ALLEGHENY COUNTY HEALTH DEPARTMENT
Air Quality Program

SUMMARY OF PUBLIC COMMENTS AND DEPARTMENT RESPONSES ON THE PROPOSED STATE IMPLEMENTATION PLAN REVISION (NO. 82) FOR THE ALLEGHENY, PA NONATTAINMENT AREA, 2010 SO_2 NAAQS

[Notice of the opportunity for public comment appeared in the legal section of the Pittsburgh Post-Gazette on May 1, 2017. A Public Hearing was held on June 1, 2017 and the public comment period ended on June 6, 2017.]

General
Comments related to the SIP in general.

1. **Comment:** It is critical to maintain the balance of environmental responsibility and economic opportunity for our region and not risk the future of our remaining manufacturing jobs. U. S. Steel and the United Steelworkers are committed to environmental protection as well as the local economy. The Allegheny County Health Department should not unnecessarily curtail manufacturing operations while meeting requirements of the Clean Air Act for this SIP.

   Response: Allegheny County Health Department (ACHD) recognizes the commitment by U. S. Steel (USS) and its employees and understands the importance of the economy and environmental protection to stakeholders in Allegheny County. ACHD considers the requirements for this SIP to be reasonable and achievable.

2. **Comment:** Losing federal transportation funding would have a serious effect on our transit system in the short term and a devastating effect in the long term. Federal monies pay for some day-to-day operations but mostly contribute to capital costs for the Port Authority, including newer and cleaner buses. Expanding and protecting public transportation is also one of the best things we can do to improve air quality, as public transportation can reduce pollution from several vehicles. Corporations need to immediately begin working to help achieve compliance with air standards and generally need to be responsible to the community where they derive their profits.

   Response: ACHD recognizes the importance of transportation funding for the County. In the case of public transit, Clean Air Act §179(b)(1)(B), "Sanctions and Consequences of Failure to Attain – Sanctions," does allow for the approval of capital programs for public transit, construction of certain roads or lanes solely for the use of passenger buses and other activities generally associated with public transit.

3. **Comment:** While ACHD correctly cites EPA's Technical Support Document regarding the nonattainment designations, the boundaries for the Allegheny, PA nonattainment area are

contrary to what PA DEP recommended in its April 8, 2013 recommendation letter to EPA, which did not include the municipalities of Braddock and North Braddock. ACHD's North Braddock monitor is currently showing attainment for 2014-2016 data. Additionally, Union Township in Washington County, in which the Elrama and Mitchell power plants are located, was not included within the nonattainment area. This should be mentioned in the Weight of Evidence section.

Response: ACHD submitted a comment to the SO_2 designations docket (EPA-HQ-OAR-2012-0233) in April 2013, recommending a nonattainment area that did not include municipalities north of West Mifflin and did include Union Township and Finleyville Borough in Washington County. EPA's final designation for the Allegheny, PA area was based on five factors, including monitored air quality, emissions and emissions-related data, meteorology, geography/topography, and jurisdictional boundaries as applicable to the area. Further discussion of the designated area would not enhance the Weight of Evidence section.

4. **Comment:** There is no explanation in the SIP of the work practice standards that will assure continuous efficient operation according to 40 CFR Part 51 Appendix V, specifically for the VCU system. Detailed information on the work practices and reporting requirements that will ensure emission levels should be included in the SO_2 SIP.

   Response: 40 CFR Part 51, Appendix V, "Criteria for Determining the Completeness of Plan Submissions" states that the following shall be included in plan submissions for review by EPA: "Evidence that the plan contains emission limitations, work practice standards, and recordkeeping/reporting requirements, where necessary, to ensure emission levels." ACHD contends that work practice standards related to the VCU system are not an issue, as it is the technology itself that enables emission reductions, and therefore discussion of work practice standards in the SIP is unnecessary. Reporting requirements will be established in the applicable installation and operating permits.

Enforceability of Limits

Comments related to the enforceability of the SIP emission limits.

5. **Comment:** Page 8 states that "Federal enforceability for limits given in this section will be achieved through permit conditions or consent orders effective on or before October 6, 2017." Though federal enforceability for limits will be achieved through permit conditions or consent orders, the limits do not necessarily need to be effective on or before October 6, 2017. ACHD should clarify that it anticipates that the permits or consent orders would be federally enforceable or effective on or before October 6, 2017, with the limits themselves effective on or before October 4, 2018.

   Response: Section 3.1 of the SIP has been clarified accordingly that the permits or consent orders will be effective by October 6, 2017 with the limits to be effective by October 4, 2018. If full implementation of all or any of the controls can be met sooner than October 4, 2018, earlier dates may be used in the permits or consent orders.

6. **Comment:** The draft attainment plan states that emission limits will be federally enforceable by permit conditions or consent orders effective on or before October 6, 2017. All emission limits needed to attain and maintain the NAAQS must be incorporated by reference into the SIP in order to be federally enforceable and should be submitted with the final attainment plan. The consent orders and permits must be made available for public comment prior to submittal to EPA for incorporation into the SIP as part of the attainment plan. ACHD should clearly indicate that a request is being made that EPA approve the consent order and/or permit limits into the SIP.

   Response: Permits or consent orders will be included in the final submittal to EPA. Clarification has been added to Section 3.2 accordingly.

Longer-Term Average Limits

Comments related to the longer-term averaging for limits assigned to sources with variability.

7. **Comment:** In regards to longer term averaging, ACHD has applied a 30-day average and an unnecessary supplementary limit. As stated; "The SIP limits will be based on the 30-day averages, with an additional restriction of no more than three consecutive days above the supplementary 24-hour limits." ACHD determined the 30-day rolling average in manner consistent with EPA's SO_2 SIP guidance; therefore, the supplementary limit is unnecessary and redundant and results in unwarranted restrictions and unnecessary data reduction and recordkeeping. The 30-day rolling average is much lower than the 24-hour average and the critical emissions value, rendering the 24-hour average limit unnecessary.

   ACHD's development of the 30-day averaging period clearly follows and does not deviate from EPA's guidance. According to the EPA guidance, it is appropriate to use longer term emission limits for variable emissions sources. EPA included the option for a longer term averaging period in response to concerns regarding the conservatism in the model (e.g., modeling emission units simultaneously at their maximum emissions) and variability in the sources – including, specifically the variability of sulfur in the fuel combusted as is the case at U. S. Steel – and analyzing the impact of emissions variability on air quality. According to the guidance, "EPA believes this approach provides appropriate flexibility while still requiring approximately the same control strategy and while still providing for attainment of the standard." Data reduction produced ratios to the critical emissions value that are in line with the ratios provided by EPA in the guidance.

   Furthermore, the EPA guidance for the 1-hour standard explicitly uses 30-day rolling average examples. Adding a "supplementary" limit that is not necessary only adds additional monitoring and recordkeeping requirements. Further, the EPA has not negatively commented on the use of the longer term 30-day rolling average limits or ACHD's approach to developing 30-day rolling average limits. Thus, the supplementary limit is not necessary

for the SIP, nor is it necessary for or used in the attainment demonstration. ACHD should remove any and all references to "supplementary (24-hour) limits."

Response: While the SIP Guidance uses 30-day averaging as examples, it also explicitly explains that averages "up to 30 days" may be adequate for longer-term average and does not preclude the use of any averages over a shorter period for supplemental restrictions. As mentioned in the EPA guidance and in Appendix D of the SIP, an "important factor in assessing whether a long term average limit provides appropriate protection against NAAQS violations is whether the source can be expected to comply with a long term average limit in a manner that minimizes the frequency of occasions with elevated emissions and magnitude of emissions on those occasions. Use of long term average limits is most defensible if the frequency and magnitude of such occasions of elevated emissions will be minimal. Consequently, supplemental limits on the frequency and/or magnitude of occasions of elevated emissions can be a valuable element of a plan that protects against NAAQS violations. Limits against excessive frequency (e.g., limitations on the number of times the hourly emissions exceed the critical emission value) and/or magnitude of elevated emissions (e.g., an hourly emissions limit, supplementing the longer term limit, which sets a cap on the magnitude of the peak hourly emissions rate) could further strengthen the justification for the use of longer term average limits."

ACHD followed the EPA guidance regarding the addition of a supplementary limit and considers the additional restriction to be appropriate for the SIP. The consecutive-day 24-hour supplementary conditions are designed to limit prolonged periods above the modeled critical emission values (CEVs), especially during inversion periods where the likelihood of exceedances is increased substantially. The 3-day consecutive basis is also consistent with the NAAQS standard, which is based on the 4th-highest day (determined by maximum hourly values) in a year. Recordkeeping requirements should be little affected by the supplementary conditions, since 24-hour block values are already required for calculation of the 30-day rolling averages.

8. **Comment:** Longer term averaging should not be used for limits since averaging would allow for some higher sulfur periods than the modeled values that show attainment on a 1-hour basis. Allowable emission excursions exceeding the SIP critical emission value (CEV) (non averaged limit) may not be so benign as EPA SO_2 Guidance suggests: "EPA's general expectation that, if periods of hourly emissions above the critical emission value are a rare occurrence at a source, particularly if the magnitude of the emissions is not substantially higher than the critical emissions value, these periods would be unlikely to have a significant impact on air quality, insofar as they would be very unlikely to occur repeatedly at the times when the meteorology is conducive for high ambient concentrations of SO_2."

Temperature inversions that leverage pollutant levels are very common in Allegheny County. A recent analysis of air inversions in the County performed by ACHD staff showed that "weak or greater surface inversions were observed nearly 45% of mornings from July 29, 2014 through February 20, 2016 inclusive with some missing days in 2014." More recently, looking at April of 2017, there were 77% of days with a morning (7:00 a.m.) surface

inversion of at least 1.0 °C. The high frequency of inversions will, in fact, very likely intersect with allowable higher SO_2 emission levels and will not be "unlikely" as suggested above by Guidance. Sources in the Mon Valley are predominantly in the lower level of the river valley, setting sets up situations for trapping air pollution, especially during with the numerous inversions in the county. There have been two monitor exceedances already in 2017, with an additional day reported at 75 ppb, even with VCU controls partially in place.

Hours above the critical emission value (CEV), while possibly accommodating facility issues such as variability, will not help the breathing public nearby or downwind of the source. It should also be remembered that there are already allowable monitor exceedances built into the one-hour SO_2 standard. EPA "links short-term exposures to SO_2, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms." Even a few hours above the critical emission value or even less than one hour could cause a local health effect immediately downwind of the higher emitting source(s). The one hour standard acknowledges these short term effects. In an area with significant inversions added to a river valley location, and continuously operating facilities, the strongest possible controls are called for.

There should be no averaging period at all, given the complexity of the air shed. Longer-term averaging would allow major polluters to comply with only 24-hour and even 30-day averages. The conservative control needed for this nonattainment area is the 1-hour, non-averaged CEV value.

Response: While ACHD understands the possibility for some hours to exceed modeled CEVs, ACHD considers longer-term averaging to be appropriate for limits for COG-combusting sources due to variability in sulfur content of coke oven gas. As stated in the EPA SO_2 SIP Guidance, longer-term average limits can provide "adequate assurance that the 1-hour SO_2 standard will be attained, so long as the limit reflects comparable stringency to the 1-hour average emission limit that modeling shows to provide for attainment." The variability and longer-term averaging analysis has been provided in Appendix D of the SIP.

The U. S. Steel facilities normally operate at levels below the modeled (CEV) rates. As shown in the example given in Appendix D, it is expected that only a few hourly emissions would exceed any of the modeled CEV emission rates during any given year. (Note that Figure 3-1 of the SIP shows the B Line COG to be below 5 gr H_2S/100 dscf COG for most hours following the VCU upgrade in April 2016.) As mentioned in the response to the previous comment, the supplementary condition of no more than 3 consecutive days above the 24-hour limit will restrict prolonged periods above the CEVs. Additionally, a plant-wide limit of 35 gr H_2S/100 dscf COG at any time is also effective for the U. S. Steel facilities, restricting any single-hour emissions.

9. **Comment:** With the use of longer-term averaging and hours that can exceed the modeled CEVs, a month's worth of emissions could be packed into a single hour, resulting in extensive severe acute illness and possibly even fatalities. Weather patterns can easily cause ambient air levels to be at "about as bad as it gets" levels for two days, followed by a normal

day, followed by two more high-level days. Longer-term averaging could overlook such unhealthy air quality events.

Response: As mentioned in the previous response, the U. S. Steel facilities normally operate at levels below the modeled (CEV) rates. While intermittent, alternating periods of high emissions (such as 2-day periods) are theoretically possible and could still show compliance with the longer-term limits mathematically, it is not expected to occur with the longer-term averaging methodology. Also as mentioned in the above response, a plant-wide limit of 35 gr H_2S/100 dscf COG at any time is also effective for the U. S. Steel facilities.

10. **Comment:** It is not clear from the SO_2 SIP how non-operating hours would be treated in the longer-term averaging. The SO_2 SIP Guidance notes in Appendix C (Page 3) in regard to longer-term averaging that: "Inherent in this recommended approach is that hours without operation are not included in the average." The longer-term averaging for this SIP should use this technique.

    Response: It has been clarified in Appendix D of the SIP that only operating hours will be used for the longer-term averaging. E.g., if a process operated for only 5 hours during a calendar day, the 24-hour average would be based on the average of the 5 hours. Zeros would not be used for the non-operating hours. Consequently, the 30-day averages would also use any 24-hour average with a value and exclude any days without any operation. Additionally, for hours when only natural gas was used, emissions would be based on SO_2 calculated from the sulfur content and flow rate of natural gas.

11. **Comment:** ACHD has not provided calculations regarding the "critical emissions values" for sulfur dioxide. In order to justify long-term averaging, ACHD must show that the sources would meet the 1-hour critical emission values. However, it is not shown how these values were calculated. Additionally, all of the steps required for the calculations for longer-term averaging and "comparable stringency" have not been included in the SIP in Appendix D. ACHD should explicitly state these values and calculations.

    Response: The critical emissions values (CEVs) are the constant hourly values used in the model that would demonstrate attainment for the control case scenario. Section 3.2 of the SIP has been reworded for clarification. The modeled CEVs as listed in Tables 3-1 and 3-3 were used as the bases for the longer-term averaging and adjustment ratios. The values provided in Appendix D are the results of calculations done via spreadsheet using several thousand records of data. The results given in Appendix D are an appropriate summary of the steps required for determination of variability and the use of longer-term averaging.

12. **Comment:** ACHD does not have enough data for its B Line VCU upgrade to determine "comparable stringency" values, since there are only eight months of data for this particular control. Due to the inadequacy of this data set, combined with the unpredictable and complicated meteorological conditions of the Mon Valley, ACHD should either use actual

VCU data from a comparable site with 3-5 years of operating data, or forego long-term modeling altogether.

Response: Appendix D indicates that there were similar distributions of the H_2S grains with/without the VCU control, and that the H_2S data prior to the VCU upgrade are appropriate to use for overall variability for B Line. Three years of data (2014-2016) were therefore used for the variability calculations.

Additionally, longer-term averaging was not used for any of the modeled results. The modeled limits for the control case runs were the CEVs, at a constant rate for each hour for all sources modeled. The longer-term averaging allows for exceptions for some hours in relation to the CEV rates, based on the statistical probability that occasional hours above the modeled rates would not affect the overall predicted results.

Control Strategy

Comments related to controls needed to demonstrate attainment for the area.

13. Comment: EPA's April 23, 2014, Guidance for 1-Hour SO_2 Nonattainment Area SIP Submissions (EPA's SO_2 SIP Guidance) states that "the EPA expects the approvable compliance dates for control measures in the attainment demonstration to be as expeditious as practicable." Some projects and emission rates have a date of on or before October 4, 2018. ACHD should ensure that these limits are in place as expeditiously as possible in order to attain the standard by the attainment date.

Response: The design, construction, and implementation of all projects for this SIP necessitate the longer schedule than prescribed by the general NAAQS schedule. It is also anticipated that concentrations will be low enough in order to show one year of monitored attainment for year 2018, if not a design value for 2016-2018 below the NAAQS, for all monitor sites in the nonattainment area (NAA). Once monitored attainment has been achieved, the area must then be modeled using actual emissions from the three most recent years, which is also anticipated to show attainment.

14. Comment: As proposed, the SO_2 SIP will not meet the one calendar year of (emission sources) compliance information for modeling purposes, starting in January of 2017. All control sources should have had a completion and operational date allowing one calendar year of operation to demonstrate compliance before the attainment date of October 4, 2018. ACHD should impose immediate deadlines for implementing proposed control strategies, and not wait until the attainment date.

Response: See response to previous comment.

15. **Comment:** Considering the cooperative efforts made by industry that will require considerable capital expenditures, ACHD should focus on an achievable flexible control schedule for the SIP.

    Response: A SIP must have a fixed schedule for control implementation and milestones that meets Clean Air Act requirements. While the control strategy includes some flexibility in limits to allow for fuel-based variability, the schedule prescribed in the SIP must be met for the SIP to be effective and approvable.

16. **Comment:** ACHD should explore additional opportunities for sulfur dioxide reductions at the U. S. Steel Facilities in addition to the projects discussed in the proposed SIP revision. These facilities contribute over 99% of the sulfur dioxide from stationary sources in the nonattainment area. Such opportunities might include the use of lower-sulfur coal, less fugitive emission releases, and efficiency initiatives. Additional controls may also lead to the public health benefit of reducing benzene and PM emissions as well as SO_2 emissions.

    For example, ACHD can and should be doing something to require fewer leaking doors at the coke oven facility in Clairton. Further coke oven pressure controls, such as PROven (as implemented for the Clairton C Battery) should be considered as a means of fugitive reduction in batteries that have not yet implemented the technology. Emission free coke pushing, discharging, and traveling systems, as seen in Japan's SCOPE 21 coke oven emission reduction system, can further reduce hot car and pushing emissions.

    Response: The SIP includes the most feasible plan identified in order to demonstrate attainment by 2018. Future projects not implemented or quantified by this SIP will lead to continued decreases of emissions from the facilities. ACHD will continue to promote low-emission technologies for sources in Allegheny County.

17. **Comment:** For the sources in Tables 3-2 and 3-3, it should be indicated how some sources will be demonstrating compliance with the limits. It is unclear if the compliance methods for these limits are going to be included in the revised permits or consent orders referenced in the previous comment. In addition to the limits themselves, compliance requirements need to be included in the attainment plan.

    Response: Section 3.3 of the SIP has been clarified to indicate the methods of compliance for sources with and without longer-term averaging.

18. **Comment:** Because the proposed Edgar Thomson stack project is underway but not finalized, it should be afforded some flexibility in the event the project design requires modification. The details will be subject to a permit application that is currently being prepared, and the intent of the SIP is not to limit the purpose and scope of permit applications in Allegheny County. U. S. Steel requests that the SIP recognize the anticipated permit being the primary means to demonstrate attainment. Language similar to the following is

suggested for the SIP: "To the extent that the conditions in the current modeling demonstration change in the final design stages of the project, a permit application would include an updated modeling demonstration to ensure that attainment can be demonstrated on or before October 4, 2018." Appendix J should also be clarified accordingly.

Response: The SIP does not dictate all design aspects of the Edgar Thomson stack project but instead specifies in the control strategy only that all the boilers will exhaust to the new stack and the stack will be constructed to have a minimum release height of 70 meters. However, a SIP must contain an attainment demonstration with definitive coordinates and stack parameters for all emission release points. For any changes to stack location, dimensions, or flow rates, if the attainment demonstration is overall unaffected in terms of impacts, a supplemental modeling submittal may be acceptable (with or without a permit modification). If design changes lead to any differences in the attainment demonstration, however, a new SIP revision (to address the design changes only) would be required.

19. Comment: The SIP identifies a reduced sulfur limit for coke oven gas in the yet to be constructed Edgar Thomson Riley Boilers replacement stack. It does not however indicate how often in practice coke oven gas will be burned as other fuels such as natural gas or blast furnace gas can also be used. How the more stringent sulfur dioxide ambient limit might influence the blending or usage of the allowable fuels (blast furnace gas, coke oven gas, natural gas) is unclear here and at other sources. It could result in increases or decreases of other pollutant types such as nitrogen oxides or particulates. Other pollutants affected by the SO_2 SIP should be identified.

Response: The Edgar Thomson Riley Boilers currently operate with the option to use any of the three fuel types, including coke oven gas. ACHD expects that reduced sulfur content in the coke oven gas will not result in increases in emissions of other pollutants.

<u>Emissions</u>
Comments related to SO_2 emissions.

20. Comment: It should be noted in Weight of Evidence that the U. S. Steel VCU tray SO_2 reduction project will lead to greater SO_2 emission reductions than currently quantified, and the actual emission rates at the sources are reasonably and rationally expected to be less than the emission rates modeled.

Response: An explanation similar to above is already included in the Weight of Evidence section. Additionally, the projected future case actual inventory (Section 4 and Appendix D) includes estimates of scaled actual emissions resulting from the VCU and tail gas recycling controls.

21. Comment: The Bruce Mansfield Power Plant, located near Shippingport in Beaver County, PA, is planning to service its current Flue Gas Desulfurization (FGD) system during its fall

2018 outage period. This should increase the FGD's control efficiency and potentially reduce SO_2 emissions which could impact the Allegheny, PA NAA.

Response: A discussion of increased control efficiency the Bruce Mansfield plant has been added accordingly to the Weight of Evidence section of the SIP.

22. Comment: It should be noted in Weight of Evidence that the facilities covered by the SIP do not operate at their maximum capacity at the same time; and even if they were able to operate in such a fashion in rare circumstances, which they are not, such circumstances would need to occur when the worst case meteorological conditions were present. Not only is this not likely, it is not possible for U. S. Steel to maintain maximum capacity operations of all facilities simultaneously. For example, all PEC, boilers, combustion sources, fugitives and underfire stacks will not operate at their maximum at the same time. Batteries operate independently and each battery operates on its individual schedule with certain ovens out of service for maintenance, etc.

Response: An explanation similar to above is already included in the Weight of Evidence section.

23. Comment: Base case maximum SO_2 emission rates are not equivalent to results presented previously to stakeholders. This should be clarified.

Response: Previous results presented were in error and did not include all sources in the NAA. These emissions were corrected for the public comment version of the SIP.

Ambient Monitored Data

Comments related to ambient monitored data and related model performance in the nonattainment area.

24. Comment: On Page 1, the SIP states that the nonattainment designation was based upon "monitoring data collected from consecutive calendar years 2009-2011 during which the design value exceeded the 75 ppb NAAQS." While it is true the designation was made based on monitoring data generated from 2009-2011, SO_2 levels have dropped considerably since then as some of the data used for the designation is now eight years old. It should be noted that much has changed since then, and the most recent monitoring data suggests that the area is either in or approaching attainment. Additionally, upwind coal-fired electric generating units (Elrama, Hatfield, and Mitchell) have been shutdown, and reductions in background emissions from power plants are expected to continue with implementation of CAIR and MATS. While the burden to meet attainment has been solely placed on U. S. Steel sources, the nonattainment designation was the result of many sources of SO_2.

Response: ACHD does not control the attainment designations promulgated by EPA and must address nonattainment areas in accordance with the Clean Air Act. Evidence of

declining concentrations and emissions (including coal-fired power plant deactivations) has already been included in Weight of Evidence and other sections. A discussion of possible continued reductions due to federal rules has been added to Section 9.4 (Weight of Evidence).

25. Comment: The SIP should take into account the fact that the Liberty monitor data for 2016 showed ambient air quality in compliance with the standard, and the North Braddock monitor has been in attainment with the standard since its installation in 2014. The SIP must consider these and other positive developments and not put unreasonable reliance on hypothetical models that are known to over-predict actual monitoring data.

Response: ACHD recognizes that recent concentrations have been decreasing, including those recorded during initial implementation of controls at U. S. Steel in 2016. Additional language has been added to Section 9.2 (Weight of Evidence) of the SIP accordingly. However, attainment of the EPA 2010 standard is based on "design values" that are calculated as 3-year averages of the 99^{th} percentiles of daily maximum hourly concentrations by year. The design value for 2014-2016 was above the standard at Liberty (94 ppb), so attainment has yet to be achieved by monitored data. Additionally, attainment must be demonstrated at all ambient air locations within in the nonattainment area, which was demonstrated for the future case 2018 via modeling. (See comments/responses under Modeling for more discussion on model overprediction.)

26. Comment: The final attainment demonstration modeling result included background concentrations from 2014-2016 (see discussions in Appendix A and I). ACHD submitted its monitoring data for early certification and concurrence with EPA Region III. The 2016 SO_2 monitoring data for Allegheny County has been deemed complete and certified by EPA regional staff in EPA's Air Quality System (AQS).

Response: A request for early certification of ACHD 2016 SO_2 monitored data was sent to EPA Region III on March 7, 2017. ACHD acknowledges that AQS currently reflects certification of all 2016 SO_2 monitored data (from Allegheny County and surrounding PA DEP sites) that were used for background concentrations for the SIP.

27. Comment: The scope of the nonattainment area may be drawn too narrowly, due to insufficient monitoring for sulfur dioxide throughout the county. Specifically, there is no monitoring station for sulfur dioxide near Springdale, where the Cheswick Generating Station is located. This power plant is the largest source of sulfur dioxide in the county, and to date, ACHD has not adequately addressed impacts from this source. ACHD should install a monitoring station near Springdale to facilitate a more reliable designation of the nonattainment area.

Response: This SIP is intended to address air quality within the nonattainment area as designated under Round 1 of 2010 SO_2 NAAQS. These initial Round1 designations were based on monitored data above the NAAQS along with other factors.

The area including and surrounding the Cheswick plant is being addressed under Round 3 of the 2010 SO_2 NAAQS (the Data Requirements Rule (DRR)), for which either modeling or monitoring can be used for air quality characterization. (There were no identified Round 2 areas for the state of Pennsylvania). This demonstration has yet to be finalized at the time of this SIP.

28. Comment: ACHD should install an additional monitor near the Grandview Golf Course, which would improve the reliability of air modeling results. One of the highest modeled levels was located on the Grandview golf course in North Braddock. The level at this location was higher than the level at the nearest SO_2 monitoring station, approximately 2000 feet away in North Braddock to the southwest. ACHD conducted a performance evaluation of the dispersion model for only one site, the Liberty monitor (see Appendix G), because the Liberty monitor was the only monitor showing nonattainment. A performance evaluation at an additional monitor near the Grandview Golf Course would provide improved data for evaluating attainment with the national ambient air quality standard and would also provide better data for evaluating the effectiveness of future models. ACHD has acknowledged that the complex terrain of the Mon Valley makes air modeling more difficult, and the ability to conduct performance testing at additional monitored locations would increase the confidence that a model is able to perform well under various conditions and in various areas. This is especially true where the maximum modeled SO_2 impact is located far away from the air monitor reflecting nonattainment, as in the present case. In order to capture the maximum SO_2 concentration downwind from the industrial facilities, ACHD should install an additional monitor near the Grandview Golf Course property.

Response: Modeling under the EPA guideline (40 CFR Part 51 Appendix W) is designed to represent air quality at all receptor locations in the NAA. The modeling was carefully reviewed for performance compared to current and historical data at all locations in the NAA. The model showed good performance at all impact zones, as described further in Appendices A, F, and I, including the North Braddock area and unmonitored locations such as the Grandview Golf Course.

29. Comment: ACHD should install and operate a monitor at the Glassport location. ACHD discontinued this monitor in 2006 because it was deteriorating and difficult to reach. But this monitor was operated for a number of years, demonstrating that it is feasible to operate a monitor at this location. More importantly, this monitor showed levels of sulfur dioxide that were much higher than at the Liberty monitor. While EPA prefers air modeling over air monitoring for purposes of SO_2 attainment demonstrations (forecasting of attainment in the future), this does not apply to attainment determinations (verification of attainment in the past). Improvements in air quality levels at the Liberty monitor may not be representative of the larger area.

Response: Monitored data at the former Glassport monitor site were taken into consideration for this SIP, and this site was an important factor in the model evaluation for the NAA. Historical data from the Glassport site were used to determine appropriate modeled concentrations at this location. The types of industrial operations closest to this location have not changed much since the site was terminated, and current trends should be similar at the Glassport and Liberty locations for comparison to the modeled predictions.

30. **Comment:** A study should be done to determine if high design value areas need additional monitoring. The modeling done for attainment in the SIP did not show the Liberty monitor area as having the highest SO_2 design values; however, the Liberty monitor is the monitor that indicated nonattainment requiring development of the present SO_2 SIP. The modeling showed other areas to be among the highest design values.

    Response: For a Round 1 nonattainment area under the 2010 SO_2 NAAQS, modeling is the recommended procedure with which to demonstrate attainment. (See above responses for more on model performance evaluation.) Determination of additional monitor sites is beyond the scope of this SIP and may be better addressed via ACHD's Annual Network Plan review.

31. **Comment:** It should be noted in Weight of Evidence that the best indicator to determine impacts is the existing Liberty monitor that is placed at or nearest highest impacts. Ambient air quality has greatly improved in the nonattainment area. The most recent data from the Liberty monitor indicates that the monitor is well under its way to demonstrate attainment with the NAAQS with 2016 demonstrating attainment. Appendix W considers the use of measured data in lieu of model estimates. It is acknowledged in Appendix W that there are some conditions where measured data may lend credence to modeling. In addition, Liberty monitor is a "neighborhood scale" monitor used to monitor and represent the emissions in the area of maximum concentration in the range of 0.5 to 4 kilometers. The monitor is properly sited as the modeled "hot spots" are located in close proximately (generally approximately within 1.5 km) of the monitor.

    Response: In 40 CFR Part 58 Appendix D, neighborhood scale is that which "would characterize air quality conditions throughout some relatively uniform land use areas with dimensions in the 0.5 to 4.0 kilometer range. Emissions from stationary point and area sources may, under certain plume conditions, result in high SO_2 concentrations at the neighborhood scale." Liberty is not likely representative of concentrations fully within 4 km of the monitor site, since there are significant differences in terrain and land use at that distance. The former Glassport monitor site indicated that a nearby location can show different concentrations. The model demonstration and evaluation was configured so as to properly account for all known locations, historical and current, for adequate predictions throughout the nonattainment area.

32. Comment: It should be noted in Weight of Evidence that, historically, exceedances of the standard have been shown to occur when breakdowns occurred during an inversion. USS is implementing a project that would be used during such breakdowns that would reduce the effects of a breakdown.

Response: While many exceedances have coincided with breakdowns, exceedances have been measured during normal operation of sources. Additionally, source breakdowns do not preclude a source from culpability, and resulting monitored exceedances are not excluded from comparison to the NAAQS. ACHD acknowledges that the control strategy will reduce the effects on air quality during breakdown periods.

Meteorology

Comments related to the meteorology data used for the modeling demonstration and analyses included in the SIP.

33. Comment: In Section 2 of the SIP, the information presented in the lower right corners of Figure 2-2 and 2-3 is inconsistent. ACHD should present the hourly SO_2 information in Figure 2-3 for the North Braddock monitor in terms of hourly SO_2 (the mean, max, design value, showing that the monitor demonstrated attainment for 2014-2016.

Response: The intent of the pollution and meteorological roses in Figure 2-2 and 2-3 was to show meteorology variables in relation to SO_2 concentrations on a directional basis for the modeled years 2012-2014. The North Braddock meteorological data was not available at that time, and therefore a 3-year design value data was not included on the chart for comparison. Figure 2-4 (1-Hour SO_2 Design Values) shows the design values through 2016 by site.

34. Comment: ACHD utilized multiple sets of meteorological data in its SO_2 SIP attainment modeling demonstration, one for each source, modeled separately in AERMOD with impacts summed using CALPOST post-processing. (This is procedure is more fully described in Appendix I.) Typically air dispersion models like AERMOD utilize only one set of meteorological data that is considered representative of the entire modeling domain. This nontraditional method was justified using analyses outlined in Appendices G, H, and I, showing important localized wind patterns across the Allegheny, PA nonattainment area. EPA Region III conducted a separate analysis of local airport ASOS sites and the MMIF-generated met data to verify the wind field variability observed by ACHD and confirms that wind fields are quite localized inside the Allegheny, PA nonattainment area. These wind fields are largely a result of topographically influenced/forced wind patterns, especially where the primary modeled sources are located (Mon River Valley). While acknowledging that this approach has merit, EPA Region III would add that this approach should not be adopted in general practice without conducting proper consultations with the reviewing authorities. Full supporting evidence should be presented in future cases for the use of multiple meteorological data sets in any air dispersion modeling analyses.

Response: ACHD acknowledges that this method is nontraditional for steady-state wind field modeling applications using AERMOD. This technique of multiple meteorological data sets can be conceptualized as a way to better simulate non-steady-state conditions and micro-scale meteorology with the use of a steady-state model. ACHD also notes that the individual MMIF meteorological data sets by source are consistent with the WRF modeling as a whole, differing mainly at the lower verticals levels that simulate in-valley flow, while converging to regional flow once above valley influences. The MMIF meteorological data sets used in the demonstration are essentially the same virtual onsite data throughout the NAA, forced into the valleys at individual points in order to create more site-specific data at source locations.

35. **Comment:** It should be clarified if the MMIF data retrieved from the WRF D05 grid for ArcelorMittal is within a suitable distance from the edge of the WRF domain (as shown in Appendix H, Figure H-17). The meteorological data could be adversely affected by model dampening functions designed to prevent spurious waves from propagating along the model boundary.

    Response: The ArcelorMittal MMIF cell was 6 cells within the "useable" portion of a mesoscale model domain (shown by the blue rectangle in Figure H-17) and was not affected by any boundary issues. The red rectangle in the figure represents the extended portion (5 cells surrounding the edge of the usable portion) that would be unsuitable for modeling.

36. **Comment:** Wind speeds in the AERMET profile files were entered as missing above 50 meters; wind direction and temperature values, however, were retained. ACHD has provided a justification for removing model wind speeds above 50 meters in Appendices G and H, principally based on the Beaver Valley Nuclear Power Plant's met tower data and the U. S. Steel Clairton SODAR site. The Weather Research and Forecasting Model (WRF)-generated vertical wind speeds appear to increase much more severely with height than what is actually observed. ACHD believes that this increases wind shear and contributes to modeled overpredictions due to building downwash based on historical monitoring data in the Mon Valley. Excluding WRF-generated wind speeds above 50 meters appears to better match the historical data and is acceptable and supported by ACHD's analysis. EPA Region III's acceptance of this approach, however, is considered case specific to this modeling analysis.

    Response: ACHD recognizes that this approach is specific to this application, and results may vary for other modeling scenarios on a case-by-case basis. As explained in Appendices G and H, this technique was deemed to be the most representative of observed wind fields and led to the best model performance for this modeling demonstration. Wind speed bias at upper vertical levels may not be observed with other MMIF data and/or may not lead to excessive wind shear with other modeling applications.

37. **Comment:** EPA found no substantive discussion in ACHD's SIP or Modeling Protocol documentation regarding how AERSURFACE was run to produce the surface characteristics input into AERMET Stage 3. The modeling files appear to use the surface characteristics

extracted from the WRF simulation. The AERMET processing files provided to EPA Region 3 included AERSURFACE output files for each facility. The AERSURFACE file output has one sector with monthly varying values throughout the simulation period (2012-2014). EPA examined these files and noted significant year to year variability in the monthly Bowen ratios and to some extent the monthly albedo values for each site; surface roughness values (Zo) showed only slight year to year variability. EPA conducted a more detailed analysis (see AERSURFACE attachment) of these surface characteristics. ACHD should review this analysis and provide any other additional information it deems necessary to more fully document how surface characteristics were passed into its processed meteorological data for its final SO_2 SIP modeling demonstration. In the future, MMIF-extracted AERSURFACE values should probably be examined with some consideration to Section 3.1.1 of EPA's AERMOD Implementation Guide.

Response: The current configuration for MMIF from WRF is to use the WRF-generated surface characteristics that are representative of the full gridded cell. (For this SIP demonstration, each cell was an area of 444 x 444 meters.) This allows for continuity between the gridded WRF and extracted MMIF data, since WRF has several planetary boundary layer sub-models that differ from the AERMET mixed-layer scheme. ACHD opted to use the WRF-based surface characteristics for this demonstration, since MMIF generates a consistent set of surface data, the three AERMET staged-input files, and a batch file to run AERMET in one "package." Typical AERSURFACE runs based on a single onsite location would be too specific for any WRF/MMIF grid cell, since the matching of winds to the surface characteristics are important factors. This may account for some differences between WRF-based and AERSURFACE-based surface characteristics. AERMOD was tested using AERSURFACE-based surface characteristics, leading to some minor differences in impacts compared to runs using the WRF-based surface characteristics. ACHD acknowledges that additional analysis of surface characteristics may be useful with future MMIF applications.

38. Comment: In Appendix C, Tables 1 and 2 tables only include monitor data up to 2015. Using 2016 data would further support a finding that the area is in or closer to attaining the standard – without additional controls beyond what was in place in 2016. The Liberty monitor data for 2016 is an indicator that the area is on its way to demonstrating attainment.

Response: The meteorological analysis included in Appendix C was for the years 2011-2015, as the 2016 analysis was incomplete at the time of the SIP preparation. Therefore, only concurrent monitored data through 2015 was included in Appendix C. Monitored concentrations in 2016 have been referenced elsewhere in the SIP.

39. Comment: In Table 3 of Appendix C, ACHD explains that the data were reviewed from the NWS site KPIT as well as the ACHD meteorology station at the Liberty Borough monitor site. While this may be true and relevant, the tables do not indicate which data set took priority in characterizing the meteorological conditions summarized in Table 3. ACHD should explain which data set took priority in its final SIP.

Response: The meteorological conditions were based on a combination of available data from the different sites as indicated in the far-left column of Table 3 in Appendix C and as described in the notes.

40. Comment: On Page 11 of Appendix C, ACHD concludes that November is the month with the strongest inversions. However, results are inconclusive given the range of temperature changes with height, the highest inversion layer top, and the longest break up times in the morning across all months of the year. No direct ties to the monitoring data were conducted but rather ACHD appears to consider only monthly averages and trends in high concentration values. It might be worthwhile for ACHD to complete more evaluations relating wind direction, wind direction variability, and wind speed to support ACHD's conclusions.

Response: The consideration of November as the worst month was based on strongest average strength of inversion, along with the highest top and longest break times as additional factors. More detailed daily analyses (not included in Appendix C) indicate a dependency on inversions during elevated SO_2 concentrations. Additionally, wind and pollution roses like those given in Figures 2-2 and 2-3 in the SIP narrative show the relationship between winds and SO_2 concentrations.

41. Comment: On Page 20 of Appendix C, ACHD states that for "improved understanding of air-dispersion characteristics and consequences, it is important to model with upper-air data that properly represents – both spatially and temporally – all locations within the modeling domain." The information in Appendix C supports concerns that the model is overly conservative and does not accurately predict ambient concentrations due to source emissions.

Response: This statement in Appendix C was based on findings that wind fields and vertical potential temperature gradients can vary from one site to another, and that the best possible meteorological data can lead to the best model results. This statement supports the use of WRF/MMIF, which generated site-specific upper air data for each MMIF location used in the model.

Modeling Demonstration

Comments related to the modeling and evaluations used for the attainment demonstration.

42. Comment: ACHD seeks to attain pollution levels less that 1% below the federal requirement. With such little room for error, just one variance from the modeled plan could knock us right out of attainment. Allegheny County residents deserve more than the bare minimum protections from harmful air pollution. Striving for more than the minimum requirement would leave room for errors in modeling and unexpected emission behavior, prepare for forthcoming more stringent regulations, and demonstrate that ACHD's main

interest is in the health of its residents and not merely to escape financial consequences from the federal regulatory agencies.

Response: The modeling demonstration was designed as a worst-case scenario according to 40 CFR Part 51 Appendix W, with all sources operating at maximum allowable capacities, along with 99th percentile background values added to each modeled hour. This scenario is unlikely to ever be achieved during actual operation of sources. If any circumstance leads to nonattainment in the area, contingency measures will trigger an investigation of the cause(s).

Additionally, ACHD makes every effort to complete timely plans in order to attain air quality standards and protect public health. The complexity of this SIP, along with delays in EPA's model releases and accompanying guideline, did not allow for completion by the original attainment date.

43. Comment: The dispersion model used (AERMOD) is well acknowledged to be overly and unreasonably conservative. Specifically, a study by the Indiana Department of Environmental Management (IDEM) in Northwest Indiana indicated that AERMOD over-predicted 84% of the modeled concentrations of 35 ppb or greater, and in no case was it shown to under-predict these concentrations. The model also shows over-prediction during time of low wind speed. It should be added to Weight of Evidence that the complex meteorology and terrain coupled with the dynamic nature of SO_2 sources noting the overly conservative nature of AERMOD makes it challenging to accurately characterize near-field impacts using current modeling.

Response: Modeling was performed using the most advanced EPA-preferred dispersion modeling techniques available. AERMOD model version 16216r with MMIF meteorology was utilized, along with the ADJ_U* option in order to properly account for impacts during stable low-wind conditions. This modeling effort represents the best possible simulation of emissions and meteorology within the complex terrain in the NAA, with special consideration given so as not to overpredict or underpredict impacts.

Based on the analyses shown in Appendices A (Modeling Protocol) and Appendices G-I (Model Performance/Evaluations), the model led to accurate predictions of pollutant impacts throughout the nonattainment area in comparison to monitored data. In regard to other studies with AERMOD (such as the IDEM study), ACHD's model configuration and results were specific to this demonstration. Results can vary on a case-by-case basis, especially for different source types, terrain, etc.

44. Comment: ACHD should correct its exclusion of various emissions from the Irvin facility from air modeling, including coke oven gas flaring. In the screening analysis, ACHD screened out intermittent sources under the rationale that the sources involve seasonal or emergency processes that would not occur frequently or at full capacity, resulting in an "unachievable level of emissions at full operation" (Appendix E, pages 21-22). Some of these sources, including Irvin flares and Edgar Thomson miscellaneous blast furnace

fugitives, may have been screened out improperly or incorrectly excluded from the emissions inventory altogether. It has not established that these emissions are included in the modeling, or that these emissions are zero when the rest of the facility is operating at full capacity. ACHD does not assert that these units cannot run when the facility is operating at full capacity but only asserts that they "cannot physically operate at full capacity while other processes are at full capacity," or that they "operate only during seasonal, emergency, or excess conditions." ACHD has not eliminated the possibility that these sources could run when the facility is operating at full capacity, even if at a lower capacity. By excluding these sources from the modeling altogether, ACHD may be under-representing emissions within the nonattainment area.

Response: As part of the screening effort, modeled impacts from these sources were evaluated at actual emissions and normal operating levels. These sources were determined not to be driving factors for nonattainment. At maximum allowable capacities (plant-wide for the Mon Valley Works), the flaring sources would not be applicable to the attainment modeling scenario since excess fuel would not be available. "Full capacity" for the facilities is synonymous with full capacities for all processes.

Additionally, as part of the 2010 NAAQS, once attainment is demonstrated by the monitor network, modeling at actual emission rates is then required as additional demonstration of attainment. Therefore, all intermittent sources would be accounted for in future model runs. This SIP revision is designed as a demonstration to show that the largest potential contributors to nonattainment have been controlled at worst-case conditions.

45. Comment: ACHD should evaluate impacts on attainment with national ambient air quality standards in other states, resulting from the transport of sulfur dioxide from the Mon Valley. Sulfur dioxide is a precursor to the formation of fine particulates ($PM_{2.5}$), but ACHD does not discuss the impact of sources on levels of sulfur dioxide or fine particulates outside this nonattainment area. In contrast, ACHD discusses the impact of upwind sources (outside the County) on sulfur dioxide levels in the nonattainment area. For example, it mentions the long-range transport of sulfur dioxide to the Liberty monitor. Page 4 of the SIP states that concentrations of SO_2 were largest from the S through SW directions, directions from which local and long-range transport carries substantial amounts of SO_2 to the Liberty monitoring site from large stationary sources. In addition, ACHD also included modeling of upwind sources outside the nonattainment area in order to properly account for transported emissions into the NAA.

Response: SO_2 as a precursor to $PM_{2.5}$ is better addressed via $PM_{2.5}$ modeling using photochemical modeling, and development of an attainment demonstration for the 2012 $PM_{2.5}$ NAAQS for Allegheny County is underway. There are no other $PM_{2.5}$ nonattainment areas for the 2012 NAAQS in the counties surrounding Allegheny County.

SO_2 nonattainment areas in surrounding counties are similar point source scenarios that are not due to local sources in those areas. While SO_2 emissions from distant sources do affect background values of SO_2 in Allegheny County, they are not the driving factors for

nonattainment in the Allegheny, PA SO_2 area, and vice versa. Sources that were immediately adjacent to the nonattainment area were included in the modeling demonstration if they were determined to be potential contributors to localized primary impacts.

46. Comment: It should be noted in Weight of Evidence that EPA's reliance on AERMOD comparisons only in space (and not time and space) is problematic and is a shortcoming in the model. Thus, EPA reviews modeling data in terms of space only and not time; therefore, actual monitoring data at any given hour when compared to the model is not significant. Since each hour has a different emission rate, comparison of different hours (as EPA recommends) is comparing apples and oranges. Additionally, it's possible that this deficiency could be corrected by multiplying the predicted value by a ratio of the emission rate for the monitored hour divided by the emission rate for the predicted hour (relative reduction ratio).

Response: ACHD recognizes that modeling has limitations for comparison to real-time measured concentrations and that AERMOD is generally better at predicting distributions of concentration rather than discrete events. However, AERMOD version 16216r (as used for the modeling) is the most recent and preferred EPA regulatory model for near-field applications. The use of multiple model years, along with the 99^{th} percentile values according to the NAAQS, allows for the exclusion of some modeled outliers. Additionally, the use of relative response ratios, while used for photochemical modeling demonstrations, is not a regulatory approach for AERMOD demonstrations.

47. Comment: In Appendix A (Modeling Protocol), it is mentioned that "some flagpole receptors were included in the demonstration for elevated receptors that were not accounted for in terrain processing by AERMAP. This applies to receptors located on the Clairton-Glassport Bridge." While not altering the ultimate results of the modeling demonstration, it is not necessary to add flagpole receptors in the manner prescribed. Appendix W does not specify that receptors should be placed at levels other than ground level for comparison to the NAAQS.

Response: While not mentioned in 40 CFR Part 51 Appendix W, it is a general and widely-used option with AERMOD to account for elevated locations above ground level (or the elevation generated by AERMAP) by the use of elevated "flagpole" receptors.

48. Comment: In Appendix E, under Initial Screening, it is not clear on how No. 3 – the screening of sources by nearby monitor direction/sector – is considered and developed in the SIP. The limits on the degree range of the wind direction sectors, any consideration of distance between sources and monitors, and any consideration of the frequency of winds from specific wind sectors is skipped over and not discussed. In addition, for sources with more than one emission point, "sources were modeled as an aggregated source or as individual sources" but no discussion is given regarding how the source aggregation was accomplished.

Response: The use of monitors to screen out sources is described further in EPA documents such as the SO_2 NAAQS Designations Modeling Technical Assistance Document (Feb. 2016). This SIP was designed to account for distance sources by way of incorporation of monitored data into background values (see Appendix A-2).

For sources with more than one emission point in AERSCREEN, if the points were similar in stack characteristics, the emissions were aggregated to one single stack. For multiple points with different stack characteristics, AERSCREEN was run separately for each point, and impacts were totaled from each run.

49. Comment: In Appendix E, under Refined Screening, the methodology includes a broad interpretation of whether a source's contribution is included in background concentrations measured at the monitoring sites, as well as no indication of what constitutes an insignificant concentration gradient. Highest first highs were used as the criteria to compare to the NAAQS in the screening analyses, however, the analysis could have considered the actual form of the 1-hour SO_2 NAAQS. Additionally, Figure E-2 does not show anything of particular relevance to this study other than the fact that Pennsylvania is influenced by complex terrain throughout the whole state and wind directions at these secondary weather locations are driven by these terrain features. This discussion did not necessarily discredit the use of the KAGC data. The use of the MMIF (Mesoscale Model Interface Program) was only noted at the end of the meteorology discussion making most of the meteorology discussion defending KPIT and Liberty data sets moot. There should be a better review of using MMIF to process mesoscale data sets here or at least a stronger cross-reference to other Appendices.

Response: The refined screening for this SIP was derived to be a technique that would properly account for potential impacts from all sources within and surrounding the NAA. There is no prescribed method for the screening of sources beyond the use of the Significant Impact Level (SIL) and monitored data, and there is also no set approach for determining a significant concentration gradient.

ACHD's methodology focused on the worst-possible impacts from any source, which was based on the highest maximums and not the 4^{th}-highest impacts. If highest possible impacts were shown to be below background, it could be assumed that 4^{th}-highs would be considerably lower and already part of background.

Additionally, typical airport or local site meteorological data was used to assess general impacts in the NAA. In regard to Allegheny County Airport (KAGC) data, the effort simply favored Pittsburgh International Airport (KPIT) for distant sources and the Liberty site for sources within the NAA. The WRF/MMIF data was developed as highly site-specific data only for the final sources included in the attainment demonstration.

50. Comment: On Page 15 of Appendix F, ACHD concludes that WRF performed well in the 1.333 km and 0.444 km domains in spite of the statistical analysis for some parameters/seasons falling outside the benchmarks provided in Table 4. Part of the justification given for this conclusion was that there are a limited number of hourly surface stations within these domains and the benchmarks were developed using larger datasets. However, a statistical analysis should have or could have been completed using the 4 km or 12 km grids in which more surface observations would be present to assess the performance of the overall WRF data sets. An analysis over the coarser grids could provide additional support that the overall WRF model performance was acceptable.

Response: The model performance evaluation was conducted similarly to other evaluations, with emphasis on the finest resolution domains. Analysis was performed for the coarser grids, showing good results for airport locations, but this analysis was not presented in the final documentation.

51. Comment: For background data in the model, ACHD's current approach in the model for the attainment demonstration does not accurately pair background emissions with meteorological conditions; and, instead, requires that the peak background emissions be used during all meteorological conditions resulting in unrealistic modeling results. This results in additional conservatism in the model that results in over-prediction of SO_2 impacts.

Response: The method of paired hours of monitored background with predicted values is not a recommended technique for EPA regulatory demonstrations.

52. Comment: In Appendix G (Dispersion Model Performance Evaluation) battery line fugitive emissions were modeled as a series of point sources in a row, while the final demonstration utilized as a series of volume sources in a row with BLP-based varying release heights. The latter should be the more appropriate technique.

Response: Over the course of the development of the SIP demonstration, several versions of AERMOD were released. While ACHD was still evaluating the BLP-based method for source characterization, as well as version 15181 of AERMOD that incorporated the former BLP code, Ramboll Environ was tasked with the model performance using point sources for the buoyant fugitives. Subsequent evaluation by ACHD led to use of the BLP-based method in the final demonstration. Appendices A and I further explain the final configuration that was used.

53. Comment: Appendix G states that the selected model is still overly conservative which yields values that over-predict impacts at the higher ranges. Figure 21 indicates that the model consistently over-predicts at concentrations >100 $\mu g/m^3$ while under predicting at lower concentrations. This is significant since the concentrations at concern for compliance are 196 $\mu g/m^3$. The "winning model" predicted 26 counts above 196 $\mu g/m^3$ compared to the

23 actual at Liberty, meaning that the model over-predict the occurrences of values of 196 by over 10%.

Response: The Dispersion Model Performance Evaluation was designed as a comprehensive first-step review of overall performance, including examination of predicted impacts at the monitor sites and comparisons to other models (model "shoot-out"). As further described in Appendices H and I, additional options and source characterization were used in the final modeling demonstration. Appendix I-1 shows that the final model is not leading to overprediction at the highest predicted hours.

54. Comment: In Appendix G on Page 40, it's stated that "Because the motivation for this study was assessing 1-hr SO_2 NAAQS attainment in Allegheny County, the greatest emphasis was placed on accuracy in predicting high-end concentrations." "The winner of the piecewise evaluation is just as accurate in the 3-year 99th percentile concentration and the robust highest concentration statistics as any of the models with higher CPM's. Therefore, the conclusion from initial model analysis remains; the best model performance for 1-hr SO_2 attainment modeling in Allegheny County, PA appears to be MMIF-based AERMOD with EPA guidance vertical levels, AERMET mixing height diagnosis and processing, and WRF domain of 444 m grid spacing." ACHD must identify the significance of the number of modeled values over 196 when comparing them to actual monitored values, since this is the value that will be used to determine the area is in attainment. Emphasis needs to be placed on this over the models performance with the 99th percentile and RHC values. The selection of the "winning model" is very subjective. It would seem that looking at CPM values and the counts over 196 as the major criteria, N=1, would have been a more appropriate model since the CPM is better and the model appears to more accurately predict counts over 196.

Response: Similar to the above response, ACHD used the analysis from the Dispersion Model Performance Evaluation for further development of the final model configuration as described in Appendices H and I. The final model configuration selected for the demonstration was closest to the N=2 configuration (see Page 1 of Appendix I-1).

55. Comment: In Appendix G, Figure 22 displays surface wind data for the 24-hour periods leading up to hours of highest modeled hourly SO_2 concentration near the Liberty monitor. The predicted maximum concentration of 504 µg/m³ occurred several hours following hours of an observed maximum of 249 µg/m³. This supports a finding that the model grossly over-predicts high concentrations by over a factor of two. As would be expected by the over-predictions, AERMOD significantly over-predicted the number of exceedances of the SO_2 NAAQS when compared to monitoring data (as ACHD's model has shown), which is of critical concern since this is the most significant feature of the attainment demonstration.

Response: Figure 22 in Appendix G was designed to show that the system is getting a high value for the right reason. As mentioned in previous responses, ACHD used a different model configuration for the final demonstration, with focus on 99th percentile values within the NAA.

56. Comment: Appendix G states: "Figure 24 and Figure 25 depict wind roses at the same locations in the 24 hours directly prior to the two highest observed SO_2 concentrations. The highest observed Liberty 1-hr SO_2 concentration during the three year study period was 422 µg/m³ at 5:00 AM, 3/13/2012. Figure 24 illustrates that the 24 hours leading up to this maximum were characterized by relatively low wind speeds both modeled and observed near Liberty, with most of these winds coming from the SW. Both the calm nature and SW direction of these winds compare to the modeled and observed conditions of the two maximum modeled concentration cases. At midnight on the morning of 10/24/2012, the 2nd-highest 1-hr concentration of 366 µg/m³ SO_2 was observed at Liberty. Very similar wind conditions were again observed at the monitor in the build-up to the maximum (Figure 25). This time, the modeled wind at the nearby sources was stronger, but predominantly from the same SW direction." (The commenter references the above comment, that the model is over-predicting.)

In addition, the Liberty monitor is a neighborhood scale monitor which makes any modeling vs. monitoring data discrepancies within 4 km suspect, as ACHD cannot be using modeling data to somehow challenge actual monitoring data. In Appendix G, model performance is tested based on a comparison with observed SO_2 concentrations at one location (the Liberty monitoring site). However, in the SIP analysis AERMOD is used across a wider grid that contains complex terrain, which is an area in which steady-state assumptions made by AERMOD can break down. It is not necessarily logical to conclude that because AERMOD gave better results at the Liberty monitor then it is necessarily accurate throughout the entire domain. The Liberty monitor is located near a specific industrial facility, so it could be that it only performed better in that location due to a reasonable representation of the emission sources and meteorology in the area closest to the monitoring site.

Response: The Dispersion Model Performance Evaluation used a radial receptor grid of 500 meters (the "near Liberty" area) for the evaluations shown in Figures 22-25. As specified in previous responses and in Appendices H and I, ACHD focused its performance evaluation on all locations within the NAA. ACHD deemed the use of monitor scales to be an appropriate method of comparison for predicted and measured data.

57. Comment: The version of CALPUFF used in the model performance evaluation is 5.8.4, which was the EPA regulatory default version of CALPUFF at the time this work was completed, as stated on Page 8 of Appendix G. However, an updated version of CALPUFF (version 7) was also publically available. Considering that other non-preferred models (SCICHEM) and non-default methods (use of prognostic meteorological data in AERMOD) were used, it is not clear why ACHD did not use the latest version of CALPUFF in its testing.

Response: ACHD concluded that if CALPUFF was selected for the demonstration, which would have required an alternative model justification according to 40 CFR Part 51 Appendix W, the regulatory version would have still been the preferred version for this

application. (Note: CALPUFF has now been removed from preferred regulatory model status.)

58. Comment: The dispersion model performance evaluation provided in Appendix G contains a discussion of 59 total AERMOD scenarios that were evaluated and one CALPUFF scenario. Based on the number of different scenarios that were considered using AERMOD versus the single CALPUFF and SCICHEM scenarios, one could conclude that AERMOD was the choice for the dispersion model to be used in this analysis from the beginning and that the performance evaluation was designed to define the appropriate AERMOD configuration to use for the regulatory analysis. It is not clear at what basis ACHD determined by default to use AERMOD in developing the SIP.

Response: Page 36 of Appendix G indicates that multiple CALPUFF configurations were tested using an initial 1-year WRF dataset, with results using the full 3-year WRF dataset shown only for the best-performing case. In regard to selection of the model, an extensive effort was put forth in order to determine the most appropriate model for this demonstration. If AERMOD with MMIF was the choice from the beginning, the task would have not included a model performance evaluation using other models. AERMOD with MMIF meteorology was selected after review of all model test results.

59. Comment: Appendix H states that the data completeness of the Clairton SODAR is only 61%. The SODAR results are used in several comparisons to MMIF data and 61% data completeness may be problematic when comparing to the MMIF from both the D04 and D05 domains.

Response: For comparisons to MMIF data, the SODAR results were the best available data for valley flow along with data from the Beaver Valley multi-level tower. Although 61% data recovery is not appropriate for use in modeling, the SODAR results presented enough data to make an adequate comparison of known-to-predicted meteorology.

60. Comment: ADJ_U* is appropriate for use in the SIP modeling. However, it is stated in Appendix I that "LOWWIND3 showed some results that were similar to ADJ_U*, possibly with a tendency toward under prediction for some sources and years. However, this option is available as a BETA option only. Overall, there was insufficient evidence based on model performance to request an alternative modeling approach using LOWWIND3." The commenter disagrees with ACHD's conclusion that insufficient evidence exists that LOWWIND3 is appropriate. Other studies show that AERMOD overpredicts when modeling low wind speeds (less than one meter per second), and under these conditions the model predicts high concentrations at all receptors regardless of wind direction. Since ACHD is using a threshold of 0.5 m/s, the risk of significant over-prediction during low wind speeds exists.

Response: Several different configurations of AERMOD were tested for the modeling demonstration. With LOWWIND3 available only as a BETA option, a robust alternative model justification would be required for use in a regulatory application. Without additional meteorological equipment and monitor sites, a conclusive demonstration for the use of LOWWIND3 would not likely be shown. Additionally, test runs using both ADJ_U* and LOWWIND3 led to underpredictions in the NAA, and the use of both options would not have been chosen for the final demonstration.

61. Comment: In Appendix I, in regard to modeled maximums, while some ratios appear acceptable (e.g., 1.06), others (e.g., 1.46, 1.49) are cause for concern. ACHD also claims that "Average ratios for the maximum expected to monitored areas fall within the range of 1 to 1.26, indicating that the model is performing well within the NAA." The use of average ratios to gauge the acceptability of the model is questionable. Average ratio is really of no value in determining the acceptability of the model, but the consideration of individual ratios and variance are – and some of variances and ratios result in significant overprediction of impacts which is cause for concern.

Response: Based on all known monitored data, past and present, ACHD considered the expected ratios to be the most appropriate method for determining performance in unmonitored areas.

62. Comment: Given the uncertainties of modeling details and future weather conditions, future concentrations are unlikely to match the modeled estimates. There is no indication of the uncertainty in the modeling, such as a standard error of the maximum concentration. If the error is roughly equally likely to be positive as negative, then the chance of nonattainment will be about 50%. If the magnitude of the estimation error is large, then the degree of nonattainment could be large. Even if the modeling were perfect (and no modeling is), weather conditions themselves are highly variable, changing not just day-to-day but over time, with the more extreme conditions being the least predictable.

Response: For modeling demonstrations according to 40 CFR Part 51 Appendix W, there is no requirement for an estimate of uncertainty for the modeled results. While it is understood that there are uncertainties with the input data and models used for the demonstration, the modeling is designed as a predictive tool for distributions of concentrations. For both monitored and modeled results, the largest outliers (above the 99^{th} percentile) are removed from the analysis. ACHD believes that the modeling conducted meets all regulatory requirements and that any uncertainties in the modeling are also understood by EPA as the reviewing authority.

63. Comment: The SIP should have a nonattainment area (NAA) informative isopleth map, or a substantially equivalent tabular form, that would report to the 22 communities in the NAA the maximum pollutant design levels to expect from the control strategy. To be helpful to the

communities, it should be in the main document as it would be unrealistic to search through multiple appendices for this information.

Response: A table with the maximum modeled concentrations by municipality for the future control case scenario has been added to Section 5.4 (Modeled Results) of the SIP.

64. Comment: The SIP states that since "both the base and control cases were modeled at maximum possible emission rates for all sources in the NAA, these locations may or may not correspond to highest impacts during normal or low operations." It is unclear whether normal or low operations might produce a different NAA maximum design value. The Guideline on Air Quality Models, recommends, "For point source applications the load or operating condition that causes maximum ground-level concentrations should be established … Where the source operates at substantially less than design capacity, and the changes in the stack parameters associated with the operating conditions could lead to higher ground level concentrations, loads such as 50 percent and 75 percent of capacity should also be modeled." Reduced load modeling where appropriate should be done and reported in the SIP.

Response: The Guideline on Air Quality Models additionally states: "As a minimum, the source should be modeled using the design capacity (100 percent load). … "A range of operating conditions should be considered in screening analyses. The load causing the highest concentration, in addition to the design load, should be included in refined modeling." ACHD did perform modeling at lower capacities, with all scenarios showing attainment. Additional language has been added to Section 5.4 for clarification. For a look at impacts from typical operating capacities, runs were also performed using projected future case actual emissions and the proposed source configuration. (See Appendix D for future case emissions.) These runs showed a maximum concentration of about 75% of the NAAQS at any location in the NAA. Additionally, specific hourly SO_2 data as required for this SIP for COG sources will provide more detailed emissions for future case model runs.

Additional SIP Elements

Comments related to Contingency Measures, Reasonable Further Progress (RFP), and Weight of Evidence.

65. Comment: ACHD should provide a more specific description of its contingency measures. The Clean Air Act requires that the measures be specific enough to take effect without further action by the Administrator. (See 42 U.S.C. §7410(c)(9).) The SIP has not provided detail regarding how possible future violations will be addressed. ACHD only asserts that future violations will be identified and monitored, after which additional controls may be implemented, if necessary. Without a comprehensive description of specific control measures, the SIP falls short of the statutory requirement.

The EPA SO_2 SIP Guidance states that contingency measures should include "a comprehensive program to identify sources of violations of the SO_2 NAAQS and to

undertake an "aggressive" follow-up for compliance and enforcement." However, The Guidance also states that "this approach to contingency measures for SO_2 would not preclude an air agency from requiring additional contingency measures that are enforceable and appropriate for a particular source category." It is notable that in the past, ACHD has included more specific contingency measures in SO_2 SIPs and maintenance plans, than it is requiring now. ACHD has included several specific control measures, including lowering the hydrogen sulfide grain loading for coke oven gas, specific plan limits for types or amounts of high sulfur fuel, and lower sulfur dioxide emission limits. It is unreasonable for the ACHD to not include more specific measures and controls as contingency measures.

Response: Contingency Measures for this SIP define a detailed process for identifying the source(s) of violation of the SO_2 NAAQS and aggressively following up with implementing corrective actions.

66. Comment: The contingency measures involve the review of data over the most recent 3-year period for comparison to the NAAQS. Given the many uncertainties, it seems wise to plan for interim data reviews to detect a trend towards nonattainment, so that troubleshooting can begin earlier than after three years. ACHD and the community deserve this precaution. Companies may also benefit, if revealing the causes makes it possible to choose and take remedial actions in time to achieve attainment.

Response: ACHD's daily data validation process, along with real-time reporting of monitored values, already provides for ongoing reviews of elevated monitored data and causes of such periods. Essentially, all stakeholders are aware of elevated periods when they occur. Furthermore, the review of interim averages within any 3-year period can be misleading if a number of elevated periods occur in one year but not in the previous or following years. The NAAQS is based on the 3-year average of the 99^{th} percentiles and not the number (or magnitude) of exceedances in any one year.

67. Comment: In Reasonable Further Progress (RFP), ACHD states that incremental point source controls were not quantified for the plan because such controls take time to implement and many controls are still under construction. ACHD asserts that overall ambient quality data shows that there is a decrease in sulfur dioxide overall, even without completed point source controls. ACHD correctly states that "reasonable further progress" contemplates "annual incremental reductions in emissions." However, the data provided in this section only demonstrates overall ambient reduction in sulfur dioxide at the Liberty monitor. The data would have to show annual incremental reductions in sulfur dioxide emissions specifically at each source, in order to demonstrate Reasonable Further Progress. ACHD confuses the concept of "reasonable further progress" by setting forth a chart showing declining concentrations of sulfur dioxide at a monitoring site. ACHD provides further evidence of this confusion when it asserts that the "shutdown of Guardian Industries in 2015 is an additional decrease in emissions" for the NAA. Adding decreases in ambient concentrations to decreases in source emissions is like adding apples to oranges.

At best, ACHD implies there have been some emissions reductions "due to partially-completed projects by USS (including projects that have not been quantified for this SIP)." But, ACHD must quantify those emissions, and it must demonstrate "reasonable further progress" in this proposed plan revision. The fact that projects are only "partially-completed," and ACHD has not even quantified them for this plan, demonstrates that ACHD has failed to show "reasonable further progress.

Response: The EPA Guidance explains that the definition of RFP is "most appropriate for pollutants that are emitted by numerous and diverse sources, where the relationship between any individual source and the overall air quality is not explicitly quantified, and where the emission reductions necessary to attain the NAAQS are inventory-wide." Furthermore, it's explained that "the definition is generally less pertinent to pollutants like SO_2 that usually have a limited number of sources affecting areas of air quality which are relatively well defined, and emissions control measures for such sources result in swift and dramatic improvement in air quality. That is, for SO_2, there is usually a single "step" between pre-control nonattainment and post-control attainment. Therefore, for SO_2, with its discernible relationship between emissions and air quality, and significant and immediate air quality improvements … that RFP is best construed as "adherence to an ambitious compliance schedule." This means that the air agency needs to ensure that affected sources implement appropriate control measures as expeditiously as practicable in order to ensure attainment of the standard by the applicable."

Given that source controls are in effect "single steps" for RFP for SO_2, and the initial controls are only partially in place (for an 8-month period in 2016 for the VCU upgrades), incremental reductions cannot be classified. Emission reductions cannot be double-counted by applying them to both the control strategy and RFP. As a method to indicate downward progress, concentration data was used along with quantifiable reductions in emissions.

68. Comment: ACHD should remove the "weight of evidence" section. ACHD dedicates a significant part of its proposed revision to a discussion of "weight of evidence." But, it does not define this concept or describe how it applies in the context of this proposed revision. EPA's Guidance document says nothing about "weight of evidence" in sulfur dioxide plan revisions. The fact that EPA has defined and applied the concept of "weight of evidence" in guidance documents for attainment demonstrations for other pollutants, but did not do this for sulfur dioxide, indicates that EPA does not intend to apply a "weight of evidence" analysis to a sulfur dioxide attainment demonstration. "Weight of evidence" is more appropriate for certain pollutants (particulates, ozone, and regional haze), in some cases allowing for the exclusion of data showing nonattainment in favor of data showing attainment. EPA did not intend to extend this approach to sulfur dioxide. ACHD cannot avail itself of softened requirements for "reasonable further progress" and "contingency measures" (which ACHD has not met, in any case), and then apply a "weight of evidence" approach under the rationale that its attainment demonstration is uncertain.

Response: Weight of Evidence is not used for this SIP as proof to support modeling that does not show attainment or to imply that the modeling demonstration is uncertain. EPA

guidance does not disallow any additional supporting evidence to support the findings of the attainment demonstration. The intent of Weight of Evidence for this SIP is to bolster the demonstration and indicate trends toward attainment.

Commenters:

Below is a summary of the commenters and organizations represented. Copies of the submitted comments, including the transcript from the hearing, are available upon request.

- Citizens, Allegheny County and PA (identical comments from 45 commenters).

- Clean Air Council, submitted by Joseph Otis Minott, Esq., and Christopher D. Ahlers, Esq. Oral testimony also given by David Smith, Outreach Coordinator, on behalf of Clean Air Council.

- Group Against Smog and Pollution (GASP) and seven other groups (shared submittal, additional submitters/organizations below), submitted by Sue Seppi, Program Manager. Oral testimony also given by Sue Seppi on behalf of GASP.
    - Matthew Mehalik, Ph.D., Executive Director, Air Quality Collaborative
    - Thaddeus Popovich, Co-founder, Allegheny County Clean Air Now
    - Steve Hvozdovich, Pennsylvania Campaigns Director, Clean Water Action
    - Lisa Graves-Marcucci, PA Coordinator, Community Outreach Environmental Integrity Project
    - Adam Garber, Field Director, PennEnvironment
    - George Jugovic Jr., Vice President of Legal Affairs, PennFuture
    - Tom Schuster, Sr. Campaign Representative, Sierra Club

- Greater Pittsburgh Chamber of Commerce, submitted by Matt Smith, President.

- Mayor Jan Weigand, Borough of Liberty.

- Pennsylvania Coal Alliance, submitted by Rachel Gleason, Executive Director.

- Pennsylvania House of Representatives, House Manufacturing Caucus, submitted by State Representatives Eli Evankovich (54th Legislative District) and Michael Schlossberg (132nd Legislative District), co-chairs (also signed by 22 other members of the House Manufacturing Caucus).

- Pennsylvania Senate, Senate Manufacturing Caucus, submitted by Senators Kim L. Ward and Jim Brewster, co-chairs.

- Pittsburgh Regional Building and Construction Trades Council, submitted by William Brooks, President (with identical comments from 2 others).

- Pittsburghers for Public Transit, submitted by Dean Mougianis, Coordinating Committee Member.

- Roger Day, Citizen, Allegheny County.

- State Representative Dan Miller, 42nd Legislative District.

- Steel Rivers Council of Governments, submitted by David Pasternak, Treasurer.

- U.S. Environmental Protection Agency (EPA), Region III, submitted by Cristina Fernandez, Director, Air Protection Division.

- United States Steel Corporation (U. S. Steel) and United Steelworkers (USW) International Union (identical comments from 1342 commenters) and family members (additional 264 commenters).

- United States Steel Corporation (U. S. Steel), submitted by David W. Hacker, Counsel-Environmental.