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BY E-MAIL

Anthony J. Como
Office of Electricity Delivery and Energy Reliability
NEPA Document Manager
Department of Energy
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585

Re: Special Environmental Assessment; DOE/SEA-04

Dear Mr. Como:

Attached please find the Comments of the City of Alexandria, Virginia to the U.S. Department of Energy's Special Environmental Analysis concerning DOE Emergency Orders 202-05-3, 202-06-2, 202-06-2A.

If you have any questions, please don't hesitate to call.

Sincerely,

John B. Britton
Schnader Harrison Segal & Lewis LLP

JBB/maj

Attachment

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY

Special Environmental Assessment For Actions Taken under Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria, Virginia	)))))	**DOE/SEA-04 Re: Order Nos. 202-05-3, 202-06-2, 202-06-2A**

COMMENTS OF THE CITY OF ALEXANDRIA

The City of Alexandria, Virginia ("Alexandria") hereby submits these Comments to the Special Environmental Analysis ("SEA") for Actions Taken under U.S. Department of Energy ("DOE") Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria (Re: DOE Order Nos. 202-05-3, 202-06-2, 202-06-2A).

BACKGROUND

On December 20, 2005, pursuant to section 202(c) of the FPA, 16 U.S.C. § 824a(c), Secretary Samuel W. Bodman (the "Secretary") issued DOE Order No. 202-05-3 (the "Order"). The Order was the Secretary's response to an emergency petition and complaint filed by the District of Columbia Public Service Commission ("DCPSC") on August 24, 2005. In his Order, the Secretary deemed the shutdown of the Potomac River Generating Station ("PRGS") in Alexandria, Virginia an "emergency" and directed the Mirant Corporation ("Mirant") to resume operation of the PRGS.

The National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 *et* seq., requires that, in the event of an agency action that may significantly affect the quality of the human environment, the federal agency must prepare a detailed statement on the environmental impact of the action and alternatives to the proposed action. The DOE did not prepare such a statement. Rather, pursuant to regulations of the Council on Environmental Quality ("CEQ") which provide for consultation with the CEQ in emergency situations to determine alternative arrangements that will be taken in lieu of preparing an impact statement, the DOE agreed to prepare an SEA by August 2006. The stated purpose of the SEA was to "examine the potential impacts from issuance of the Order, and identify potential mitigation measures." 71 Fed. Reg. 3279 (January 20, 2006). The DOE did not prepare the SEA by August 2006.

On June 1, 2006, Mirant entered into an Administrative Compliance Order ("ACO") with the U.S. Environmental Protection Agency ("EPA") regarding operation of the PRGS. The ACO orders Mirant to operate the PRGS under "non-line outage situations" pursuant to daily predictive modeling that permits the PRGS to operate up to the maximum level each day where modeling results show no violations of the NAAQS. Under "line outage situations" the ACO orders Mirant to operate the PRGS as necessary to meet demand while taking "reasonable steps" to limit emissions of criteria pollutants. The ACO does not prohibit the PRGS from operations that result in emissions that violate the National Ambient Air Quality Standards ("NAAQS").

On June 2, 2006, DOE ordered Mirant to comply with the ACO. In so ordering, DOE did not undertake any independent analysis of the impacts associated with operation of the PRGS pursuant to the ACO. On September 28, 2006, again without any environmental analysis and after the date on which the SEA was due to be prepared, DOE extended the Order until 12:01 a.m., December 1, 2006. On the day that the SEA was made publicly available, November 22, 2006, DOE extended the order again until 12:01 a.m., February 1, 2007.

COMMENTS

Alexandria is deeply disappointed and troubled by the SEA. It has been close to a year since the DOE issued the Order and in that time the DOE has produced a document that amounts to little more than an academic exercise undertaken to ratify the actions taken by and intended to be taken by the DOE. Alexandria residents have faced a year of operation of the PRGS under the Order, pursuant to which the PRGS has emitted pollutants at concentrations that exceed health based standards and that are known to be harmful to Alexandria residents. And yet the SEA fails to recommend even one concrete measure to mitigate this impact. The SEA ensures that the burden of DOE's stated "emergency" will continue to fall entirely on Alexandria residents. In the end, the SEA seems calculated more to ensure the continued operation of the PRGS than to ensure the protection of the environment and the health and safety of Alexandria residents.

The SEA fails in many critical respects. In particular, the SEA (i) endorses an unorthodox modeling procedure that is unique to PRGS and that is not protective of human health, (ii) underestimates the impacts of sulfur dioxide ("SO_2") and particulate matter ("PM_{10}") emissions, (iii) fails to adequately consider the impacts of fine particulate matter ("$PM_{2.5}$") emissions, (iv) fails to adequately analyze the impacts of hazardous air pollutants, (v) fails to independently assess impacts by inappropriately relying on data provided by Mirant, (vi) fails to properly assess whether the Order conforms to the State Implementation Plan, and (vii) fails to consider mitigation of the serious health effects caused by operation of the PRGS under the Order.

1. The Administrative Consent Order Establishes an Unorthodox Procedure That is Not Protective of All NAAQS. The ACO provides a framework whereby the PRGS's output can rise, on a daily basis, to limits as high as SO_2 NAAQS limits allow, based on predicted, not actual, daily weather conditions. This is a wholly unorthodox procedure that fails to comply with the rules binding the operations of other power plants, which must operate at limits consistent with the assumption that every day may result in the worst-case set of meteorological conditions. By contrast, the ACO permits maximum emissions on any given day based on the previous day's forecasts with the only assurance that there are no violations of the NAAQS being an audible alarm when SO_2 emissions have reached the limits at a very limited number of locations. Previous modeling submitted by Mirant to DOE shows that for many of the PRGS's current operational scenarios, impacts equivalent to or almost equal to the SO_2 NAAQS occur at points to the northwest and southwest of the plant where no monitors are currently located. There are not even these limited assurances for other criteria pollutants; $PM_{2.5}$ impacts by the PRGS are completely ignored both in Mirant's submittals to the DOE in response to the Order and in the ACO's predictive modeling approach. Furthermore, there are no monitors to measure impacts on the surrounding public residences. Yet the SEA confirms that the PRGS's emissions cause or contribute significantly to severe exceedances of the $PM_{2.5}$ standards with $PM_{2.5}$ impacts *as the most constraining* for design of the PRGS's operational scenarios that comply with the NAAQS.[1]

It is difficult to reconcile the requirements of the DOE's Order, intended to address electricity reliability for the District of Columbia's core downtown area (see Ordering Paragraph B), with the flexible multi-boiler and near normal operating scenarios allowed by the ACO. By stating that "regulation of $PM_{2.5}$ is still developing," SEA attempts to reduce DOE's responsibility with respect to $PM_{2.5}$. In this, the SEA is disingenuous. The $PM_{2.5}$ NAAQS has existed since 1997. The standard is "developing" only in the sense that recent regulatory developments have made it more restrictive--the maximum allowable ambient level for 24-hour averaging periods has been lowered due to near unanimous consensus within EPA's Clean Air Scientific Advisory Council that the original 1997 level was not sufficiently protective of the public health.

The SEA's analysis of the PRGS's $PM_{2.5}$ impacts confirms that none of the ACO's operational scenarios can comply with *all* NAAQS, as required by the DOE Order (see Table 1 below). For these reasons, the SEA should recommend reverting to the most restrictive operational scenarios that were allowed by DOE during periods when both 230 kV lines that serve the District of Columbia were operating, *i.e.*, "non-outage" scenarios, and providing capacity sufficient to prevent any loss of electricity in the District of Columbia. Put simply, the one- and two-boiler operating scenarios employed during the first six months of 2006 are sufficient and appropriate to satisfy the requirements of the Order both for compliance with the NAAQS and to maintain electricity reliability.

In the SEA, DOE's SO_2 predictive modeling methodology does not consider the 3-hour standard for the stated reason that the run times are too large to model. For a large, sophisticated federal agency charged in this instance with review of public health impacts, this is a shocking and unsupportable justification to dismiss analysis of a

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[1] Mirant's modeling results of proposed operational scenarios in submittals to DOE and the Virginia Department of Environmental Quality ignored the NAAQS for $PM_{2.5}$ (see Updates 1 through 6 within Supplements No. 1 through 4, dated September 20, 2005 through February 6, 2006). Simple scaling of the SO_2 test results to reflect $PM_{2.5}$ shows severe exceedances of the short-term and annual $PM_{2.5}$ standards. These results also showed that maximum overall impacts for many scenarios occur at locations to the northwest and southwest of the PRGS, where no monitors are located.

NAAQS standard. This is particularly disturbing because, under the ACO's operational scenarios which allow much greater boiler output and SO_2 rates over the short-term period than over the daily period, the 3-hour impacts are more constraining than 24-hour impacts.[2] Thus, because they are based on the lower 24-hour emission and output rates, the maximum 3-hour impacts in SEA Table 4.3.1-2 are significantly understated. Rather than dismiss this very important analysis, DOE should have modeled each of the possible 3-hour scenarios using a more powerful computer, if necessary, or used other means to first define that scenario with the greatest potential to exceed standards and then model only that scenario. This huge variability in allowed operational scenarios and the deficiencies in monitoring all the possible points of maximum impact for <u>all</u> NAAQS pollutants also exposes the inadequacy of the ACO to protect public health.

There is similarly no justification for not simulating the effects of daily predictive modeling on particulate matter emissions. For PM_{10}, the SEA states that "DOE found that with the 0.019 lb/MBtu emission rate, stack emissions never lead to exceedances of the NAAQS limit for PM_{10}." Not only is this statement completely unsupported, there is also no basis for the validity of this emission rate--April, 2006 test results at the PRGS show an emission rate that is significantly higher.[3]

Neither the SEA nor the ACO provide a sufficient justification to warrant a departure from the normal rules governing the manner in which emission limits are established for power plants. It is not at all clear that if the PRGS were constrained on a daily basis to operate at limits consistent with overall worst-case meteorological conditions, that it would not provide the necessary reliability for non-outage situations. Consequently, for the *Potential Extension of the Order Scenario,* daily, non-varying permit limits should be developed with NAAQS-compliance as the criteria, and the resulting plant output should be evaluated to see if it meets the minimum DOE reliability criteria.

Even after having endorsed the ACO's jerririgged modeling procedure to maximize emissions, the SEA still inappropriately distinguishes between modeled exceedances and actual exceedances ("[t]he exceedances indicated in the table are modeled exceedances, not actual exceedances." SEA at 67. In terms of the permitting process, where emission limits are established, modeled exceedances are actual exceedances. Unless there are extenuating circumstances where a model does not apply, the model is the standard. Measured air quality concentrations are used by regulatory

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[2] Table 1 of the ACO shows that 3-hour rolling SO_2 rates are in many cases two or more times the scenario's 24-hour SO_2 rate. Additionally, for many of the 19 scenarios, two or three boilers are allowed to run at maximum load for up to 8 hours while output is significantly curtailed for the balance of the daily period.

[3] "Summary of Results – Mirant – Potomac – Unit 5 Stack – Alexandria, VA" for test dates of April 25 and 27, 2006.

agencies to set attainment status for urban air quality designations, but the air quality permit process is a model-based approach.[4]

2. The SEA Underestimates SO_2 and PM_{10} Emissions. It is fundamental that in a document intended to analyze all the impacts from the operation of the PRGS that the impacts for all operating scenarios should represent worst-case. The SEA fails in this regard. For pre-shutdown operations, DOE assumes an SO_2 emission rate and annual output that are too low. Publicly available DOE fuel delivery records of sulfur, Btu content and weight show that for the years 2002-2005, the average SO_2 emission rate at the PRGS ranged from 1.12 to 1.15 versus the 1.05 lb per MMBtu rate assumed, and coal consumption exceeded 988,000 tons for at least one recent year versus the 832,000 tons assumed.[5]

Similarly, the DOE states that the ash content of the coal combusted at the plant before shutdown in August, 2005 is 14%. SEA at 17. The SEA does not provide a reference for this information. This 14% ash content is very different, however, from the average ash content of the coal delivered to the plant in 2002, 2003, 2004 and 2005, which publicly available purchase records for the facility show equaled 7.4%, 7.7%, 8.5% and 7.7% respectively[6]. This is significant because if trona injection requires the use of a higher ash content coal for optimum efficiency, the increased ash content should be considered in estimating PM emissions.

The final draft of the SEA comments should note this change in ash content of the coal. The increase in ash to be hauled off the site with trona will increase by more than a factor of two, because in addition to the trona mass collected in the ESPs, there will be additional mass from coal ash (with this higher ash coal) and gaseous SO_2 mass that is converted to particulate mass. Overall, the ash to be hauled for the trona scenarios could be about four times the pre-trona ash hauling.

PM_{10} emission rates err on the side of underestimation for several reasons. For stack emissions, DOE relies on test results that have not been accepted as valid by any regulatory agency. DOE adopts the average result of one set of these three 90-minute tests, without accounting for contributions to daily PM_{10} emissions from soot-blowing,

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[4] On page 70 of the SEA there is a discussion of the discrepancy between monitored and modeled maximum SO_2 concentrations. It is not clear, however, why the discussion focuses exclusively on the reasons why AERMOD might over-predict. Completely absent from this discussion are reasons related to possible deficiencies in the monitoring data, including (i) monitor bias, (ii) possible reduction in measured SO_2 concentrations due to sample tubing length from monitor to analyzer that may exceed recommended lengths and (iii) the reliance on only two monitors on Marina Towers, neither of which are located at the point of PRGS's maximum impact as shown by the previously published Wind Tunnel Study. Attached hereto is Alexandria's response to Mirant's Wind Tunnel Study, submitted to EPA and VDEQ on January 5, 2007.

[5] See for each year—http://www.eia.doe.gov/cneaf/electricity/page/f423x1s

[6] Id.

ESP-rapping or to reflect expected variations in operating conditions through the course of a 24-hour period, including variations in trona use.[7] Additionally, the set of results that DOE selects is only one set of many test results at the PRGS, some of which indicate significantly higher PM_{10} rates.[8] One example is the PM_{10} stack test performed by the same vendor that DOE references, but performed in April, 2006, for which results are approximately 20% higher than the test result DOE selects.[9] PM_{10} impacts should be recalculated using the maximum 24-hour average PM_{10} emission rate that the facility is willing to commit to, with compliance determined by an in-stack continuous emission monitor for PM_{10}. Unless Mirant is willing to commit to a lower rate with an in-stack PM_{10} CEM for each boiler, the emission rate assumed in the SEA should be at least twice the value derived from the optimum and time-limited conditions that testing represents.

For the *Operations Under the Order* and *Potential Extensions of the Order*, PM_{10} impacts are significantly understated due in part to the neglect of contributions by increased fugitive emissions that derive from the need to handle at least two times the ash of the pre-shutdown scenario. The SEA reports that in estimating PM_{10} impacts, "[t]he parameters are based on the assumption that four of the five units operate full time, but they do not account for the extra dust generated by disposal of trona waste." SEA at 62. Given that up to 25 tons of trona may be used per hour, exclusion of trona waste as a potential source of particulate matter is unacceptable. Also, the SEA ignores completely the increased corrositivity of the flyash as a result of its trona content.

3. The SEA Fails to Adequately Assess the Impacts of $PM_{2.5}$. The SEA confirms that PRGS emissions of $PM_{2.5}$ cause or contribute to violations of the NAAQS under all modeled scenarios, and at levels that contribute to impacts that are several times the standard.[10] SEA at 70-72. However, impacts are likely to be even more severe because

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[7] A recent peer-reviewed evaluation of the effect of ESP rapping on electrostatic precipitator outlet emissions from a pulverized coal boiler shows that PM_{10} emissions increase by approximately 100% during rapping events. See "Characteristics of Inhalable Particulate Matter Concentration and Size Distribution from Power Plants in China." H. Yi, J. Hao, L. Duan, X. Li and X. Guo, J. Air & Waste Manage. Assoc., 56:1243-51, Sept. 2006.

[8] See "City of Alex Po River Data Request 4-1-05 Rev. 1.xls." submitted by Mirant to City of Alexandria, June, 2005, in which TSP rates from RATA tests for boilers 1, 2 and 3 range from 0.033 to 0.057 lb per MMBtu. These rates likely do not include condensable emissions, and when condensable emissions are estimated and filterable TSP scaled to PM_{10} using AP-42 assumptions, PM_{10} rates likely exceed 0.06 lb per MMBtu.

[9] "Summary of Results – Mirant – Potomac – Unit 5 Stack – Alexandria, VA." for test dates of April 25 and 27, 2006.

[10] New $PM_{2.5}$ standards took effect on December 18, 2006, after the SEA was released. Given the adoption of new standards, sections 4.1 through 4.3.2 of the SEA should be revised to focus on the PRGS' impacts on $PM_{2.5}$. Similarly, all tables showing facility impacts (Tables 4.3.1-1 and 4.3.1-2) should be modified to present $PM_{2.5}$ impacts versus the NAAQS in addition to PM_{10} impacts.

$PM_{2.5}$ emission rates are understated due to several inappropriate assumptions made in the SEA.

For stack emissions of $PM_{2.5}$, the SEA scales down the PM_{10} emission rate. However, as discussed above, the test results from which the PM_{10} emission rates derive have not been accepted by any regulatory agency, and are not values that the plant could meet on a continuous 24-hour basis. In addition, condensable emissions are not considered in the SEA. The SEA refers to EPA's AP-42 that shows that the ratio of $PM_{2.5}$ to PM_{10} emissions equals 0.76; however, this ratio applies only to the filterable component. Condensable emissions, all of which fall in the $PM_{2.5}$ size range, are about two times the mass of the PM_{10} filterable portion. Therefore, total $PM_{2.5}$ emissions from the stack exceed 90% of total PM_{10} emissions ((0.76 + 2 x 1.0)/3.0). Additionally, contributions to $PM_{2.5}$ impacts by secondary formation of this NO_2 and SO_2 laden gas-stream are regulated as Mirant's but not accounted for here, and these concentrations are a significant percentage of total $PM_{2.5}$. Table 1 repeats the SEA's own results for the PRGS's maximum $PM_{2.5}$ impacts. Even using emission rates that err on the side of underestimation, the SEA shows that the PRGS causes or contributes significantly to exceedances of the NAAQS for all operational modes.

TABLE 1

Modeled Maximum Ambient $PM_{2.5}$ Concentrations ($\mu g/m^3$) for PRGS Operations Among All Receptor Locations Without Background Concentrations.		
	Maximum 24-hour Average	Maximum Period Average
Pre-shutdown operations	76	7.8
Pre-Order operations	9.2	2.0
Dec. 30, 2005 to June 30, 2006	41	3.9
July 1 through September 30, 2006	43	5.7
Maximum Impact Allowed in this Non-Attainment Region	**5.0 $\mu g/m^3$**	**1.0 $\mu g/m^3$**

For fugitive emissions of $PM_{2.5}$, the assumption that $PM_{2.5}$ is 15% of PM_{10} is far too low. While for re-suspended roadway dust recent US EPA studies indicate that the fraction of $PM_{2.5}$ to PM_{10} is about 15%, for all of the other processes that contribute to fugitive dust at the site, including coal and ash handling, coal dumping and wind erosion, EPA's AP-42 shows that the ratio of $PM_{2.5}$ to PM_{10} emissions equals 30% or higher.[11] Additionally, the SEA completely ignores the contribution to total PM_{10} and $PM_{2.5}$ impacts from the combustion emissions from heavy duty diesel trucks, which make many trips per day in order to haul off the ash from this coal and trona combustion process. For

[11] See Sections 11.19.2, 13.2.1, 13.2.4 of "AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary, Point and Area Sources." US EPA, September, 1998, for crushing and transferring operations, re-suspended roadway dust from truck travel, and aggregate handling and Section 4.1.2 of "Control of Open Fugitive Dust Sources," EPA-450/3-98-008(a) for wind erosion from piles.

the post-Order operational scenarios, PM_{10} and $PM_{2.5}$ emission rates should reflect the expected increase in truck trips with trona use. Therefore, fugitive $PM_{2.5}$ emissions in the SEA have been underestimated in this analysis by at least a factor of 2.

For the *Operations Under the Order* and *Potential Extensions of the Order*, $PM_{2.5}$ impacts are significantly understated, in part due to the neglect of contributions by increased fugitive emissions that derive from the need to handle at least two times the ash of the pre-shutdown scenario. The SEA states that adding background levels to $PM_{2.5}$ impacts "involves some double counting of plant effects." [12] It is not clear why the DOE interjects this commentary on a standard guideline procedure for evaluating compliance. However, this comment is especially misplaced in this analysis, where the entire DC/Northern Virginian region is classified as nonattainment, not on the basis of the single monitor at Aurora Hills but by results at numerous monitors located around the region.

While the SEA acknowledges the nonattainment status of the area, it never states what this means for the plant's compliance status, i.e., that for compliance with the $PM_{2.5}$ NAAQS the PRGS's maximum potential impacts must fall below significance levels. Therefore, the exercise on p. 72 in which the DOE adds the plant's maximum impacts for $PM_{2.5}$ to background levels is unnecessary. Instead, $PM_{2.5}$ impacts for the plant should simply be compared against significance levels, as shown in Table 1.

4. SEA Fails to Analyze Impacts of Hazardous Air Pollutants. Prior to the shutdown of the PRGS in August 2005, air quality analyses showed elevated levels of hazardous air pollutants ("HAPs") emitted from the PRGS, in particular, the acid gases of hydrogen fluoride and hydrogen chloride and trace metals. The SEA fails to provide any analysis whatsoever regarding impacts associated with hydrogen fluoride and hydrogen chloride. Additionally, the SEA ignores the air impacts of trona's hazardous component silica. Assessment of impacts against health-based standards for all of these stack-based hazardous pollutants for which analysis is absent could easily have been undertaken by simply scaling SO_2 impacts. The SEA also fails to assess the impacts of the emissions of trace metals. The SEA does undertake a mass balance analysis on the fly ash captured from the combustion of Appalachian coal, but according to the SEA that analysis reveals likely emissions of toxic metals into the atmosphere. The SEA, however, undertakes no analysis of the quantities of these emissions. This is a very serious omission because the impacts on human health associated with emissions of toxic pollutants, particularly during downwash events, is severe.

5. SEA Fails to Independently Assess Impacts. In several areas where it describes procedures within its AERMOD analysis, DOE states that it relied on data provided by

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[12] The SEA suggests that because the background concentrations used in DOE's $PM_{2.5}$ estimates were measured while PRGS was operating at pre-shutdown levels, there is the potential for double counting of the PRGS's effects. However, the Aurora Hills monitoring station is approximately 2.5 miles from the PRGS. Review of isopleths analyses would show that double counting is insignificant.

US EPA. However, in a meeting that Alexandria's consultants had with US EPA in March, 2006, Meteorologist Denis Lohman stated that when simulating the PRGS under various operating scenarios, he used Mirant's consultant's AERMOD input files. Therefore, the SEA does not provide a truly independent analysis of the PRGS's impacts. Receptors, meteorological data and building dimensions should be independently processed by the DOE and used in AERMOD as the basis for deriving all results.

According to AERMOD implementation guidance issued in September, 2005, meteorological data should be processed within AERMET using the meteorological station site as the center of the 3-kilometer land use circle, *i.e.,* the surface characteristics around the measurement site (Ronald Reagan National Airport) should be used. There is no description of how meteorological surface characteristics were treated in the SEA. If the DOE relied on AERMET data processed by Mirant's consultant, then meteorological data will *not* have been processed with the measurement site as the center. These input files should be independently derived by DOE with the measurement site as the center if this is not the case currently. Additionally, in accordance with the modeling guidelines, DOE should process a full five-year set of historical meteorological data in order to ensure that maximum potential impacts for the many different operating scenarios and averaging periods reflect all expected meteorological variability.

There is also no discussion of the format of the meteorological data processed in AERMET and used in the SEA's analysis. While it is stated that Reagan National Airport data were used, several available formats of recent National Weather Service ("NWS") data from the Reagan National Airport station use a higher wind speed reporting threshold, so that wind speeds below 3 knots are reported as calms. In contrast, before 1993 the NWS station at Reagan National Airport used a lower reporting threshold that allows for recording of wind speeds in the 2 to 3 knots category. In air quality simulations, the highest offsite impacts often occur during hours when wind speeds are their lowest, due to decreased pollutant dispersion. [13] Additionally, for Reagan National Airport, wind speeds in the 2 to 3 knot category account for a significant 10% of total hours. Use of lower threshold data allow for a fuller accounting of possible impacts of the PRGS. For this important analysis, all AERMOD results should be re-derived using the Reagan National Airport NWS meteorological data that report this subset of wind speeds in the category of 2 to 3 knots. These data and the concurrent upper air data for the region are readily available from the EPA's meteorological data online system. [14]

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[13] Recent analysis of the PRGS's baseline impacts shows that maximum overall impacts increase when these lower wind speeds are included. Additionally, when using TD-3280 formatted data for the year 2002, for which the reporting threshold is 3 knots, versus the TD-1440 data for the year 1991, for which the reporting threshold is 2 knots, approximately 800 hours are excluded from the analysis.

[14] See, Surface Archived Data in TD-1440 format at the SCRAM site -- http://www.epa.gov/ttn.

6. The SEA's Determination Regarding Compliance with the Virginia State Implementation Plan is Flawed. Section 176(c)(1) of the Clean Air Act requires that DOE's Order conforms to Virginia's State Implementation Plan ("SIP"). *See* 42 U.S.C. § 7506(c)(1). The SEA disingenuously concludes that the Order is in conformity with the SIP on the grounds that the Order "does not cause or contribute to new emissions not already accounted for in the SIP" and because there is not currently a SIP for $PM_{2.5}$. SEA at 76. The obvious fact which somehow escapes DOE is that emissions from the PRGS cause or contribute to violations of the NAAQS for $PM_{2.5}$ and SO_2, and the DOE Order is specifically responsible for the continued operations of the PRGS notwithstanding these violations. When the Virginia Department of Environmental Quality ("VDEQ") became aware of the violations it ordered immediate corrective action consistent with its obligation under the SIP to ensure compliance with the NAAQS. DOE's Order directly interfered with VDEQ's efforts to enforce the SIP. For the DOE to now take the position in the SEA that the Order conforms with the SIP notwithstanding continued violations of the NAAQS is nothing short of incredible.

Even if the SIP did already account for emissions of the PRGS, and somehow sanction emissions that violate the NAAQS, the Order makes it impossible for Virginia to achieve "timely attainment of any standard." *See* 42 U.S.C. § 7506(c)(1)(B)(iii). This is a required component of the conformity analysis and one that the SEA utterly fails to consider.

The SEA's conclusion that the Order is exempt from conformity regulations is wrong as a matter of fact and law. The conformity regulations exempt those actions that are taken "in response to emergencies or natural disasters such as hurricanes, earthquakes, etc., which are commenced on the <u>order of hours or days after the emergency or disaster</u> . . ." 40 C.F.R. § 93.153(d)(2). The "emergency" that existed here, if at all, was the shutdown of the plant on August 24, 2006. The action taken by DOE in response to the "emergency" was not taken until December 20, 2006, almost four months later. This action was not taken on the order of hours or days after the emergency and hardly constitutes "quick action" within the meaning of 40 C.F.R. § 93.152, which refers to the kinds of quick action necessary after natural disasters or armed conflicts. The Order does not fall within the definition of an emergency under the Clean Air Act and is not exempt from compliance with the conformity requirements.

7. SEA Fails to Adequately Address High Water Quality Impacts from the PRGS. The SEA acknowledges that "[p]rincipal water quality concerns for the Potomac River tributary streams . . . near the Plant include . . . high fecal coliform bacteria counts . . . . ." SEA at 32. Yet, the SEA fails to discuss mitigation measures for the four-fold increase in the concentrations of these bacteria in PRGS's effluent compared to the intake water. SEA at 20. The historical wastewater effluent from the PRGS (345 million gal/day) is roughly equal to the rated capacity of the Blue Plains Wastewater Treatment Plant (370 million gal/day) and therefore has a similar potential to influence the water quality in the river as the Blue Plains facility. PRGS's effluent discharge contains, however, considerably higher concentrations of constituents than the Blue Plains facility, *i.e.,* almost three times the biochemical oxygen demand, over five times the total dissolved solids, and the presence of several metals not found in Blue Plains' effluent. The SEA makes no attempt to explain the adverse effects of PRGS's effluent on this important aquatic resource and how these impacts can be mitigated. On the contrary, the SEA and DOE's extension Order appear to sanction the continuation of these impacts.

8. The SEA Permits Excessive Operations of PRGS. A major flaw in the SEA is that, notwithstanding acknowledged violations of NAAQS and adverse health impacts, it permits operation of the PRGS at levels that ignore the actual demand in the District of Columbia load pocket and the total available capacity that can reliably supply it. A load pocket occurs when electricity supply can be delivered from only one source, creating a pocket. The downtown DC load is considered a load pocket, in that no other feeders supply it except the PRGS units (482MW) and the two Palmer's Corner to Blue Plains' substation transmission tielines (930MW). This provides a total of 947 MW (first contingency) that can serve an historical maximum load of 520 MW in downtown District of Columbia area. The load in the downtown area can vary significantly between 150 and 550 MW, depending on weather and other external factors. The DOE fails to incorporate this type of analysis in its SEA. When there are no line maintenance scenarios between Palmers' Corner and the Blue Plains Substation, only one PRGS unit is required to meet the maximum load at the time of the system peak. At other times, especially low load periods, there may not be a need for PRGS generation at all.[15]

During non-line outage situations, which occurs the vast majority of the time, the SEA would permit the PRGS to operate at a level that Mirant claims is necessary to be able to produce full power within a few hours of a line outage, *i.e.*, each baseload unit to operate 20 hours per day at minimum power (about 30MW) and 4 hours at maximum power (about 105 MW), and the load-following or cycling units to operate 8 hours per day at minimum power (30) MW and 4 hours at maximum power (88MW). SEA at 110. Thus, the SEA would allow Mirant to generate between 150 and 492 MW of power that is not needed.

In effect, the SEA permits the PRGS to operate at these higher levels even though they are not necessary to meet demand, so that according to Mirant, it can achieve full power during line outage situations. But full power is only necessary for reliability in the extremely unlikely event of an unplanned outage of both 230 kV transmission lines. In the event of transmission planned outages, Mirant would have plenty of notice to start up the required base load units to meet the demand. It is unconscionable for the DOE to

[15]The PRGS is connected by two 230 kV lines from Palmers Corner to the Blue Plains Substation for a total transmission capability of 930 MW. Under a single contingency scenario, with one line out and zero generation at PRGS, there is still 465 MW available to flow into the District which will meet demand under all but maximum load situations. At the time of an historical load pocket system peak of 520 MW, only one PRGS unit needs to run 55 MW to fulfill the one contingency requirement. Thus with no maintenance on the Palmers Corner to Blue Plains Bus tielines, only one PRGS unit needs to run at the time of the system peak to supply the downtown load pocket in the District of Columbia.

expose Alexandria residents to excessive and harmful pollution when it is plainly unnecessary and mainly serves to provide a significant financial benefit to Mirant.

9. The SEA Imposes Burdens of "Emergency" on Alexandria Residents. Perhaps the greatest failure of the SEA is that while it acknowledges that operations at the PRGS under the Order have resulted and will continue to result in emissions that exceed the NAAQS for SO_2 and particulate matter, and that such emissions cause illness and increase incidence of premature death, the SEA fails to fulfill its core mission of identifying potential mitigation measures. The SEA provides cursory discussion of alternatives and mitigation measures that were raised by others in comments to the DOE. However, it fails to undertake comprehensive, critical analysis of these alternatives and without any of the urgency that an "emergency" should invoke.

The SEA should have, but did not, identify specific, emergency and non-emergency load reduction programs in the District of Columbia to compensate for electricity generation or transmission reduction at PRGS. In light of the significant use of electricity by government customers and the existence of an "emergency," the SEA should have included as an alternative the Secretary imposing load shedding or load cycling for Federal and District of Columbia buildings.[16]

Most critically, the SEA fails to offer any mitigation measures that will protect Alexandria residents from the known health hazards that continuation of the Order will cause, and, in particular, under line outage situations.[17] If this is truly an "emergency" justifying operations that violate federal environmental protection laws, then extraordinary protective measures are appropriate. The DOE should require that

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[16] The SEA unnecessarily constrains its consideration of alternatives and mitigation measures to those that can be implemented prior to the time the two 230-kv power lines have been brought into service. Continued reliance by Washington D.C. on electricity generated by the PRGS, whether under the Order or not, will require continued mitigation measures. The SEA should have considered, and the DOE must consider, mitigation measures that ensure the protection of Alexandria's residents for as long as necessary.

[17] SEA concludes that because "only very small amounts of construction and employment are associated with the changed operations at the Plant, no appreciable effects on *social* or *economic resources* are anticipated." SEA at 12. However, the SEA acknowledges that PRGS's emissions lead to increased incidence of illnesses and premature mortality among the population of adults leading to work loss days numbering in the thousands. These lost days of work have a direct impact on social and economic resources. The SEA fails completely to assess the impact on Alexandria and the region from reduced productivity caused by increased illness and death. Also, although the SEA provides an analysis pursuant to Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations") concerning PRGS's impacts on minority and low income residents in Alexandria, it fails to provide any such analysis for communities of similar residents in the District of Columbia where modeling analyses have shown impacts.

appropriate measures to protect residents around the PRGS be undertaken whenever emissions may exceed the NAAQS. Incredibly, the SEA fails even to suggest that those most adversely impacted—residents of communities nearby and adjacent to the PRGS—be notified prior to periods when emissions may exceed the NAAQS. It is unacceptable that the brunt of an electric reliability "emergency" in Washington, D.C. should fall entirely on Alexandria's residents, especially when the burden they must bear is paid for with their health and their lives. Once the additional kV transmission lines are installed for the supply of electricity for the District of Columbia, there is absolutely no need for the PRGS to operate for reliability reasons. At the very least, the DOE should then terminate its Order and declare that the PRGS should only operate if in strict compliance with all air quality standards.

Respectfully submitted,

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ATTACHMENT

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January 5, 2007

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Re: ***Wind Tunnel Modeling Evaluation for the Mirant Potomac River Generating Station – Final Report***

Dear Mr. Welsh and Mr. Paylor:

On behalf of the City of Alexandria, we have reviewed the Mirant Potomac River, LLC's Wind Tunnel Modeling Evaluation for the Mirant Potomac River Generating Station, Final Report ("Wind Tunnel Study"), dated August, 29, 2006 and prepared by CPP, Inc. Our review reveals several erroneous assumptions from which the equivalent building dimensions ("EBDs") were derived. Since the use of these dimensions will lead to higher output rates for the Potomac River Generating Station ("PRGS") under the EPA's Administrative Compliance Order by Consent ("ACO"),[1] you should withhold approval of the Wind Tunnel Study and use of the EBDs set out therein pending a full review and resolution of the issues we raise in this letter. Specifically, we identify the areas where the Wind Tunnel Study simulations will need to be refined to more accurately characterize the actual airflow around the PRGS. Some of these areas relate to the scope of the study, while others address the inaccurate assumptions related to the model inputs.

In contrast to the real world where practical constraints limit the number of monitors deployed around a facility, a wind tunnel study is a highly controlled and precisely reproduced environment that provides the opportunity to document a facility's full range of impacts at all possible points. One of the most striking results of the Mirant Wind Tunnel Study, therefore, is

[1] Administrative Compliance Order by Consent, United States Environmental Protection Agency, Region III, Issued to Mirant Potomac River, LLC, June, 2006.

the documentation of the severity of the historical impacts on Marina Towers for criteria pollutants emitted by PRGS for frequently occurring meteorological events and historically common operational scenarios, *i.e.,* four boilers running at mid-load and combusting coal with 0.9% sulfur content. Not surprisingly, such documentation is not featured prominently in either CPP, Inc.'s report (Appendix I of the Wind Tunnel Study) or Mirant's transmittal letter. Furthermore, even without fully accounting for all the possible worst-case conditions, the Wind Tunnel Study demonstrates that PRGS's current operational scenarios pose significant risk to the health of the nearby residents.

1. The Wind Tunnel Study Mischaracterizes Real-world Windflow and Underestimates PRGS's Impacts.

Any wind tunnel study must, first and foremost, accurately simulate the actual operations, configuration and real world environment of the subject facility. In the wind tunnel, concentration profiles are first measured for each wind sector using the real-world shape and size of the facility and nearby structures. Second, simply-shaped buildings are employed as substitutes to develop EBDs that will lead to a match to the actual wind-tunnel concentration profile within a pre-determined error margin. This is not an explicit solution, but instead is an iterative and empirical process whereby different building shapes and sizes are placed in the wind tunnel and the concentration results compared against the site's actual concentration profile.

Finally, and most importantly, because it is the basis upon which all EBDs are measured, the actual concentration profile must be re-created in the wind tunnel accurately or the subsequent results will be inaccurate. Put simply, any EBD solution derives from the actual concentration profile that the wind tunnel study provides. Figures in Appendices E and G of the Mirant Wind Tunnel Study illustrate that if the overall maximum concentrations are mischaracterized in the simulation, the EBDs also will be in error. Consequently, this will lead to a mischaracterization of concentrations in subsequent air quality simulations, with the potential to substantially understate estimated concentrations and the true public health risks of such concentrations.

With respect to the PRGS, the EBDs will be used to design the emission and operational limitations of the plants pending Permit to Operate, based on the overall maximum impacts of the plant's operations on locations of public access. The boiler and turbine tier structures of the PRGS create downwash and cavity effects. Immediately adjacent to PRGS, however, is Marina Towers, a residential structure which also forms a cavity that influences the PRGS's boilers' exhaust dispersion. The outcome of the Wind Tunnel Study – dimensions intended to accurately characterize the effect of these multiple structures' cavities on the plume height and spread – has significant bearing on the results of subsequent AERMOD simulations and the adequacy of the attainment demonstration. In the case of the PRGS, any mischaracterizations of the EBDs would significantly affect stack downwash and plume impaction on the elevated receptors. [2]

2. *The Mirant Wind Tunnel Study Did Not Simulate a Range of Loads and Potential Worst-Case Operational Scenarios.*

Each of the PRGS boilers operates within a wide range of loads, from approximately 30% to 110%. Despite the ACO's requirement for a range of maximum to minimum loads, the Wind Tunnel Study simulated only one load for all of the boilers. The simulated load at 65 MW is approximately equivalent to mid-range load. This limited analysis provides no assurance that EDBs will be protective of the health of nearby residents for the full range of operational levels allowed in the ACO.

The Wind Tunnel Study also fails to include any demonstration that the 65 MW load operating configuration is the worst-case operational scenario for offsite impacts. Limiting this important analysis to only one load is not an acceptable technique within US EPA's "Guideline on Air Quality Models," which specifies that for purposes of determining permit limitations for major sources, the load that produces the worst concentration must be determined and used within all ambient air quality simulations. Notwithstanding EPA's guidance, the Wind Tunnel Study does not determine worst concentrations. [3]

This determination should not be dismissed. For many boilers, even though emissions for some pollutants may linearly fall with load levels, actual pollutant impacts increase because of the non-linear losses in plume buoyancy and momentum that occur with reductions in stack exhaust velocities and temperature. Review of the Wind Tunnel Study's Figures 16(a) – 16(r) suggests that if each of the stack's plume rise was more limited, as it would be for minimum load conditions versus the mid-load conditions simulated, then PRGS's plume capture in the cavity between Marina Towers and PRGS caused by downwash effects of the structures will be significantly more severe.

Consequently, the development of the actual concentration profiles with all site structures in place significantly underestimates the concentration profiles and overall maximum concentration values for each wind sector. For example, if actual concentrations at Marina Towers are indeed higher than the Wind Tunnel Study results show for the all-site-structures-in-place scenario, then all the concentration profiles in the Wind Tunnel Study's Figures G(1)

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[2] In a recent peer-reviewed evaluation of AERMOD's performance against 17 field study databases, the authors state that *"although it seems rather obvious, the [performance] results here strongly suggest that specification of the cavity extent and plume material height and spread (near the building) is critical to appropriately simulating the downwash effect."* AERMOD: A Dispersion Model for Industrial Applications. Part II: Model Performance against 17 Field Study Databases, S. Perry, et. al., J. of Applied Meteorology, Volume 44, pp. 694-708, May, 2005.

[3] Appendix W to Part 51 – Guideline on Air Quality Models, 40 CFR Ch. 1 (7-1-03 Edition).

through G(34) will shift to a higher level, leading to selection of EBDs that would produce higher modeled concentrations than the iterative process has yielded to date.

The results in Table 1 (set out below) illustrate why performing a full load analysis within the Wind Tunnel Study is an essential component of this air quality analysis. This table repeats some of the sulfur dioxide ("SO_2") results shown in Appendix I of the Wind Tunnel Study (Full Scale Concentration Results for Various Stack Combinations Operating Together). Page 6 of Appendix I of the Wind Tunnel Study shows that for winds of 8.8 mps from 160-degree direction, the maximum overall SO_2 concentrations equal 5437.9 $\mu g/m^3$ when four boilers are operating at 65 MW each. The table below shows that while the trona injection process may yield SO_2 reductions which may bring the facility closer to compliance with SO_2 National Ambient Air Quality Standards ("NAAQS") with relatively minor curtailment in operations, fine particulate matter ("$PM_{2.5}$") impacts may far more excessively contribute to violations of the respective NAAQS, thereby becoming a critical pollutant in determining the facility's operational limits. Both the Wind Tunnel Study and the Mirant forecasting approach, as documented in a memorandum from Mirant to Mr. Richard Baier, dated August 4 and November 28, 2006, erroneously ignore consideration of this critically important factor. For example, Mirant's November 28th submittal states that "on the days during which the follow-up model showed potential NAAQS exceedances, the actual monitors demonstrated that, in fact, there was no NAAQS exceedance or even the threat of a NAAQS exceedance." There is no factual basis for such an expansive claim by Mirant. Even a cursory analysis of the Wind Tunnel Study shows that placement of only two monitors on the rooftop of Marina Towers with measurements limited to SO_2 provides no assurance for all Marina Towers' residents against NAAQS violations of SO_2, $PM_{2.5}$ and other criteria pollutants.

TABLE 1

Four Boilers Operating at 65 MW - Estimated Maximum SO_2 and $PM_{2.5}$ Impacts ($\mu g/m^3$) on Marina Towers based on the Maximum Wind Tunnel Full Scale 1-Hour Concentration Result of 5437.9 ($\mu g/m^3$) [a, b]

	SO_2 – 3 hour	**SO_2 – 24 hour**	**$PM_{2.5}$ -24 –hour**	**$PM_{2.5}$ - annual**
	Scaled to 3-hour Impact using US EPA Screening Factor of 0.9 [c]	Scaled to 24-hour Impact using US EPA Screening Factor of 0.4 [c]	Scaled to $PM_{2.5}$ Emission Rate 0.03 lb per MMBtu and to 24-hour impact using US EPA Screening Factor of 0.4 [d]	Scaled to $PM_{2.5}$ Annual Impacts [f]
Historical Four-Boiler Impact	4,894	2,175	48	7
w. Trona Reduction at 80%	979	435	--	--
Background	238	60	39	15
Total	***1,217***	***495***	***87***	***22***
NAAQS [e]	***1,300***	***365***	***35***	***Impact must be insignificant (<1.0) in this non-attainment area.***

Notes:
a. Wind Tunnel Study results for 1-hour maximum SO_2 impact on Marina Towers equals 5,438 $\mu g/m^3$ (see Appendix I) for 4 boilers operating at 65 MW each. Impacts from Boiler 4 were not included in the presentation of impacts in Appendix I.
b. Although not explicitly stated in Appendix I, the gram per second emission rates correspond to an average emission factor of 1.37 lb per MMBtu: this translates to approximately 0.9% fuel sulfur content, which is equivalent to the sulfur content of many coal shipments delivered to the PRGS in the years 2002 and 2003 (as shown by US Department of Energy records).
c. "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised," US EPA, EPA-454/R-92-019, www.epa.gov/ttn/scram.
d. "Summary of Results – Mirant – Potomac – Unit 5 Stack, Alexandria, Virginia," shows a total PM_{10} result of 0.023 lb per MMBtu from Unit 5 with trona injection. Test results show that condensable PM is a very large fraction of the total value and a large portion of total mass is expected to be $PM_{2.5}$. Therefore, we assume here a value of 0.03 lb per MMBtu for $PM_{2.5}$ to account for contributions by soot blowing and ESP rapping and to reflect average operating conditions over a 24-hour period.
e. On September 21, 2006, US EPA reduced the 24-hour $PM_{2.5}$ NAAQS to 35 $\mu g/m^3$. See http://epa.gov/pm/naaqsrev2006.html.
f. For this facility, the ratio of the five-year average of maximum 24-hour $PM_{2.5}$ impacts to the five year average of maximum annual $PM_{2.5}$ impacts equals 0.15, using AERMOD results from "Ambient Air Quality Analysis – Potomac River Generating Station – Alexandria, Virginia," AERO Engineering Services, August, 2005.

These results show that in this analysis where existing background concentrations of $PM_{2.5}$ are so high, leaving little margin for additional impacts, there is similarly little margin for error within the characterization of downwash effects. Therefore, EBDs used in any AERMOD simulations for the design of operational limits for the facility must accurately represent the air flow around the existing site simulation for all potential worst-case conditions of PRGS's operation.

Mirant should conduct a new wind tunnel analysis with the actual site concentrations re-measured for all site structures in place, for each boiler, for each of 36 wind directions (see item 8 below), and for each of three load conditions (minimum, mid-load, and maximum). Future AERMOD simulations should either use load-specific EBDs or use the overall largest EBDs for each boiler and 10-degree wind direction.

Importantly, the Wind Tunnel Study provides significant evidence that, relative to the Wind Tunnel Study results, AERMOD results derived using the default BPIP-PRIME building dimensions do not significantly overstate impacts. Note that Mirant's baseline analysis for the PRGS using AERMOD with BPIP-PRIME dimensions (referred to as AERMOD Default) produced a maximum 3-hour SO_2 impact on Marina Towers that, without accounting for background, exceeded the NAAQS by seven times (9,025 vs 1,300 $\mu g/m^3$).[4]

This 3-hour maximum value assumes that all five boilers are operating at the maximum permitted emission rate. When this maximum 3-hour result from AERMOD-Default is scaled down to reflect a similar four-boiler, reduced emission configuration that is simulated in the Wind Tunnel Study, we see that AERMOD-Default calculated a maximum impact that is only about 30% higher than what the Wind Tunnel Study shows (7,230 versus 5,438 $\mu g/m^3$) as set out in Table 2 below. If Wind Tunnel Study exhaust flow parameters do not accurately represent reduced load or worst-case load, as described below, the degree of differential between AERMOD-Default and the Wind Tunnel Study will be even less. We stress that, relative to the Wind Tunnel Study results, the use of AERMOD-Default to calculate the facility's maximum design concentrations *and* operational limits under the ACO does not lead to significant overstatement of the PRGS's impacts, but instead provides a degree of protection which should be continued due to other aspects of operations under the ACO which, as described below, fail to protect the public against violations of all NAAQS at offsite locations.

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[4] "Mirant Po tomac River, LLC, Alexandria, VA – A Dispersion Modeling Analysis of Downwash from Mirant's P otomac River Power Plant," ENSR Corporation, August, 2005. See Table 5-1, for year 2001, AERMOD-PRIME without background.

TABLE 2

SO2 Impacts – AERMOD Default vs. Wind Tunnel Study Results	**AERMOD-Default Result, Scaled Estimates (µg/m^3)**	**Wind Tunnel Study Result**
Max. 3-hour Impact for 5 Boilers, Permitted Emission Rate	9,025	--
Max. 1-hour Impact for 5 Boilers, Permitted Emission Rate (scaled by 1/0.9)	10,028	--
Max. 1-hour Impact for 4 Boilers (scaled by 4/5)	8,022	--
Maximum 1-hour Impact for 4 Boilers, Reduced Emission Rate	7,230	5,438

3. The Wind Tunnel Study Used Stack-exhaust Velocity That Significantly Overstates Plume Momentum.

As shown in Table 1a of the Wind Tunnel Study ("Actual Full-scale Exhaust and Modeling Information"), the assumptions for exit velocities exceed actual exit velocities for these mid-load conditions. Despite the City of Alexandria's request for comprehensive historical stack exhaust flow data as a function of load, the only data available showing stack exhaust rates derive from recent stack tests and concurrent continuous emissions monitoring ("CEM") data. Note that the Wind Tunnel Study assumes an output power of 65 MW: when actual test results for velocity are scaled to reflect an equivalent load, it shows that estimates used in the Wind Tunnel Study overstate rates by almost 100%. The extent by which the assumed velocity overstates actual values may be even worse because velocity measured during Method 201A/202 procedures, as is the case with the stack test results presented here, may be higher than the actual velocity due to flow disturbance created by the in-stack cyclone. This is supported by CEM data measured concurrently with the April, 2006 test results: CEM velocity equals 12.7 meter per second, versus 14.7 meter per second measured during the Method 201A/202 test.

These CEM data also show a lower stack temperature than either the test result or the value assumed in the Wind Tunnel Study. An overestimate of flue gas flow rate or temperature leads directly to overestimation of plume momentum, and to overestimation of plume rise within the wind tunnel's simulation of the actual flow characteristics. Put simply, the Wind Tunnel Study underestimates the effects of downwash. Additionally, temperatures used in the Wind Tunnel Study are similar to results from stack tests even though load conditions are very different, *i.e.*, 65 MW for the Wind Tunnel Study versus 84 to 103 MW for stack tests. Stack temperature is not necessarily independent of boiler load. (See Table 3 below.)

TABLE 3

Stack Test Results (Jan., and Apr., 2006)[a,b]					**Values Used in Wind Tunnel Study**[c]			
	Load (MW)	Exit Velocity, mps	Stack Exhaust Temp.	Stack Exit Dia., m	Load (MW)	Exit Velocity, mps	Stack Exhaust Temp.	Stack Exit Dia., m
Blr 1 [(a)]	84	17.5	345 F	3.11	65	25.5	338 F	2.59
Blr 5 [(b)]	96 - 103	14.6	289 F	3.81	65	21.5	285 F	2.44

Notes:
a. Stack test performed December 20-21, 2005 and reported in "Final Report – Particulate Emissions Testing – Unit 1 – Potomac River Generating Station – Alexandria, Virginia," TRC Environmental Corp., January, 2006. Velocity was calculated here from each test's measured flowrate and diameter.
b. "Summary of Results – Mirant – Potomac – Unit 5 Stack – Alexandria, VA," for test dates of April 25 and 27, 2006.
c. From Table 1a of the Wind Tunnel Study, "Actual Full-scale Exhaust and Modeling Information."

The optimum means to accurately define each boiler's stack parameters for the range of loads is to review recorded values of the existing in-stack flow and temperature during an extended historical period. Mirant should relay historical flow and temperature data, measured by in-stack monitors for each of the five boilers, in electronic format, to US EPA and VDEQ, or alternately, perform stack velocity and temperature measurements for a range of loads on one of each of its peaking and baseline boilers during ongoing stack testing. Additionally, stack diameter must be corrected within the Wind Tunnel Study to reflect test results. These data should then be used within a more comprehensive Wind Tunnel Study that includes a range of load conditions. [5]

4. The Wind Tunnel Study Failed to Identify Roof-top Receptors on Buildings West of Marina Towers.

Figure 6a of the Wind Tunnel Study shows that the buildings located on Slater's Lane immediately to the west of Marina Towers, were included within the tunnel simulation for the all-site-structures-in-place scenario. However, there were no concentration measurements made at the rooftop locations for these buildings. While these are commercial buildings, and therefore access to outside patios at varying levels is not expected, intakes on the rooftops may supply air to building occupants Currently, concentration profiles for the 120 degree to 160 degree wind directions were derived using only ground-level measurements of concentrations. Actual concentration profiles for these wind directions should be re-measured in the wind tunnel with receptors placed at rooftop locations, and the new concentration profiles should be used as the criteria for EBDs for these wind directions.

[5] Mirant is conducting $PM_{2.5}$ stack tests in response to a request by VDEQ dated August 18, 2006.

5. The Wind Tunnel Study Incorrectly Identified Scales and Direction Indicators.

The scales on several of the figures labeled as Figure 5 in the Wind Tunnel Study are significantly incorrect, indicating that the buildings are at least twice as close and half as large than actual conditions. Additionally, the direction indicators on Figures 6(b) and (d) are incorrect, and should instead indicate all views from the west and east, respectively. The analysis should be re-checked to ensure that incorrect scales or assumptions were not used, and scales and direction indicators should be corrected on the next submittal.

These incorrect scales may explain why the Wind Tunnel Study does not measure ground level concentrations at the closest points of public access to the PRGS for many wind directions, including for southerly, northeasterly and westerly directions (see Appendix D). While the shortest distance between the fenceline and the PRGS structure equals only about 30 meters to the north, less than five meters to the east, and about 60 meters to the southwest, the Wind Tunnel Study did not measure concentrations at any point closer than 90 meters. Impacts along a facility's fenceline often rank among the highest, thereby representing design concentrations for the facility's permit limits. Lack of analysis at these points would similarly understate maximum ground-based impacts and lead to underestimation of EBDs for many wind directions. Therefore, the analysis of ground-based concentrations within the Wind Tunnel Study should be re-performed with concentration measured at the closest points of public access, *i.e.,* starting at points along the facility's fenceline for the wind directions of 10 through 100 degrees and 150 through 340 degrees.

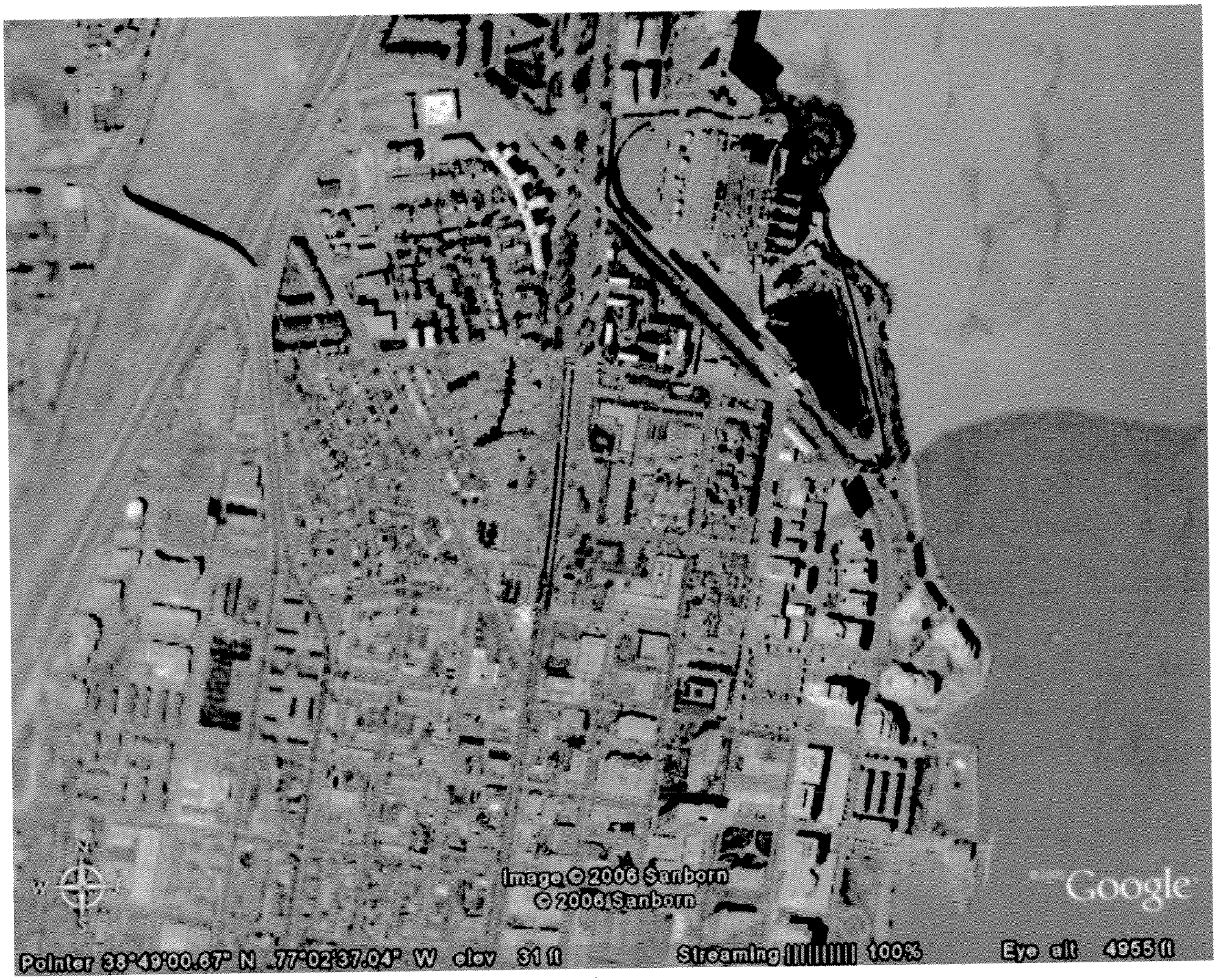
6. Surface Roughness Is Inconsistent With Actual Conditions for Both Water and Land Approaches.

The most critical sector for flow from Mirant towards Marina Towers is 155^0 through 175^0. Land trajectories with fetch of approximately 750 m or more start at 159^0. On this basis, over water trajectories would only be applicable to 25 percent of the sector of concern, i.e. 155 through 158^0. The Wind Tunnel Study has incorrectly assumed over-water trajectories through 170 degrees. According to the AERMET user's guide (Page 5-9) for trajectories with surface roughness values in the range of 0.5 to 1.5m, land influences up to 100m would occur by 700 m of fetch. Applying the same slope factor to the actual stack top would show a distance of approximate 335 m to equilibrate to overland conditions. Applying a methodology from Panofsky & Dutton (1984) shows the estimated height of the interface change as a function of fetch produced, an estimate of 285m. The wind tunnel results are based, therefore, on a much smoother surface than is actually encountered. Figure 1, taken at the roof of Marina Towers facing south-southwest, and Figure 2 show the view from the overland fetches that actually influence the transport and dispersion conditions upwind of key trajectories from Mirant towards Marina Towers. Tree cover and multi-level structures are encountered along the overland fetches. There is no technical justification for using such a smooth, *i.e.*, 15 cm, surface roughness value within the overland range of 159^0 through 175^0 – and beyond on a clockwise basis. The wind tunnel analysis, therefore, should assume overland fetches from 159^0 and onward on a clockwise basis.

The primary objective of any air quality analysis is to represent site-specific conditions as accurately as possible, as is stated in the EPA Guideline on Air Quality Models. The trajectories from the Mirant facility towards Marina Towers are very unusual in that the closest stack height (48m) and the nearby highrise, Marina Towers (43m) are only approximately 105 m apart. The potential for severe plume impaction is pronounced. It is very important, therefore, that the rate of dispersion be defined as accurately as possible, especially for the most critical trajectories. The primary concern is that by defining most of the critical wind flows as over-water flow, with very smooth surfaces, the rate of dispersion is reduced. The affect that this understatement will have on the analysis needs to be determined once the other issues noted in this review are resolved, because the present approach has a high potential to significantly understate maximum impacts at Marina Towers.

Figure 1 - View from Marina Towers Facing South-Southwest.

Figure 2- Aerial View Showing Trajectories and Upwind Fetch.



Also, the heading of the Wind Tunnel Study's Table 2 indicates that the surface roughness values are calculated by AERMET. This is incorrect – these values are user-selected inputs to AERMET.

7. ***Due to Complexity and Number of Structures, Relationship between Buildings to Each Stack's Exhaust Dispersion Pattern is Unique - The Wind Tunnel Study Failed to Analyze Wind Direction for Each Stack.***

Page 14 of the Wind Tunnel Study states: "[T]he EBD values determined for BS1 and BS4 for all wind directions could theoretically be used for their comparable stack." The analysis then continues by calculating EBDs for BS2, BS3 and BS5 at only 40-degree increments and only for the wind directions of 160 to 360 degrees, *i.e.*, only for wind directions ranging from the southeast to the north (clockwise), while analysis of wind directions ranging from 10 to 150 degrees, *i.e.*, from the northeast, east and southeast, are absent. The lack of analysis for these three boilers for these wind directions is especially troublesome given that application of AERMOD for at least one full annual meteorological period shows that the overall maximum 1-hour impact for BS5 occurs for winds from the northeast, *i.e.*, along the facility's southwest fenceline, instead of on Marina Towers' rooftop.[6]

Due to the complexity and proximity to each other of the Marina Tower, PRGS and the other Slater Lane structures, and the significant distance between each stack, there is no theoretical basis for assuming that the EBDs that result for BS1 are equivalent to those for BS2, or that EBDs for BS4 are equivalent to those for BS3 and BS5. Review of the orientation of the Marina Towers structure relative to PRGS indicates that the cavity extent of the taller Marina Towers structure affects different stacks and for different wind directions. Review of the BPIP-PRIME for this site configuration supports this, showing significant variation among controlling tier heights and widths among all boilers and with respect to all wind directions.[7]

While a Wind Tunnel Study limited to only boiler stacks BS1 and BS4 may have been warranted if the stack merge project were complete, that project's completion is delayed by at least one year.[8] Impacts on Marina Towers by the PRGS's emissions continue to be defined according to the plant's current five-stack configuration. Therefore, the Wind Tunnel Study should be re-simulated, and concentration profiles measured for all boilers, all wind directions and the full range of loads. Only then can Mirant and the regulatory agencies rely on the EBDs established through the analysis to determine a valid attainment strategy.

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6 These results derive from application of AERMOD for the year 2002 using BPIP-PRIME dimensions for the PRGS that assumes a simplified tier structure, *i.e.,* ESP heights were assumed equal to the lower turbine tier height.
7 "Ambient Air Quality Analysis – Potomac River Generating Station – Alexandria, Virginia," AERO Engineering Services, August, 2005.
8 VDEQ has requested that Mirant apply for a construction permit for the stack merge project. Due to operational constraints, Mirant will not commence construction until the latter part of 2007.

8. The Wind Tunnel's Flow Visualization Exercise Illustrated Only Rare or Non-existent Scenarios.

Page 18 of the Wind Tunnel Study describes the flow visualization exercise and states that photographs of "selected" cases are provided in Figures 16, 17 and 18. These photographs depict, however, flow visualization for scenarios that either never or rarely occur. For the most part, these photographs show scenarios with only one boiler operating, an extremely infrequent event. They also show photographs of plume flow from only one stack, even though the scenario is described as all boilers operating. This is a misleading visualization exercise, and significantly mischaracterizes the effect on overall dispersion of multiple, independent stacks operating simultaneously. The flow visualization portion of the Wind Tunnel Study should either be repeated, using all possible five-separate stack operating scenarios, or if these scenarios have already been included in the visualization exercise, then their photographs should be presented.

9. Similarity Parameters Developed Using Incorrect Anemometer Height.

The Wind Tunnel Study uses meteorological observations from the Reagan National Airport for the period 1964 – 2002. While the anemometer height for observations after May, 1996 equaled the 10 meter value CPP, Inc. assumed, the height of observations prior to that date was 6.1 meters.[9] CPP, Inc. should identify how this will affect Wind Tunnel Study results, and re-perform any section of the analysis for which results will differ.

10. Full Scale Concentration Results indicate Historical Severe Violations of NAAQS; West and Northern Wings Also Experience Very High Impacts.

Appendix I of the Wind Tunnel Study shows full-scale SO_2 concentration impacts on Marina Towers for various operational scenarios of the PRGS. Review of these tables shows several operating scenarios where, historically, impacts on Marina Towers led to severe violations of ambient air quality standards.[10] This is based on the assumption that meteorological periods occurred when winds of approximately 8 meters per second with a southerly direction persisted for a 3-hour period. Review of Figure 4 in the Wind Tunnel Study shows this to be a reasonable assumption, given that southerly winds in the category labeled 8.0 meter per second occur with the second-highest frequency among all categories for this 39-year locally-observed data set. Furthermore, as shown in Table 1, large exceedances of SO_2 (even with Trona reduction) and $PM_{2.5}$ standards are shown based on the scaling of the wind tunnel results for maximum hourly SO_2 to 24-hour averages of $PM_{2.5}$.

Review of the results in Appendix I also indicates that impacts on Marina Towers are not highest on the southeastern tier and center, where ambient monitors are currently located. Rather, they show that the overall highest impact on Marina Towers occurs on the northern side

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[9] Correspondence with Scott Stephens, Meteorologist, National Climatic Data Center, National Oceanic and Atmospheric Administration, December 7, 2005.

[10] "Screening Procedures for E stimating the Air Quality Impact of Stationary Sources, Revised," US EPA, EPA-454/R-92-019, from www.epa.gov/ttn/scram.

of the western wing. They also show that impacts among rooftop monitors for any one combination of wind speed, direction and operating scenario vary significantly, so that any one rooftop monitor cannot accurately characterize overall impacts on the structure. For example, for one set of wind speed and directions, the simultaneously-measured rooftop impact on the west wing was more than six times the value measured at the location where the southeast rooftop monitor is currently located.

Table 4 below shows the number of scenarios where impacts were highest on each of the wings of Marina Towers, and values at several of the lower-level heights for the operating scenarios when maximums occurred.

TABLE 4

Number of Scenarios where Maximum Impact Occurred and 1-Hour SO_2 Impacts			
	North Wing	West Wing	South Wing
No. of Scenarios out of 20 Simulated	3	7	10
1-Hour SO_2 Values on Other Wings when Overall Maximum Occurred on West Wing	3,006 μg/m^3	5,438 μg/m^3 (overall maximum)	893 μg/m^3
Selected Values at Lower-level Heights	2,081 μg/m^3	4,604 μg/m^3	3,907 μg/m^3

These actual full-scale simulation results from the Wind Tunnel Study clearly show that monitoring of the facility's operation through placement of only two monitors on Marina Towers -- on the rooftop at the southeastern-most point and center -- is grossly inadequate. This error is compounded in light of the intention to use this monitored data in the highly unorthodox manner of serving as the basis to determine the level of plant operation for SO_2 compliance. Furthermore, without ongoing coverage of $PM_{2.5}$ and similar curtailments placed into effect, the current forecast approach with monitor "safeguards" is clearly inadequate to protect the public health and welfare of local residents. For even the limited loads and meteorological conditions studied here, which likely do not capture worst-case conditions due to the factors discussed above, maximum impacts on Marina Towers occur at locations other than where monitors are placed approximately half of the time and, overall, maximum impacts occur on Marina Towers' west wing where no monitor is located.

Additionally, it is not clear why full-scale concentration results at every one of the 46 receptors studied were not included in Appendix I (see pages 8 and 9). Nor were full-scale concentration results for Boiler 4 (BS4) presented for review. The tables on these pages should be modified to include these results and disseminated for public review.

11. The Wind Tunnel Study Illustrates Failure of the ACO to Adequately Protect Public Health Against NAAQS Violations.

The Clean Air Act permitting procedures require that power plant operators design their facility's constant, daily emission limits under the premise that each day's meteorological events could result in that "worst-case" set of daily conditions, determined from simulation of the plant's impacts using a full five-year historical record of meteorological conditions for the site. Through this procedure, in the event that worst-case meteorological conditions actually do occur, the public is protected at offsite locations from exceedances of the health-based standards due to a plant's impacts.

The ACO releases Mirant from this constraint. Instead, it allows the PRGS to design a new day-by-day maximum output on the basis of the next day's forecasted conditions. Furthermore, due to the densely settled and complex, elevated residential structures adjacent to the PRGS to the south, west and north, there are significant gaps in the public health protection offered by the ACO's limited number of monitors. These gaps are even more pronounced when one considers that no monitors are required or in place anywhere along the facility's southwest, west or northwest boundaries. Therefore, in the event that PRGS's operations are designed *a priori* to forecasted meteorological conditions that vary from those that actually occur, there are no means to identify impacts in excess of health-based standards if they occur in these areas. Put simply, operation under the ACO poses risks for other Alexandria residents in addition to those in Marina Towers, including residents of Harbor Terrace, located immediately adjacent to the PRGS's southwest fenceline, and for occupants of the office complex to the west of Marina Towers on Slater's Lane. Table 5 below illustrates this showing that for at least several ACO-approved operational scenarios, impacts measured in the Wind Tunnel Study or predicted by AERMOD (for wind directions that were not analyzed in the Wind Tunnel Study) exceed NAAQS for SO_2 in areas where no monitors are present.

TABLE 5

ACO Scenario	Total SO_2 emission rate allowed by ACO[a]	1-Hour Unit-rate Impact from Wind Tunnel Study (See App. D-4)	SO_2 1-hour impact from Wind Tunnel Study	SO_2 3-hour impact (without background) vs. NAAQS
BS1 and BS4 at 0.54 lb/MMBtu	145 grams/sec.	29.48 μg/m^3 for 1.0 grams/sec.[b]	4,275 μg/m^3 to northwest of facility	3,847 μg/m^3,[c] to northwest of facility
BS5 at 0.9 lb/MMBtu	125 grams/sec.	No Wind Tunnel Analysis for Impacts to the Southwest, where AERMOD shows Maximum Impact for BS5	--	1,729 μg/m^3 (3-hour result from AERMOD along southwest fenceline)
3-hour SO_2 NAAQS				**1,300 μg/m^3**

Notes:
a. Assumes maximum load of each boiler, as allowed by ACO for short-term operation, equal to 1053, 1087 and 1107 MMBtu per hour for BS1, BS4 and BS5, respectively.
b. See Table D-119 of Wind Tunnel Study, where at 309m, -25m total impact from BS4 and BS1 equals 29.48 μg/m^3 for a wind direction of 140 degrees for a unit emission rate.
c. Scaled using 0.9 times the 1-hour impact.

12. Health Analyses.

The magnitude of the wind tunnel modeled concentrations that were used to represent actual SO_2 concentrations at Marina Towers showed estimated concentrations that are more than three times the 3-hour SO_2 standard. Once the deficiencies in the wind tunnel analysis are corrected, there are two health-related issues that should be explored as high priorities:

(i) Based on EPA 5-minute SO_2 considerations, historical SO_2 exposures at Marina Towers likely have exceeded both the level of concern (1,567 μg/m^3) and level of endangerment (5,223 μg/m^3).[11] Also, in the event of Trona failure or variability, there will be the potential for exposures at concentrations that exceed the level of endangerment. The Wind Tunnel Study results available to date understate actual maximum values and, therefore, predict the long-term severity of impacts caused by the PRGS.

[11] EPA, "G uideline Document for Ambient Monitoring of 5-Minute SO_2 Concentrations," Office of Air Quality Planning and Standards, July 20, 2000.

(ii) It is significant that the wind tunnel analysis is limited to SO_2 and ignores $PM_{2.5}$ impacts. The ratio of $PM_{2.5}$ to SO_2 emissions (matched to the actual wind tunnel estimate assumptions) shows a value of (0.03 / 1.37) = 0.022. Applying this value to the maximum value observed at the top of Marina Towers (5,438 $\mu g/m^3$) would show an estimated maximum hourly $PM_{2.5}$ concentration of 119 $\mu g/m^3$. Applying a standard screening factor to convert maximum hourly to a daily estimate (a factor of 0.4) would show a screening-level estimate of 48 $\mu g/m^3$. This concentration is almost 50 percent higher than the $PM_{2.5}$ 24-hour standard, even without consideration for the background levels that are nearly equal to the standard as the baseline. Pending more definitive data to the contrary, the Mirant facility is seriously endangering the health and welfare of the residents of Marina Towers. Yet, the analysis presented here focuses only on the primary components of $PM_{2.5}$ emitted by the PRGS. When the PRGS's impacts are more fully evaluated to include the substantial contribution to secondary formation of $PM_{2.5}$ by the stacks' nitrate- and sulfate-laden gas stream, it is likely that such a demonstration, given the high regional background levels of $PM_{2.5}$, will show that the PRGS's emissions also pose endangerment to the health of residents in broader reaches of Alexandria and in the District of Columbia. The lack of mitigation measures for fine particulates is an obvious and unacceptable flaw in the control strategy for the PRGS.

13. Summary of Deficiencies and Modifications.

The above items delineate areas where the current Wind Tunnel Study either falls short of the full scope of analysis required to capture the worst-case downwash scenarios of the PRGS and Marina Towers structures, or where assumptions should be revised to ensure accurate simulations. Furthermore, approval of the EBDs set out in the Wind Tunnel Study would lead to higher power output rates by the PRGS and higher impacts at places of public access that substantially exceed health-based standards. Accordingly, we suggest the following:

(i) The Wind Tunnel Study should present $PM_{2.5}$ full-scale concentrations results.

(ii) Mirant should relay historical measurements by in-stack monitors for flow rate and temperature to US EPA and VDEQ, in digitized format, in order to determine agency-approved representative conditions of velocity and temperature for each of the low, mid- and high range loads. The Wind Tunnel Study should be re-simulated using these representative load parameters.

(iii) The wind tunnel analysis is inconsistent with stack testing results that show significantly different exit velocities than were modeled in the wind tunnel. Differences also were noted between the stack diameters modeled in the wind tunnel and those measured in stack tests conducted recently. Mirant should resolve these inconsistencies and propose their correction to US EPA and VDEQ prior to relying on the results of the wind tunnel analysis for any regulatory purpose.

(iv) Mirant should expand the number of monitors on Marina Towers to encompass all possible points of maximum impact, including on the rooftop at the ends of the western and northern wings, at approximately mid-level height in each of the faces of the wings, and at several locations between the PRGS and Marina Towers at ground location. $PM_{2.5}$ instrumentation should employ continuous sampling methods. Mirant should also place SO_2 and $PM_{2.5}$ monitors along the southwest and northwest fencelines.

(v) Mirant should perform all resimulations in the wind tunnel analysis by correcting the treatment to overland trajectories starting from 159 degrees and onward on a clockwise basis. Dispersion modeling also should be consistent with actual surface conditions along this critical trajectory, and all trajectories.

(vi) In all resimulations in the wind tunnel, Mirant should include rooftop receptors on other multi-story structures in the vicinity, including buildings to the west of Marina Towers on Slaters Lane.

(vii) In all re-simulations in the wind tunnel, Mirant must measure full-scale concentration results and develop unique equivalent building dimensions for each wind direction and for each of the five stacks. For ground-based measurements, the Wind Tunnel Study must measure concentrations starting at the closest points of public access for each wind direction, *i.e.,* starting at the fenceline.

(viii) All full-scale concentrations results of re-simulations in the wind tunnel must be presented, including impacts by BS4, and impacts on all receptors.

(ix) In the revised Wind Tunnel Study report, visualizations of flow for wind directions of 150 through 180 degrees for all of the operating scenarios that are simulated should be presented, including the scenario where the five boiler stacks are operating simultaneously.

CONCLUSION

For the above reasons, the City of Alexandria respectfully requests that you reject the current Wind Tunnel Study results and that Mirant be advised either (i) to use BPIP-PRIME results in all AERMOD simulations, both to conform to the US EPA's ACO requirements and for subsequent design of facility permit limits or (ii) conduct a new wind tunnel analysis with the modifications as recommended herein.

Sincerely,

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