.F.R. § 50.6(a) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(4)(c)(1)). An area violates the 24-hour average PM_{10} NAAQS—and, thus, becomes subject to the stricter "nonattainment area" provisions in Part D of the Act, 42 U.S.C. §§ 7501-7515—if the 24-hour average PM_{10} concentrations in the area exceed 150 $\mu g/m^3$ more than one calendar day in a year. *Id*.

23. To demonstrate whether a new source will comply with the 24-hour average PM_{10} NAAQS requires calculating the facility's potential "worst-case" PM_{10} emissions in a 24-hour period and then determining the resulting ambient air concentrations in each 24-hour period under a range of expected meteorological conditions. The purpose of this analysis is to determine if and how often the source will cause or contribute to a violation of the 24-hour standard.

24. EPA also has promulgated standards for the maximum allowable increase, or "increment," of 24-hour average PM_{10} air pollution levels associated with major new sources of air pollution, like Plant Washington. An increment is a defined amount of air pollution that can be added to the ambient air in an attainment area. *See* 40 C.F.R. §51.166(c).

25. The increment program is designed to allow some new industrial growth in an area that meets air quality standards while assuring that the existing air quality does not significantly deteriorate as a result. *Envt'l. Def. Fund, Inc. v. EPA*, 898 F.2d 183, 184 (D.C. Cir. 1990); *Ala. Power Co. v. Costle*, 636 F.2d 323, 401 (D.C. Cir. 1979).

26. The 24-hour average PM_{10} increment is 30 $\mu g/m^3$, which may be exceeded only during one 24-hour period per year at any one location. 40 C.F.R. § 52.21(c) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(7)(b)(1)).

27. As with the 24-hour average PM_{10} NAAQS, determining compliance with the 24-hour increment requires estimating the worst-case average PM_{10} emissions and the resulting concentrations measured for each 24-hour period.

(iv) The Hazardous Air Pollutant Program

28. The second Clean Air Act program pertinent to this case addresses regulation of HAPs. Although HAP emissions were regulated under CAA § 112 beginning in 1970, over the next 18 years EPA "established standards for only seven [HAPs] and as to these seven addressed only a limited selection of possible pollution sources." *New Jersey v. EPA*, 517 F.3d 574, 578 (D.C. Cir. 2008) (citing S. Rep. 101-228, at 131 (1989), as reprinted in 1990 U.S.C.C.A.N. 3385, 3516).

29. In 1990, Congress responded to the slow pace of HAP regulation by amending section 112 of the Act to classify nearly 200 contaminants as HAPs and to create a stringent national pollution control program to eliminate or limit, to the "maximum" extent possible, emissions of the most toxic air pollutants. S. Rep. 101-228 (1989), as reprinted in 1990 U.S.C.C.A.N. 3385, 3388, 3518; *see National Mining Ass'n v. EPA*, 59 F.3d 1351, 1353 (D.C. Cir. 1995) ("Dissatisfied with EPA's health-based regulation of hazardous air pollutants under the 1970 program, Congress replaced [the old] approach with a detailed, technology-based regulatory scheme."); *National Lime Ass'n v. EPA*, 233 F.3d 625, 634 (D.C. Cir. 2000) (Congress "added the list of pollutants to be regulated, regulation deadlines, and minimum stringency requirements to the Clean Air Act precisely because it believed EPA had failed to regulate enough HAPs under previous air toxics provisions.").

30. Congress directed EPA to list all categories of major sources of HAPs and develop highly protective emission standards (known as "maximum achievable control technology" or "MACT" standards) for each listed category. 42 U.S.C. § 7412(c), (d).

31. To enforce these standards, the Act prohibits construction or modification of a major source of HAPs (like Plant Washington) unless EPA (or a

state with delegated authority) first determines that the MACT standard will be met (a "MACT determination"). 42 U.S.C. § 7412(g)(2)(B); 40 C.F.R. § 63.42(c).

32. Where EPA has not yet established a federal MACT standard for a category of sources, CAA § 112 and its implementing regulations require a "case-by-case" MACT determination. *Id.* The resulting emission controls "shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source" (the "MACT floor" emissions limitation). 42 U.S.C. § 7412(d)(3); 40 C.F.R. § 63.43(d)(1). Further, considering available technologies, costs, non-air quality health and environmental impacts, and energy requirements, control levels must be tightened as much as possible beyond the MACT floor ("beyond the floor" emissions limitations). *See* 42 U.S.C. § 7412(d)(2), (g)(2)(B); 40 C.F.R. § 63.43(d) (2).

33. EPA has promulgated regulations for case-by-case MACT determinations at 40 C.F.R. §§ 63.40 to 63.44 (Subpart B of Part 63). The EPA regulations define and implement the requirements for the MACT floor and beyond the floor emission standards in substantially the same manner as Congress prescribed in CAA § 112. *Cf.* 42 U.S.C. § 7412(d)(2), (3) and 40 C.F.R. § 63.43(d)(1), (2).

34. To implement the HAP program in Georgia, Georgia's SIP incorporates by reference the requirements of the federal HAP program. Ga.

Comp. R. & Regs. r. 391-3-1-.02(9)(a) & (b)(16) (incorporating by reference 40 C.F.R. Part 63, Subpart B, §§ 63.40 – 63.44). Tr. 1609.

35. Pursuant to Georgia's SIP, "[n]o person shall construct or operate any facility from which air contaminants are or may be emitted in such a manner as to fail to comply with . . . [a]ny applicable emission standard or other requirement for a hazardous air pollutant established by EPA pursuant to Section 112 of the Federal Act." Ga. Comp. R. & Regs. r. 391-3-1-.02(1)(b).

II. JURISDICTION AND STANDARD OF REVIEW

A. <u>Jurisdiction</u>

1. The Office of State Administrative Hearings ("OSAH") has jurisdiction over this matter pursuant to O.C.G.A. §§ 12-2-2(c)(2) and 12-9-15, and Ga. Comp. R. & Regs. r. 391-1-3-.02(1), which authorize any person who is aggrieved or adversely affected by any order or action of EPD to obtain review of the EPD's order or action.

2. Petitioners timely filed their original petition within thirty days of EPD's issuance of the PSD permit and have demonstrated, through affidavits filed with their original Petition and through testimony and evidence presented at the merits hearing (*see, e.g.,* Tr. 50-69; 89-108), that they have standing to bring this action.

B. **Standard of Review**

3. This proceeding "is *de novo* in nature and the evidence on the issues in any hearing is not limited to the evidence presented to or considered by the Referring Agency prior to its decision." Ga. Comp. R. & Regs. r. 616-1-2-.21(3); *see also* O.C.G.A. § 50-13-41(b) ("An administrative law judge shall have all the powers of the referring agency with respect to a contested case"); O.C.G.A. § 12-2-2(c)(2)(A) (an administrative law judge acts "in place of the Board of Natural Resources").

4. The applicable rules of administrative procedure, "require[] the ALJ to consider the applicable facts and law anew, without according deference or presumption of correctness to the EPD's decision, and to render an independent decision on whether the Challengers carried their burden to prove by the preponderance of the evidence that the permit should not have been issued." *Longleaf Energy Associates, LLC v. Friends of the Chattahoochee, Inc., et al.,* 298 Ga. App. 753, 768 (2009); *see* Georgia's Administrative Procedure Act, O.C.G.A. § 50-13-1, *et seq.*, and Administrative Rules of Procedure, Ga. Comp. R. & Regs., Chapter 616-1-2, *et seq*.

5. Georgia's Administrative Procedure Act, "under which the Office of State Administrative Hearings was created 'for impartial administration of administrative hearings' (OCGA § 50-13-40 (a)), does not contemplate ALJ

deference to agency expertise." *Longleaf*, 298 Ga. App. at 768. To the contrary, in this review of EPD's permit action, it is "the ALJ's duty to conduct a *de novo* hearing and render an independent determination without deference to a technically complex agency decision." *Id.*

6. In fact, "[t]he ALJ's review [is] not judicial review of an agency decision, but constitute[s] the final decision of the agency's policy making and governing board." *Id.* (citing O.C.G.A. §§ 12-2-2 (c) (2)(D), 12-2-24, 12-9-15 (a)(1)).

7. Pursuant to OSAH Rule 21(1), the undersigned is required to "make an independent determination on the basis of the competent evidence presented at the hearing" and, except where a remand is required under OSAH 29 (which applies only to matters contesting the denial of a permit or license), the undersigned "may make any disposition of the matter as was available to the Agency."

8. Petitioners bear the burden of proving their claims by a preponderance of the evidence. OSAH Rule 21(4). The Georgia Code defines the preponderance of the evidence standard as "that superior weight of evidence upon the issues involved, which, while not enough to free the mind wholly from a reasonable doubt, is yet sufficient to incline a reasonable and impartial mind to one side of the

issue rather than to the other." O.C.G.A. § 24-1-1(5). It has been further explained as follows:

> Preponderance simply requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence before ruling in favor of the party with the burden of persuasion. If the test could be quantified, the test would say that a factual conclusion must be supported by 51% of the evidence. A softer definition, however, seems more accurate: the preponderance test means that the fact-finder, either the presiding official and any administrative appeal authority, must be convinced that the factual conclusion it chooses is more likely than not.

Administrative Law and Practice, Part I. Chap. 5, F.1. Courts have likened this burden to a tipping of the scales of justice, in which the party with the burden merely must tilt the scales in its favor. *Smith v. Merck*, 206 Ga. 361, 376, 57 S.E.2d 326 (1950).

9. Under some circumstances, a fact-finder should presume Petitioners' claims to be well founded. Specifically, Georgia law provides that:

> If a party has evidence in his power and within his reach by which he may repel a claim or charge against him but omits to produce it, or if he has more certain and satisfactory evidence in his power but relies on that which is of a weaker and inferior nature, a presumption arises that the charge or claim against him is well founded; but this presumption may be rebutted.

O.C.G.A. § 24-4-22. Thus, if EPD produces evidence that is weaker or inferior, or fails to bring forth evidence in response to a claim, that claim is presumed to be well founded.

10. Further, as the United States Supreme Court has observed, "[a]n

agency does not acquire special authority to interpret its own words when . . . it has elected merely to paraphrase the statutory language." *Gonzales v. Oregon*, 546 U.S. 243, 257 (2006).

III. CLAIMS ARISING UNDER THE PREVENTION OF SIGNIFICANT DETERIORATION PROGRAM – COUNTS II AND VII

In 1977, Congress amended the Clean Air Act to add the PSD program because the record of the Act without PSD had proven "insufficient by itself to achieve the goal of protecting and ***improving*** air quality." *ASARCO v. EPA*, 578 F.2d 319, 327 (D.C. Cir. 1978) (emphasis in original). Congress created PSD as a statutory "mechanism . . . to assure that before new and expanded facilities are permitted, a State demonstrate that these facilities can be accommodated within its overall plan to provide for attainment of air quality standards." S. Rep. No. 95-127, at 55 (May 10, 1977). Section 165 of the Act (42 U.S.C. § 7475) establishes the requirements for issuing PSD permits. There are two aspects of the PSD process that are at issue this proceeding: (1) whether the PSD permit's emission limit for sulfuric acid mist meets the PSD program's BACT requirements; and, (2) whether the air dispersion modeling conducted to support the PSD permit assures that Plant Washington will not cause or contribute to a violation of the 24-hour average PM_{10} NAAQS or PSD increment.

A. <u>The BACT Emission Limit for Sulfuric Acid Mist – Count II</u>

(i) Findings of Fact

1. Sulfuric acid mist – also known as "H_2SO_4" or "SAM" – is a regulated PSD pollutant for which a BACT emission limit must be established when potential emissions are expected to exceed the significance threshold set by regulation. *See* 40 C.F.R. § 52.21(b)(23)(i) and (b)(50)(ii), Ga. Comp. R. & Regs. r. 391-3-1-.02(7)(b)(8).

2. Plant Washington is projected to have potential SAM emissions of 145 tons per year, which is above the significance level triggering the need for BACT analysis. RESP-ST-3 at ¶ 28. Tr. 1534

3. SAM is formed due to the oxidation of sulfur dioxide ("SO_2") to sulfur trioxide ("SO_3"), and subsequent reaction with water vapor. RESP-ST-3 at ¶ 27.

4. SAM emissions are a function of several variables: the amount of sulfur in the parent coal; the amount of coal burned; the occurrence of conversion factors during combustion and throughout the process train; and the effectiveness of various removal mechanisms or controls in the process train. Tr. 870, 1061.

5. In the Plant Washington process train, SAM formation will occur in two places – the boiler and the Selective Catalytic Reduction ("SCR") system immediately downstream of the boiler that will be designed and installed to provide NO_X control. Tr. 1555.

6. The Permit limits SAM emissions to 0.004 pounds per million BTU

heat input ("lb/MMBtu")[2] on a 3-hour average. Ex. J016[3] at Condition 2.13(l).

7. Compliance with the SAM limit would be demonstrated via stack testing using either EPA Method 8 or CTM013. Ex. J016 at Condition 6.2.j. The Permit requires an initial performance test within 180 days of initial startup of the boiler and annual compliance tests thereafter. *Id.* at Condition 6.3.e. & h.

8. The Permit's SAM BACT emission limit is based on the use of duct sorbent injection in combination with a fabric filter baghouse. Ex. J016 at Condition 2.7. Tr. 1066.

9. Duct sorbent injection ("DSI") is a process used to control SAM emissions that involves injecting a sorbent material into the exhaust gas stream. The injected sorbent reacts with SO_3 and condensed SAM and then is collected within a particulate matter control device such as a fabric filter baghouse. INT-ST-2 at ¶ 54.

10. In addition to duct sorbent injection, P4G will utilize coal selection, coal washing, and low oxidation catalysts to control SAM emissions. INT-ST-2 at ¶ 58-59, 61, 80. RESP-ST-3 at ¶ 39.

11. Coal selection is a pre-combustion control that emphasizes use of low

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[2] Pounds per million BTU is a measure of the mass of a given pollutant in pounds per unit of heat input into the boiler. Tr. 715.

[3] References to exhibits include an alphanumeric designation in which the alphabetic prefix indicates the party or parties which listed the exhibits ("J" for Joint Exhibits, "P" for Petitioners' Exhibits, and "RI" for Respondent-Intervenor's Exhibits); page number designations refer to the Bates numbers affixed to individual exhibits, unless otherwise noted.

sulfur coals to limit the amount of sulfur that would otherwise be available to form SAM. INT-ST-2 at ¶ 47. The Permit requires Plant Washington to fire only low sulfur sub-bituminous PRB coal or up to a 50/50 blend of PRB and bituminous, higher sulfur Illinois # 6 coal. Ex. J016 at Condition 2.11.

12. P4G represented in its application that use of 100% PRB coal would be its "primary" and "preferred" fuel. Ex. J005 at 000173 & 000177.[4] Despite this representation, P4G's SAM BACT analysis used the higher sulfur 50/50 blend as the design coal. INT-ST-2 at ¶ 75. Tr. 1062-63. Moreover, the Permit applies the same SAM BACT limit for both coal types, despite the fact that the amount of SAM created (and emitted) depends on the coal sulfur content. Ex. J016 at Condition 2.13(l). In contrast, the Permit applies a weighted average (*i.e.*, one that takes into account the differing nitrogen content of both coal types) to its NO_X limit. *Id.* at Condition 2.13.r. Justin Fickas, who took the lead role in preparing the BACT analysis for P4G, testified that there was no technical reason that he could not have assigned a weighted average for SAM that took into account the

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[4] Justin Fickas, who took the lead role in performing P4G's BACT analysis, reaffirmed in his written direct testimony that 100% PRB coal would be Plant Washington's "primary" and "preferred" fuel. INT-ST-2 at ¶¶ 58, 64. Similarly, another P4G witness, Dennis Johnson of Fluor, stated in his written testimony that Plant Washington would "predominantly burn" PRB coal. INT-ST-3 at ¶ 28. Moreover, there was considerable testimony at trial that EPD considers P4G, and P4G considers itself, bound by representations contained in its permit application. *See generally* Tr. 998-99, 1444, 1552, 1720. However, at trial, Mr. Fickas, Mr. Johnson, and P4G representative Dean Alford, among others, sought to disavow these written representations and testimony, stating that there is no preference for PRB coal over the 50/50 blend. *See generally* Tr. 971, 1067-68, 1270.

differing sulfur content of the 100% PRB and 50/50 blends. Tr. 1077.

13. The Permit does not require that the 50/50 blend be burned during the required annual compliance tests for SAM. Ex. J016 at Condition 6.2.j. Tr. 943.

14. Coal washing is another pre-combustion control. Coal washing is performed to remove impurities in coal, to improve its heat content, and to reduce the sulfur content of the coal. Washing can remove as much as 40% of the inorganic sulfur in coal that would otherwise be available to form SAM. INT-ST-2 at ¶ 48. The Permit requires that the Illinois #6 coal used as part of the 50/50 blend be washed. Ex. J016 at Condition 2.11.

15. Low oxidation catalyst is a means of reducing the formation of SAM emissions in the SCR system by limiting the rates of conversion of SO_2 to SO_3. Plant Washington will utilize a three-layer-plus-one catalyst design, meaning three initial layers of catalyst plus a fourth layer that would be added two to three years after startup. INT-ST-2 at ¶ 50. Tr. 1257.

16. In addition, Plant Washington will be equipped with a wet scrubber as its principal technology to control SO_2 emissions. Wet scrubbers provide a co-benefit effect of controlling SAM emissions. RESP-ST-3 at ¶ 32.

17. The Permit's SAM limit is based upon P4G's determination, which was accepted by EPD, that a 90% removal efficiency of SAM is achievable through the use of duct sorbent injection. INT-ST-2 at ¶ 69. RESP-ST-3 at ¶ 45.

Tr. 1590.

18. The Permit's SAM limit is also based upon P4G's determination, which was accepted by EPD, that there will be a 1% conversion of SO_2 to SO_3 (and subsequently SAM) across the entire combustion and pollution control system at Plant Washington, which would include SO_3 formed in both the boiler and across the SCR system. INT-ST-2 at ¶ 77. Tr. 1552.

19. In establishing the SAM BACT limit, neither P4G nor EPD took into account the various inherent SAM removal mechanisms across the process train. These include the loss of sulfur in the boiler to bottom ash; the loss of SO_3 to the formation of ammonium salts in the air preheater; and SAM removal in the wet scrubber. Tr. 1076, 1557-59.

20. Petitioners do not challenge the adequacy of the controls chosen by P4G and approved by EPD for limiting SAM emissions. Instead, Petitioners direct their challenge at the Permit's SAM emission limit. Petitioners contend that when proper accounting is done for the various inherent removal mechanisms across the process train, the facility is capable of achieving a much lower rate of SAM emissions while maintaining an adequate margin of compliance. Specifically, Petitioners contend that the SAM limit should be no greater than 0.001 lb/MMBtu on a 3-hr average. PET-ST-2 at ¶ 26.

Dr. Sahu's Calculations

21. Petitioners' expert, Dr. Ranajit Sahu, is an expert in engineering, air permitting and compliance. Tr. 660.

22. Dr. Sahu performed his own calculations to determine the estimated rate of SAM emissions using the control technology proposed for Plant Washington. Dr. Sahu relied upon the same assumptions as P4G regarding the average sulfur content of the coals to be used at Plant Washington (0.32% for PRB coal and 1.72% for the 50/50 blend). Further, Dr. Sahu made the same assumption as P4G regarding the rate of conversion of SO_2 to SO_3 across the process train, *i.e.*, a 1% conversion rate. PET-ST-2 at ¶ 24.

23. Dr. Sahu likewise accepted P4G's estimate of 90% removal efficiency for the chosen SAM emission control – duct sorbent injection in combination with the fabric filter baghouse. However, Dr. Sahu determined that the actual SAM removal efficiency is likely to be as high as 98% when taking into account the various inherent removal mechanisms across the process train – *i.e.*, loss of sulfur to bottom ash, and the removals that occur at the air preheater and wet scrubber. Tr. 1783, 1790.

24. When coal is burned in a boiler, some portion of the coal sulfur will associate and drop out with the ash that is created in the boiler ("bottom ash"). The sulfur thus lost becomes unavailable for formation into SO_2 and later SAM. The

bottom ash is collected and disposed of in a land disposal facility. PET-ST-2 at ¶ 15.

25. Another loss mechanism occurs at the air preheater, which is located after the SCR system in the process train. As SO_3 exits the boiler and enters the SCR system, it reacts with ammonia that is injected to make the SCR system function for NO_X control. The result is the formation of ammonium salts and accompanying loss of SO_3 that would otherwise be available to form SAM. This reaction occurs again at the backend of the SCR system as SO_3 formed across the SCR system reacts with excess ammonia (known as "ammonia slip") to produce additional ammonium salts. The ammonium salts then tend to collect on the air preheater. Air preheater designs include a mechanism for washing precisely because of this phenomenon, as the salts that tend to deposit can degrade the heat transfer characteristics of the air preheater. The air preheater will also collect fine aerosol droplets of SAM as the flue gases are forced through it. Tr. 866-868.

26. After leaving the air preheater, the remaining SAM will be controlled by the technology chosen by P4G and approved by EPD for SAM control: the use of duct sorbent injection in combination with a fabric filter baghouse. The injected sorbent will react with the SAM to form particles that will subsequently be captured in the fabric filters. Tr. at 868.

27. Any SAM remaining after the baghouse can be removed in the wet

scrubber, which will have mist eliminators. The main purpose of the mist eliminators is to prevent carryout of the wet slurry that is injected to provide for SO_2 control. However, the mist eliminators provide a co-benefit effect of removing SAM from the exhaust gases. Tr. 869-70.

28. In its BACT analysis, P4G identified wet scrubber systems as one of the top control technologies for SAM emissions. INT-ST-2 at ¶ 46. Although P4G sought to dispute their co-benefit effect by arguing that SO_3 entering the wet scrubber can also be converted to SAM (*see, e.g.,* INT-ST-2 at ¶ 51), EPD determined that the wet scrubber would have a co-benefit effect on SAM emissions. However, EPD did not attempt to quantify that effect. EPD did not perform any calculations to verify P4G's chosen BACT limit for SAM. RESP-ST-3 at ¶ 39. Tr. 1554-57.

29. The existence and efficacy of the above removal mechanisms have been documented by the power industry itself – first by the Southern Company and later by the Electric Power Research Institute ("EPRI"), which adopted and expanded upon the Southern Company's efforts. EPRI assumed this function in order to help its membership improve the accuracy of their emissions estimates after recognizing that utilities were over-reporting their SAM emissions to EPA. Tr. 1783-84, 1789, 1810.

30. According to the data collected and tabulated by EPRI, the amount of

sulfur loss to bottom ash at Plant Washington would be expected to be 12.5% for PRB coal and between 5% and 12.5% for the 50/50 blend. Further, EPRI has documented SO_3 removals of between 50-60% at the air preheater and an additional, equivalent loss in the wet scrubber. Tr. 1790-91.

31. The removal mechanisms documented by EPRI occur in series. A percentage of SAM or a SAM precursor is removed at one stage, and the resulting amount is further reduced at a subsequent stage. Tr. 1791.

32. When these various removal mechanisms are considered in conjunction with the 90% removal efficiency of the duct sorbent injection, the overall SAM removal efficiency across the Plant Washington process train is likely to be as high as 98%. Tr. 1790-1791.

33. Using P4G's assumptions regarding the sulfur content of the fuel, the conversion rate of SO_2 to SO_3 across the process train, and the removal efficiency of the duct sorbent injection, but also taking into account the inherent removal mechanisms across the process train as recognized and documented by EPRI, Dr. Sahu calculated a controlled SAM emission rate of 0.00018 lb/MMBtu for the PRB coal and 0.00085 lb/MMBtu for the 50/50 blend. These rates are 22 times and 5 times lower, respectively, than the SAM limit in the Permit. INT-ST-2 at ¶¶ 24-25.

34. Dr. Sahu applied a margin of compliance to his calculations to account for variability. Based on Dr. Sahu's calculations, Petitioners' proposed

emission limit for SAM of 0.001 lb/MMBtu is more than five times (500%) higher than the controlled emission rate for PRB coal, which based on the representations in the application will be the facility's primary or preferred fuel. It is also 15% higher than the controlled rate Dr. Sahu determined for the 50/50 blend. Tr. 1794.

35. In applying this margin of compliance, Dr. Sahu took into account "measurement uncertainty" noted by EPRI in its discussion of SAM removal at high dust areas like the air preheater, which occurs upstream of the fabric filter baghouse. Tr. 1824. No such measurement uncertainty affects EPRI's bottom ash loss estimates, which are based on gravimetric measurements and not measurement of air emissions. Tr. 1817.

36. Dr. Sahu's calculations also distinguished between inherent and controllable variability. Controllable variability is variability that can be reduced by properly maintaining control equipment. The Permit limits controllable variability through a condition requiring Plant Washington to maintain and operate its air pollution control equipment in a manner consistent with good air pollution control practices "at all times." Ex. J016 at Condition 1.1. Operators reaching lower emission levels tend to experience lower variability in equipment performance. They achieve lower levels by better control and operational attention, and this in turn has the beneficial effect of dampening controllable variability. Tr. 874-76, 1795-96.

37. In contrast, in reviewing the BACT SAM limit proposed by P4G, EPD made no distinction between inherent and controllable variability. Applying a "subjective" margin of compliance, EPD took into account all forms of variability in operational parameters, even those that are within the ability of the plant operator to control. Tr. 1539.

38. In performing his calculations, Dr. Sahu considered the potential trade-offs that could occur by lowering the SAM emission limit. Dr. Sahu determined that Plant Washington could meet Petitioners' proposed SAM limit while also meeting its NO_X limits and Petitioners' suggested limit for CO as a surrogate for organic HAPs. Tr. 1751.

39. As BACT for NO_X control, the Permit requires the use of low NO_X burners and over-fire air to limit NO_X formation in the boiler. The Permit also requires the use of an SCR system, which provides a second opportunity to control NO_X. Ex. J016 at Condition 2.4. Tr. 1755.

40. The size of the SCR system is a function of the NO_X concentrations coming out of the boiler. With lower incoming concentrations of NO_X, less catalyst is required in the SCR system to achieve the Permit's NO_X limits, and there are consequently fewer opportunities for SO_2 to SO_3 conversion across the catalyst. Tr. 1755-56.

41. P4G and EPD contend that the Permit's low NO_X limit is an

impediment to further reductions in the SAM limit. They argue that the amount of catalyst required to achieve the Permit's NO_X limit will afford more opportunities for conversion of SO_2 to SO_3 across the catalyst than a similar plant with higher NO_X limits. INT-ST-2 at ¶ 50. RESP-ST-3 at ¶¶ 41-42. P4G and EPD have sought to distinguish facilities identified in the permit application as having lower SAM emission limits than the value selected for Plant Washington on the basis that those facilities have less stringent NO_X limits. Those facilities include the Newmont TS Power Plant in Nevada (0.001 lb/MMBtu); the WA Parish Unit 8 in Texas (0.0015 lb/MMBtu); and the Santee Cooper Cross Generating Station in South Carolina (0.0014 lb/MMBtu). INT-ST-2 at ¶¶ 82-88. RESP-ST-3 at ¶ 44.

42. In determining the NO_X BACT limit for Plant Washington, EPD assumed a NO_X concentration at the boiler outlet of 0.15 lb/MMBtu for PRB coal and 0.185 lb/MMBtu for the 50/50 blend. Further, EPD assumed 80% NO_X removal from the SCR system. EPD determined that while 90% reduction in the SCR system might be achievable for NO_X inlet rates of 0.4 to 0.5 lb/MMBtu, such level of reduction would not be achievable at the lower inlet rates. Ex. J015 at 000039.

43. At trial, Dennis Johnson of Fluor, an engineering design company that assisted in the preparation of P4G's BACT analysis, testified that the NO_X inlet concentrations would range from 0.16 to 0.22 lb/MMBtu depending on whether the

final boiler design was wall- or corner-fired. Based upon these expected concentrations, Mr. Johnson made the recommendation that Plant Washington employ a three-layer-plus-one catalyst design for its SCR system. Tr. 1256, 1303.

44. Dr. Sahu performed calculations to determine the required level of SCR efficiency to meet the NO_X limits in the Permit. Dr. Sahu based his calculations upon the estimated NO_X concentrations at the SCR inlet of 0.16 to 0.22 lb/MMBtu as provided by Mr. Johnson. Dr. Sahu determined that with a twenty percent margin for compliance, the SCR system would need to achieve NO_X removal efficiencies of between 85% and 89%. Tr. 1774-76.

45. Using the three-layer-plus-one configuration recommended by Mr. Johnson, Dr. Sahu determined that Plant Washington could easily meet its NO_X limit and a much lower SAM limit. As support, Dr. Sahu cited a 2006 paper by Hitachi, which is one of the handful of vendors of SCR and other pollution control equipment, reporting the results of its use of low oxidation catalysts at the Gavin plant in Ohio. The SCR system installed at Gavin utilized a three-layer-plus-one catalyst design. The plant also burned bituminous coals, meaning that it had more NO_X to reduce than would be the case at Plant Washington. Hitachi reported achieving SO_2 to SO_3 conversion rates as low as 0.1% across three layers of catalyst while maintaining 90% NO_X removal efficiency. The measured SO_2 to SO_3 conversion rate was considerably lower than the guaranteed rate of 0.38%

across the three layers of catalyst. Tr. 1779-81. Ex. J-39.

46. In its calculations, P4G assumed a catalyst conversion rate of 0.3% per layer based upon data provided by Mr. Johnson of Fluor. This was the lowest guaranteed rate of SO_2 to SO_3 conversion of which Mr. Johnson was aware. Although he talked to equipment vendors about SCR designs capable of meeting the emission limits in the Permit, Mr. Johnson was not aware of guaranteed rates of conversion as low as 0.38% across three layers of catalyst. Because the projects he has worked on never required such low conversion rates, Mr. Johnson has never asked for them. Tr. 1277.

47. In reviewing P4G's BACT analysis, EPD made no assumptions or determinations regarding the amount or type of catalyst that would be used in the SCR system. Tr. 1588. Although EPD's lead BACT reviewer, Ms. Purva Prabhu, spoke with various equipment control vendors about "new or different control technologies," she did not inquire about available SO_2 to SO_3 conversion rates across the SCR system. RESP-ST-3 at ¶ 19. Tr. 1552.

48. In his calculations, Dr. Sahu recognized that it is important that the proposed SAM limit be achievable over the life of the plant. However, factors affecting SAM generation and removal will not change over time except in favor of better control. Over the life of the plant, the sulfur content of the fuel and the amount of sulfur lost to bottom ash will not change. On the other hand, the

catalysts used in the SCR system will be replenished every few years with new and better catalysts. Likewise, fabric filter bags in the baghouse will need to be replaced periodically. Therefore, over the lifetime of the facility, there will be many opportunities for improving margins for SAM control. Tr. 881-83. As P4G's witnesses conceded, the trend in pollution control technology over time is in favor of better and better systems of control. Tr. 1110, 1274.

(ii) Conclusions of Law

49. Congress defined BACT as the maximum degree of pollution reduction "achievable" in order "to promote use of the best control technologies as widely as possible." *In re Knauf Fiber Glass, GBMH*, 8 E.A.D. 121, 140 (EAB 1999) (Attachment A hereto); *see In re General Motors*, 10 E.A.D. 360, 378 (EAB 2002) (Attachment B hereto); *see also* 42 U.S.C. § 7479(3) (defining BACT). Rather than establishing a static emission limit for new sources, Congress chose to require an emission limit based on the "maximum degree of reduction . . . achievable for such source." 42 U.S.C. § 7479(3). Thus, BACT requires increasingly stringent limits as technology and experience improve the ability to reduce and capture pollutants. This forward-looking emphasis is the "most important" mechanism promoting the Clean Air Act's "philosophy of encouragement of technology development." S. Rep. No. 95-127 at 18; *see also Alabama Power v. Costle*, 636 F.2d 323, 372 (D.C. Cir. 1980) (noting that PSD

Program is intended to be "technology forcing"). The BACT standard is intended to require use of "the latest technological developments [in pollution control] as a requirement in granting the permit," so as to "lead to rapid adoption of improvements in technology as new sources are built," rather than "the stagnation that occurs when everyone works against a single national standard for new sources." *Id*.

50. EPA developed the Draft New Source Review Workshop Manual (October 1990) ("NSR Manual") as "a comprehensive guidance document on the entire PSD permitting process" to assist regulators in preparing and issuing PSD Permits. Ex. J011, PSD Preliminary Determination at 00001; *see* Ex. J001, NSR Manual. EPA's Environmental Appeals Board ("EAB") has observed that "[t]he analytical rigor demanded by Congress has found widely adopted expression in a guidance manual issued by EPA's Office of Air Quality Planning and Standards in 1990," known as the NSR Manual. *In re: Northern Michigan University Ripley Heating Plant*, 2009 EPA App. LEXIS 5, at *23 (Feb. 18, 2009).

51. Among other things, the NSR Manual provides guidance for conducting BACT determinations. *See, e.g.,* Ex. J001, NSR Manual, at 000078. The NSR Manual delineates a five-step, "top-down" method that requires regulators to "assemble all available control technologies, rank them in order of control effectiveness, and select the best." *In re: Northern Michigan University*

Ripley Heating Plant, 2009 EPA App. LEXIS 5, at *24 (Feb. 18, 2009); *see* Ex. J011, PSD Preliminary Determination, at 000011; Ex. J001, NSR Manual at 000080-131. "So fixed is the focus on identifying the 'top' or most stringent alternative that the analysis presumptively ends there …." *In re: Northern Michigan University Ripley Heating Plant*, 2009 EPA App. LEXIS 5, at *25 (Feb. 18, 2009).

52. To comply with the BACT requirements as defined in the Act and Georgia's SIP, "Georgia EPD requires PSD permit applicants to use the top-down process in the BACT analysis, which EPD reviews." Ex. J011, PSD Preliminary Determination, at 000011.

53. As part of its PSD application, P4G performed the 5-step "top-down" BACT analysis for PSD pollutants that Plant Washington would emit in significant quantities, including SAM. *Id.* at 000023. Specifically, P4G (1) identified all available control technologies; (2) eliminated technically infeasible options; (3) ranked remaining control technologies by control effectiveness; (4) evaluated the most effective controls and documented the results; and (5) selected the most effective option not rejected as BACT. Ex. J001 at 000080-81.

54. Through this process, P4G identified duct sorbent injection as the top technology for controlling SAM emissions. P4G also identified as technically feasible and promised to employ several other controls, including coal selection

(i.e., a preference for low sulfur coals), coal washing, the use of low oxidation catalysts and the co-benefit effects of the wet scrubber.

55. The problem is not with the selection of these technologies – indeed, Petitioners do not challenge their adequacy or appropriateness. The problem is that the Permit's emission limit for SAM fails to reflect the maximum degree of SAM reduction that is capable through implementation of these technologies at Plant Washington, which will be a new facility, employing the latest, state-of-the-art controls.

56. For example, P4G has pledged to use low oxidation catalyst in its SCR system. INT-ST-2 at ¶ 50. The purpose of such catalyst is to maintain high NO_X removal efficiency while minimizing the opportunities for SO_2 to SO_3 conversion, and hence, SAM creation. However, in its analysis, P4G assumed an unreasonably high rate of conversion – 0.3% per layer or 0.9% total – even though technology vendors were achieving (and guaranteeing) conversion rates lower than 0.5% across three catalyst layers as long as four years ago. Mr. Johnson of Fluor, who advised P4G regarding available technology, was unaware of such lower conversion rates. Because the projects he has worked on never required such lower conversion rates, Mr. Johnson had never asked for them. Tr. 1277. In this instance, Mr. Johnson did not ask, nor was he told by any vendor, that Petitioners' proposed SAM limit of 0.001 lb/MMBtu was not achievable with the latest

technology. Tr. 1267. Similarly, even though Ms. Prabhu of EPD had discussions with vendors about "new or different control technologies," she did not ask them about available conversion rates across the SCR system. Tr. 1552. As a result, the Permit's SAM emission limit fails to reflect the low levels of conversion that current low oxidation catalysts are capable of achieving.

57. Similarly, despite determining that the facility's wet scrubber would provide a co-benefit effect of controlling SAM emissions, EPD assigned no value to such reduction. EPD's failure to assign a value to the SAM removal effect of the wet scrubber is perplexing given that there is a wealth of data on the subject, developed by the power industry itself, showing that wet scrubbers can result in reductions as high as 50 to 60 percent.

58. Likewise, the Permit's SAM emission limit fails to reflect the use of coal selection as a SAM-reducing technology. The limit is based upon calculations that relied upon the higher sulfur 50/50 blend, even though P4G stated unequivocally in the application that 100% PRB coal would be the primary and preferred fuel. The Permit applies the same SAM limit for both coal types, even though the amount of SAM emissions depends on the sulfur content of the fuel. Although P4G attempted at trial to retreat from its prior representations, this is all the more reason that the Permit should apply a weighted average to SAM, as it does with respect to NO_X emissions. Moreover, there is nothing in the Permit that

requires the facility to use the 50/50 blend during annual compliance testing. Thus, even if the Permit did not apply a weighted average, Plant Washington could burn 100% PRB coal during its annual stack test and achieve a lower SAM limit.

59. Although framed as a technology standard, BACT is designed to set an emission limit. Tr. 1389. That emission limit must, in turn, reflect the maximum degree of reduction that is achievable for the source using the best available technologies identified through the BACT analysis. The Permit's SAM limit fails to do that. It is based on calculations that used the worst-case fuel and that applied only the reduction achievable from the use of duct sorbent injection alone. As a result, the Permit's SAM limit fails to account for the other SAM control technologies that P4G's identified and promised to employ, and whose use is mandated by the Permit. Because the Permit's SAM limit fails to reflect what the chosen control technology can actually achieve, it is not BACT.

60. P4G and EPD also failed to account for the various inherent SAM removal mechanisms that exist in the process train. Other than the co-benefit effect of the wet scrubber (which EPD assumed but did not quantify), these removal mechanisms include sulfur loss to bottom ash and the loss of SO_3 to ammonium salt formation at the air preheater. Like the co-benefit effect of the wet scrubber, these removal mechanisms have been recognized and documented by the power industry itself. Although EPRI has recognized some "measurement

uncertainty" with regard to estimating SAM removal at the air preheater, no such measurement uncertainty affects estimating sulfur loss to bottom ash. Moreover, to the extent measurement uncertainty affects estimates at the air preheater, this can be taken into account in establishing the margin for compliance. However, to cite measurement uncertainty as a reason not to account for such removal mechanism at all is error.

61. It is clear that EPD relied upon uncertainty as a pretext to avoid hard analysis. Because of what she perceived to be uncertainty in the factors relating to SAM creation and removal, Ms. Prabhu performed no calculations to verify the Permit's SAM limit until after the Permit was issued (and specifically to respond to the contentions of Petitioners' expert, Dr. Sahu). Tr. 1554-55. Ms. Prabhu's post-permit calculations, which did not account for removal mechanisms other than duct sorbent injection, and which assumed unreasonably high rates of SO_2 to SO_3 conversion, showed that Plant Washington would emit SAM at a rate three times the Permit limit when burning the 50/50 blend. Tr. 1590. Although Ms. Prabhu testified that her calculations gave her confidence about the Permit's SAM limit (RESP-ST-3 at ¶ 46), they do just the opposite: they call into question both the validity of the limit and EPD's analysis (or lack thereof) underlying it.

62. Ms. Prabhu testified that she selected the Permit's SAM limit not as a result of calculations but based on an analysis of "similar projects." Tr. 1558.

This was error. In setting emission limits, permitting agencies cannot limit their analysis to emission levels other plants have achieved. To determine the maximum level of pollution reduction that is "achievable" for a proposed new source, agencies also must examine enhanced levels of control that new facilities can achieve based on advances in technological capabilities. *See Sierra Club v. Environmental and Public Protection Cabinet*, slip op. at 7-8 (Ky. Cir. Ct. Aug. 6. 2007) (observing that "[t]he question that the Secretary must answer is not, 'What have other plants achieved in the past?' but rather, 'What can this plant achieve for the future?'" and concluding that it was error as a matter of law to base a BACT determination solely on "a retrospective survey of emissions achievements of older, less-advanced sources.") (Attachment D hereto).

63. For all of the above reasons, the Court concludes that the Permit's SAM limit is not reflective of BACT.

(iii) Proposed Remedy

63. The Court hereby **GRANTS** Count II of the Petition for Hearing and **REMANDS** to EPD for further proceedings consistent with this Decision. On remand, EPD is directed to perform an analysis, with accompanying calculations, that takes into account the lowest available conversion rates for the type and volume of catalyst anticipated for Plant Washington (based, if necessary, on additional information from the applicant regarding the design parameters of the

SCR system); sulfur loss to bottom ash; and estimated removals from the air preheater and wet scrubber based upon EPRI data. EPD is then directed to determine whether a lower emission limit should be set as BACT for SAM. EPD is further directed to analyze the feasibility of utilizing a weighted average for SAM.

B. Air Dispersion Modeling for 24-Hour Average PM_{10} – Count VII

In addition to demonstrating that Plant Washington will meet BACT emission limit requirements for each PSD pollutant the facility will emit in significant amounts, P4G also must demonstrate and EPD must confirm, before P4G commences construction, that Plant Washington will not cause or contribute to violations of the NAAQS or PSD increments for each regulated pollutant. 40 C.F.R. § 52.21(k) (providing the burden is on "[t]he owner of the proposed source" to show that "allowable emission increases from the proposed source … in conjunction with all other applicable emissions increases or reductions … would not cause or contribute to air pollution in violation of" PSD increment standards or the NAAQS). Petitioners contend, in Count VII of their Petition, that the PSD permit is unlawful because it is based on flawed air dispersion modeling that fails to adequately demonstrate that Plant Washington will not cause or contribute to violations of the 24-hour average PM_{10} NAAQS or PSD increments.

(i) Findings of Fact

64. Coarse particle pollution, or "PM_{10}," describes a class of very small particles and aerosols with an aerodynamic diameter of less than 10 microns.

65. Due to its extremely small size, PM_{10} pollution can evade the body's normal defense mechanisms and penetrate deep into the lungs. Scientific studies have linked PM_{10} pollution to harmful health effects, including decreased lung function, aggravated asthma, chronic bronchitis, irregular heartbeat, heart attacks, and premature death. *See* PET-ST-1 at ¶ 4; "National Ambient Air Quality Standards for Particulate Matter; Proposed Rule," 71 Fed. Reg. 2619, 2636 (proposed Jan. 17, 2006) (to be codified at 40 C.F.R. pt. 50).

66. EPA has determined that PM_{10} pollution poses a risk to people and the environment and, accordingly, has designated PM_{10} as a criteria pollutant. 40 C.F.R. Pt. 50.

67. The primary and secondary NAAQS for 24-hour average PM_{10} concentrations is 150 μ/m^3, which may not be exceeded more than once during a calendar year. 40 C.F.R. § 50.6(a) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(4)(c)(1)); Tr. 391.

68. The PSD increment for 24-hour PM_{10} pollution is 30 μ/m^3, which may not be exceeded more than once during a calendar year. 40 C.F.R. § 52.21(c) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(7)(b)(1)); Tr. 392.

69. The proposed site for Plant Washington lies in an attainment area for the 24-hour average PM_{10} NAAQS. *See* 40 C.F.R. § 81.311.

70. Pursuant to Georgia's SIP, before EPD could issue the PSD permit for Plant Washington, "[t]he owner or operator of the proposed source or modification shall demonstrate that allowable emission increases from the proposed source or modification, in conjunction with all other applicable emissions increases or reductions (including secondary emissions), would not cause or contribute to air pollution in violation of: (1) Any national ambient air quality standard in any air quality control region; or (2) Any applicable maximum allowable increase over the baseline concentration in any area." 40 C.F.R. § 52.21(k) (incorporated by reference by Ga. Comp. R. & Regs. r. 391-3-1-.02(7)(b)(8)).

71. In this manner, Georgia's SIP is designed to ensure, before EPD may issue a PSD permit for a new air pollution source in an attainment area, that the new pollution source will not emit air pollution that poses a threat to people or the environment or, by consuming too much of the available air pollution increment remaining within the air quality standard, stifle the possibility of other forms of growth in the area.

72. Air dispersion modeling is a computer-based tool used to predict the potential air quality impact of a proposed new air pollution source, such as Plant Washington, on people's health and the environment, by using mathematical

equations to characterize the transport and dispersion of air pollutants.

73. P4G's permitting consultant for Plant Washington, MACTEC, referred to and used various EPA and EPD guidance documents to model Plant Washington's PM_{10} emissions and resulting PM_{10} concentrations in the ambient air, including: (1) EPA's Guideline on Air Quality Modeling, found at 40 C.F.R. Pt. 51, Appendix W, Tr. 394-95; (2) EPA's NSR Manual, Tr. 395; (3) EPA's AP-42 Emission Factors, Tr. 396; (4) EPD's Quarry Modeling Guideline, Tr. 396-97.

74. To demonstrate that Plant Washington would not cause or contribute to a violation of the 24-hour average NAAQS and increments for PM_{10}, MACTEC used the AERMOD dispersion model. Tr. 394. AERMOD is the approved model for this situation based on EPA's *Air Quality Modeling Guideline*, promulgated in 40 C.F.R. Part 51, Appendix W, and Georgia's SIP. 40 C.F.R. § 52.21(l), Ga. Comp. R. & Regs. r. 391-3-1-.02(7)(b)(9); *see also* Ex. J011, Preliminary Determination, at 000080 (EPD Aug. 24, 2009); PET-ST-1 at ¶ 19; Tr. 394-95.

75. The accuracy and validity of air dispersion model results depend on the accuracy and representativeness of the data inputs into the model. Tr. 399. Important dispersion model inputs include the following:

- Source emissions: EPA guidelines require that the emissions input to the model, or the "emissions inventory," match the applicant's requested allowable permit levels for each emission source and each averaging time of interest.

- Stack and Release parameters: Physical data is needed

> describing stack height, inside diameter, exit velocity or flow rate, and stack exhaust temperature of each emission point. For area and volume sources, the model input data should reflect the actual physical dimensions and release characteristics of the sources being modeled.
>
> • Plot plan: A facility diagram is required showing the location of each emissions point, nearby buildings and structures, property boundary and perimeter fence line. This diagram should be to scale and show the Universal Transverse Mercator (UTM) coordinate system (or be transferable to UTM coordinates).
>
> • Topography: Topographical data for input to AERMOD can be derived from U.S. Geological Survey digital terrain data.
>
> • Meteorology: AERMOD uses meteorological inputs such as wind speed, wind direction, surface temperature, and mixing depth. These data are usually taken from a continuous record of meteorological measurements. EPA modeling guidance prefers on-site meteorological information, but off-site data such as a nearby National Weather Service station may be acceptable if they are demonstrated to be representative. The EPA Modeling Guidelines (40 C.F.R. 51, Appendix W) establish criteria for judging the data representativeness.

PET-ST-1 at ¶ 32; Tr. 399.

76. After determining appropriate and accurate input data for the model, the model is run and the model results are compared to applicable NAAQS and PSD increment to determine whether Plant Washington's maximum potential PM_{10} emissions in a 24-hour period would cause or contribute to a violation of the 24-hour average PM_{10} NAAQS and PSD increment under a range of representative meteorological conditions for the site. PET-ST-1 at ¶¶ 25 and 33.

77. For Plant Washington, EPD approached air dispersion modeling to

evaluate compliance with NAAQS and PSD pollutant increments in two stages. *See* Ex. J011, Preliminary Determination, at 000080 (EPD Aug. 24, 2009); Tr. at 397. The first step required P4G to model Plant Washington's PM_{10} emissions in isolation (a "screening model") to determine whether the facility's maximum potential PM_{10} emissions in a 24-hour period would be significant enough to warrant more robust, "cumulative" modeling. *See* Ex. J011 at 000080; Tr. 397-98. EPD explained in its Preliminary Determination that "[i]nitially, a Significance Analysis is conducted to determine if the . . . PM_{10} . . . emissions increases at the Plant Washington would significantly impact the area surrounding the facility. Maximum ground-level concentrations are compared to the pollutant-specific U.S. EPA-established monitoring significant level (MSL)." Ex. J011 at 000080. If this initial single source modeling showed that "a significant impact does result, further refined modeling would be completed to demonstrate that the proposed project would not cause or contribute to a violation of the NAAQS or consume more than the available Class II Increment." *Id*; Tr. 397-98.

78. Conversely, if the initial screening modeling for Plant Washington showed that its PM_{10} emissions would result in concentrations that exceed the significant impact level, then EPD would require P4G to conduct expanded modeling. In this second step, EPD would require "cumulative source" modeling to assess the combined air quality effects of Plant Washington and other emission

sources in the area that will affect air quality in the same ambient air locations as Plant Washington. *See* PET-ST-1 at ¶ 34.

79. The EPA-approved significance level for 24-hour PM_{10} concentrations used by EPD in this case is 5 μ/m^3. *See* PET-ST-1 at ¶ 15; *see also* Ex. J011 at 000080-81. This regulatory threshold represents the "significant impact" level that triggers a cumulative analysis of Plant Washington emissions with all other nearby PM_{10} emission sources. *Id.* Cumulative source modeling is required if the screening model results show that the peak PM_{10} concentrations exceed the significant impact level at one or more receptors. Tr. 398.

80. The 24-hour average PM_{10} modeling used as support for the Plant Washington PSD permit reported a maximum 24-hour average PM_{10} concentration of 4.951 μg/m^3, which is 99% of the significant impact threshold. *See* Ex. J011 at 000080-81; *see also* PET-ST-1 at ¶ 20; Tr. 397-99. Based on this initial modeling, EPD did not require, and P4G did not conduct, cumulative source modeling. PET-ST-1 at ¶ 21; Tr. 397-398.

81. Petitioners' air dispersion modeling claims focus on the modeling conducted to demonstrate compliance with the 24-hour average PM_{10} NAAQS and PSD increment. Specifically, Petitioners challenge P4G's estimates of maximum potential PM_{10} emissions from six "fugitive" dust sources: (1) paved haul roads; (2) unpaved haul roads; and (3) four transfer points and storage areas for PRB coal,

Illinois #6 coal, limestone, and bottom ash.

82. Fugitive dust generally refers to emissions of PM_{10} and other particulate matter that does not exhaust through a stack, chimney, vent, or similar device. Fugitive dust can occur as a result of a wide array of processes, including but not limited to: (1) dust generated by vehicle traffic traveling across a paved or unpaved road surface, (2) wind erosion from material stockpiles and other open areas where materials are stored such as ash or gypsum disposal sites, and (3) handling and transfer of materials such as coal and other minerals, aggregate, sand, and gravel. PET-ST-1 at ¶ 36.

83. EPA has compiled data on emissions from various industrial processes including fugitive dust. These data are expressed for the most part as an "emission factor," where the emissions magnitude can be related to one or more specific operational parameters for the equipment or process in question. These data have been placed in the EPA document "Compilation of Air Pollutant Emission Factors," more commonly known by its EPA document number of "AP-42." *See* Exs. J026, J027, J028, and J031.

84. To demonstrate Plant Washington's compliance with the 24-hour average PM_{10} NAAQS and PSD pollution increment requires modeling the "worst-case" daily average conditions. *See* 40 C.F.R. § 52.21(l) incorporated by reference into Ga. Comp. R. & Regs r. 391-3-1-.02 (7)(b)(9) and 40 C.F.R. Part 51,

Appendix W, Section 8.1; *see also* December 1, 2006 Georgia Air Dispersion Modeling Guidance; Ex. J001, NSR Manual, at 000194-197; EPA's "Example Air Quality Checklist" available on EPA's Support Center for Air Modeling (SCRAM) internet website at www.epa.gov/ttn/scram; Tr. 392-93. For the 24-hour average PM_{10} modeling, the "worst-case" daily emissions should represent the daily operating conditions that will produce the maximum emissions for each PM_{10} emission point within the facility based on the maximum physical and operational capacity for each emission point, unless limited by regulatory constraints or enforceable operational or physical permit conditions that will restrict emissions. Tr. 392-93; Ex. J001, NSR Manual, at 000195. In cases where a source operates intermittently (for example, only 5 days per week), the peak daily emissions rate will always exceed the annual average emissions rate. PET-ST-1 at ¶ 44.

85. Petitioners' air dispersion modeling expert, Howard Gebhart, reviewed the air dispersion modeling files produced by MACTEC on behalf of P4G, which were submitted to EPD in support of the Plant Washington air permit application. PET-ST-1 at ¶ 50. Based on his review of the MACTEC modeling files, Mr. Gebhart determined the relative contribution of the various Plant Washington emission sources to the 24-hour average PM_{10} concentrations at the receptor location experiencing the highest PM_{10} concentrations on the worst-case day. *Id.*

86. As Mr. Gebhart explained, the height at which an emission point releases PM_{10} pollution is important because for those emissions released close to ground-level there is less opportunity for dispersion and dilution of the pollutants compared to emissions from elevated stacks. *See* PET-ST-1 at ¶ 48; *see also* Tr. 401-402. Proximity to the ambient air boundary is also important for the same reason. *Id*. Where an emissions unit is close to the ambient air boundary—for example, where an emission source is close to the facility's fence line—there is less opportunity for plume dispersion before the emissions reach the public. *Id*. The effect of proximity is generally more pronounced for emission sources that have lower emission release heights. PET-ST-1 at ¶ 48.

87. Mr. Gebhart explained that fugitive dust sources are generally released at or near ground level. PET-ST-1 at ¶ 39. As a result, fugitive dust emissions have a greater relative impact on ambient PM_{10} concentrations compared to the same quantity of PM_{10} emissions released from an elevated stack. *Id*.

88. Mr. Gebhart determined that, due to the fact that fugitive dust sources release PM_{10} pollution close to ground level, they account for a large percentage of the PM_{10} concentrations at the highest receptor, even though fugitive sources account for a relatively small percentage of the total mass of PM_{10} emissions from the facility. PET-ST-1 at ¶¶ 49-51.

89. The table below shows the relative impact of the different Plant

Washington emission sources on 24-hour average PM_{10} concentrations for the worst-case modeling day. *Id.* Ex. P032, ARS Spreadsheet: Plant Wash PM_{10} Modeling Benchmark – Worst Case Day & Receptor.

Source	**24-Hour Average Concentration**	**Percentage**
Main stack	0.26	5.28%
Auxiliary stack	0.08	1.71%
Cooling towers	0.63	12.80%
Baghouses	1.60	32.31%
Paved Roads	0.20	4.08%
Unpaved Roads	1.58	31.92%
Other Fugitives	0.59	11.90%
Total PM-10	4.95	

Concentrations are listed in micrograms per cubic meter for the worst-case 24-hour average modeling period.

90. As Mr. Gebhart determined, the PM_{10} modeling results for Plant Washington show the expected relative influence of the plant's fugitive dust emission sources on the overall PM_{10} concentration. The fugitive dust sources, primarily traffic on paved and unpaved roads, account for almost 50% of the predicted PM_{10} concentration on the worst-case day in MACTEC's modeling analysis. On the other hand, the main boiler stack accounts for only 5% of the maximum PM_{10} impact, despite the fact that the main stack emissions account for the majority of the Plant Washington PM_{10} emissions. PET-ST-1 at ¶ 51.

91. MACTEC did not attempt to determine the relative impact of the different Plant Washington emission sources on 24-hour average PM_{10} concentrations. Tr. 401.

(a) Use of a Precipitation Mitigation Factor to Estimate Emissions

92. P4G calculated and modeled fugitive PM_{10} emissions from paved and unpaved roads according to the procedures outlined in EPD's "Quarry Modeling Guidelines," Ex. J024, and EPA's AP-42 emission factor documents for estimating fugitive dust emissions from paved and unpaved roads. Exs. J027, J028; *see* Ex. J002, PSD Modeling Protocol, at 000005.

93. According to EPD's Quarry Modeling Guideline, an applicant is directed to first calculate PM_{10} emissions from paved and unpaved roads by multiplying the maximum number of vehicle miles traveled in a 24-hour period by the uncontrolled PM_{10} emissions rate. Tr. 405-406.

94. After calculating the maximum uncontrolled PM_{10} emissions from paved and unpaved roads, the permit applicant is directed to apply a control efficiency figure based on the dust control measures that are required as enforceable conditions in the permit. Tr. 406.

95. In addition to the EPD Quarry Guideline, MACTEC relied on AP-42 § 13.2.1 (2006) to calculate uncontrolled PM_{10} emissions from paved and unpaved roadways. Tr. 414-15. For unpaved roads, the equation estimates the number of

days in a year with 0.01 inches or greater of precipitation and assumes that no road dust emissions would occur on such days. Ex. J027 at 13.2.1-6; PET-ST-1 at ¶ 71. The paved road mitigation factor is more complex, but is also based on the number of days in a year with precipitation of 0.01 inches or more. Ex. J027 at 13.2.1-6 and 1-7; PET-ST-1 at ¶ 71.

96. Equation 1 of AP-42 § 13.2.1 (2006) is designed to calculate uncontrolled emissions of dust from paved roadways. Tr. 416-417; J027 at 000004. Equation 1 does not include a precipitation correction factor for calculating maximum uncontrolled PM_{10} emissions in a 24-hour period. *Id.*

97. Similarly, EPD's Quarry Modeling Guideline does not include a precipitation correction factor for calculating maximum uncontrolled PM_{10} emissions in a 24-hour period. Tr. 417-418; J024 at 000007-8.

98. The AP-42 § 13.2.1 (2006) equations (Equations 2 and 3) use a precipitation correction factor only when calculating uncontrolled annual or other long-term average dust emissions from paved and unpaved roads. Tr. 421; J027 at 000006-7; PET-ST-1 at ¶ 70.

99. To develop an emissions inventory for the Plant Washington 24-hour average PM_{10} modeling in this case, P4G applied an annual precipitation correction factor to quantify the 24-hour average PM_{10} emissions for paved and unpaved roads. PET-ST-1 at ¶ 66.

100. The AP-42 annual precipitation correction factor is based on the annual occurrence of precipitation and has no bearing on PM_{10} emissions during 24-hour periods when precipitation does not occur. *Id.* As a result, the precipitation correction factor is inappropriate for use in estimating the maximum PM_{10} emissions over a 24-hour period. *Id.*; *see also* Tr. 1197 (Gale Hoffnagle testimony).

101. To reflect the fact that precipitation suppresses fugitive dust emissions, the precipitation correction factor reduces PM_{10} emissions from paved and unpaved roads during periods of precipitation. *See* Tr. 423; PET-ST-1 at ¶ 66.

102. The "worst-case" scenario for fugitive PM_{10} emissions from paved and unpaved roads in a 24-hour period are days with no precipitation. Tr. 424, 1197.

103. According to EPA, the Plant Washington site would be expected to receive, on average, precipitation of 0.01 inches or more 120 days a year. Tr. 422. This means that the site would receive no precipitation or less than 0.01 inches of precipitation 245 days a year. Tr. 422-424.

104. The 24-hour modeling for Plant Washington should have been based on PM_{10} emissions from paved and unpaved roads on a day when no precipitation will occur, which is the worst-case day for this source category. PET-ST-1 at ¶ 66. Tr. 1197.

105. By using the precipitation factor, the Plant Washington PSD permit modeling significantly underestimated the peak 24-hour average PM-10 emissions and associated ambient air quality impacts from paved and unpaved roads. *See* PET-ST-1 at ¶ 73.

106. Petitioners' expert, Howard Gebhart, corrected and quantified the effect of this error on ambient 24-hour average PM_{10} concentrations by running the AERMOD model using the same model inputs listed in the data files submitted on behalf of P4G by MACTEC, changing no other assumptions or inputs in P4G's air dispersion modeling, except that he modified the 24-hour average PM_{10} emissions for paved and unpaved roads to eliminate the precipitation correction factor. *See* PET-ST-1 at ¶ 74. Mr. Gebhart identified this emissions scenario as Case 2, for ease of reference. Ex. P034 Air Resource Specialists ("ARS") Spreadsheet: Revised PM_{10} Modeling (Case 2 - EPD Receptors - Summary of Full Year Results).

107. As Mr. Gebhart's modeling demonstrates, when the 24-hour average PM_{10} modeling is conducted without using the precipitation correction factor, the model produces a maximum 24-hour impact of 5.75 μ/m^3 for the maximum 24-hour average concentration at the ambient air receptors that P4G included in its PM_{10} modeling. PET-ST-1 at ¶ 75. Mr. Gebhart's modeling identified a total of 5 separate days where the 24-hour PM_{10} concentration exceeded the 5 μ/m^3 PSD

significance level. *Id.*

(b) <u>Lack of a Dust Suppression Plan for Achieving 90% Control</u>

108. In the Plant Washington PM_{10} inventory, a "control efficiency" of 90% has been assigned to reflect P4G's proposed level of dust control for truck traffic on paved roads. *See* PET-ST-1 at ¶ 77.

109. Achieving a 90% control efficiency for fugitive PM_{10} emissions from paved roadways requires specific control, monitoring, and verification methods. *Id.; see also* Tr. 436-437.

110. There has been no dust suppression plan developed for the paved and unpaved roads at Plant Washington. Tr. 430, 437.

111. The final Plant Washington PSD permit does not prescribe, as enforceable conditions of the permit, the specific control technologies, required frequency of use, or conditions that would trigger or limit application of the dust suppression methods, nor does the permit prescribe the monitoring and reporting requirements necessary to assure that P4G will consistently implement any such measures and actually achieve the 90% level of dust control that is assumed in the plant's PM_{10} modeling. *See* PET-ST-1 at ¶ 77. Tr. 1454.

112. Andrew Keeley, who led the MACTEC modeling effort on behalf of P4G, testified that he has prepared dust suppression plans before and, if requested to do so, could and would have prepared a dust suppression plan for Plant

Washington. Tr. 429-431, 438.

113. Under the PSD permit (Condition 2.22), P4G is required only to "take all reasonable precautions to prevent fugitive dust from becoming airborne" for a variety of emission sources including roadway particulate sources. Ex. J016 at 000012. In Condition 7.17 of the PSD permit, P4G is also required, at some future date, to "develop and implement a Dust Suppression Plan." *Id*. at 000027.

114. The PSD permit does not provide an opportunity for public notice or comment on any subsequently developed dust suppression plan. *Id.*; Tr. 1457.

115. Achieving a 90% reduction in fugitive dust emissions requires reducing the silt loading of the roadway surface by more than 90%. PET-ST-1 at ¶ 83.

116. The AP-42 equation P4G used to calculate the paved road PM_{10} emissions uses the road surface silt loading (sL) as a variable. Tr. at 406-407; PET-ST-1 at ¶ 91.

117. In the "uncontrolled" equation, P4G used a value of 8.2 grams per square meter to define the silt loading that would accumulate on the facility's paved haul roads if no dust control measures are implemented. PET-ST-1 at ¶ 91.

118. In AP-42, PM_{10} emissions are related to silt loading to the 0.65 power. PET-ST-1 at ¶ 91. Due to this nonlinearity, the actual silt loading of the road surface must decrease by substantially more than 90% in order to achieve a 90%

reduction in PM_{10} emissions. *Id.*

119. In order to achieve a 90% PM_{10} emissions control to reflect P4G's modeling assumptions regarding the effectiveness of its dust mitigation strategy, the "controlled" silt loading would be calculated using AP-42 to 0.24 grams per square meter, which is a reduction of about 97% in the "uncontrolled" silt loading of the road surface. PET-ST-1 at ¶ 92.

120. If dust suppression measures reduced the "silt loading" value by 90% from the uncontrolled level, the PM_{10} emissions control would equate to approximately 77.6% based on the AP-42 Emission Factors. PET-ST-1 at ¶ 93.

121. P4G and EPD used and relied on EPD's Quarry Guideline, AP-42, and EPA's Control of Open Fugitive Dust Sources document for guidance regarding potential levels of dust suppression that can be achieved with dust suppression measures. Tr. 431-432; PET-ST-1 at ¶ 96. EPD's Quarry Modeling Guideline incorporates the AP-42 emission factors and cites to the EPA's Control of Open Fugitive Dust Sources document to develop projected control efficiency rates for different dust suppression methods. Tr. 413-414, 431-433.

122. As stated in the June 30, 2010 affidavit of Peter Courtney, EPD relied on EPA's Control of Open Fugitive Dust Sources document as the basis for the 90% control figure used in the Plant Washington PSD permit. *See* PET-ST-1 at ¶ 96; Ex. J021, Cowherd, C.; Mukleski, G.E.; and Kinsey, J.S., Control of Open

Fugitive Dust Sources, Table 2-4, EPA-450/3-88-088, September 1988.

123. Based on EPA's Control of Open Fugitive Dust Sources, the only mitigation measure that has a documented PM_{10} emissions reduction of 90% or greater for fugitive dust emissions on a paved road surface is high pressure water flushing combined with sweeping. Ex. J021, Cowherd, C.; Mukleski, G.E.; and Kinsey, J.S., Control of Open Fugitive Dust Sources, Table 2-4, EPA-450/3-88-088, September 1988; PET-ST-1 at ¶ 97.

124. The PSD permit states that dust from paved and unpaved roads will be controlled with a combination of water sprays and/or dust suppressants. Ex. J016, Final PSD permit, at 000004, 000012, 000027. The PSD permit does not indicate the quantity of water or suppressants that will be applied, the intensity of application, the frequency of application, the number of vehicle passes between applications, or the monitoring and recordkeeping requirements to insure that these techniques are effective. *Id.*; PET-ST-1 at ¶¶ 77, 87; Tr. 436-437.

125. EPA's Control of Open Fugitive Dust Sources provides an equation for determining the emissions reduction associated with high pressure water flushing combined with sweeping. Ex. J021 at 000031; PET-ST-1 at ¶ 97. The control efficiency is calculated as "96 – 0.263 V", where "96" is the initial control efficiency and "V" is the number of vehicle passes between applications of the control measure. *Id.*; Tr. 433-434. As this equation illustrates, the effectiveness of

high pressure water flushing combined with sweeping diminishes by 0.263% with each vehicle that travels along the road.

126. The Plant Washington PSD permit states that 126 vehicles per day will travel along the paved road to the ash disposal area. PET-ST-1 at ¶ 98; Tr. 405-406. If the control measure is applied once per day, the control efficiency degrades to 62.9% by the end of the day (96 – (0.263 * 126) = 62.9). Thus, if the control measure (high pressure water flushing combined with sweeping) is applied once per day, the average control over the entire 24-hour period is only 79.5% ((96 + 62.9)/2) = 79.5). This would roughly double the PM_{10} emissions from the paved road compared to the 90% control assumed in the PSD application.

127. To achieve a 90% level of control, the control measure (high pressure water flushing combined with sweeping) needs to be reapplied every 45.6 vehicle passes to achieve a 90% emissions reduction. PET-ST-1 at ¶ 99. With a maximum of 126 vehicle trips per day, the control measure needs to be applied three times daily to achieve a 90% emissions reduction (126/45.6 = 2.76). *Id.*

128. The PSD permit does not identify the specific provisions that must be employed by P4G to achieve a 90% control level of fugitive dust from paved haul roads nor the requirements for testing, monitoring, and recordkeeping in order to ensure that the dust control measures that are eventually adopted are effective and properly implemented to achieve the 90% emissions reduction. PET-ST-1 at ¶¶

77, 87-88.

129. In light of the fact that the PSD permit does not specify or mandate implementation of specific dust suppression control measures that have been demonstrated to achieve a 90% level of fugitive dust control on a consistent basis, Petitioners' expert, Howard Gebhart, conducted a revised PM_{10} modeling analysis to determine the ambient air concentrations of PM_{10} without this control measure. PET-ST-1 at ¶¶ 87-88.

130. Mr. Gebhart designated this emissions scenario as Case 3, which also excludes use of the precipitation correction described under Case 2 earlier. Ex. P036, ARS Spreadsheet: Revised PM10 Modeling (Case 3 - EPD Receptors - Summary of Full Year Results). PET-ST-1 at ¶ 88.

131. The PM_{10} modeling results for Case 3 resulted in a maximum 24-hour impact of 9.47 μ/m^3, maximum 24-hour average concentration at the ambient air receptors identified in the PSD application. *Id.* The modeling identified a total of 26 separate 24-hour days where the 24-hour PM_{10} concentrations exceeded the 5 μ/m^3 PSD significance level. *Id.*

(c) <u>Underestimating Average Vehicle Weight on Paved Roads</u>

132. The Plant Washington facility will require trucks to transport fly ash, bottom ash and gypsum from the main plant area, known as the "power block," to the on-site solid waste management facility. *See* PET-ST-1 at ¶ 57.

133. For traffic on paved roads, the AP-42 emission factor generates estimates of PM_{10} emissions in terms of mass (*i.e.*, lbs) per unit distance of vehicle travel (*i.e.*, vehicles miles traveled, or "VMT"). PM_{10} emissions are a function of the total VMT at the source over the period of interest, in this case, one day.

134. Additionally, PM_{10} emissions are a function of unit-specific operating data such as the dustiness of the road surface (*i.e.*, silt loading for a paved road in units of grams per square meter) and the average vehicle weight (generally expressed in tons). PET-ST-1 at ¶ 57; Ex. J027, J028; Tr. 407-408.

135. In the AP-42 equation, the average vehicle weight variable is raised to the 1.5 power, meaning that changes in average vehicle weight have a greater than one-to-one effect on PM_{10} emissions. Ex. J027; PET-ST-1 at ¶ 60; Tr. 506. For instance, this means that doubling the vehicle weight would more than double the associated PM_{10} emissions. PET-ST-1 at ¶ 60. In fact, doubling the average vehicle weight would change the associated PM-10 emissions by a factor of 2.83. *Id.*

136. The average vehicle weight is influenced by two factors, the truck's empty-weight (or the truck weight when unloaded, "WU") and the payload carried by the truck ("WL"). When loaded, the total weight would be the sum of the empty-weight and the load ("WU + WL"). Ex. J027; PET-ST-1 at ¶ 62; Tr. 407-408.

137. The average vehicle weight used in the emission calculations for truck travel on paved roads is linked to the empty weight of the truck and the weight of the material moved. Ex. J027; PET-ST-1 at ¶¶ 63-64.

138. If the truck travels the same distance back and forth when delivering a load, then the average vehicle weight is the mean of the empty-weight and the loaded weight, or:

$$W = (WU + (WU + WL)) / 2$$

Ex. J027; PET-ST-1 at ¶ 64; Tr. 407-408.

139. If the mass or weight of the vehicle or the material transferred is not properly accounted for when calculating the paved road emissions rate, the resulting PM_{10} emissions may be significantly in error, even if the emissions and associated modeling is based on the correct number of vehicle trips. PET-ST-1 at ¶ 65.

140. According to the Plant Washington PM_{10} emissions inventory and associated modeling, the average vehicle weight used in the permit calculations for truck traffic on the paved road leading to the ash disposal area was 12.5 tons. PET-ST-1 at ¶ 108; Tr. 407-408.

141. According to the Plant Washington PM_{10} emissions inventory and associated modeling, the maximum payload per truck was 20 tons. Tr. 409.

142. Based on the AP-42 equation for calculating average vehicle weight, a

vehicle with a payload of 20 tons and an average vehicle weight of 12.5 tons would have an empty-weight of 2.5 tons. *Id*. A 2.5 ton vehicle is about the size and weight of a full-size pickup truck, which is much smaller than vehicles typically used for hauling coal and coal ash at coal-fired power plants. Tr. 1215.

143. Based on the EPD Quarry Modeling Guideline that EPD directed MACTEC to use for modeling PM_{10} emissions from paved roads, and customary practices at coal-fired power plants, vehicles used to haul coal and coal ash would weigh approximately 22 tons and have a 21 ton payload capacity. J024; Tr. 324-328, 504-506. This would yield an average vehicle weight of 32.5 tons. Tr. 327-328.

144. Changing the average vehicle weight from 12.5 tons to 32.5 tons would increase PM_{10} emissions by a factor of 4.2. Tr. 327-328.

(d) <u>Annualizing Emissions from Material Handling Points</u>

145. Petitioners claim that the AERMOD modeling for Plant Washington is flawed because it incorrectly uses the same PM_{10} emissions rate for the annual modeling and 24-hour average modeling at several emission sources, which normalizes or "smoothes out" the peak daily PM_{10} emissions from these sources. *See* PET-ST-1 at ¶ 116.

146. Specifically, Petitioners have identified the following emission sources:

- Transfer Point for PRB Coal (Emission Points A6, A8);
- Transfer Point for Illinois Basin Coal (Emission Points A7, A9)
- Limestone Transfer Point (Emission Point A10)
- Bottom Ash Transfer Point (Emission Point A3)

Id.

147. To calculate the maximum 24-hour average PM_{10} emissions from the identified material handling and transfer points, P4G based the material throughput at each emission point on the maximum hourly coal usage by the boiler. INT-ST-1 at ¶¶ 52-53; Tr. 453-456. Peak production from the boiler will occur during highest electricity demand and utilization of the boiler to meet that demand. PET-ST-1 at ¶ 121.

148. The peak daily emissions from the coal and limestone handling transfer points will occur on days with the most intense activity at each emission point. PET-ST-1 at ¶ 122. This, in turn, will occur on days when coal or limestone are delivered to the facility and on days when those materials are transferred to storage piles or elsewhere. *Id.*

149. Coal and limestone will be delivered to the facility by railroad cars. *Id.*; Tr. 442.

150. As demonstrated by the process flow diagrams for the coal handling system and limestone handling system in the Plant Washington Revised PSD Application (Ex. J05 at 000029, Figure 2-2, and 000031, Figure 2-3), there is no material storage for coal or limestone upstream of their respective stockpiles.

PET-ST-1 at ¶ 122; Tr. 461. As such, coal and limestone will be loaded to the storage piles at the same rate as the rail unloading for each material. *Id.*

151. Based on data in the Revised PSD Application, Ex. J005 at 000424, the coal unloading rate is 1,500 tons per hour and the limestone unloading rate is 1,000 tons per hour. PET-ST-1 at ¶ 122; Tr. 442-43.

152. The PSD permit does not limit the amount of coal or limestone that can be delivered by railcar and transferred to Emission Points A6, A7, A8, A9, or A10, as appropriate, in any 24-hour period. Tr. 443-44. As a result, the amount of coal and limestone received and transferred in any 24-hour period is limited only by the physical capacity of the coal and limestone unloading and handling facility. *Id*.

153. Over a 24-hour period, the maximum physical capacity of the coal and limestone unloading and handling facility is 36,000 tons of coal and 24,000 tons of limestone. Tr. 445.

154. The maximum amount of coal that the boiler is physically capable of burning in a 24-hour period ranges from approximately 10,000 tons per day for the 50/50 blend of PRB and Illinois #6 coal, up to 11,712 tons per day for 100% PRB coal. Tr. 453-456. This equates to a maximum coal consumption capacity of between 417 and 488 tons per hour. Tr. 454, 456.

155. To supply the boiler and build up and maintain the active and inactive

coal piles, more coal will have to be delivered than the boiler can consume in any given 24-hour period. Tr. 462-464.

156. The inactive coal pile is designed to store a 90-day supply of coal, which equates to approximately one-million tons of coal at maximum boiler capacity. Tr. 463. It will take approximately 2 years to build the inactive coal piles for PRB and Illinois No. 6 coal to their intended capacity. *Id.*

157. The maximum physical capacity of the coal unloading facility to unload and transfer coal to the active and inactive coal piles in any 24-hour period exceeds by more than 3 times the maximum capacity of the boiler to consume coal in any 24-hour period.

158. With respect to the two bottom ash transfer points modeled as part of Emission Source A3, the emissions inventory and PM_{10} modeling are based on an annual ash throughput of 273,660 tons per year, which equals an average of about 750 tons per day. *See* PET-ST-1 at ¶ 123. One of the bottom ash transfer points references transfer from bin to truck, representing the truck-loading rate assumed by the modeling. *Id.* Thus, the PM_{10} compliance demonstration is based on a transfer rate of bottom ash to trucks of no more than 750 tons per day. *Id.*

159. The Plant Washington PM_{10} modeling assumes that the peak 24-hour emissions for the bottom ash handling and transfer point will be at a constant daily rate, every day of the year, with no allowance for day-to-day variability. PET-ST-

1 at ¶ 124.

160. The PSD application indicates, however, that the waste-haul trucks will not operate daily, which negates the modeling assumption that the number of truck trips and amount of materials hauled to the solid material handling facility will be consistent for each 24-hour period. *See* Ex. J005 at 000035.

161. Because the waste-haul trucks are not expected to operate consistently on a daily basis, making the same number or trips with the same loads and mean vehicle weights, the maximum daily loading rate for bottom ash has been underestimated along with the associated PM_{10} emissions for Emission Source A3.

(e) Failure to Model Ambient Air on Public Roads

162. The proposed Plant Washington site is bisected by two roads—Mayview Road and Mathis Road—that currently are open to and used by the public. *See, generally,* P104, Aerial Depiction of Plant Washington Site; Tr. 50-69, 89-108, 464-465.

163. Mayview Road and Mathis Road currently are public rights-of-way that provide access to local residents and to nearby Minton Springs Church, which is located within one-half mile of the northern property boundary proposed for Plant Washington. *See, generally,* Tr. 50-69; 89-108, 464-465; PET-ST-1 at ¶ 127.

164. Minton Springs Church is located in the area projected to experience some of the highest PM_{10} concentrations and impacts. *See* Ex. RI002, Plant

Washington Maximum 24-hour PM10 Impacts in Model Year 1989.

165. The Plant Washington PSD permit does not contain any conditions requiring the closure or relocation of Mayview Road or Mathis Road before P4G can commence construction of Plant Washington. *See* Ex. J016; PET-ST-1 at ¶ 56; Tr. 465

166. The decision to close and/or relocate Mayview Road and Mathis Road is outside EPD's jurisdiction and may require additional public proceedings before a final determination can be made. *See, e.g.,* Ex. J037, Letter to Dean Alford, P4G, re: relocation of Mayview Road (Tommy Walker, 08/03/2010).

167. P4G did not locate, and EPD did not require, modeling receptors on Mayview Road or Mathis Road. Tr. 464-465.

168. Because Mayview and Mathis Roads are open to public access and the PSD permit does not prohibit commencement of construction until the roads are closed or relocated, Petitioners' expert, Howard Gebhart, conducted additional modeling for receptors along Mayview Road and Mathis Road. PET-ST-1 at ¶ 128.

169. This additional modeling was performed incorporating corrections for some of the other modeling errors Mr. Gebhart identified in this testimony, specifically: 1) eliminating the precipitation correction factor for paved and unpaved roads (Case 2, *supra*); 2) using Case 2 but also eliminating the control

efficiency credit for paved roads on the basis that the specific controls were not identified and the emissions control credit is unenforceable (Case 3, *supra.*); and 3) using Case 3, but also changing the mean vehicle weight for traffic on the paved road for ash hauling from 12.5 to 27.5 tons to reflect an appropriate average vehicle weight. *Id*. Otherwise, Mr. Gebhart's modeling was based on all the same model parameters used by P4G in its air dispersion modeling. *Id.*

170. According to Mr. Gebhart's Case 2 modeling results, which retained all of P4G's modeling inputs but eliminated P4G's use of the annual precipitation correction factor for paved and unpaved roads to model peak 24-hour average emissions, the maximum PM_{10} impact was 8.67 μ/m^3, measured on a 24-hour average. *Id*. The location of the maximum impact was along Mayview Road, near where the haul road to the solid material handling facility would cross the public right-of-way. *Id*. This concentration exceeds the PM_{10} significance modeling level of 5 μ/m^3, indicating the need to conduct a cumulative modeling analysis for PSD increment and NAAQS compliance. Mr. Gebhart depicted the results of this modeling on Ex. P035, ARS Spreadsheet: Revised PM-10 Modeling (Case 2 – Interior Receptors – 5 Years).

171. According to Mr. Gebhart's Case 3 modeling results, which retained all of P4G's modeling inputs but eliminated P4G's use of the annual precipitation correction factor and the assumed 90% control efficiency credit for paved roads,

the maximum PM_{10} impact was 41.5 μ/m^3, measured on a 24-hour average. The location of the highest PM_{10} concentration also was along Mayview Road near where the haul road to the solid material handling facility would cross the public right-of-way. This impact exceeds the PM_{10} significance modeling level of 5 μ/m^3, indicating the need to conduct a cumulative modeling analysis for PSD increment and NAAQS compliance. Additionally, the Case 3 modeled PM_{10} concentrations from Plant Washington alone would exceed the Class II PSD increment along Mayview Road based on the predicted highest-second-highest 24-hour average impact of 38.2 μ/m^3. Mr. Gebhart depicted the results of this modeling on Ex. P037, ARS Spreadsheet: Revised PM-10 Modeling (Case 3 – Interior Receptors – 5 Years).

172. In addition to the Case 3 model results described above, Mr. Gebhart also ran the Case 3 modeling scenario with a corrected average vehicle weight of 27.5 tons. PET-ST-1 at ¶ 131. The results of this revised Case 3 modeling produced a maximum PM_{10} concentration of 132.93 μ/m^3 and a highest-second-highest PM_{10} concentration of 123.17 μ/m^3, measured over a 24-hour average. *Id.* The location of this worst-case impact was also along Mayview Road near where the haul road to the solid material handling facility crossed the public right-of-way. *Id.* The maximum PM_{10} impact under this emissions scenario exceeds the PM_{10} significance modeling level of 5 μ/m^3, indicating the need to conduct a cumulative

modeling analysis for PSD increment and NAAQS compliance. *Id.* Moreover, the predicted PM_{10} impact from Plant Washington alone under this scenario would exceed the Class II PSD increment along Mayview Road based on the predicted highest-second-highest 24-hour average impact. *Id.* Finally, EPD has established a background PM_{10} concentration of 38.5 μ/m^3, measured over a 24-hour average, for the area in which Plant Washington would be located. *See* Ex. P027, Preliminary Determination from Carbo Ceramics, Inc, Wilkinson County, Oct. 2009. When the PM_{10} concentrations demonstrated by Mr. Gebhart's revised Case 3 are added to the background concentration of 38.5 μ/m^3, the highest-second-highest PM-10 concentration would exceed the PM_{10} NAAQS of 150 μ/m^3, 24-hour average. Mr. Gebhart depicted the results of this modeling on Ex. P039, ARS Spreadsheet: Revised PM-10 Modeling (Case 3 – Interior Receptors – with corrected vehicle wt.).

(f) Representative Meteorological Data

173. An integral part of the air dispersion modeling process requires obtaining meteorological data that accurately represent the range of meteorological conditions that would be expected at the project site. PET-ST-1 at ¶ 134; Tr. 466-468, 513-514.

174. The AERMOD model requires, in addition to an accurate inventory of the potential emissions of air pollutants, two types of meteorological information

in order to predict potential concentrations of ambient air pollution under a range of reasonably expected weather conditions: (1) representative surface meteorological data; and (2) a representative profile of the upper air, or "vertical," meteorology above the project site. Tr. 466-467, 514.

175. The surface meteorological measurements are then paired with the upper air meteorology profile, and the model assumes those data sets represent the surface and upper air meteorological conditions at the project site. Tr. at 467-468.

176. There are two basic ways to obtain these data: (1) either by obtaining at least one-year of onsite measurements of surface and vertical meteorological conditions; or (2) by using five years of offsite data that are demonstrated to be representative of meteorological conditions at the project site. PET-ST-1 at ¶ 134; Tr. 466-468, 513-514.

177. For the Plant Washington AERMOD modeling, P4G used as the surface meteorological measurements data from Middle Georgia Airport at Macon, Georgia, which is located about 55 miles (90 km) from the proposed plant site at Sandersville, Georgia. PET-ST-1 at ¶ 147; Tr. 466. The meteorological data at Macon were collected at a measurement height of approximately 23 feet. PET-ST-1 at ¶ 157. Notably, the Plant Washington stack height is projected to be 450 feet. *Id*. The surface meteorological data from Macon was used to define the surface winds and temperature data for input to AERMOD. PET-ST-1 at ¶ 147; Tr. 466,

514.

178. EPA criticized P4G's use of the Macon surface data to characterize surface conditions at the Plant Washington project site because P4G's comparison of the Macon site was not adequate to demonstrate that it was representative of the surface conditions at the Plant Washington site. Tr. 468-471.

179. The upper air data for the Plant Washington modeling was taken from the National Weather Service's Centreville, Alabama site, which is located about 250 miles (400 km) from the project site at Sandersville, Georgia. PET-ST-1 at ¶ 148; Tr. 517.

180. In AERMOD, the upper air data are used to define the temperature structure of the atmosphere at or near sunrise in order to estimate the convective boundary layer growth during the day. PET-ST-1 at ¶ 148.

181. Petitioners' expert, Howard Gebhart, testified that the large distance between Centreville and the project site near Sandersville introduces the potential for substantial errors in accurately defining the vertical temperature profile. PET-ST-1 at ¶ 149. As Mr. Gebhart explained, instances where significant errors may be introduced include periods of active weather where fronts or convective storms propagate from west to east. *Id.* In such cases, the active weather may lie between Centreville and Sandersville at the time of the morning sounding, causing differences in important air mass characteristics between these two locations. *Id.*

182. By relying on meteorological data from the Centreville, Alabama site, however, the AERMOD model will treat the Sandersville location as if it lies behind the weather front, when in fact, Sandersville would lie ahead of the weather front in a completely different air mass. PET-ST-1 at ¶ 150. The probability for such an occurrence increases with increasing distance between the project site and the measurement site. *Id.* For this reason, proximity is one of the variables EPA recommends evaluating to assure data representativeness. *Id.*

183. Another important situation that occurs with some regularity is a "backdoor" cold front that moves into Georgia from the northeast. PET-ST-1 at ¶ 151. In this situation, the Appalachian Mountains can act as a barrier to movement of the weather front, so that these fronts typically do not move further west into Alabama. *Id.* This situation also results in sharp differences in air masses between Centreville, Alabama and Sandersville, Georgia, which in turn introduces errors in defining the vertical temperature profile used by AERMOD. *Id.*

184. EPD called as an expert meteorologist Billy Burns Murphey, Jr. Tr. 510-511; RESP-ST-1.

185. Dr. Murphey testified that EPD first consulted him regarding Plant Washington just a few weeks before the hearing, and after the modeling protocol was developed and EPD had issued the PSD permit. Tr. 512.

186. Dr. Murphey agreed that when using off-site meteorological data it is

important to verify that they are representative of conditions expected at the project site. Tr. 518.

187. Dr. Murphey testified that he was not aware of any efforts to correlate the ground-level weather conditions at the Centreville, Alabama site with the weather conditions at the Plant Washington site. Tr. 519.

188. Dr. Murphey also acknowledged that localized weather systems, larger frontal systems, and high-pressure systems like the "Bermuda High" could affect weather in one area, like Georgia, and not in a different area, such as Centreville, Alabama. Tr. 519-525.

189. For instance, in 2004 and 2005, the Bermuda High expanded beyond its normal area and sat just offshore or directly on top of Georgia. Tr. 520. When the Bermuda High sits over an area, it shuts down the wind, resulting in hot, stagnant, sunny weather. Tr. 521. As you move farther from the area outside the high pressure cell, the weather can be quite different. Tr. 521- 525.

(ii) Conclusions of Law

(a) Use of a Precipitation Mitigation Factor to Estimate Emissions

190. Based on the applicable AP-42 Emission Factor documents and EPD Quarry Modeling Guidelines used and relied on by EPD and P4G, modeling to demonstrate Plant Washington's compliance with the 24-hour average PM_{10} NAAQS and PSD pollution increment requires modeling the "worst-case" daily

average conditions. *See* 40 C.F.R. § 52.21(l) incorporated by reference into Ga. Comp. R. & Regs r. 391-3-1-.02 (7)(b)(9) and 40 C.F.R. Part 51, Appendix W, Section 8.1; *see* Exs. J024, J027, and J028; *see also* Ex. J002, PSD Modeling Protocol, at 000005.

191. The testimony and evidence adduced at trial demonstrates that the "worst case" conditions for fugitive PM_{10} emissions from paved and unpaved roads will occur on days with no precipitation. Tr. 424.

192. Applying the precipitation correction factor to compute 24-hour average PM_{10} emissions from paved and unpaved roads contradicts the guidance in AP-42, §§ 13.2.1 and 13.2.2, as well as EPD's Quarry Modeling Guideline. *See* J024, J027, and J028; *see also* PET-ST-1 at ¶ 72.

193. The precipitation correction factor is properly used when modeling PM_{10} emissions during longer averaging periods, such as for modeling annual average emissions, to account for precipitation and reduced PM_{10} emissions that are projected to occur over the course of a year. PET-ST-1 at ¶ 66; Tr. 425.

194. It is improper to use the precipitation correction factor to model 24-hour average PM_{10} emissions, in which the objective is to model the maximum PM_{10} emissions that would occur over the course of a 24-hour period, because precipitation does not occur every day of the year. *See* PET-ST-1 at ¶ 66; Tr. 422, 424, 1197.

195. P4G erred by using, and EPD erred by approving the use of, a precipitation correction factor to calculate uncontrolled PM_{10} emissions from paved and unpaved roads at the Plant Washington site. Correcting P4G's erroneous use of the precipitation correction factor, the PM_{10} emissions from Plant Washington would exceed the 5 μ/m^3 significant impact level established by EPA. *See* PET-ST-1 at ¶ 76.

196. As a result, correcting this error requires P4G to conduct cumulative source modeling of the PM_{10} emissions from Plant Washington and other sources of PM_{10} air pollution in the area to determine whether the sources in combination would exceed the Class II PSD increment or violate the NAAQS for 24-hour average PM_{10} concentrations. *See Id.*

(b) <u>Lack of a Dust Suppression Plan for Achieving 90% Control</u>

197. PSD permits must contain all applicable requirements of the Clean Air Act and state PSD programs. 42 U.S.C. § 7475(a)(1)-(8).

198. As a corollary, PSD permits also must include enforceable provisions to implement any assumptions or conditions that are used to demonstrate and ensure that the permitted pollution source will comply with all applicable PSD requirements. *Id*. § 7475(a)(1), (3).

199. Pursuant to these fundamental requirements, Georgia's SIP-approved PSD permitting program directs that PSD permits must "specify the conditions

under which the facility shall be operated in order to comply with the Act and rules and regulations." Ga. Comp. R. & Regs. r. 391-3-1.03(2)(c).

200. Applicable provisions of the Act and Georgia's PSD program prohibit issuance of a PSD permit without a showing that the facility's "technological system of continuous emission reduction which is to be used will enable such source to comply with the standards of performance which are to apply to such source." *Id.* § 7410(j).

201. Contrary to these fundamental requirements, the Plant Washington PM_{10} modeling inventory assumes a "control efficiency" of 90% to reflect the proposed level of PM_{10} dust control for truck traffic on paved roads, even though the PSD permit does not identify or require specific emissions technologies or controls that will achieve a 90% reduction in PM_{10} emissions.

202. By relying on the assumption that P4G will consistently achieve a 90% reduction of PM_{10} emissions from paved roadways, despite the fact that the PSD permit does not identify or contain any enforceable fugitive dust control requirements or a dust suppression plan designed and demonstrated to achieve the required 90% reduction, the permit fails to "demonstrate[] . . . that emissions from construction or operation of [Plant Washington] will not cause, or contribute to, air pollution in excess of any . . . maximum allowable increase . . . national ambient air quality standard . . . or . . . any other applicable emission standard or standard of

performance." 42 U.S.C. § 7475(a)(3)(A).

203. Without a demonstrated, verifiable, and enforceable dust suppression plan that will consistently achieve a 90% level of PM_{10} fugitive dust control from paved roads, it is more likely than not that the maximum modeled 24-hour average PM_{10} concentration due to the Plant Washington facility itself would equal or exceed the 24-hour average modeling significance level of 5 $\mu g/m^3$.

204. To correct this error, EPD should require P4G to develop and demonstrate an effective dust suppression plan that will reliably achieve a 90% level of fugitive dust control from paved roads, make the plan available for public notice and comment, and, if the plan meets the assumed control capabilities, incorporate it as an enforceable part of the permit. Additionally, any such plan must include monitoring measures that are adequate to demonstrate compliance with the control requirements. To do this, the permit should include specific dust suppression requirements that are demonstrated to achieve a 90% level of dust control from paved roads on a consistent basis and monitoring protocols that will demonstrate compliance with the plan and the 90% level of control.

205. Further "[t]he Clean Air Act requires meaningful public participation in the PSD permitting process." *In the Matter of: Hadson Power 14 - Buena Vista, Permit No. 211301992*, 4 E.A.D. 258, 1992 EPA App. LEXIS 44, 33 (1992) (citing

42 U.S.C. § 7475(a)(2) and 40 C.F.R. § 51.166(q)(2)(iii)[5]). For this reason, EPD must supply the public with the information it needs to participate meaningfully in the permitting process, including the specific terms of the dust suppression plan, and provide an opportunity for the public to test and comment on the dust suppression plan.

(c) Underestimating Average Vehicle Weight

206. The Plant Washington air dispersion modeling used an unrealistic and incorrect average vehicle weight that does not adequately allow for transfer to the on-site waste management facility of the maximum daily volume of bottom ash, fly ash, and gypsum, which are byproducts of coal combustion.

207. The weight of vehicles traveling along the plant's haul roads is an important model input for calculating the PM_{10} emissions from roadways.

208. By understating the average weight of vehicles traversing Plant Washington's haul roads, the air dispersion modeling understates the PM_{10} emissions that will be associated with haul truck traffic on the paved roads at Plant Washington and this, in turn, underestimates the overall 24-hour average PM_{10} impacts from Plant Washington.

209. As a result, the screening model performed for Plant Washington does

[5] 40 C.F.R. § 51.166 specifies the minimum plan requirements for a state to obtain approval of a SIP to implement the Act's PSD program; 40 C.F.R. § 51.166(q)(2)(iii) is substantially similar to 40 C.F.R. § 52.21(q), which incorporates the public participation provisions in 40 C.F.R. Pt. 124 (prescribing EPA procedures for issuing, modifying, revoking and reissuing, or terminating all PSD permits, among others).

not adequately demonstrate that the facility's PM_{10} emissions will not exceed the significant impact level for 24-hour average PM_{10} emissions, thus requiring cumulative source modeling with all other PM_{10} sources that would affect air quality in the area.

210. For the same reasons, the air dispersion modeling for Plant Washington does not adequately demonstrate that the facility's PM_{10} emissions will not cause or contribute to violations of the 24-hour average PM_{10} NAAQS or PSD increments.

(d) Annualizing Emissions from Material Handling Points

211. According to the EPA guidelines that EPD directed P4G to use for the PSD permitting process, each individual emission source within the Plant Washington facility should be modeled at an emissions and processing rate that represents the peak utilization of that process for the averaging time in question.

212. EPA's NSR Manual specifies the emissions information required for the modeling analysis:

> For both NAAQS and PSD compliance demonstrations, the emissions rate for the proposed new source or modification must reflect the maximum allowable operating condition as expressed by the federally enforceable emissions limit, operating level, and operating factor for each applicable pollutant and averaging time.

Ex. J001 at 000195.

213. To demonstrate compliance with the 24-hour PM_{10} NAAQS and PSD

increment, the emissions inventory for the 24-hour average PM_{10} modeling should represent the daily operating conditions that will produce the maximum emissions for each emissions point within the facility, as limited by regulatory constraints or enforceable permit conditions that will restrict emissions.

214. The testimony and evidence adduced in this case demonstrate that the emissions inventory for daily PM_{10} from the material handling and transfer emissions sources identified by Petitioners in Count VII (namely, the transfer points for PRB coal (Emission Points A6, A8), Illinois Basin coal (Emission Points A7, A9), Limestone (Emission Point A10), and Bottom Ash (Emission Point A3)) did not reflect the peak daily emissions from these sources based on the maximum potential material throughput for each source in a 24-hour period.

215. The peak daily emissions from these emissions points will occur during periods with maximum material throughput.

216. The maximum physical capacity for coal unloading and transfer to the coal piles is 1,500 tons per hour, and the limestone unloading and transfer rate is 1,000 tons per hour. PET-ST-1 at ¶ 122; Tr. 442-443, 445. In a 24-hour period, this translates in a material throughput of 36,000 tons of coal and 24,000 tons of limestone per day. Tr. 442-443, 445.

217. Because the maximum capacity to unload and transfer coal and limestone is not limited by regulation or permit condition, the PM_{10} inventory

should reflect emissions based on these material throughput rates.

218. P4G and EPD erred, however, by calculating the maximum PM_{10} emissions from these material handling and transfer points based on the maximum amount of coal that the boiler is physically capable of burning in a 24-hour period. INT-ST-1 at ¶¶ 52-53; Tr. 453-456. The maximum amount of coal the boiler can burn in a 24-hour period ranges from approximately 10,000 tons per day for the 50/50 blend of PRB and Illinois #6 coal, up to 11,712 tons per day for 100% PRB coal. Tr. 453-456. This equates to a maximum coal consumption capacity of between 417 tons per hour and 488 tons per hour. Tr. 454, 456.

219. Thus, the maximum potential material throughput in a 24-hour period—and, thus, the peak daily PM_{10} emissions—at the material handling and transfer points would exceed by more than a factor of three the boiler's maximum physical capacity to burn coal in a 24-hour period.

220. Accordingly, the PM_{10} emissions inventory and PM_{10} modeling based on that inventory are flawed, because they were calculated based on the maximum amount of coal that the boiler is physically capable of burning in a 24-hour period rather than the maximum potential daily throughput at each emissions point.

(e) <u>Failure to Model Ambient Air on Public Roads</u>

221. P4G referred to and relied on EPA's NSR Manual, among other guidelines, to develop and implement the modeling approach for Plant

Washington. Tr. 395; *see* Ex. J001.

222. Pursuant to the NSR Manual, EPA requires modeling receptors at all affected "ambient air" locations in order to demonstrate compliance with the NAAQS and applicable PSD increments. *See* PET-ST-1 at ¶ 53; Ex. J001, EPA NSR Manual.

223. The EPA New Source Review Manual provides that:

> modeling receptors for both the NAAQS and PSD increment analysis should be placed at ground-level points anywhere except on the applicant's plant property if it is inaccessible to the general public. Public access to plant property is to be assumed, however, unless a continuous physical barrier, such as a fence or wall, precludes entrance onto that property. In cases where the public has access, receptors should be located on the applicant's property.

Ex. J001 at 000192.

224. Mayview Road and Mathis Road, including the portions that bisect the proposed Plant Washington property, meet the definition of "ambient air" because they are open to public access.

225. P4G has not secured closure or relocation of Mayview or Mathis Roads; EPD lacks the authority to close or relocate Mayview or Mathis Roads; and the PSD permit does not prohibit commencing construction of Plant Washington until Mayview or Mathis Roads are closed or relocated.

226. The Clean Air Act and federal and state PSD regulations require that P4G demonstrate compliance with the 24-hour average PM_{10} NAAQS and PSD

increments by modeling all ambient air areas affected by emissions from the new pollution source.

227. At the time EPD issued the PSD permit, through the present, this required modeling receptors along the portions of Mayview and Mathis Roads that bisect the proposed plant property.

228. P4G and EPD thus erred by failing to model 24-hour average PM_{10} concentrations along the portions of Mayview and Mathis Roads that bisect the proposed plant property.

229. According to Mr. Gebhart's modeling, which was not controverted, if P4G had modeled receptors on Mayview Road and Mathis Road, as required to demonstrate compliance with the 24-hour PM_{10} increment and NAAQS, and had corrected the other modeling errors Mr. Gebhart identified, the modeling would have demonstrated that Plant Washington's PM_{10} emissions would (1) exceed the significant impact levels, requiring cumulative source modeling; (2) cause an exceedance of the PM_{10} increment; and, when added to background PM_{10} concentrations, would (3) cause or contribute to a violation of the 24-hour average PM_{10} NAAQS.

230. Under those circumstances, the Clean Air Act would prohibit EPD from issuing the Plant Washington permit and P4G from constructing and operating the plant unless and until P4G first secured closure or relocation of

Mayview and Mathis Roads, according to the required procedures for doing so, or, in the alternative, substantially reduced Plant Washington's projected fugitive PM_{10} emissions based on enforceable permit conditions such that revised modeling would demonstrate compliance with the significant impact level, increment, and NAAQS at all ambient air locations, including those along Mayview and Mathis Roads.

(f) <u>Representative Meteorological Data</u>

231. As with the pollutant emissions inventory, it is essential for demonstrating compliance with the 24-hour average PM_{10} NAAQS and PSD increment that P4G develop and use in the air dispersion modeling meteorological data that are representative of the range of reasonably expected meteorology at the Plant Washington site.

232. EPA has established regulatory guidelines for the application of air quality dispersion models in support of permit applications; the guidelines are found in EPA's Guideline on Air Quality Models, which is codified at 40 C.F.R. Pt. 51, Appendix W.

233. As directed by EPD, P4G referred to and relied on EPA's Guideline on Air Quality Models, among other guidelines, to develop and implement the modeling approach for Plant Washington. Tr. 394-395.

234. Section 8.3 of the Guideline covers requirements for meteorological

data. It provides, among other things that:

> Regulatory application of AERMOD requires careful consideration of minimum data for input to AERMET. Data representativeness, in the case of AERMOD, means utilizing data of an appropriate type for constructing realistic boundary layer profiles. Of paramount importance is the requirement that all meteorological data used as input to AERMOD must be both laterally and vertically representative of the transport and dispersion within the analysis domain. Furthermore, since the spatial scope of each variable could be different, representativeness should be judged for each variable separately. For example, for a variable such as wind direction, the data may need to be collected very near plume height to be adequately representative, whereas, for a variable such as temperature, data from a station several kilometers away from the source may in some cases be considered to be adequately representative.

235. Section 8.3.3.1 of the Guideline further provides that:

> Spatial or geographical representativeness is best achieved by collection of all of the needed model input data in close proximity to the actual site of the source(s). Site specific measured data are therefore preferred as model input, provided that appropriate instrumentation and quality assurance procedures are followed and that the data collected are adequately representative (free from inappropriate local or microscale influences) and compatible with the input requirements of the model to be used.

236. The EPA Guideline on Air Quality Models, thus, expresses a preference for on-site meteorological data as model input.

237. EPA further emphasizes this point in its NSR Manual, Ex. J001. EPA explains that:

> Meteorological data is generally needed for model input as part of the air quality analysis. It is important that such data be representative of the atmospheric dispersion and climatological conditions at the site of the proposed source or modification, and at locations where the source

> may have a significant impact on air quality. For this reason, site-specific data are preferable to data collected elsewhere.

238. Specifically addressing the AERMOD model used in this case, EPA's Modeling Guidelines (40 C.F.R. 51 Appendix W, Ex. P011, Section A.1) state that:

> Additionally, measured profiles of wind, temperature, vertical and lateral turbulence may be required in certain applications (e.g., complex terrain) to adequately represent the meteorology affecting plume transport and dispersion.

239. EPA has thus made it clear that the preference in the EPA Modeling Guideline is for on-site meteorological data to drive the model input.

240. In this case, however, P4G used and EPD relied on surface meteorological data collected at a height of 23 feet from a site in Macon, Georgia, to characterize dispersal of pollutants emitted from the 450-foot tall Plant Washington stack, and vertical meteorological data from a site in Centreville, Alabama, approximately 250 miles away.

241. The preponderance of the testimony and evidence adduced at trial demonstrated that P4G used and EPD relied on dispersion modeling conducted using off-site meteorological data that does not meet the various tests for data representativeness required under applicable EPA dispersion modeling guidance (Ex. P011, 40 C.F.R. 51 Appendix W, and Ex. J036, AERMOD Implementation Guide, Revised March 19, 2009). *See* PET-ST-1 at ¶¶ 147-151, 157; Tr. 466, 514, 517-525.

242. In fact, EPA found that P4G had failed to demonstrate that the Macon surface data were sufficiently representative of the surface conditions at the Plant Washington project site. Tr. 468-471.

243. Notably, the testimony shows that neither P4G nor EPD attempted to determine whether the climatological conditions at Centreville, Alabama were representative of the conditions at the project site located 250 miles away in east-central Georgia. Tr. 519.

244. Accordingly, it was error for P4G to use and for EPD to rely on the Macon surface meteorological data and the Centreville, Alabama upper-air meteorological data without confirming and demonstrating on the record that those sites and data are representative of conditions at the Plant Washington site.

245. In the alternative, P4G should conduct an on-site monitoring program at the proposed Sandersville site. At the conclusion of the on-site monitoring, P4G should conduct revised dispersion modeling studies to demonstrate compliance with applicable air quality standards and increments validated using the on-site data.

(iii) Proposed Remedy

246. Based on the foregoing findings of facts and conclusions of law, the PSD permit is hereby **REMANDED** to EPD for further proceedings in light of this Decision.

247. To remedy, on remand, the errors described above with respect to the air dispersion modeling claims contained in Count VII of the Petition, EPD shall not reissue a revised PSD permit unless and until P4G files an amended application that includes, at a minimum, the following:

a. An enforceable dust suppression plan containing specific measures that are demonstrated to consistently achieve a 90% control of PM_{10} emissions from the facility's paved and unpaved haul roads, with monitoring, recordkeeping, and reporting requirements to assure compliance with the plan provisions. EPD shall make any proposed dust suppression plan available for public notice and comment before finalizing and reissuing the PSD permit.

b. Enforceable daily maximum limits on material handling operations at the coal and limestone stock piles and enforceable daily maximum limits on bottom ash transfer and loading that are consistent with the data used in the permit application and ambient air quality modeling study.

c. Enforceable conditions that limit the maximum amount of fly ash, bottom ash, and gypsum transported along the facility's paved haul roads to the on-site waste disposal area in any 24-hour period to be consistent with the emissions used in the air dispersion modeling.

d. Provisions that prohibit P4G from commencing construction of Plant Washington until P4G has obtained all necessary approvals for closing Mayview and Mathis Roads or relocating them to a location external to the property boundaries.

e. A demonstration that Plant Washington's 24-hour average PM_{10} emissions will not exceed the significant impact level, requiring cumulative source modeling, or cause or contribute to a violation of the PM_{10} NAAQS or PSD increment by conducting revised 24-hour average PM_{10} modeling that properly reflects (i) a range of meteorological conditions that are spatially and temporally representative of onsite conditions; (ii) the daily maximum emissions for all PM_{10} emission sources at the Plant Washington site considering the plant's maximum potential rate of operations based on its physical and operational design, as limited by enforceable permit requirements; (iii) accurate average vehicle weights for trucks transporting material on the facility's paved haul roads; and (iv) without using a precipitation mitigation factor.

f. If the revised modeling fails this test, EPD shall not re-issue a PSD permit for Plant Washington unless the Permit is revised to include terms that reduce the facility's 24-hour PM_{10} emissions to levels that will not exceed the PSD increment or NAAQS in all ambient air locations.

248. Finally, before issuing any revised PSD permit, EPD shall make available for public notice and comment a draft version of the proposed revised PSD permit.

IV. CLAIMS ARISING UNDER THE HAZARDOUS AIR POLLUTANT PROGRAM – COUNTS IV, V, AND VI

In 1990, Congress substantially overhauled the Clean Air Act's HAP program because "[r]igorous regulation of toxic air pollutants is needed to avoid risk of serious, irreversible damage to human health." S. Rep. 101-228 (1989), as reprinted in 1990 U.S.C.C.A.N. 3385, 3388, 3518; *see* Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399, 2531-84 (1990); *see also New Jersey v. EPA,* 517 F.3d 574, 578 (D.C. Cir. 2008). To protect people from exposure to "substances which are known to be, or may reasonably be anticipated to be, carcinogenic, mutagenic, teratogenic [attacking development of an embryo or fetus], neurotoxic, which cause reproductive dysfunction, or which are acutely or chronically toxic," 42 U.S.C. § 7412(b)(2), Congress amended CAA § 112 to list 188 of the most toxic air pollutants, including dioxins, PCBs, benzene, acid gases, arsenic, mercury, selenium, and other heavy metals, *id*. at § 7412(b)(1), and directed EPA to identify the major sources of these toxic pollutants and to develop on a strict schedule stringent MACT emission limits for each HAP emitted by a listed category. *Id.* at § 7412(c), (d).

In the interim between the time when EPA lists a source category and when EPA promulgates final federal MACT standards, CAA § 112 and EPA's and Georgia's implementing regulations prohibit construction of a major new source in the listed category unless and until EPA or the state first determines, on a case-by-case basis, that the MACT emission standards will be met. *Id.* at § 7412(g)(2)(B), 40 C.F.R. § 63.42(c) (incorporated by reference at Ga. Comp. R. & Regs r. 391-3-1-.02(9)(a) and (b)(16)). At a minimum, the resulting emission limits must satisfy the MACT floor requirements for each HAP the source will emit and, to the extent achievable, must meet any beyond the floor requirements. 42 U.S.C. §§ 7412(d)(2), (3), (g)(2)(B); 40 C.F.R. § 63.43(d)(1), (2) (incorporated by reference at Ga. Comp. R. & Regs r. 391-3-1-.02(9)(a) and (b)(16)).

EPA listed coal-fired power plants as sources subject to CAA § 112 requirements in December 2000, but has not yet promulgated nationwide MACT emission standards for the source category. *See New Jersey v. EPA,* 517 F.3d at 579. As a result, proposed new coal-fired power plants that qualify as major sources are subject to the case-by-case MACT requirements of CAA § 112. Plant Washington is a "major source" of HAPs that, if constructed and operated, would "emit[] or have the potential to emit considering controls" at least 10 tons per year of any HAP, or 25 tons per year of any combination of HAPs. 42 U.S.C. §

7412(a)(1); 40 C.F.R. § 63.41 (incorporated by reference at Ga. Comp. R. & Regs r. 391-3-1-.02(9)(a) and (b)(16)). Thus, P4G may not begin construction of Plant Washington until it conducts a case-by-case MACT determination and obtains a permit with MACT emission limits for each of the HAPs the source will emit. 40 C.F.R. § 63.42(c)(2) (incorporated by reference at Ga. Comp. R. & Regs r. 391-3-1-.02(9)(a) and (b)(16)); *see, e.g.,* Ex. J011 at 000019.

A. <u>Principles of Case-By-Case MACT Determinations</u>

1. Congress established the minimum requirements for MACT emission standards for HAPs in CAA § 112(d). Section 112(d)(2) provides, in pertinent part:

> Emission standards promulgated under [CAA § 112(d)] and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, 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 for new or existing sources . . . .

42 U.S.C. § 7412(d)(2).

2. Congress further specified the minimum permissible emission control requirements for new and existing major HAP sources in CAA § 112(d)(3). For new sources, such as Plant Washington, section 112(d)(3) provides that the level of HAP emission control "shall not be less stringent than the emission control that is

achieved in practice by the best controlled similar source . . . ." 42 U.S.C. §§ 7412(d)(3); *see* 40 C.F.R. § 63.43(d)(1) (incorporated by reference at Ga. Comp. R. & Regs r. 391-3-1-.02(9)(a) and (b)(16)). This minimum level of acceptable HAP control is known as the "MACT floor" level of control. Tr. 1611.

3. Further, considering available technologies, costs, non-air quality health and environmental impacts, and energy requirements, control levels must be tightened as much as possible beyond the MACT floor. 42 U.S.C. §§ 7412(d)(2); 40 C.F.R. § 63.43(d)(2). This enhanced level of HAP control is known as "beyond the MACT floor" emission limits. Tr. 1610.

4. The case-by-case MACT requirements are designed to implement the MACT floor and beyond the floor emission standard requirements for new sources where EPA has not yet developed nationwide MACT standards for a listed source category. *See* 42 U.S.C. § 7412(g)(2)(B). Tr. 1398. Pursuant to 40 C.F.R. § 63.42(c):

> [N]o person may begin actual construction or reconstruction of a major source of HAP in such State or local jurisdiction unless:
>
> *   *   *
>
> (2) The permitting authority has made a final and effective case-by-case determination pursuant to the provisions of § 63.43 such that the emissions from the constructed or reconstructed major source will be controlled to a level no less stringent the maximum achievable control technology emission limitation new sources.

5. EPA has promulgated regulations for conducting case-by-case MACT floor and beyond the floor emission control determinations at 40 C.F.R. § 63.43(d), which is entitled "Principles of MACT Determinations," and provides, in pertinent part, as follows:

> The following general principles shall govern preparation by the owner or operator of each permit application or other application requiring a case-by-case MACT determination concerning construction or reconstruction of a major source, and all subsequent review of and actions taken concerning such an application by the permitting authority:
>
> (1) The MACT emission limitation or MACT requirements recommended by the applicant and approved by the permitting authority ***shall not be less stringent than the emission control which is achieved in practice by the best controlled similar source***, as determined by the permitting authority.
>
> (2) Based upon available information, as defined in this subpart, the MACT emission limitation and control technology (including any requirements under paragraph (d)(3) of this section) recommended by the applicant and approved by the permitting authority shall achieve the maximum degree of reduction in emissions of HAP which can be achieved by utilizing those control technologies that can be identified from the available information, taking into consideration the costs of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements associated with the emission reduction.

(emphasis added). Georgia has incorporated EPA's principles for case-by-case MACT determinations found at 40 C.F.R. §§ 63.40 to 63.44 by reference. *See* Ga. Comp. R. & Regs. r. 391-3-1-.02(9)(a) and (b)(16); *see also* Tr. 1609.

11. The case-by-case MACT process thus involves two steps. In the first step, EPD must set the "MACT floor" level of emission control, which "shall not be less stringent than the level of emission control that is achieved in practice by the best controlled similar source" (the "MACT floor"). 42 U.S.C. § 7412(d)(3), (g)(2)(B); 40 C.F.R. §§ 63.42(c)(2); 63.43(d)(1) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(9)(a) and (b)(16)). In setting the MACT floor level of control, permitting authorities "may not deviate" from what "the best performers actually achieve." *Cement Kiln Recycling Coalition v. EPA*, 255 F.3d 855, 861-62 (D.C. Cir. 2001). The D.C. Circuit Court of Appeals[6] has consistently rejected any attempts by regulators to deviate from this strict standard. *See, e.g., Northeast Maryland Waste Disposal Authority v. EPA,* 358 F.3d 936, 955 (D.C. Cir. 2004) ("EPA has once again improperly invoked achievability … (incorrectly relying on the emission variability of ***all*** [sources] … rather than on the variability of the ***best performing*** unit) to gloss over the actual achievement requirement.") (emphasis in original).

12. The definition of "similar source" "means a stationary source . . . that has comparable emissions and is structurally similar in design and capacity to [the proposed new source] ***such that the source could be controlled using the same***

[6] Like decisions of the Supreme Court, which represent "the controlling interpretation of federal law," *Harper v. Va. Dept of Taxation*, 509 U.S. 86, 97 (1993), decisions of the D.C. Circuit Court of Appeals represent the controlling interpretation (unless overturned by the Supreme Court) of regulations promulgated under the CAA, as the Act vests in the D.C. Circuit exclusive jurisdiction for suits challenging such regulations. 42 U.S.C. § 7607(b)(1).

***control technology*.**" 40 C.F.R. § 63.41(emphasis added) (incorporated by reference at Ga. Comp. R. & Regs r. 391-3-1-.02(9)(a) and (b)(16)).

13. Once the agency has identified the best controlled similar source and determined the level of HAP emission control that source achieves in practice, the agency may then adjust the MACT floor level of control to reflect the expected variability of the best controlled similar source under normal operating conditions. *Mossville Envtl. Action Now v. EPA*, 370 F.3d 1232, 1242 (D.C. Cir. 2004) (holding that the agency may adjust the MACT "floor" to account for the emissions variability of the best performing source only where "it has supported its decision with record data that shows the connection between its MACT floor and the top performing plants."); *Cement Kiln Recycling Coalition*, 255 F.3d 855, 865 (D.C. Cir. 2001); *Ne. Md. Waste Disposal Auth. v. EPA*, 358 F.3d 936, 955 (D.C. Cir. 2004) (concluding that "EPA has once again improperly invoked achievability (incorrectly relying on the emission variability of ***all*** [sources] that use the technology rather than on the variability of the ***best performing*** unit) to gloss over the actual achievement requirement.") (emphasis in original).

14. In the second step, EPD must tighten control levels as much as possible beyond the MACT floor, considering available technologies, costs, non-air quality health and environmental impacts, and energy requirements ("beyond the MACT floor" controls). 42 U.S.C. § 7412(d)(2), (g)(2)(B); 40 C.F.R. §§

63.42(c)(2); 63.43(d) (2) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(9)(a) and (b)(16)).

15. Unlike "beyond the floor" control levels, which consider the "achievability" of more stringent emission limits, the MACT "floor" establishes minimal emission limits that apply to new sources irrespective of cost or achievability. *Cement Kiln Recycling Coalition*, 255 F.3d at 857-58. If a proposed new source cannot meet the MACT floor, it is the new source, ***not*** the emissions limit, that must change. *Id.* at 863 (observing that the CAA itself directs agencies to consider "process changes, substitution of materials or other modifications . . . design, equipment, work practice, or operational standards . . . [or] a combination of above"); *see also Ne. Md. Waste Disposal Auth. v. EPA*, 358 F.3d 936, 955 (D.C. Cir. 2004) (MACT "floors" based on achievability cannot satisfy the statute's actual achievement requirement).

16. A case-by-case MACT determination must demonstrate compliance with the MACT floor and beyond the floor emission standards for each HAP the new source will emit. The Clean Air Act "establishes a 'clear statutory obligation to set emission standards for each listed HAP' that the source category emits." *Mossville Environmental Action Now v. EPA*, 370 F.3d 1232, 1242 (D.C. Cir. 2004) (quoting *National Lime*, 233 F.3d at 634).

17. As a narrow exception to this statutory mandate, a regulatory agency may substitute the control of one pollutant, known as a "surrogate" pollutant, in lieu of setting emission limits directly for a HAP under limited circumstances that assure a high level of HAP control. *National Lime*, 233 F.3d at 637-39; *Sierra Club v. EPA*, 353 F.3d 976, 982-85 (D.C. Cir. 2004).

18. For another pollutant to operate as a surrogate for a HAP, the permitting agency must conduct an analysis and demonstrate each of the following three criteria: (1) the HAP is "invariably present in [the surrogate];" (2) the control technology for the surrogate "indiscriminately captures [the] HAP . . . along with [t]he surrogate;" and (3) the surrogate "control is the only means by which facilities 'achieve' reductions in [the] HAP . . . emissions." *Sierra Club v. EPA*, 353 F.3d at 984 (quoting *National Lime*, 233 F.3d at 639).

19. Justin Fickas, who was at the time an environmental engineer with MACTEC, took the lead role in preparing the case-by-case MACT determination for Plant Washington. INT-ST-2 at ¶ 5.

20. Ms. Anna Aponte, an environmental engineer with EPD, was the lead agency employee responsible for reviewing P4G's case-by-case MACT analysis. EPD's MACT determinations are set forth its Notice of MACT Approval for Plant Washington. Tr. 1608.

B. The MACT-Floor Emission Limit for Particulate Matter as a Surrogate for Non-Mercury Metal HAPs – Count IV

(i) Findings of Fact

21. One category of pollutants for which EPD must set a MACT limit is metal HAPs other than mercury. Non-mercury metal HAPs that will be emitted by Plant Washington include antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, and selenium. Pet-ST-2 at ¶ 30.

22. Rather than set a MACT limit for each such HAP, EPD elected to rely upon a single limit on filterable particulate matter ("PM") emissions as a "surrogate" for all non-mercury metal HAPs. Ex. P050, Notice of MACT Approval, at 000027.

23. The Permit identifies the filterable PM limit as applicable to filterable PM_{10} emissions. Ex. J016, final PSD Permit, at Condition 2.13(d). Particulate matter is defined as airborne particles regardless of diameter. PM_{10} encompasses only those particles that are less than or equal to 10 microns in aerodynamic diameter. Most filterable PM emissions from a coal-fired boiler are 10 microns or less in size. "Filterable" PM and PM_{10} refers to the fraction of PM and PM_{10} that exist in solid particle form in the boiler and the subsequent series of pollution control devices that follow.[7] PET-ST-2 at ¶ 32.

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[7] In addition to filterable PM, a significant amount of particulate emissions form in the stack and in portions of the pollution control devices from gaseous pollutants that condense or react with

24. The Permit imposes an emission limit on filterable PM/PM_{10} as a surrogate for non-mercury metal HAPs of 0.010 lb/MMBtu on a 24-hr rolling average. EPD also determined that this same limit was BACT for filterable PM/PM_{10} pollution emitted from Plant Washington. Ex. J016 at Condition 2.13(d). Ex. J015, PSD Final Determination, at 13-14.

25. The Permit requires Plant Washington to install a fabric filter baghouse to meet the filterable PM/PM_{10} emission limit. Compliance with the emission limit is to be determined by use of a continuous monitoring system ("CEMS"). Ex. J016 at Condition 2.8 & Condition 5.2(c).

26. Petitioners contend that the Permit's filterable PM/PM_{10} limit must be set lower, consistent with the level of emission control achieved at the best controlled similar source. Specifically, Petitioners contend that the MACT limit for filterable PM/PM_{10} as a surrogate for non-mercury metal HAPs should be no greater than 0.001 lb/MMBtu. Tr. 835. However, Petitioners also propose a longer averaging time, *i.e.*, 30 days, to allow for "smoothing out" of short-term fluctuations in PM emissions. Tr. 908. Petitioners do not propose a different control technology.

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water to form aerosol particles as the flue gas cools. These are called condensable particulate matter. Condensable PM emissions are not being used as a surrogate for non-mercury metal HAPs in the Plant Washington permit. PET-ST-2 at ¶¶ 32-33.

EPD's MACT Determination

27. EPD determined that the best controlled similar source was the Wygen Unit II coal-fired electric utility boiler. RESP-ST-5 at ¶ 52. Tr. 1615.

28. In determining the level of filterable PM control achieved by Wygen II, Ms. Aponte considered the filterable PM emission limitation contained in the unit's permit rather than the unit's actual performance rate of 0.00094 lb/MMBtu. Tr. 1615.

29. Wygen II's permit limit for filterable PM is 0.012 lbs/MMBtu. Ms. Aponte determined that the facility had complied with that limit based on review of available stack test data. Tr. 1615.

30. However, the same stack test data showed that Wygen II had achieved in practice a level of filterable PM emission control of 0.00094 lb/MMBtu. Ex. J045. Tr. 1618.

31. EPD initially set Plant Washington's filterable PM limit at 0.012 lb/MMBtu, as requested by P4G. However, after receiving comments from Petitioners and reviewing other information, EPD lowered the limit to 0.010 lb/MMBtu on a 24-hr average. RESP-ST-5 at ¶¶ 42, 44, 46.

32. While EPD identified Wygen II as the best controlled similar source, the filterable PM/PM_{10} emission limit that EPD imposed in the Permit is more than 10 times higher than the average emission rate of filterable PM control achieved at

Wygen II. PET-ST-2 at ¶ 42. Tr. 1619.

Use of Stack Tests to Demonstrate Emissions Control and Compliance

33. At trial, EPD questioned the reliability of single stack test results for establishing MACT limits. Although EPD accepted the Wygen II stack test results as an indication that the facility was meeting its permit limit for filterable PM, and then proceeded to rely upon that permit limit to establish the MACT floor for Plant Washington, EPD did not consider the stack test result to be "definitive proof" that Wygen II was "achieving those limits in practice all of the time." Tr. 1401.

34. Throughout trial, witnesses for EPD and P4G repeatedly described stack test results as amounting to no more than a "snapshot" that was representative only of a limited time span under limited operating conditions, and therefore not reliable for purposes of setting a MACT limit. *See generally,* Tr. 1100-01, 1403, 1413, 1428.

35. Stack tests have been used since the Clean Air Act's inception forty years ago as indicators of compliance. They are designed to demonstrate the representative operation of the plant. Tr. 1079, 1800.

36. Stack tests are the reference method for testing to certify CEMS and to periodically ensure that they are properly working. Stack tests are the standard by which CEMS are certified, operated and relied upon. Tr. 910, 1678.

37. The Permit requires the use of stack tests to certify the accuracy of the CEMS that will be used to continuously monitor and track the emissions levels of various pollutants emitted by Plant Washington. Tr. 1516.

38. Pollution control equipment vendors typically rely upon a single stack test to demonstrate that a guaranteed control performance has been met. Tr. 1361.

39. In a stack test, samples are collected and evaluated pursuant to an EPA method that includes certain protocols that must be followed. Agency representatives have the opportunity to review and approve the protocol and to be present for the test. The methods and operating parameters of the unit and test itself are recorded and reported along with the results. The process is quality assured, controlled and evaluated to determine that everything was done according to the required protocols and procedures. If everything is done properly, the results are certified. Tr. 1077-78, 1616-17. *See also* Ex. J016 at Condition 6.1.a. thru d. (provisions applicable to stack tests at Plant Washington).

40. Although a stack test is a snapshot, it is a snapshot of plant operations under representative conditions, and the permittee has the obligation to track certain parameters that reflect good source operation, including good air pollution control operation. Tr. 1800-01. *See also* Ex. J016, final PSD Permit, at Condition 6.1.d. (requiring that all monitoring systems and devices be installed, calibrated and operational prior to conducting stack tests and that they be used to acquire data

during each stack test). The use of stack tests in combination with tracking of operational parameters provides an assurance of their accuracy. Tr. 1801.

41. P4G argued that a stack test would not be representative of normal operating conditions because the facility would, for purposes of the test, be attempting to make sure that its pollution control equipment was operating correctly. However, this would require assuming that the facility does not keep its equipment in good working order at all times. This is not a valid assumption because most permits, like the Permit at issue here, require the facility to be maintained and operated in accordance with good pollution control practices for minimizing emissions at all times. Tr. 744. *See* Ex. J016 at Condition 1.1.

42. EPA uses stack test data to set limits for nationwide MACT standards. Tr. 1515, 1802. EPA is currently relying on single stack tests from the best controlled similar sources for the MACT standard that it is in the process of developing for utility boilers. Tr. 1100-01. In 2004, when EPA last developed a MACT standard for utility boilers , the agency based its proposal on single stack test results from multiple sources. Tr. 1103-04.

43. As a long as a stack test result is representative and there are no indications that the test was performed incorrectly, it can be relied upon to set the MACT floor. There is no regulatory requirement for a certain minimum number of tests. Tr. 905.

44. Ms. Aponte had the actual stack test data from Wygen II available to her and had no indication that the data were not collected according to accepted protocols and procedures. Based on her review, Ms. Aponte felt they were reliable stack test results. Tr. 1621.

45. The Wygen II stack test results are not an aberration. Wygen II is an older facility. Modern baghouses are designed to achieve even lower limits routinely. Tr. 742.

Inconsistency with EPA's Approach to Industrial Boilers

46. EPD's determination that the filterable PM emission limit for (rather than the level of control achieved at) Wygen II reflected the MACT floor for filterable PM is inconsistent with how EPA has set the MACT floor for industrial boilers. PET-ST-2 at ¶ 45.

47. EPA has proposed a filterable PM emission rate for new coal-fired industrial boilers of 0.001 lb/MMBtu on a monthly average, which is consistent with the level of emissions control achieved in practice at Wygen II. Compliance would be determined with the use of a PM CEMS. PET-ST-2 at ¶ 49. Ex. P084 at pp. 32014, 32050, 32066.

48. This filterable PM limit is based solely on EPA's determination of the MACT floor for new sources; EPA's proposed MACT limits for new sources did

not reflect any beyond the MACT floor analysis. Ex. P084 at 32038 (Table 5), 32030.

49. In developing its MACT standard for industrial boilers, EPA collected emissions data and other information between 2007 and 2009. EPA did not distinguish between coal type, boiler type or boiler size in determining the MACT floor for filterable PM. PET-ST-2 at ¶¶ 46-47.

50. Industrial, commercial and institutional steam-generating units ("industrial boilers") that use steam to provide electricity and/or produce steam for other uses at an industrial facility or institution are similar sources to Plant Washington for purposes of determining a filterable PM/PM_{10} limit reflective of MACT for non-mercury metal HAPs. As long as the fuel is any type of coal, the particulate matter that is ultimately emitted by these boilers is formed from minerals in the coal, converting to fly ash during the combustion process. That portion of the fly ash that is not captured by particulate control devices (almost universally either fabric filters or electrostatic precipitators) is emitted into the air. PET-ST-2 at ¶ 38.

51. The filterable PM and PM_{10} emissions from both coal-fired electric utility steam generating units and coal-fired industrial boilers are comparable and can be controlled by the same types of control technologies. EPA's AP-42 "Compilation of Air Pollutant Emission Factors," which EPA has compiled and

updated over the years to provide emission factors for various source types and pollution control configurations, does not distinguish between emission factors for electric utility boilers and emission factors for industrial boilers. Section 1.1 of AP-42 provides emission factors for bituminous and sub-bituminous coal combustion and includes industrial as well as utility boilers. PET-ST-2 at ¶ 38. Ex. J034, Table 1.1-4 "Uncontrolled Emission Factors for PM and PM-10 from Bituminous and Sub-bituminous Coal Combustion."

52. Because the filterable PM and PM_{10} emissions from electric utility boilers and industrial boilers are comparable on a lb/MMBtu basis, both types of sources can readily be controlled with the same types of particulate matter control equipment. That control equipment includes electrostatic precipitators ("ESPs") and fabric filter baghouses. EPA states in AP-42 that both ESPs and baghouses are applicable to a wide variety of coal combustion sources. PET-ST-2 at ¶ 38. Ex. J034, at 1.1-6 to 1.1-7.

53. When Mr. Fickas of MACTEC compiled a list of similar sources for filterable PM in the application for Plant Washington, he included several industrial coal-fired boilers. Ex. J005 at Table 4-3. Tr. 1090-96.

54. When setting MACT emission limitations for new sources, EPA first collects available emissions data for the source category in question. Often this is done via "Information Collection Requests," which require stack testing for

various HAPs at several facilities of the source type in question. Second, EPA ranks the emission rates achieved in practice based on the test data for each HAP. The source with the lowest emissions rate achieved in practice is then selected as the best controlled similar source. PET-ST-2 at ¶ 44.

55. In setting the MACT floor for industrial boilers, EPA did not consider the permitted "emission limit" of the best controlled similar source. Instead, EPA made a determination of the level of emissions control achieved in practice by the best controlled similar source, based on actual emissions data for the lowest emitting source and adjusted to account for variability of emissions at that source. PET-ST-2 at ¶ 44. Ex. P084; Ex. P085 at 5-10, 13-14.

Accounting for Variability

56. In setting an emission limit that reflects the level of control achieved by the best controlled similar source (i.e., the "MACT floor"), EPA typically makes an adjustment to that emission rate, as needed, to account for variability in emissions of a particular HAP at that source. In the industrial boiler MACT, EPA went through a statistical analysis to adjust the PM emissions data to reflect a 99% upper prediction limit ("UPL") for the average for the best controlled similar source. PET-ST-2 at ¶ 44. Ex. P084; Ex. P085 at 5-10, 13-14.

57. EPA determined that the MACT floor filterable PM emissions rate for new coal-fired industrial boilers was 0.000928 lb/MMBtu (or 0.001 lb/MMBtu

rounded to 3 digits) based on the 99% Upper Prediction Limit (UPL) of the test runs at the best controlled similar source (meaning that there is a 99% confidence level that the average of three test runs would fall below this emission rate). PET-ST-2 at ¶ 47. Ex. P084 at 32038 (Table 5).

58. Ms. Aponte did not make any attempt to analyze the Wygen II stack test results to determine a range of variability among those results. She did not perform any calculations for variability. Tr. 1619.

59. Applying even a 50% margin to the Wygen II stack test results would result, after rounding, in a filterable PM limit for Plant Washington of 0.001 lb/MMBtu. Tr. 1620.

60. Although Ms. Aponte did not make a determination of variability at the best controlled similar source, EPD did consider variability at the proposed source, *i.e.*, Plant Washington. EPD determined that the MACT limit had to be achievable by Plant Washington under all reasonably foreseeable operating conditions for the life of the facility. EPD considered both variability in operating scenarios (including periods of startup, shutdown, malfunction and soot blowing) and variability in the operation of control devices (*i.e.*, the baghouse). RESP-ST-5 ¶¶ 50-51.

61. MACT determinations do not require a demonstration that the MACT floor level of emissions control can be met by the source subject to the MACT

determination. To the contrary, the MACT floor "may not deviate" from what "the best performers actually achieve," regardless of whether the MACT floor is achievable by the proposed new source. *Cement Kiln Recycling Coalition v. EPA,* 255 F.3d at 861-62. Nevertheless, there is ample evidence that Plant Washington will be able to achieve the MACT floor represented by the level of control achieved in practice at Wygen II. PET-ST-2 at ¶ 53.

62. Plant Washington will utilize a fabric filter baghouse, which is the state of the art for control of filterable PM from coal-fired boilers. Tr. 1105, 1622.

63. A fabric filter baghouse consists of a number of bags made of finely woven or felted fabric through which flue gas is drawn and the particulate matter is filtered out onto the bags. The accumulated filter "cake" on the bags aids in particulate removal. Both ESPs and baghouses are very effective in removing filterable particulate matter and can achieve greater than 99% control of particulate matter, but baghouses are typically more effective than ESPs. Baghouses can remove in excess of 99.9% of the filterable particulate matter emitted by a coal-fired boiler. The removal efficiency is enhanced in baghouses by the choice of fabric filter materials as well as with parameters that define how the baghouse is designed and operated including air-to-cloth ratio, allowable pressure drop across the bags and various operational parameters regarding the cleaning of the bags

(including cleaning cycle timing and frequency, order of bag cleaning, and methods of cleaning). PET-ST-2 at ¶ 39.

64. A fabric filter baghouse is a constant emission rate system: it is designed to achieve the same level of control on a lb/MMBtu basis regardless of how much filterable PM there is in the flue gas. Tr. 892-93, 1622.

65. Plant Washington will be a new plant using bags that are likely to be much better than those used at Wygen II. Unlike Wygen II, Plant Washington is subject to limits for fine particulates (*i.e.*, particulate matter with an aerodynamic diameter equal to or less than 2.5 microns, or "$PM_{2.5}$"), which necessitates the use of better fabric filter material. As part of its BACT analysis for PM2.5, P4G committed to evaluate membrane or coated filter bags. Ex. J006 at 000017. There are different filtration media that are known to be extremely effective at removing particulate matter, especially fine particulate matter, including Daikin's AMIREX™, PTFE membrane filters, and W.L. Gore's L3650. Ex. PET-ST-2 at ¶ 54.

66. In setting MACT limits for new facilities, it is important to account for technological improvements. The trend in pollution control technology is always toward better and better systems of control. Tr. 748, 1109-10.

67. The effectiveness of the Plant Washington's baghouse at removing PM is likely to improve rather than degrade over the life of the facility. As bags

age and require replacement, the replacement bags are likely to reflect technological improvement. Tr. 1109-10.

68. Proper operation and maintenance of the baghouse will likewise help to ensure the greatest level of PM removal. The Permit, at Condition 1.1, requires that PW operate all pollution control devices consistent with good air pollution control practices. Proper operation and maintenance, including periodically inspecting, cleaning and replacing bags, is essential to maintaining baghouse effectiveness. Tr. 1108, 1622. Ex. J016, final PSD Permit, at Condition 1.1.

69. The use of CEMS, as mandated by the Permit, will allow for the early detection and diagnosis of any problems with the baghouse and rapidly facilitate any adjustments in the operation of the baghouse that may be needed to improve its particulate matter collection. PET-ST-2 at ¶ 55.

70. Due to the number of bags to be deployed at Plant Washington, the facility will be equipped with a leak detection system. Leak detection systems help the operator to identify problems and quickly make necessary repairs. Tr. 1109.

71. The wet scrubber downstream of the baghouse will provide additional control during periods of upset by capturing PM even when bags in the baghouse break. PET-ST-2 at ¶ 55. Tr. 746.

72. Excess emissions are unlikely to occur during startup and shutdown, and any excess emissions that might occur as a result of malfunction are an

example of controllable variability, which is not appropriate for consideration in establishing a margin of compliance. Tr. 910-11.

73. On startup, the Permit requires Plant Washington to fire only low-sulfur diesel fuel. Ex. J016 at Condition 2.12. When startup is done with oil or gas, as will be required at Plant Washington, dust concentrations are low compared to full operation. Similarly, at shutdown, the coal fire is being brought down, so there is less dust. Tr. 910-11.

74. In addition, Georgia regulations allow for excess emissions during startup and shutdown so long as the source complies with good operational practices. Tr. 1478.

75. A malfunction such as soot blowing or bags breaking is a function of boiler operations and maintenance. The Permit requires the facility to be maintained and operated in accordance with good air pollution control practices to minimize emissions "at all times." Ex. J016 at Condition 1.1. Such events, especially when coupled with a 30-day averaging time, will not be a material factor in meeting a more stringent limit. Tr. 910-11.

76. At trial, EPD witnesses agreed that one way to account for temporary increases in PM is to provide for a longer averaging time, as Petitioners have suggested with their proposed revised filterable PM MACT limit. Tr. 1480, 1624.

77. Supposed variability in operating loads is not an appropriate

consideration in setting the facility's filterable PM MACT limit. Plant Washington is a base-load plant and is expected to operate at full load for most of the year, with some exceptions during the spring and fall months when energy demand is not as great. Plant Washington would not be like a "peaker plant" whose loads would vary markedly over the course of a month or a few months. It would have a stable load condition. Tr. 1481, 1630-31.

(ii) Conclusions of Law

78. EPD erred by setting the Permit's filterable PM/PM_{10} MACT limit based on the *permit limit* of the best controlled similar source (Wygen II) rather than the *level of emission control* achieved in practice by that source. The principles of case-by-case MACT determinations, which Georgia air quality regulations incorporate by reference, clearly and unmistakably require that the MACT floor be no less stringent "than the emission control which is achieved in practice by the best controlled similar source." 40 C.F.R. § 63.43(d)(1) (incorporated by reference at Ga. Comp. R. & Regs. r. 391-3-1-.02(9)(a) and (b)(16)). In setting the MACT floor level of control, EPD "may not deviate" from what "the best performers actually achieve." *Cement Kiln Recycling Coalition v. EPA,* 255 F.3d at 861-62.

79. While EPD has argued that it is not bound by 40 C.F.R. § 63.43(d)(1) and that because Georgia is a SIP-approved State, only Georgia law applies, the

Court finds this argument unpersuasive for several reasons. First, Georgia's air quality regulations explicitly adopt and incorporate 40 C.F.R. § 63.43(d)(1) by reference. Second, while EPA has delegated to Georgia authority to implement the Clean Air Act's HAP program, such delegation does not include authority to set standards less stringent than those promulgated by EPA under the Clean Air Act. 42 U.S.C. § 7412(l)(1). To the extent that EPD is attempting to interpret and enforce Georgia's SIP in a manner that is inconsistent with the Clean Air Act, the Supremacy Clause of the United States Constitution requires pre-emption. *See International Paper Co. v. Ouellette,* 479 U.S. 481, 491-92 (1987) (pre-emption is required when state law stands as obstacle to accomplishment and execution of full purposes and objectives of Congress and "interferes with the methods by which the federal statute was designed to reach this goal.").

80. While EPD contends that a single stack test result cannot serve as the basis for setting the MACT floor, the regulations governing case-by-case MACT determinations authorize this approach, and EPD cannot deviate from the level of HAP emission control achieved in practice by the best controlled similar source. In fact, EPA routinely relies upon single stack test results in setting nationwide MACT standards, as most recently evidenced in the Industrial Boiler MACT. In doing so, EPA accounts for variability at the best controlled similar source by conducting a statistical variability analysis.

81. Here, EPD made no attempt to analyze the variability of the Wygen II stack results. EPD simply assumed that the results were unreliable as a basis for setting the MACT floor because they were a mere "snapshot in time" (even though EPD found no indication that the test was not performed according to the accepted protocols and procedures or that the results were otherwise unreliable). Tr. 1621. This was error.

82. While EPD failed to perform a variability analysis for Wygen II, EPD did consider variability at Plant Washington. EPD determined that the level of control achieved at Wygen II would not be achievable at Plant Washington under all reasonably foreseeable operation conditions over the life of the facility. This too was error. In setting the MACT floor, considerations such as achievability and cost are improper. *Cement Kiln Recycling Coalition,* 255 F.3d at 857-58. Such considerations come into play, if at all, only in connection with the "beyond the floor" analysis, which is conducted only after the MACT floor is established. *Id.* If the MACT floor, which is determined with reference to the *level of emission control* achieved in practice by the best controlled similar source, is not achievable at Plant Washington, then it is the proposed source – *i.e.*, Plant Washington – not the MACT floor that must change. *Id.* at 863. *See also Ne. Md. Waste Disposal Auth. v. EPA,* 358 F.3d at 955 (MACT floors based on achievability do not satisfy the Clean Air Act).

83. Although achievability by Plant Washington is not an appropriate consideration in setting the MACT floor, there is ample evidence, as set forth *supra*, that the facility can achieve the Wygen II level of control, particularly over a longer averaging time.

(iii) Proposed Remedy

84. For the above reasons, the Court **GRANTS** Count IV of the Petition for Hearing and **REMANDS** the Permit to EPD for further proceedings. On remand, EPD is directed to revise the Permit's filterable PM/PM_{10} MACT limit in accordance with the level of control achieved in practice by the best controlled similar source (Wygen II) and to conduct a variability analysis as to that source for purposes of setting an appropriate MACT floor for Plant Washington.

C. <u>Carbon Monoxide as a Surrogate for Dioxins and Furans – Count V</u>

(i) Findings of Fact

85. EPD relied on carbon monoxide (CO) as a surrogate for all of the organic HAPs that will be emitted by Plant Washington, including dioxins and furans. EPD's justification for use of CO as a surrogate was that both CO and organic HAPs are products of incomplete combustion, and that "good combustion practices" required to meet the specified CO limit will also indiscriminately reduce all organic HAPs. Ex. J015 at 000108-109.

86. EPD established a CO emission limit as a MACT surrogate for organic HAPs of 0.10 lb/MMBtu on a 30-day rolling average. Ex. J016, Condition 2.13(b).

87. Dioxins typically refer to a family of compounds called polychlorinated dibenzodioxins or PCDDs. Similarly, furans refer to a family of compounds called polychlorinated dibenzofurans or PCDFs. There are over 200 dioxins and furans. They are among the most highly carcinogenic compounds known to humankind. EPA has noted that exposure to dioxins is a potential concern for both cancer and non-cancer effects "even at extremely low levels." Ex. RI159 at 000393. PET-ST-2 at ¶ 60.

88. The mechanisms of formation of dioxins and furans in coal-fired boilers are complex and depend on numerous factors including the chlorine content in coal and the form and distribution of chlorine and carbon compounds in the boiler gases, the temperature profiles in the boiler (and particularly in the cooler sections of the boiler), the presence of catalyzing metals in the coal and in coal ash, and reaction kinetics associated with precursor chlorinated phenols and benzenes. Ex. P094 at 000098-99. PET-ST-2 at ¶ 60.

89. While some dioxin and furan emissions can form from PCDDs and PCDFs that are in the coal and that are not combusted, EPA has stated that this is not the primary cause of PCDD and PCDF formation. Most dioxins and furans are

likely formed in a "*de novo*" process, from chlorine and other molecules that then form precursors to PCDDs and PCDFs. These precursor reactions typically occur in the temperature range of 250 to 450 degrees Celsius. Thus, most dioxin and furan formation actually occurs in the portions of the boiler where the exhaust gases are cooling as they exchange heat with other media or even outside the boiler as the gases continue to cool. Dioxins and furans are not generally formed in coal-fired boilers due to "incomplete combustion," unlike carbon monoxide. CO and dioxins/furans are formed in different parts of the boiler. PET-ST-2 at ¶ 60. Ex. RI159 at 000393-94. Ex. P094 at 000098-99.

90. In the Final Determination relative to the Permit, EPD concluded that CO was an appropriate surrogate for all organic HAPs based on the three-part legal standard for surrogates established by the U.S. Court of Appeals for the D.C. Circuit in the *National Lime* case. EPD concluded that it had satisfied the *National Lime* standard in using CO as a surrogate for all organic HAPs, including dioxins and furans. Ex. J015 at 000108.

91. Dioxins and furans are not invariably present in carbon monoxide. CO is a unique chemical compound with a molecular weight of 28. Dioxins and furans represent families of compounds that have large molecular weights. CO and dioxins are created by very different mechanisms and in different parts of the

boiler. Conditions that favor the formation of CO and conditions that favor the formation of dioxins and furans are different. PET-ST-2 at ¶ 61.

92. The control technology for CO does not indiscriminately capture dioxins and furans. As EPD stated in its Final Determination, CO emissions are typically controlled through good combustion practices at coal-fired power plants. However, good combustion practices – typically some combination of adequate mixing, minimum temperatures, and residence time – will do little or nothing to prevent the formation (or assure the destruction) of dioxins and furans. PET-ST-2 at ¶ 62.

93. Formation of dioxins and furans are dependent on the fuel, whereas CO emissions are not. Because chlorine is inherent to dioxin and furan formation, lower chlorine coals like PRB coal would produce less dioxins and furans than use of bituminous coals such as Illinois #6 that have much higher chlorine content. Equally important is the presence of catalyzing metals in the coal and coal ash. Thus, control of CO through good combustion practices does not ensure control of dioxins or furans. PET-ST-2 at ¶ 62.

94. Control of CO is not the only means of achieving control of dioxins and furans. The methods for reducing dioxins and furans are different than the methods for reducing CO emissions. Dioxins and furans are controlled by a number of methods that are separate from the quality of combustion in the boiler,

including carbon injection collected in a downstream dust control system, such as a fabric filter baghouse. PET-ST-2 at ¶ 63. Ex. P080 at Slide 12. Ex. P094 at 000140-141.

95. Mr. Fickas and Ms. Aponte agreed that dioxins and furans can form outside of the combustion process and that they can be controlled through the use of activated carbon injection and a fabric filter baghouse, which provide no control for CO. Tr. 1113-15, 1638.

96. EPD based its decision not to set a separate MACT limit for dioxins and furans in part on the fact that no other coal-fired utilities have yet done so. Ex. J015 at 000108. Tr. 1429.

97. In its recent proposed MACT standards for industrial boilers, EPA relied on CO as a surrogate for all organic HAP except dioxins and furans. EPA's justification for not including dioxins and furans in the grouping of organic HAPs to be covered by the CO surrogate emission limits was that dioxins and furans can be formed outside the combustion unit. EPA assumed carbon injection would be used for control of dioxins and furans to meet its proposed coal-fired industrial boiler MACT standards for dioxins/furans. Ex. P084 at 000014 and 000033.

98. In setting MACT standards for hazardous waste combustors, EPA declined to use CO as a surrogate for dioxins and furans for hazardous waste incinerators, hazardous waste burning cement kilns and hazardous waste burning

light aggregate kilns. EPA instead set a direct limit on dioxins and furans for those sources. Tr. 1659-61. Ex. I-9.

99. EPA retained the use of either CO or hydrocarbon emissions as a surrogate for dioxins and furans for solid fuel boilers that burn hazardous waste. Ms. Aponte and Mr. Fickas testified that solid fuel boilers burning hazardous waste are a more similar source to Plant Washington than cement kilns or hazardous waste incinerators. However, coal-fired industrial boilers using pulverized coal are even more similar: they utilize the same method of coal combustion and the manner in which pollutants are generated and controlled is the same. Ex. I-9. Tr. 1124-25, 1665-66, 1793. And for coal-fired industrial boilers, EPA has proposed setting a direct limit on dioxins and furans. *See generally* Ex. P084.

100. EPA is currently in the process of collecting HAP emissions data under an "Information Collection Request" from coal-fired electric utility boilers for its upcoming development of a MACT rule for coal-fired electric utility boilers. In its Supporting Statement for its Information Collection Request, EPA stated that it planned to collect dioxin and furan emissions data from units that have activated carbon injection systems in its effort to characterize dioxin and furan emissions from the top performing 12% of all units. Ex. P091 at 000004.

101. There currently is limited data available on emissions of dioxins and furans from coal-fired electric utility boilers. However, there is data from EPA's

collection of dioxin/furan emissions from coal-fired industrial boilers over the past few years for its industrial boiler MACT proposal. While industrial boilers are generally smaller boilers than utility boilers, they can provide a conservative guide to control capabilities for the utility boilers. PET-ST-2 at ¶ 66.

102. In evaluating the proposed MACT floor for dioxins/furans, EPA subcategorized coal-fired boilers into three types: pulverized coal, fluidized bed, and stoker/sloped grate. EPA subcategorized these boiler types for establishing the MACT floor for dioxins and furans because, in its opinion, these HAP emissions can vary with combustor design. Ex. P085 at 000004.

103. Plant Washington will have a pulverized coal boiler. Thus, a MACT floor determination for Plant Washington can and should use the source data and analyses underlying EPA's determination of the proposed MACT floor for pulverized coal-fired industrial boilers. These industrial boilers are similar sources to the proposed Plant Washington utility boiler, as these source types are structurally similar, likely have similar levels of dioxin and furan emissions on a per MMBtu heat input basis, and the dioxin and furan emissions from these sources can be controlled with similar controls. PET-ST-2 at ¶ 67.

104. In its proposed industrial boiler MACT, EPA proposed a dioxin/furan MACT emission limit for new pulverized coal-fired industrial boilers of 0.002 nanograms per dry standard cubic meter ("ng/dscm"), toxicity equivalent [TEQ],

corrected to 7% oxygen. This emission limit was based on a MACT floor determination for new sources; EPA's proposed MACT limits for new sources did not reflect any beyond the MACT floor analysis. In deriving the floor of 0.002 ng/dscm for new sources, EPA noted that the average dioxin level of the best controlled existing source was 0.00104 TEQ ng/dscm, and that the 99% Upper Prediction Limit (UPL) of the test runs at the best controlled existing source (meaning that there is a 99% confidence level that average of three measurement runs would fall below this emission rate) was 0.00147 ng/dscm. This accounts for variablity. Finally, EPA rounded up the 99% UPL to the proposed level of 0.002 ng/dscm, corrected to 7% oxygen. Ex. P084 at 000008, 000026, 000034, 000046 and 000062.

105. Based on EPA's determination of the best controlled similar source and the fact that coal-fired industrial boilers and coal-fired electric utility boilers are similar sources with respect to dioxin/furan emissions, Dr. Sahu determined that the dioxin/furan MACT emission limit for Plant Washington should be no less stringent than 0.002 ng/dscm, TEQ, corrected to 7% oxygen. PET-ST-2 at ¶ 69.

106. Plant Washington will be equipped with an activated carbon injection system for mercury control, which is the control system EPA assumed would have to be used at industrial boilers to meet the dioxin/furan MACT standard. Ex. J016 at Condition 2.9. Ex. P084 at 000033.

(ii) Conclusions of Law

107. EPD erred in failing to establish a separate limit for dioxins and furans. Although EPD concluded in the Final Determination for Plant Washington that the *National Lime* three-part test for surrogacy had been satisfied (Ex. J015 at 000108), the testimony at trial established just the opposite. Both the EPD and P4G witnesses responsible for the case-by-case MACT determination conceded that (1) dioxins and furans are *not* invariably present in CO (the former can form outside the combustion process, which is the only location where CO is formed and can be controlled); (2) that the control technology for the surrogate, *i.e.*, good combustion practices for CO, does *not* indiscriminately capture dioxins and furans; and that (3) control of CO is *not* the only means by which facilities achieve reductions in dioxins and furans – carbon injection in combination with the fabric filter baghouse will provide control for dioxins and furans that are formed or survive past combustion, and such technology provides no control for CO. Tr. 1113-15, 1638.

108. Because CO fails the test for surrogacy for dioxins and furans, a separate limit must be established for these HAPs, as EPA has recently done for pulverized coal-fired boilers in the Industrial Boiler MACT.

109. Although EPD based its decision not to set a separate limit for dioxins and furans in part on the fact that no other coal-fired utilities have yet done so,

there is nothing in the regulations governing MACT, as adopted by reference in Georgia, that allows for such considerations. The Clean Air Act requires that a MACT limit be established for each HAP that will be emitted from the facility unless the narrow surrogacy exception is met, and here it is not.

110. Plant Washington is already planned to have the control technology that EPA has specified for meeting the dioxin/furan limit in the Industrial Boiler MACT – *i.e.*, activated carbon injection in combination with a fabric filter baghouse. Therefore, no redesigning of the source is required. It is simply a matter of setting an appropriate MACT limit.

(iii) Proposed Remedy

111. For the above reasons, the Court **GRANTS** Count V of the Petition for Hearing and **REMANDS** the Permit for further proceedings consistent with this Order. On remand, EPD is directed to establish a MACT emission limit directly for dioxins and furans in accordance with MACT floor and, to the extent achievable, beyond the floor requirements.

D. The MACT-Floor Emission Limit for Carbon Monoxide as a <u>Surrogate for Non-Dioxin/Furan Organic HAPs – Count VI</u>

(i) Findings of Fact

112. EPD imposed an emission limit on carbon monoxide (CO) as a surrogate MACT limit for all organic HAPs likely to be emitted by the proposed Plant Washington boiler. The Permit imposes a CO emission limit of 0.10

lb/MMBtu on a 30 day rolling average measured with a continuous emission monitoring system (CEMS). Ex. J016 at Conditions 2.13.b. and 5.2.d.

113. This is the same numeric limit and associated averaging time that EPD determined as the BACT limit for CO. Ex. J011 at 000040.

114. In serving as a surrogate for organic HAPs, CO is playing a new role in air pollution control. Traditionally, CO has not been a major pollutant of concern because the NAAQS for CO have been very high and facilities have had no trouble meeting those limits. Now, however, CO is being asked to serve as a stand-in for a whole range of organic chemicals, including known and probable carcinogens such as benzene and formaldehyde, which will be emitted in potentially harmful amounts if CO is not controlled properly. Tr. 1753-54.

115. As discussed previously, Petitioners have challenged the appropriateness of EPD's reliance on a CO emission limit as a surrogate for emissions of dioxins and furans, which are a subset of organic HAPs. Petitioners do not challenge EPD's use of CO as a surrogate for non-dioxin/furan organic HAPs; however, they contend that the emission limit selected by EPD for such purpose is not reflective of MACT. Specifically, Petitioners contend that the limit should be 0.005 lb/MMBtu on a rolling 24-hr average, with compliance demonstrated via CEMS. PET-ST-2 ¶ 87.

EPD's MACT Determination

116. EPD agreed with P4G's determination that the best controlled similar source for CO was the Newmont TS Power Plant (which is also known as Newmont Nevada) coal-fired electric utility boiler. INT-ST-2 at ¶ 141. RESP-ST-5 at ¶ 67. Ex. J015 at 000113.

117. Newmont Nevada has demonstrated and achieved a CO emission rate of 0.002 lb/MMBtu. Ex. J014 at 000011.

118. However, as with its MACT analysis for filterable PM, EPD relied upon Newmont's permit limit – rather than the level of emission control achieved in practice – as an indication of the MACT floor. RESP-ST-5 ¶ 67.

119. EPD once again relied upon stack test data simply as an indication that the best controlled similar source was complying with its permit limit but not as an indication of the level of emission control achieved in practice for purposes of setting the MACT floor for Plant Washington. EPD again took the position that a single stack test result does not represent "all operating scenarios" and therefore cannot be used determine the MACT floor. RESP-ST-5 at ¶ 72-73.

120. The CO emission limit selected by EPD (*i.e.*, 0.10 lb/MMBtu) is fifty times higher than the CO emissions rate achieved in practice at Newmont Nevada. PET-ST-2 at ¶ 79.

121. EPD's Notice of MACT Approval identified seven units and their CO emissions. All but one of the seven reported CO emissions less than the 0.10 lb/MMBtu limit selected for Plant Washington. Tr. 1633. Ex. P050 at 000034, Table XVII.

122. P4G's "Best Controlled Similar Source Evaluation" for Plant Washington identified the Rocky Mountain Power Hardin Generating Station in Montana as achieving a CO emission rate of 0.001 lb/MMBtu. This is half of the emission rate achieved at Newmont Nevada, and 100 times lower than the CO emission limit proposed for the Plant Washington boiler by EPD. Ex. J014 at 000011.

123. Mr. Fickas determined that Hardin was not the best controlled similar source because it burns PRB coal from a dedicated mine with a higher heat value than the coal that would be used at Plant Washington. Tr. 1115-16.

124. The average high heat value of the PRB coal used at Hardin is 8,700 Btus per pound. The average high heat value of the PRB coal to be used at Plant Washington is *lower* and only marginally different: 8,500 Btus per pound. The average high heat value of the 50/50 blend is between 9,650 and 9,950 Btus per pound, significantly higher than Hardin. Tr. 1116.

125. In addition to conducting a best controlled similar source evaluation, Mr. Fickas also reviewed the EPA's 1999 MACT standards for hazardous waste

combustors, which were subsequently vacated by the D.C. Circuit Court of Appeals. The 1999 HWC MACT sets a CO limit of 100 ppm as MACT for organic HAPs. Mr. Fickas found that a CO limit of 100 ppm corresponded to an emission level from Plant Washington's coal-fired boiler of 0.10 lb/MMBtu. INT-ST-2 at ¶ 140. Tr. 1112.

Inconsistency with EPA's Approach

126. As noted previously, in promulgating MACT standards, EPA bases its determination of MACT floor on the actual emission rates achieved in practice by the best controlled similar source, not on the emission limit stated in the best controlled source's permit. Once EPA has identified the best controlled source, EPA then conducts a statistical analysis of variability of the emissions at the best controlled similar source to derive an emission rate that it defines as the MACT floor. EPA does not consider the source's permit limit in its variability analysis. The permit limit for the best controlled source has no bearing on determining the MACT floor. PET-ST-2 at ¶ 80.

127. Mr. Fickas acknowledged that "statistical analysis can be used to evaluate an emission limit from stack testing data." However, because compliance with the Plant Washington emission limit will be determined through the use of CEMS, and because CEMS would measure short-term variability in CO emissions due to operational circumstances such as load changes that would not be reflected

in stack testing, he declined to do such statistical analysis of the Newmont results. INT-ST-2 at ¶ 141.

128. Ms. Aponte did not make any attempt to conduct a variability analysis of the seven units identified in Table XVII of the Notice of MACT Approval. Tr. 1633.

129. A statistical variability analysis could be done for the Hardin Generating Station with more specific and detailed data on CO emission rates from this source. PET-ST-2 at ¶ 83.

130. In the absence of more detailed data, Dr. Sahu applied a variability factor of 5 times the emission rate achieved in practice at the Hardin Generating Station to establish the CO MACT floor limit at 0.005 lb/MMBtu as a 24-hour average standard. Dr. Sahu applied this conservative variability factor, in part, because he also recommended a shorter averaging time (*i.e.*, 24 hours) rather than the Hardin Station's BACT averaging time of 30-days. PET-ST-2 at ¶ 83.

131. Dr. Sahu applied a shorter averaging time because, unlike Hardin, in this instance EPD has used CO as a surrogate in lieu of setting limits directly for organic HAPs. In this context, a shorter averaging time is important because it will better assure that short term deviations from combustion malfunctions (which can cause spikes in organic HAP emissions) are not "averaged out" over a longer averaging time. A short-term average for CO will assure that the operator keeps a

close eye on such combustion deviations. PET-ST-2 at ¶ 83.

<u>Relationship Between CO and NO_X</u>

132. P4G and EPD argued against a lower CO limit on the basis that reducing CO emissions can produce increases in NO_X emissions. They argued that there is a "trade-off" between NO_X and CO formation and control during the combustion process, such that lowering Plant Washington's CO limit would jeopardize its ability to meet the Permit's NO_X limits. INT-ST-2 at ¶¶ 146-47; RESP-ST-5 at ¶ 65. *See also* Tr. 1634.

133. Ms. Aponte distinguished both the Newmont and Hardin test results on the basis that those facilities have higher NO_X limits and correspondingly higher NO_X test results – 0.066 lb/MMBtu and 0.072 lb/MMBtu, respectively – than Plant Washington. RESP-ST-5 at ¶¶ 69-70.

134. However, Hardin is a relatively old facility and does not have the same SCR system capabilities for removing NO_X that Plant Washington will have. Furthermore, neither Hardin nor Newmont has undergone a MACT determination. Their CO limits are just BACT limits. Tr. 821, 828-30, 852-53.

135. In conducting its stack test, Newmont was attempting to demonstrate compliance with its NO_X limit, which it did by testing at 0.066 lb/MMBtu for that pollutant. The facility was not attempting to determine how low it could go while still maintaining a low result for CO. Tr. 831.

136. Plant Washington's boiler will be equipped with the latest technology for NO_X control, including over-fire air and low-NO_X burners. The purpose of such technology is to allow for staged combustion, which is specifically designed to decouple NO_X and CO in the boiler, thereby allowing the facility to achieve low NO_X and CO values simultaneously. Tr. 831, 1752.

137. The "control" techniques typically used or applied to reduce CO emissions from coal-fired boilers fall into the category of "good combustion practices." These qualitative techniques include maintaining proper mixing of the combustion gases in the boiler, maintaining proper gas residence time, and maintaining appropriate temperature profiles and sufficient amounts of excess oxygen (or air) to ensure "complete" combustion to the extent feasible, subject to reaction kinetics constraints. PET-ST-2 at ¶ 78.

138. There are no add-on control technologies that can reduce CO emissions. All CO generation/destruction occurs in the boiler and is related to overall boiler performance and the use of good combustion practices. There is no further opportunity in the process train for CO generation or reduction. RESP-ST-5 at ¶ 64. Tr. 826, 1754.

139. In contrast, NO_X control occurs in two places: the boiler and the SCR system. The SCR system provides a second opportunity for NO_X control beyond what occurs in the boiler. The SCR system is designed based on the NO_X

concentrations coming out of the boiler. It is in the interest of the plant operator to minimize NO_X formation in the boiler so that the SCR can be smaller and less costly. However, most NO_X control occurs in the SCR unit. Modern SCR systems are capable of achieving 90 percent reduction of NO_X. The SCR provides no control for CO. Tr. 849-51, 1634, 1754-58.

140. In current generation boilers, operators attempt to minimize NO_X formation in the boiler before accomplishing further reduction in the SCR system. The strategy for the boiler involves the use of low NO_X burners and over-fire air. In the burner zone of the boiler, the coal is burned under oxygen-starved conditions in order to keep NO_X formation to the lowest level possible. At this stage, there is an inverse relationship between NO_X and CO: the relative absence of oxygen produces a gas that is low in NO_X but high in CO. However, in the over-fire air zone, the air that was held back previously is reintroduced to oxidize the CO. Very little NO_X is generated in this location. Tr. 844-49.

141. P4G's witnesses agreed with Dr. Sahu regarding the principles of staged combustion that will be utilized at Plant Washington. Mr. Fickas agreed that the principle behind over-fire air is to burn residual carbon that was not burned in the burner zone so that the boiler is more efficient, with the result that less incompletely oxidized carbon is available for CO formation. Tr. 1120. Similarly, Dennis Johnson of Fluor agreed with Dr. Sahu that the boiler would be designed to

have a zone where there is insufficient air for complete combustion, and that the reason this is done is to minimize NO_X formation because the SCR system is "not a perfect removal device." He agreed that staged combustion is performed in order to achieve low NO_X emissions from the combustion process. Tr. 1306.

142. Dr. Sahu cited numerous studies from the last decade demonstrating that modern boilers using staged combustion and over-fire air (as will be the case with Plant Washington) have eliminated the trade-off between CO and NO_X control that existed in older boiler designs. The studies demonstrate that CO emissions can be lowered while maintaining NO_X levels, that NO_X levels can be lowered while maintaining CO levels, and that lower emissions of both pollutants can be achieved simultaneously. Tr. 1763-72. Exs. P-108, P-109, P-110, P-111, P-112, P-113, P-114.

143. The studies cited by Dr. Sahu showed facilities achieving boiler outlet NO_X concentrations within the range of, or lower than, the concentrations anticipated for Plant Washington, while achieving CO concentrations as low as 5 ppm. CO levels of 5 ppm equate to an emission limit of approximately 0.0045 lb/MMBtu. Tr. 1764.

144. It is in Plant Washington's interest to reduce CO emissions because CO generation is an indication that the boiler is not operating efficiently. Because fuel costs are a major part of the operational costs of a coal-fired power plant,

increases in thermal efficiency are a key component of the overall economics of operating a plant. Tr. 1772, 1828.

145. Ms. Aponte agreed that to know at what level of removal efficiency the SCR would have to operate, it is important to know the concentration of NO_X at the inlet to the SCR. Tr. 1635.

146. However, Ms. Aponte did not perform any calculations to determine what the NO_X concentration at the SCR inlet would be. Tr. 1634.

147. In reviewing the Newmont and Hardin test results, Ms Aponte did not attempt to determine the level of NO_X present at the inlet to the SCR system at either facility. Nor did she attempt to determine the number of layers or volume of catalyst in those SCR systems. She did not contact the regulatory authorities in Nevada and Montana for this information. Tr. 1658.

148. Mr. Fickas and Ms. Aponte both agreed that in the event of conflict between a MACT limit for CO and a BACT limit for NO_X, the MACT limit would govern. Tr. 1123, 1635.

(ii) Conclusions of Law

149. EPD erred in setting the Permit's MACT CO surrogacy limit for the same reasons previously discussed with regard to filterable PM/PM_{10}. Once again, EPD determined the MACT floor with reference to the *permit limit* of the best controlled similar source rather than the *level of emission control* achieved by that

source. For the reasons previously discussed, this was error and requires reversal.

150. However, here EPD also erred in its determination of the best controlled similar source. The Hardin facility achieved a significantly lower emission control in practice than Newmont Nevada. Hence, Hardin, not Newmont, is the best controlled similar source (although Newmont's tested level of control was also significantly – 50 times – lower than the Permit's current CO MACT limit). P4G's efforts to distinguish Hardin are unconvincing. The average heat value of the coal used at Hardin is only marginally higher than the heat value of the coal to be used at Plant Washington, and only when the 100% PRB coal is considered. The average heat value of the 50/50 blend, which at trial P4G contended could be used as often or more frequently at Plant Washington than 100% PRB coal, is significantly higher than the average heat value of Hardin's coal. Tr. 1115-16.

151. EPD and P4G also erred once again in their consideration of variability. Neither conducted any analysis of variability at the best controlled similar source, which they erroneously determined to be Newmont Nevada. INT-ST-2 at ¶ 141; Tr. 1633. Instead, they looked to variability at Plant Washington, again arguing that a limit based on the level of control achieved in practice at the best controlled similar source would not be achievable at Plant Washington, particularly considering the latter's use of CO CEMS. This too was error for the

reasons previously discussed with regard to the MACT limit for filterable PM/PM_{10}: in setting the MACT floor, the only variability that may be considered is variability at the best controlled similar source; achievability by the proposed source is not an appropriate consideration.

152. The alleged inverse relationship between CO and NO_X is an example of this improper analysis. Even if this relationship did exist, it would not affect the MACT determination. Both the P4G and EPD witnesses responsible for the MACT determination were in agreement that in the event of conflict between a MACT and BACT standard, the MACT standard should govern. Tr. 1123, 1635. This is in keeping with CO's "new role" as a surrogate for a number of harmful pollutants that Congress has directed must be addressed through MACT limits. Although Ms. Aponte claimed that the Permit's low NO_X limit was necessary in order to address ozone non-attainment problems affecting Georgia, she acknowledged that Plant Washington would not be sited in an ozone non-attainment area. Tr. 1636. Ms. Aponte also acknowledged that NO_X is not the only ozone precursor – volatile organic compounds (VOCs) are also ozone precursors and some VOCs are among the organic HAPs for which CO is, in this instance, being asked to serve as a surrogate. Tr. 1635. Therefore, as both a legal and a factual matter, there was no justification for placing NO_X above CO in the MACT analysis.

153. In any event, the alleged inverse relationship between CO and NO_X is illusory and a relic of older boiler designs. Plant Washington will be equipped with the latest, state-of-the-art NO_X control technologies in its combustion unit, which is the only area where CO is formed and can be controlled. Low NO_X burners and over-fire air will, as P4G's witnesses acknowledged, allow for staged combustion and simultaneous achievement of low NO_X and CO limits. Plant Washington has every incentive to operate this technology in accordance with good air pollution control practices to minimize CO emissions because, among other things, CO emissions are an indication that the boiler is not operating efficiently.

154. Thus, even if Plant Washington's NO_X BACT limit was an appropriate consideration in setting the MACT floor, it would not justify the Permit's current CO MACT limit.

155. The result of the above errors is a CO MACT limit that is 100 times higher than the level of CO emission control achieved in practice by Hardin, an older facility with older controls that has not even gone through a MACT analysis. Because Plant Washington is a new facility with state-of-the-art controls and is unquestionably subject to MACT, there is simply no justification for such a high CO MACT limit.

(iii) Proposed Remedy

157. For the above reasons, the Court hereby **GRANTS** Count VI of the Petition for Hearing and **REMANDS** the Permit for further proceedings consistent with this Decision. On remand, EPD is directed to revise the Permit's CO MACT limit in accordance with the level of control achieved in practice by the best controlled similar source (Hardin) and to conduct a variability analysis as to that source for purposes of setting an appropriate MACT floor for Plant Washington.

V. CONCLUSION

For all the foregoing reasons, Petitioners' claims as to Counts II, IV, V, VI, and VII of the Petition, as amended, are **GRANTED** and the PSD permit is **REMANDED** to EPD for further proceedings consistent with this Decision.

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CERTIFICATE OF SERVICE

I do hereby certify that I have this day served a copy of **PETITIONERS' PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW** by electronic means to:

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