APPENDIX 6

Comments and Responses on Proposed 2016 Monitoring Network Plan, Revision 0

COMMENTS AND RESPONSES ON
PROPOSED 2016 MONITORING NETWORK PLAN, REVISION 0

The public comment period for the proposed 2016 Missouri Monitoring Network Plan opened on May 27, 2016 and closed on June 28, 2016. The Missouri Department of Natural Resources' Air Pollution Control Program prepared the 2016 Monitoring Network Plan to address the requirements of 40 CFR 58.10 (a) (1) for annual submittal of a plan to provide information on current State or Local Air Monitoring Stations (SLAMS), other ambient air monitoring, and any proposed network changes for the upcoming year.

The following is a summary of comments received and the Missouri Department of Natural Resources' Air Pollution Control Program's (Air Program's) corresponding responses.

SUMMARY OF COMMENTS: During the public comment period for the proposed 2016 Monitoring Network Plan, the Air Program received comments from Steven C. Whitworth (Ameren Missouri) and Maxine I. Lipeles (Washington University School of Law on behalf of the Sierra Club).

The comments focus primarily on ambient air monitoring networks for the Ameren Missouri Labadie and Rush Island coal fired power plants and were generally related to the implementation approach of the 1-hour Sulfur Dioxide (SO_2) National Ambient Air Quality Standards (NAAQS). The Air Program is responding to comments that relate specifically to ambient air monitoring issues as appropriate and applicable to the requirements of 40 CFR 58.10 (a) (1). Our responses follow the original comments identified in italics.

COMMENT #1: Both commenters addressed the issue of ambient air monitor classifications relative to 40 CFR 58 and EPA's SO_2 Data Requirements Rule (DRR) 40 CFR 51 Subpart BB.

Sierra Club commented: "*DNR erroneously relies on EPA's statement that state agencies may rely on data collected from third-party operated monitors provided the monitors comply with the data quality and assurance requirements of EPA's ambient monitoring regulations. However, DNR conveniently ignores EPA's statement that, regardless of whether an ambient source-oriented SO2 monitor is operated by a government, industry, or other third party, "[t]he critical issue is that the monitor or monitors must be either a SLAMS monitor or SLAMS-like monitor."*

Ameren commented: "*Ameren suggests that the Department should classify the Labadie and Rush Island monitoring networks as SLAMS in lieu of industrial SO2 monitors."*

RESPONSE: The Air Program relies on the recently promulgated revisions to 40 CFR 58 Appendix A (March 28, 2016) which indicates that the quality assurance requirements of 40 CFR 58 Appendix A are applicable to industrial monitors used for NAAQS compliance. "40 CFR 58 Appendix A, 1.1 Applicability. (a) This appendix specifies the minimum quality system requirements applicable to SLAMS and other monitor types whose data are intended to be used to determine compliance with the NAAQS (e.g., SPMs, tribal, CASTNET, NCore, industrial, etc.), unless the EPA Regional Administrator has reviewed and approved the monitor for exclusion from NAAQS use and these quality assurance requirements."

Since EPA specifically identifies industrial monitors as being applicable to NAAQS compliance, our reliance on the industrial monitor classification is appropriate and consistent with the ambient air monitoring regulations. As indicated in our 2016 Monitoring Network Plan, industrial monitors have been used in the Missouri ambient air monitoring network for decades. US EPA has relied on industrial monitors for area designations and other purposes. Any ambient air monitors that meet the quality assurance requirements of 40 CFR 58 Appendix A are indeed operated in a manner equivalent to SLAMS and are suitable for use as monitors to satisfy monitoring requirements of the SO_2 DRR, 40 CFR 51.1203(c).

The following are examples where EPA has used industrial monitors during a NAAQS designation process. These examples include but are not limited to the designation process for Round 1 of the 2010 Lead NAAQS which relied on industrial lead monitors in Iron county: https://www.epa.gov/sites/production/files/2016-04/documents/07_mo_epamod2.pdf and Round 1 of the 2010 1-hour SO_2 NAAQS which relied on an industrial SO_2 monitor in Greene County: https://www.epa.gov/sites/production/files/2016-03/documents/mo-epa-resp.pdf

No changes to the plan were made as a result of this comment.

COMMENT #2: Several Sierra Club comments address or are related to the issue of the minimum number of SO_2 monitors needed to satisfy the monitoring objectives of the 1-hour SO_2 DRR. "*With one or two possible exceptions, Ameren's monitors are not located in areas of expected peak ambient SO_2 concentrations.*"

RESPONSE: The Air Program addressed this issue in our response to Sierra Club's comments regarding the 2015 Monitoring Network Plan.

Neither the EPA Monitoring Technical Assistance Document (TAD) nor the DRR specifies a minimum number of monitoring sites needed to characterize sources for the 1-hour SO_2 NAAQS. The Preamble to the DRR states: "Potential ambient air monitoring costs are estimated based on the assumption that air quality for each of the 412 SO2 sources exceeding the 2,000 tpy threshold would be characterized through a single newly deployed air monitor. (Note, however, that the Monitoring TAD discusses situations where more than one monitor may be appropriate or necessary to properly characterize peak 1-hour SO_2 concentrations in certain areas, which would increase costs proportionally.)" Federal Register /Vol. 80, No. 162 / Friday, August 21, 2015 /Rules and Regulations 51085.

Consistent with the DRR, the department determined the number of monitoring sites for these areas using a case-by-case technical evaluation as described in the monitoring plans. The Characteristics and complexity of both areas indicates siting multiple monitoring sites is appropriate in these areas for additional spatial coverage as suggested in the EPA 1-hour SO_2 Monitoring TAD (Draft February 2016 version) page 15: "When multiple sites are under consideration, the network plan should consider the benefits including increased spatial representation, increased understanding of concentration gradients, increased understanding or verification of the frequency at which certain locations see SO_2 concentration maxima, and possibly increased population exposure coverage or representation. As stated previously, there is

no particular minimum of SO_2 monitors that is universally applicable, and the appropriate number and location of any monitoring sites will be a case-by-case determination."

No changes to the plan were made as a result of this comment.

COMMENT #3: Most of the remaining Sierra Club comments relate to the following issues and various interpretations of EPA's SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (Monitoring TAD):

"- Ameren selected the monitoring locations at both Labadie and Rush Island. But according to Ameren's own modeling, most of Ameren's monitoring locations are not in areas of expected peak ambient SO2 concentrations.

- DNR has not done due diligence in reviewing and accepting Ameren's monitoring locations. DNR offers no independent support for Ameren's Labadie locations, and its purported support for the Rush Island locations actually undermines the propriety of those locations.

- Based on currently available modeling, one or both of the Labadie monitoring sites and two of the three Rush Island monitoring sites are unlikely to capture maximum ambient SO2 concentrations because they are not located in areas where peak ambient SO2 concentrations are expected to occur."

RESPONSE: The Labadie and Rush Island monitoring networks were developed following the EPA Monitoring TAD which has been revised from its original version. The Monitoring TAD provides states with flexibly in designing the monitoring network and describes three main approaches: "The three different potential approaches presented are to: 1) conduct new modeling to aid in monitoring site placement; 2) conduct exploratory monitoring to inform permanent monitor placement; and 3) take advantage of existing emissions data, existing monitoring data, and existing modeling, where possible, to determine permanent monitoring site placement." The Monitoring Network Plan follows elements of this guidance and describes the rationale the Air Program used to site the monitors to satisfy the DRR.

While it is true that the Labadie network was established based on modeling performed prior to the most recent revision of the monitoring TAD, the TAD allows the use of existing modeling. As the Sierra Club indicated, after following the most recent revision of the monitoring TAD in regards to design value and concentration frequency ranking they came to the same conclusion that Northwest monitor is located in an area of anticipated maximum modeled design values and high frequency impacts. As indicated in our response to comment #2, the Valley site is useful in understanding 1-hour SO_2 spatial representation and concentration gradients which is consistent with the monitoring TAD.

No changes to the plan were made as a result of this comment.

On June 30, 2016, EPA designated the area around the Labadie power plant as unclassifiable. In a detailed response to comments document[i] and a technical support document (TSD) [ii] for the second round of the 1-hour SO2 NAAQS designation process EPA reviewed and commented on technical information regarding SO_2 dispersion modeling and other analysis for the Labadie area.

In their response to comments document, EPA cites reviewing a total of 48 modeling runs submitted by Ameren Missouri, the Air Program, and Sierra Club for the Labadie area. EPA concludes on page 26 in the designations TSD that for the Labadie area "…EPA's view is that the modeling results widely vary and greatly depend upon how the modeling was conducted, as discussed in this Technical Support Document. Because of the issues present in the modeling methodologies, the EPA does not have a clear basis to determine whether the area currently meets or does not meet the 2010 SO_2 NAAQS based on all currently available information."

On page 84 of the response to comments document EPA states: "While EPA has indicated for MDNR's 2015 monitoring network plan that the monitors meet siting criteria for purposes of being away from obstructions, etc., EPA has not made any determinations of whether the monitors are in expected peak concentration locations as outlined by the 1-hr SO2 designations Monitoring Technical Assistance Document. Given our analysis of both the windrose and terrain information, along with factoring in historic monitoring locations, it appears that the current monitors are not likely sited in an area to measure the maximum concentrations."

As a result of the issues addressed in these EPA designation documents which were posted after the 2016 Monitoring Network Plan plan's public inspection period, Air Program will work with EPA to determine any additional monitoring plan changes that are needed and revise the 2016 Monitoring Network Plan accordingly.

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[i] Responses to Significant Comments on the Designation Recommendations for the 2010 Sulfur Dioxide Primary National Ambient Air Quality Standard (NAAQS), Docket Number EPA–HQ–OAR–2014–0464
U.S. Environmental Protection Agency, https://www.epa.gov/sites/production/files/2016-07/documents/so2d-r2-response-to-comments-06302016.pdf

[ii] 1 Final Technical Support Document Missouri Area Designations for the 2010 SO2 Primary National Ambient Air Quality Standard, https://www.epa.gov/sites/production/files/2016-07/documents/r7_mo_final_designation_tsd_07012016.pdf

Washington University in St. Louis
SCHOOL OF LAW
Interdisciplinary Environmental Clinic

June 28, 2016

Missouri Department of Natural Resources
Air Pollution Control Program
Air Quality Analysis Section/Air Monitoring Unit
P.O. Box 176
Jefferson City, MO 65102
Via email to: cleanair@dnr.mo.gov

Re: 2016 Monitoring Network Plan

To whom it may concern:

Submitted on behalf of Sierra Club, these comments urge the Missouri Department of Natural Resources ("DNR") to revise its 2016 Monitoring Network Plan[1] to require Ameren to make significant changes to its sulfur dioxide ("SO_2") monitoring networks at the Labadie and Rush Island power plants. As DNR is expected to submit its 2016 Plan to the U.S. Environmental Protection Agency ("EPA") for review and approval shortly after the close of the comment period, these comments also urge EPA to reject most of the 2016 Plan's SO_2 monitoring locations at the Labadie and Rush Island plants. With one or two possible exceptions, Ameren's monitors are not located in areas of expected peak ambient SO_2 concentrations. Accordingly, they do not satisfy applicable requirements for "SLAMS … or SLAMS-like" monitors.[2]

This letter highlights the following key points:

- Ameren selected the monitoring locations at both Labadie and Rush Island. But according to Ameren's own modeling, most of Ameren's monitoring locations are not in areas of expected peak ambient SO_2 concentrations.
- DNR has not done due diligence in reviewing and accepting Ameren's monitoring locations. DNR offers no independent support for Ameren's Labadie locations, and its purported support for the Rush Island locations actually undermines the propriety of those locations.
- Based on currently available modeling, one or both of the Labadie monitoring sites and two of the three Rush Island monitoring sites are unlikely to capture maximum ambient SO_2 concentrations because they are not located in areas where peak ambient SO_2 concentrations are expected to occur.

[1] Missouri Department of Natural Resources, Air Pollution Control Program, 2016 Monitoring Network Plan (May 27, 2016) ("2016 Monitoring Network Plan" or "2016 Plan").
[2] U.S. Environmental Protection Agency ("EPA"), Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS); Final Rule ("DRR"), 80 Fed. Reg. 51052, 51072 (Aug. 21, 2015).

I. DNR's 2016 Monitoring Network Plan Does Not Comply With Applicable Legal Requirements.

Source-oriented ambient SO_2 monitors must be sited in areas of expected peak 1-hour SO_2 concentrations.[3] EPA guidance highlights the need for detailed analysis to support the appropriate location of ambient SO_2 monitors:

> The EPA suggests that the more data and analysis that goes into a source-oriented monitoring site evaluation process, the greater the confidence in how appropriate the resulting monitoring network proposal will be in supporting the objectives of the DRR. Air agencies electing to use monitoring as a means of satisfying the DRR or other source-oriented monitoring activity are expected to provide adequate reasoning in a monitoring network proposal. Such a network proposal would characterize an area around or impacted by an identified SO_2 source and include the identification of one or more locations where peak 1-hour SO_2 concentrations are expected to occur.[4]

In its 2015 Monitoring Network Plan, DNR labeled Ameren's Labadie and Rush Island SO_2 monitors as Special Purpose Monitors for the stated reason that the Data Requirements Rule had not yet been issued in final form, while making it clear that the monitors were intended to serve as SLAMS monitors. "Once the rule is finalized, it is the intention to convert these monitors to SLAMS."[5] In approving DNR's 2015 Monitoring Network Plan, EPA indicated that it had not evaluated Ameren's Labadie and Rush Island monitors but would do so after DNR acted on its stated intention to convert them to SLAMS monitors.[6]

DNR's 2016 Monitoring Network Plan changes course: "Despite EPA's previous recommendation to classify these monitors as SLAMS, … we have decided to classify the Labadie and Rush Island SO_2 monitors as industrial SO_2 monitors."[7] DNR erroneously relies on EPA's statement that state agencies may rely on data collected from third-party operated monitors provided the monitors comply with the data quality and assurance requirements of EPA's ambient monitoring regulations. However, DNR conveniently ignores EPA's statement that, regardless of whether an ambient source-oriented SO_2 monitor is operated by a government, industry, or other third party, "[t]he critical issue is that the monitor or monitors must be either a SLAMS monitor or SLAMS-like monitor."[8] EPA's numerous statements about the need for states to perform due diligence to support the location and number of monitors, and the need for discussing these items with EPA in advance of making decisions, underscores the fact that, if states plan to use third-party monitors for regulatory NAAQS designation or compliance

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[3] 40 C.F.R. Part 58, Appendix D, § 1.1.1(a), (c); 40 C.F.R. § 51.1203(b); DRR, 80 Fed. Reg. at 51055, 51057, 51083, 51085; In the Matter of Union Electric Company d/b/a Ameren Missouri, No. APCP-2015-034, Consent Agreement between DNR and Ameren Missouri (Mar. 23, 2015), Appendix 1, ¶b (Appendix J to DNR's pending SIP for the Jefferson County Sulfur Dioxide Nonattainment Area). See also EPA, SO2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (Feb. 2016, Draft) ("Monitoring TAD") at i, 2, 10, 15.
[4] Monitoring TAD at 10.
[5] Missouri Department of Natural Resources, Air Pollution Control Program, 2015 Monitoring Network Plan (June 12, 2015) ("2015 Monitoring Network Plan") at 12.
[6] EPA, Region 7 (Mark Hague), letter to DNR (Kyra Moore) (Jan. 25, 2015).
[7] 2016 Monitoring Network Plan at 17.
[8] DRR at 51072.

decisions, the monitors must meet all of the substantive requirements of SLAMS monitors. Ameren's Labadie and Rush Island monitors do not, as they are not sited in areas of expected peak ambient SO_2 concentrations.

II. The Labadie Monitors Are Not Located In Areas of Expected Peak Ambient SO_2 Concentrations.

As demonstrated in comment letters previously submitted on behalf of Sierra Club, one or both of Ameren's Labadie monitors are not in areas of expected peak concentrations, and a third monitor is also needed.[9] Our previous comments, which are attached as Exhibits 1-5 and incorporated herein by reference, highlighted the following key points:

- Ameren's original modeling to site the monitors identified three distinct areas where peak 1-hour SO_2 concentrations are expected to occur. These areas are located northwest, northeast, and southeast of the plant and are shown in Figure 1. However, only one of the monitors – the Northwest monitor – is located in one of these areas. No monitor is located in either of the other two peak concentration areas. The Valley monitor is located between the two unmonitored peak concentration areas, at a site where the modeled concentration is approximately 20 percent lower than in the peak areas.
- DNR's modeling for its proposed Labadie designation recommendation, which used newer emissions and meteorological data than Ameren's original modeling, confirmed that the Valley monitor is not located in an expected peak concentration area and predicted an even lower concentration (relative to the peak) at the Valley monitoring site than Ameren's original modeling. This is shown in Figure 2.
- Early on-site meteorological data from the Valley site suggests that meteorological data from the Spirit of St. Louis Airport (KSUS) in nearby Chesterfield may be more representative of meteorological conditions at Labadie than data from the much more distant Jefferson City Memorial Airport (KJEF) in Jefferson City. Like Ameren, DNR used KJEF meteorological data in the modeling it performed for its proposed Labadie designation recommendation. However, if KSUS meteorological data are used instead in light of their greater similarity to the on-site met data, then DNR's modeling shows expected peak concentration areas located south and southwest of the plant. This is shown in Figure 3. Both the Northwest and Valley monitors are located well outside of these areas, where the modeled concentration is more than 25 percent lower than in peak areas.

[9] Comments on Ameren Missouri's Labadie Sulfur Reduction Project Quality Assurance Project Plan (April 13, 2015) (Ex.1); Comments on the 2015 Monitoring Network Plan (July 20, 2015) (Ex.2); Supplemental Comments on the 2015 Monitoring Network Plan (August 11, 2015) (Ex.3); Comments on the 2010 1-Hour Sulfur Dioxide Standard, Proposed Options for Area Boundary Recommendations, July 2016 Designations (September 3, 2015) (Ex.4); Comments on the Proposed Area Designation Under the 2010 SO_2 NAAQS for the Area Around the Labadie Energy Center in Franklin County, Missouri (March 31, 2016) (Ex.5).

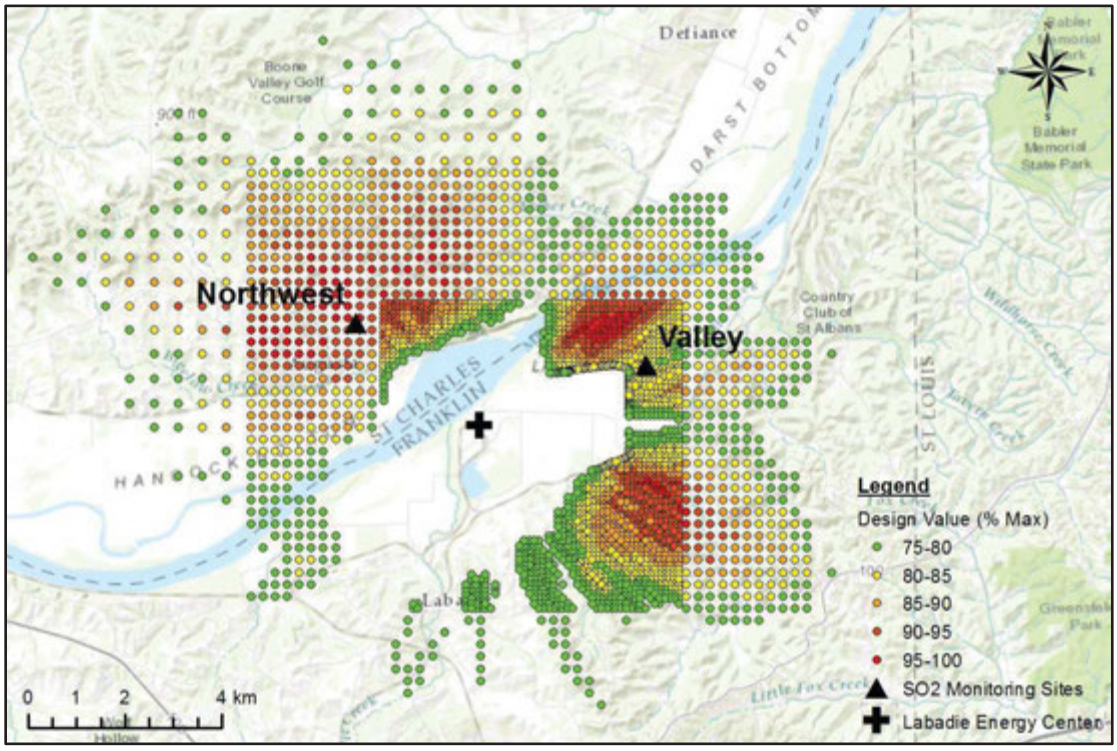

Figure 1. Expected peak concentration areas per Ameren's original modeling.

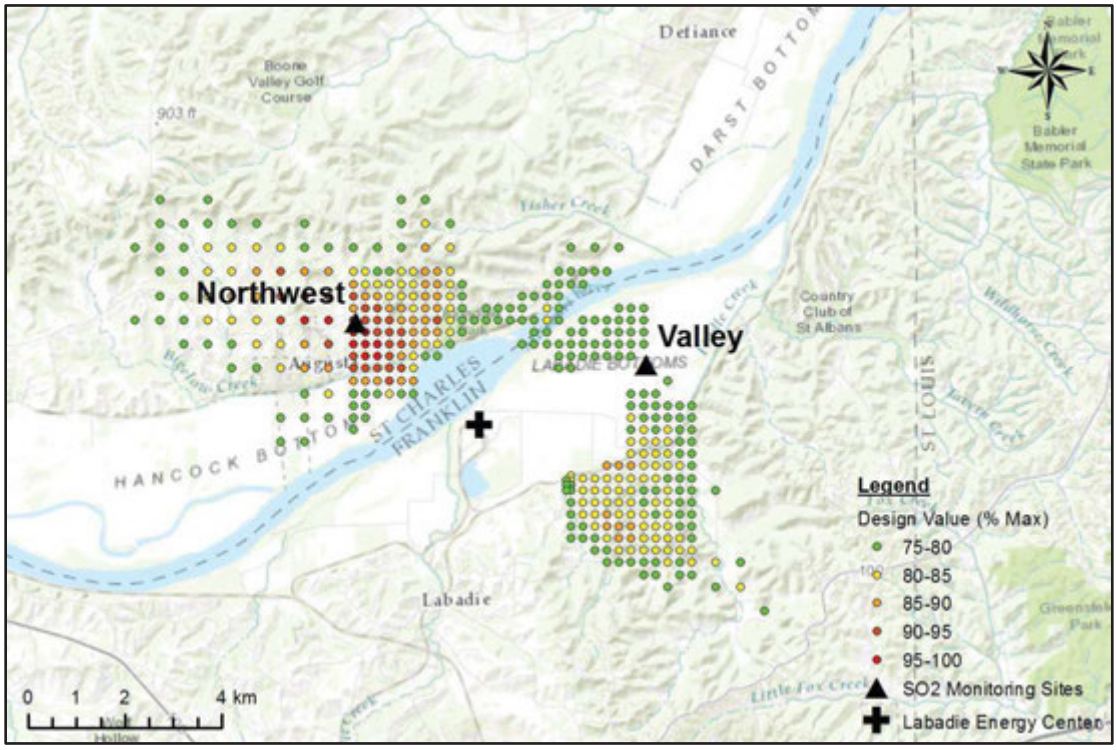

Figure 2. Expected peak concentration areas per DNR's Labadie designation recommendation modeling.

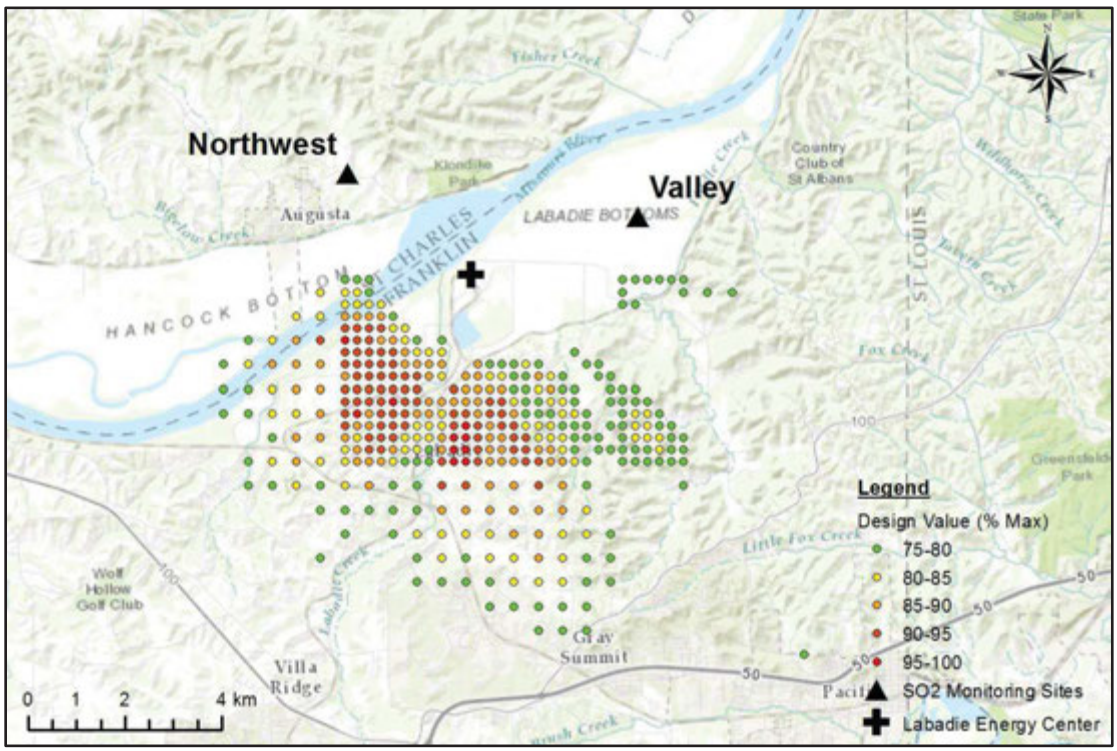

Figure 3. Expected peak concentration areas per DNR's Labadie designation recommendation modeling, using KSUS meteorological data.

III. DNR Has Not Conducted An Independent Modeling Analysis Of Ameren's Labadie Monitoring Sites.

Inexplicably, DNR has not performed an independent modeling analysis of the suitability of Ameren's Labadie monitoring sites. In its 2015 Monitoring Network Plan, DNR only provided Ameren's modeling analysis of the sites.[10] Even though DNR performed independent modeling last year related to its Labadie designation recommendation, it did not use that modeling to evaluate or attempt to justify the Labadie monitoring sites in the 2015 Monitoring Network Plan. And although DNR updated its modeling earlier this year in response to EPA's proposed Labadie designation decision, it still failed to use that updated modeling to assess the siting of Ameren's Labadie monitors in the 2016 Monitoring Network Plan.

Nor has DNR conducted a monitor siting analysis for Labadie using the receptor scoring strategy described in the Monitoring TAD, which was revised last February. This is curious given DNR's contention in the 2016 Monitoring Network Plan that its original Rush Island analysis needed to be updated because it focused solely on modeled design values, and "based on the revised guidance, the site selection process also needs to account for the frequency with which a receptor registers a daily maximum concentration."[11] Like DNR's original Rush Island analysis, Ameren's Labadie analysis did not account for frequency of having the highest 1-hour daily

[10] 2015 Monitoring Network Plan, Appendix 2.
[11] 2016 Monitoring Network Plan, Appendix 2 at 2.

maximum concentration amongst all receptors. Hence, if the revisions to the Monitoring TAD necessitated a supplemental analysis of the Rush Island monitoring sites on those grounds, it necessitates one for the Labadie sites as well. In light of the updated modeling that DNR performed earlier this year in connection with the pending Labadie designation, it needed only to perform an additional model run using the MAXDAILY output option in AERMOD to evaluate the sites using the scoring strategy described in the Monitoring TAD, as it did for the Rush Island monitoring sites.

DNR also should have reevaluated the Labadie monitoring sites in the 2016 Monitoring Network Plan due to various technical issues with Ameren's original analysis. As noted above, DNR relied from the outset on Ameren's modeling analysis, which Ameren provided in the Quality Assurance Project Plan ("QAPP") for what the company ironically dubbed its "Labadie Sulfur Reduction Project." However, Ameren's modeling used constant emission rates and therefore did not comport with the Monitoring TAD, as explained in our April 2015 comments on the QAPP (Ex. 1 attached hereto). It also used 2005-2009 meteorological data and was therefore conspicuously out of date even at the time of submittal.

DNR's approach to the Labadie monitoring sites cannot be squared with EPA's requirements:

> [R]esponsible air agencies are expected to establish a clear rationale for the number and placement of the monitors it is using to satisfy the requirements of the [DRR] rule. In this process, there is flexibility for the state to use professional judgment in determining what is appropriate for their individual situations, but *they are expected to perform due diligence in attempting to locate monitors in the most ideal locations possible*.[12]

IV. Analysis Of The Labadie Monitoring Sites Using The Scoring Strategy Described In The Monitoring TAD Demonstrates That The Valley Monitor Is Improperly Sited And That Additional Monitors Are Needed.

Per the Monitoring TAD, prioritization of receptor locations for consideration as permanent monitoring sites using normalized design values (NDVs) and frequency of having the highest 1-hour daily maximum concentration is accomplished using the following scoring strategy:[13]

1. Calculate the NDV at each receptor and rank from highest to lowest receptor. Rank of 1 means the highest design value.
2. Using the MAXDAILY output option in AERMOD, determine each day's highest normalized concentration and receptor. The MAXDAILY option in AERMOD outputs each receptor's highest concentration for each modeled day.
3. Using the output from step 2, determine the number of days each receptor has the highest concentration for the day among all receptors.
4. Rank the results from step 3 from highest to lowest number of days. Rank of 1 means the highest number of days having the highest daily maximum value.

[12] DRR, 80 Fed. Reg. at 51073 (emphasis supplied).
[13] Monitoring TAD, Appendix A.

5. For each receptor, add the concentration rank and the day rank. The lowest possible score is 2, meaning the receptor was the highest overall NDV and also had the highest number of days where the receptor was the highest concentration for the day amongst all receptors.

Ranking receptors by their resultant scores provides a list of locations ranked in general order of desirability with regard to monitor siting. Lower relative scores indicate a higher probability of experiencing peak 1-hour SO_2 concentrations.

Had DNR analyzed Ameren's Labadie monitoring sites using this strategy in either its original modeling, which used 2012-2014 emissions data, or its updated modeling, which used 2013-2015 emissions data and also included a new variant with a merged stack for units 3 and 4, it would have found – as shown in our comments on the 2015 Monitoring Network Plan (Ex. 2 attached hereto) – that the Valley monitor is not sited in an expected peak concentration area and needs to be relocated. We obtained DNR's original and updated modeling via Sunshine Law request and reviewed the results in order to identify the 300 receptors with the highest modeled design values. Next, as DNR did in its supplemental analysis of the Rush Island monitoring sites, we reran the models for the top 300 receptors using the MAXDAILY output option in AERMOD to determine the maximum 1-hour concentration for each receptor for each day and then tallied the number of days each receptor had the highest 1-hour daily maximum concentration among all receptors.[14] Then, we ranked the top 300 receptors by both design value (concentration rank) and the number of days each had the highest 1-hour daily maximum concentration (day rank) and calculated a score for each one by adding its concentration rank and its day rank. Finally, we ranked the receptors by their scores to create a list of receptor locations in general order of desirability with regard to monitor siting. Figures 4, 5, and 6 show modeled design values and receptor score ranks for the top 300 receptors for DNR's original and updated modeling.

Note that in these and most subsequent figures, receptor color indicates concentration (as a percentage of the maximum modeled design value) and receptor size denotes either frequency of having the highest 1-hour daily maximum concentration, score (concentration rank plus day rank), or score rank

[14] Like DNR, we used actual rather than normalized design values, but that does not affect the outcome of the analysis.

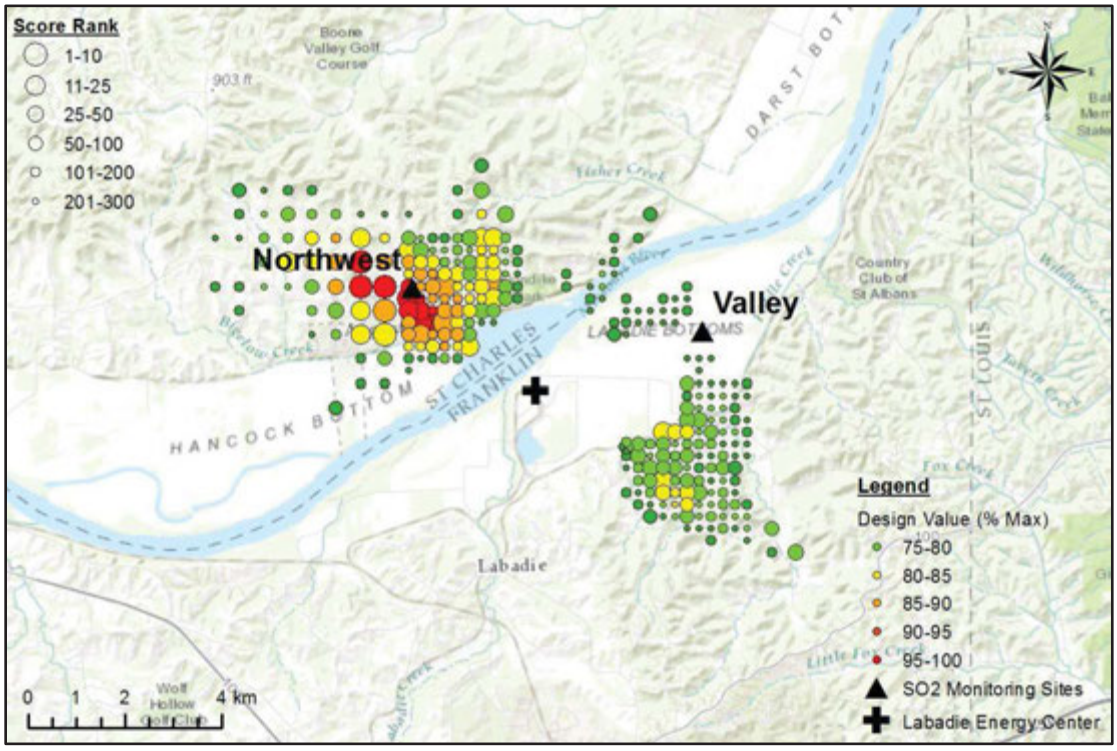

Figure 4. Design values and score ranks for the top 300 receptors, DNR modeling based on 2012-2014 emissions.

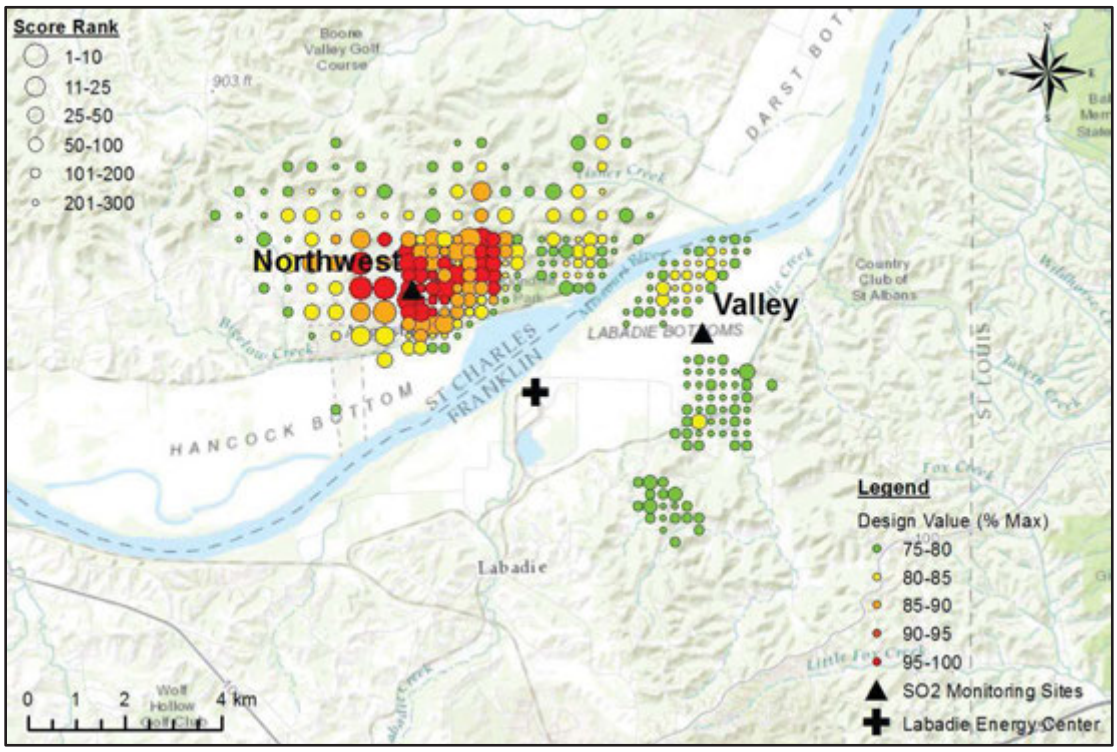

Figure 5. Design values and score ranks for the top 300 receptors, DNR modeling based on 2013-2015 emissions and separate stacks for units 3 and 4.

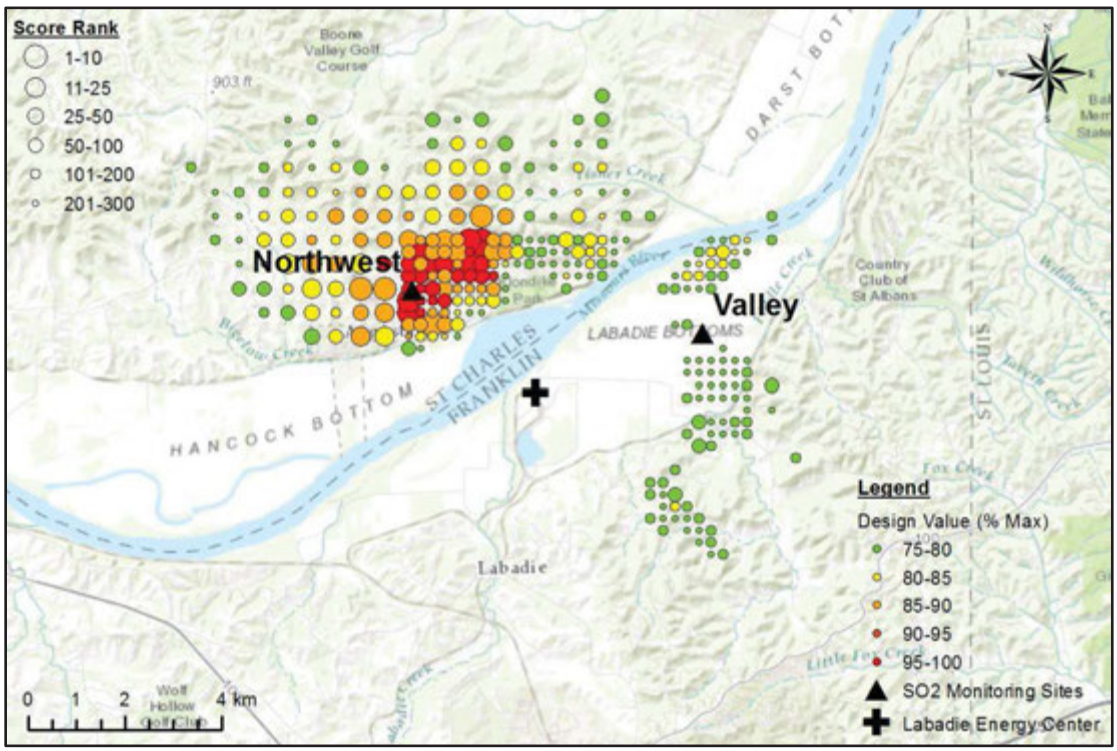

Figure 6. Design values and score ranks for the top 300 receptors, DNR modeling based on 2013-2015 emissions and merged stacks for units 3 and 4.

Figures 4, 5, and 6 all show that while the Northwest monitor is sited in an area with high modeled design values and numerous highly ranked receptors, the Valley monitor clearly is not. Regardless of which modeling is used in the analysis, the Valley monitor is sited in an area where there are no top 300 receptors and where the modeled design value is generally less than 75% of the maximum. As such, its location is not on the prioritized list of receptor locations for permanent monitoring sites developed using the scoring strategy described in TAD, and DNR should require that it be moved to a location that is. Figure 4 (based on DNR's modeling with 2012-2014 emissions) shows a large cluster of highly-ranked receptors, including several in the top 25 and many in the top 50, south of the Valley monitor, while Figures 5 and 6 (based on DNR's modeling with 2013-2015 emissions) show a smaller cluster of top 100/200 receptors north of the Valley monitor. It should be noted that, as we discussed in our April 2015 comments on the Labadie QAPP, Ameren's original analysis of the Labadie monitoring sites showed very high modeled design values in both of these areas, yet Ameren still chose to site the Valley monitor where modeled design values were considerably lower.

A similar analysis of Ameren's most recent modeling supports not only relocating the Valley monitor but also adding at least one monitor southwest of the plant. In late March, in response to the EPA's proposed nonattainment designation for Labadie, Ameren submitted a host of new modeling runs using 2013-2015 emissions data. Half of the new runs used a non-default beta option in AERMOD that EPA has not approved for use at Labadie. Therefore, we did not analyze those runs. Of the four remaining runs, all of which appropriately used AERMOD's regulatory default options, two used meteorological data from the same National Weather

Service ("NWS") station that DNR used (Jefferson City Memorial Airport (KJEF)). Figures 7 and 8 show modeled design values and receptor score ranks for the top 300 receptors for these runs. The other two runs used meteorological data from the NWS station at Spirit of St. Louis Airport (KSUS). Figures 9 and 10 show modeled design values and receptor score ranks for the top 300 receptors for these runs.

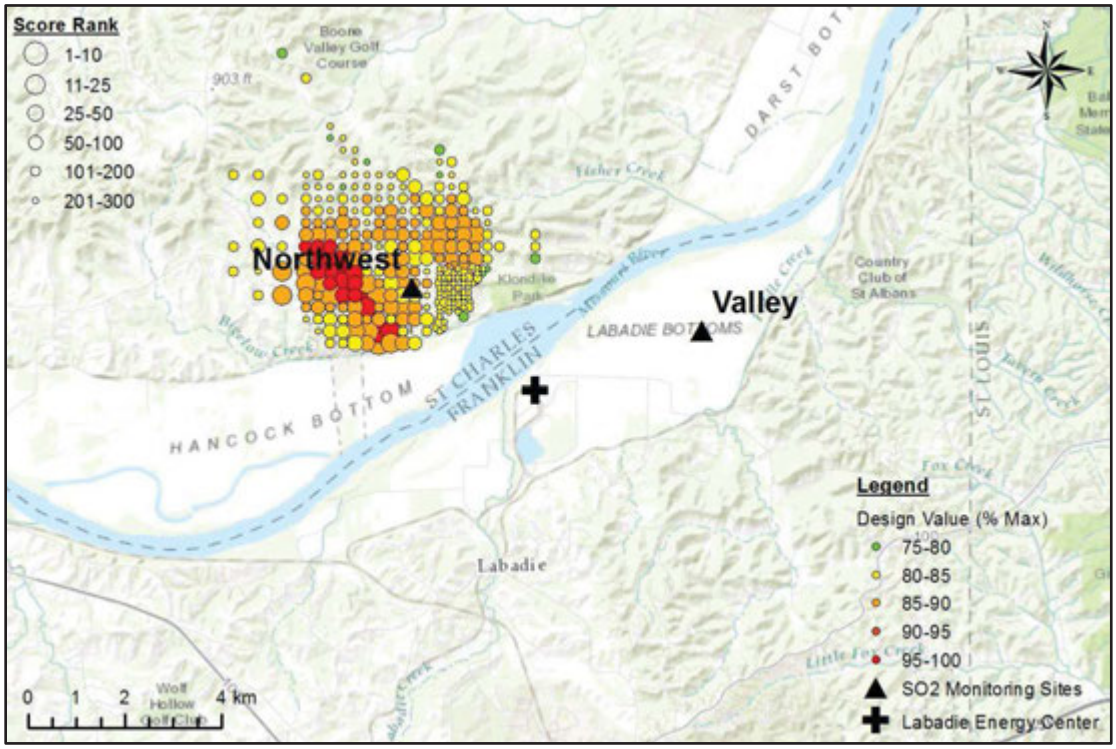

Figure 7. Design values and score ranks for the top 300 receptors, Ameren modeling based on 2013-2015 emissions, KJEF met, and East St. Louis background.

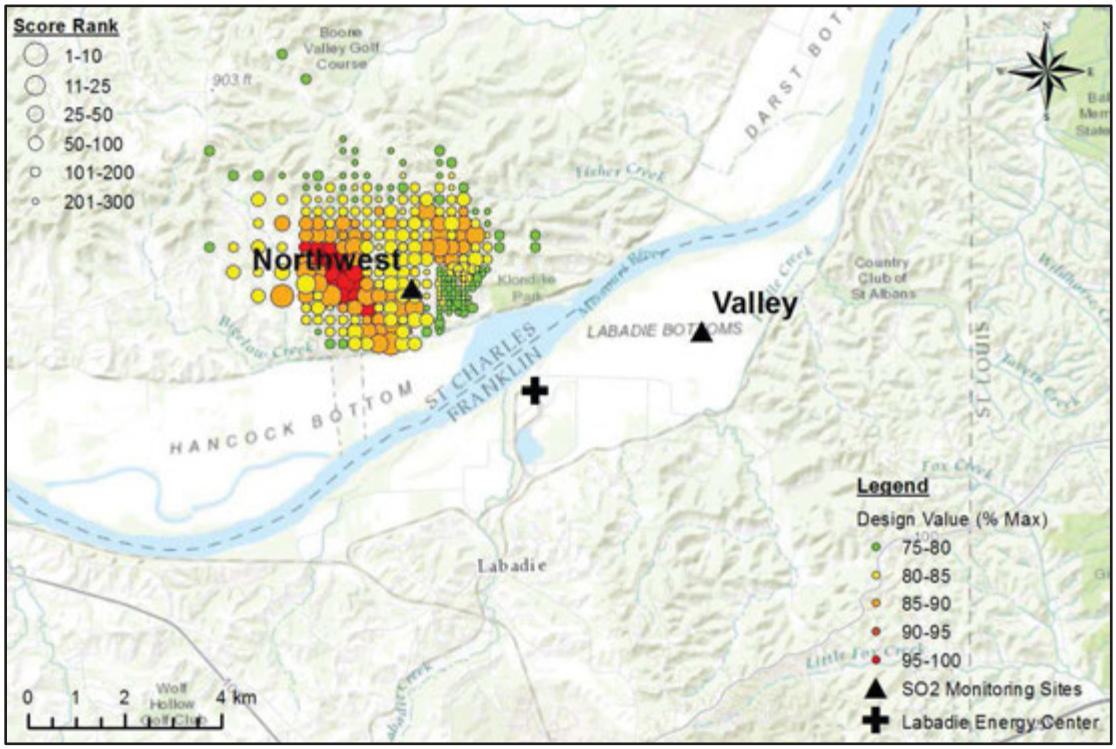

Figure 8. Design values and score ranks for the top 300 receptors, Ameren modeling based on 2013-2015 emissions, KJEF met, and Nilwood background.

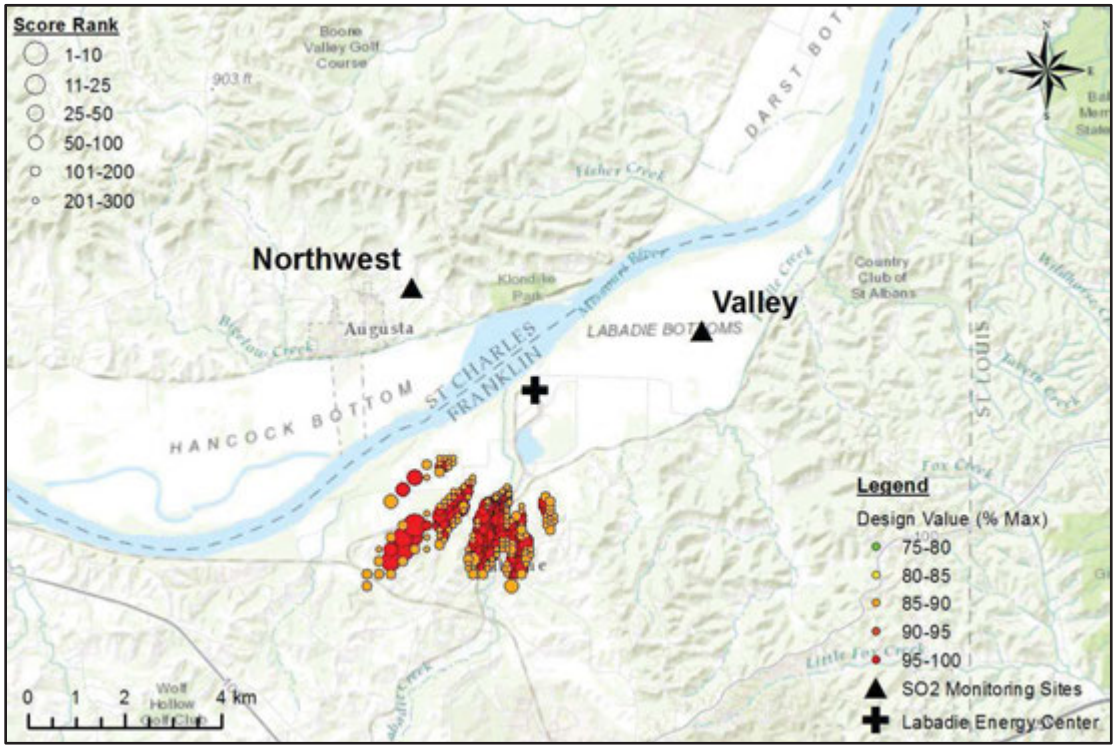

Figure 9. Design values and score ranks for the top 300 receptors, Ameren modeling based on 2013-2015 emissions, KSUS met, and East St. Louis background.

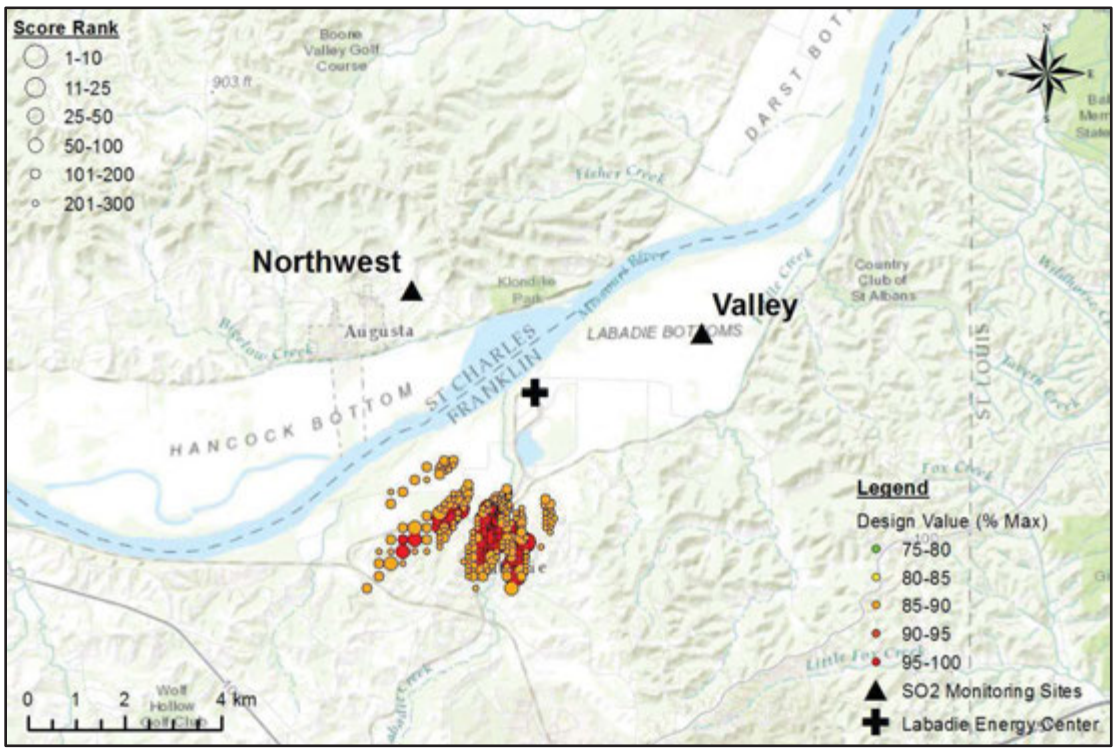

Figure 10. Design values and score ranks for the top 300 receptors, Ameren modeling based on 2013-2015 emissions, KSUS met, and Nilwood background.

Because Ameren used a much finer receptor spacing than DNR, Ameren's top 300 receptors are much more concentrated than DNR's, limiting to some degree the conclusions that can be drawn from Ameren's modeling without swapping out Ameren's receptor grid for DNR's and re-running Ameren's models. Still, Figures 7 and 8 show that based on Ameren's KJEF model runs, the Valley monitor is sited where there are no highly ranked receptors and the modeled design value is less than 75% of the maximum. Hence, these runs support the conclusion – drawn from our analysis of DNR's latest modeling – that the Valley monitor should be relocated.

Figures 9 and 10, on the other hand, show that based on Ameren's KSUS model runs, *neither* of the Labadie monitors is sited in an expected peak concentration area. The highest modeled design values, as well as the highest ranked receptors, are located south-southwest of the plant. There are no highly ranked receptors, and modeled design value are generally less than 75% of the maximum, at both the Valley and Northwest monitoring sites. As demonstrated in our supplemental comments on the 2015 Monitoring Network Plan (Ex. 3 attached hereto) preliminary meteorological data from the Valley site indicate that KSUS meteorological data is more representative of meteorological conditions at Labadie than KJEF meteorological data. Given that expected peak concentration areas are dramatically different when KSUS meteorological data are used, DNR should require one or more additional monitors in the peak concentration areas shown in Figures 9 and 10 in addition to the two existing monitors (one of which should be relocated). Failure to monitor these areas would result in failure to detect ground-level SO_2 concentrations maxima if KSUS meteorological data ultimately prove more representative of the area than KJEF meteorological data.

V. DNR's Supplemental Analysis Of The Rush Island Monitoring Sites Does Not Follow EPA Guidance.

The 2015 Monitoring Network Plan included Ameren's modeling and justification for the locations of three Rush Island monitors as well as an independent modeling analysis by DNR. DNR stated that it undertook its analysis to determine whether the monitors, which were sited by Ameren, "will adequately represent … Rush Island Energy Center's SO_2 air quality impact," and it concluded that they are "within … areas predicted to have the highest and most frequent modeled impacts" and are therefore "reasonable."[15] However, as demonstrated in comment letters previously submitted on behalf of Sierra Club, two of Ameren's Rush Island monitors are not in areas of expected peak concentrations.[16] Our previous comments, which are attached as Exhibits 2 and 6 and incorporated herein by reference, highlighted the following key points:

- Ameren's modeling for its analysis of SO_2 and meteorological monitoring sites around Rush Island identified one large and four smaller areas where peak 1-hour SO_2 concentrations are expected to occur. These areas are shown in Figure 11. However, none of the Rush Island monitors are located in the large peak concentration area south of the plant, which is also where the highest modeled concentrations occur. Furthermore, while two of the monitors – Fults and Natchez – are located on the periphery of two of the smaller expected peak concentration areas, the Weaver-AA monitor is not located in an expected peak concentration area at all.
- DNR's independent analysis of the Rush Island monitoring sites used a flawed methodology that biased the results. When corrected, DNR's analysis shows that only the Fults monitor is located in an expected peak concentration area and both the Natchez and Weaver-AA monitors are not.

[15] 2015 Monitoring Network Plan, Appendix 5 at 1, 7-8.
[16] Comments on the 2015 Monitoring Network Plan (July 20, 2015) (Ex.2); Comments on Ameren Missouri's Analysis of SO_2 and Meteorological Monitoring Stations Around Its Rush Island Energy Center (May 29, 2015) (Ex.6).

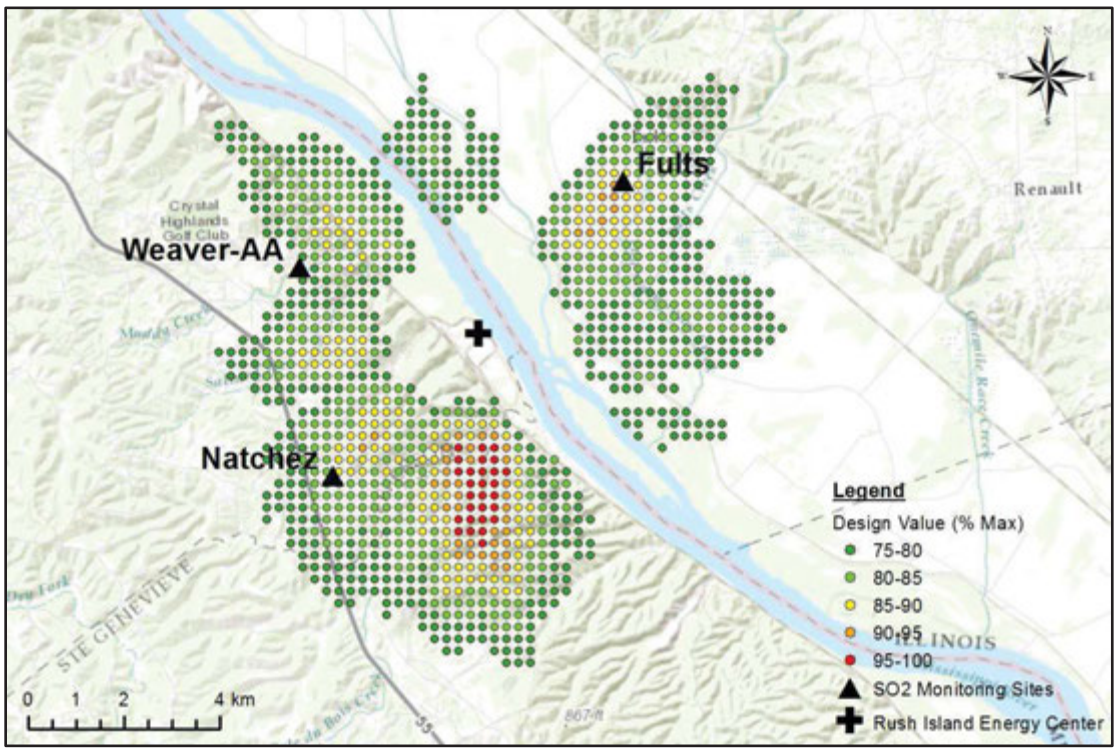

Figure 11. Expected peak concentration areas per Ameren's modeling for its analysis of SO_2 and meteorological monitoring sites around Rush Island.

The 2016 Monitoring Network Plan includes a supplemental analysis by DNR of the Rush Island monitoring sites. The purpose of the supplemental analysis was to update the modeling performed for DNR's original analysis to address the February 2016 revisions to the Monitoring TAD, which includes an option for creating a relative prioritized list of receptor locations for permanent monitoring sites using normalized design values (NDVs) and frequency of having the highest 1-hour daily maximum concentration amongst all receptors. According to DNR, it needed to update its modeling because its original analysis focused solely on modeled design values, and "based on the revised guidance, the site selection process also needs to account for the frequency with which a receptor registers a daily maximum concentration."[17] DNR's supplemental analysis concludes, "This … analysis supports the conclusions from the June 15 report [2015 Monitoring Network Plan]. The locations of the … monitoring sites are reasonable and in agreement with the air program's analysis."[18]

It is worth noting that the option to create a relative prioritized list of receptor locations for consideration of permanent monitoring sites using NDVs and frequency of having the highest 1-hour daily maximum concentration is not a new addition to the February 2016 version of the Monitoring TAD. It was in the previous (December 2013) version of the TAD as well, so DNR could have used it for its original analysis of the Rush Island monitoring sites. Why it chose not to and decided to focus instead only on modeled design values without any kind of assessment of

[17] 2016 Monitoring Network Plan, Appendix 2 at 2.
[18] *Id.* at 5.

the frequency with which receptors have the highest 1-hour daily maximum concentration was not explained in the 2015 Monitoring Network Plan.

More importantly, although DNR generally followed the strategy in its supplemental analysis of the Rush Island SO_2 monitoring sites,[19] it omitted the most crucial, final step – ranking receptors according to their score (the sum of concentration rank and day rank). As a result, it ignored the entire purpose of conducting the TAD-suggested prioritization analysis, and its supplemental analysis offers no support for the location of the Rush Island monitors. First, DNR reviewed the modeling performed for its original analysis and identified the 300 receptors with the highest modeled design values. These receptors are shown in Figure 12. Next, it reran its model for the top 300 receptors using the MAXDAILY output option in AERMOD to determine the maximum 1-hour concentration for each receptor for each day and then tallied the number of days each receptor had the highest 1-hour daily maximum concentration among all receptors. The frequency of having the highest 1-hour daily maximum concentration among the top 300 receptors is shown in Figure 13. Finally, it ranked the top 300 receptors by both design value (concentration rank) and the number of days each had the highest 1-hour daily maximum concentration (day rank) and calculated a score for each one by adding its concentration rank and its day rank. These scores are shown in Figure 14.

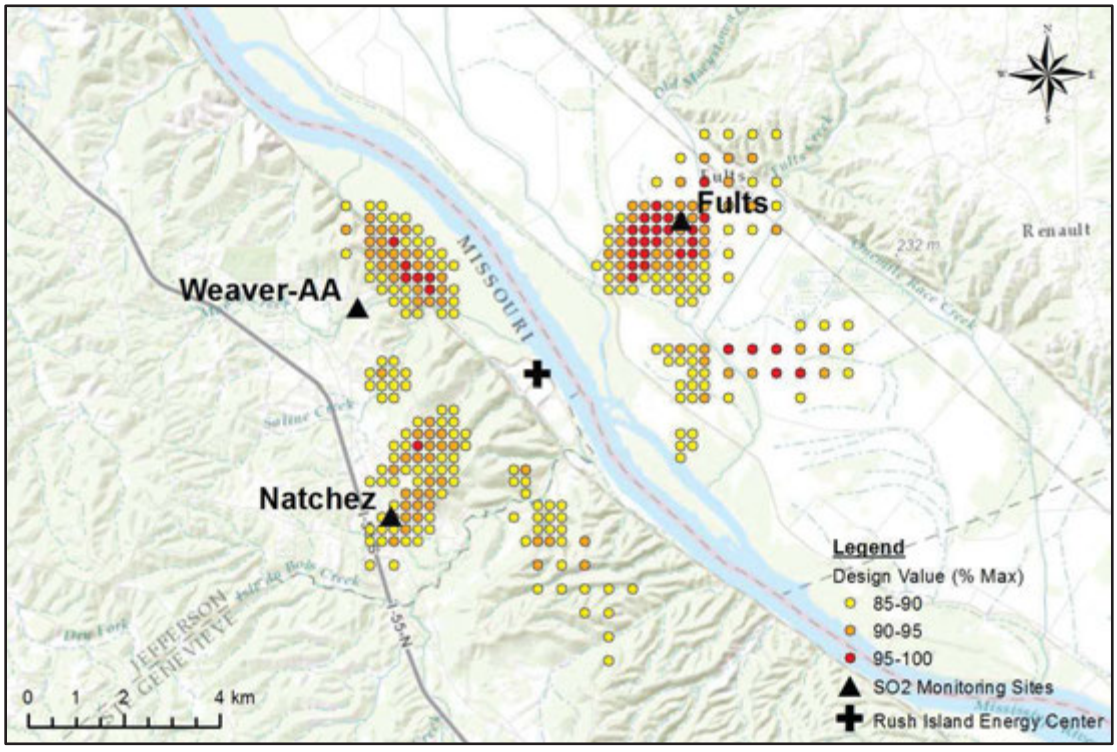

Figure 12. Top 300 receptors per DNR's original modeling.

[19] DNR used actual rather than normalized design values, but that does not affect the outcome of the analysis.

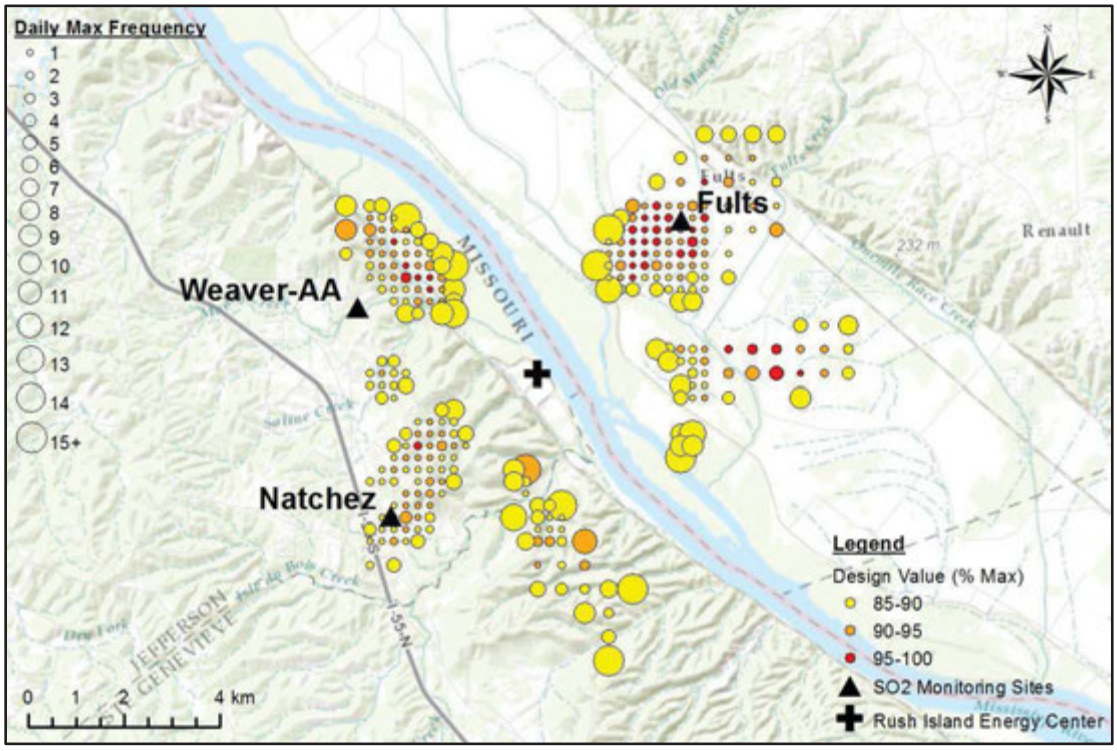

Figure 13. Frequency of having the 1-hour daily maximum concentration.

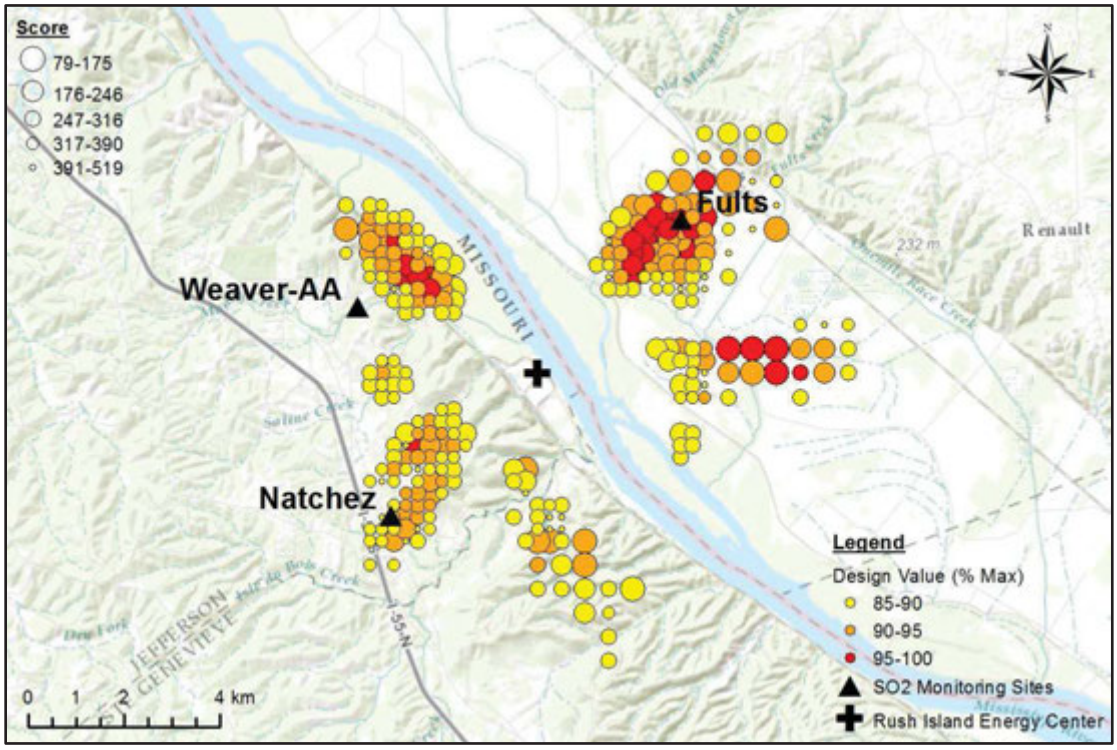

Figure 14. Receptor scores (concentration rank + day rank).

At this point, however, DNR abandoned the scoring strategy described in the Monitoring TAD. Instead of performing the final step and ranking receptors by their scores in order to provide a list of locations ranked in general order of desirability with regard to permanent monitor siting, it reverted to the flawed methodology used in its original analysis and counted the number of top receptors within five numbered polygons arrayed around the plant. These polygons are shown in Figure 15. It then ranked the polygons by the number of top receptors within each one and concluded, based on the fact that polygons 1, 2, and 3, where DNR Figures S-2 and S-3 show the monitors are located, contain the most top receptors, that the supplemental analysis supports its earlier conclusion that the siting of the monitors is reasonable.

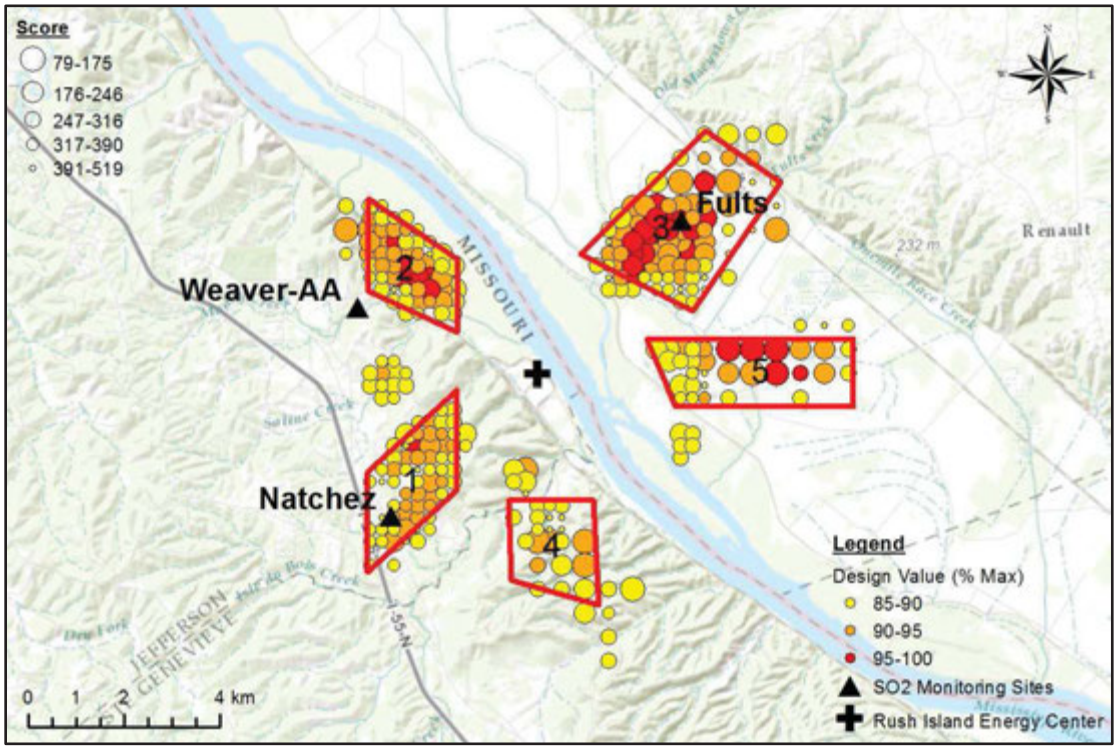

Figure 15. Polygons used in DNR's supplemental analysis.

There are several problems with this analysis:

1) DNR's use of a telescoping receptor grid results in biased counts of the number of receptors within each of the five polygons because the polygons are located in a region where the receptor spacing varies. As a result, some of the polygons contain more receptors than others simply because the receptors in those polygons are spaced more closely together.
2) The polygons used in DNR's supplemental analysis are a different size and shape than the ones used in its original analysis. This is shown in Figure 16. Setting aside the bias inherent in DNR's methodology owing to its use of a telescoping receptor grid, the supplemental analysis should use the same polygons as the original analysis if polygon rankings based on receptor counts are going to be compared.
3) The Weaver-AA monitoring site is located outside of polygon 2, so even if DNR's original conclusion that monitors placed in polygons 1, 2, and 3 are "the best options to

represent Rush Island Energy Center's air quality impacts" were supported by its supplemental analysis, the Weaver-AA monitor still would not be properly sited.

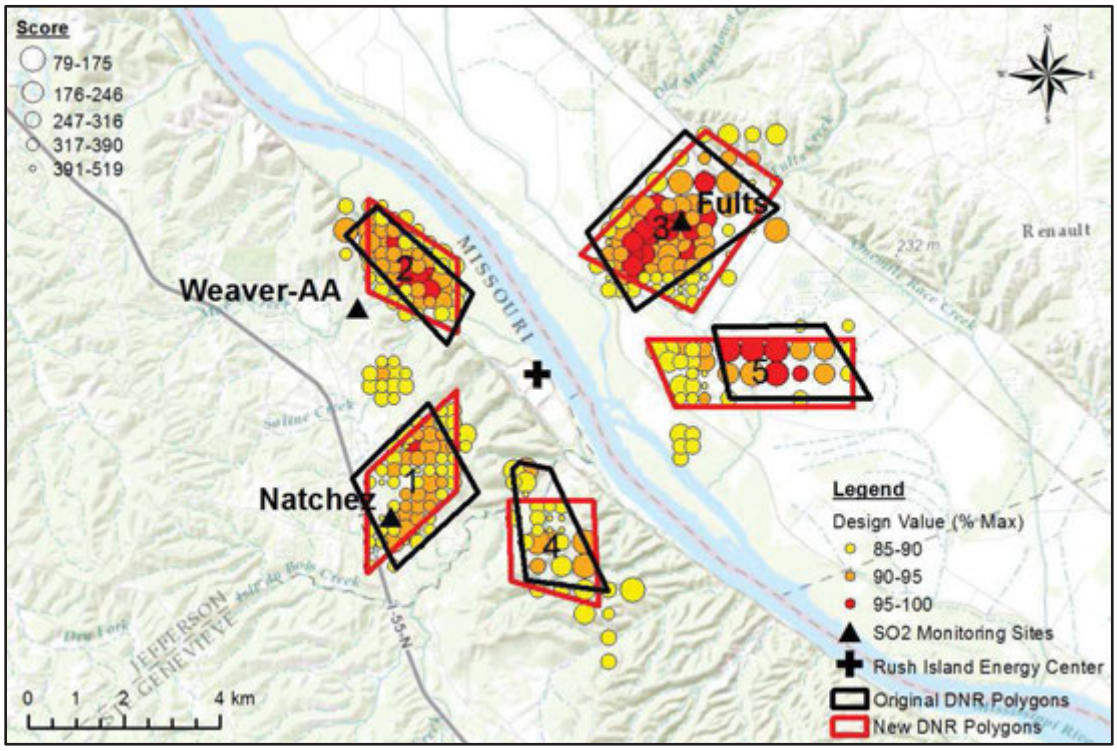

Figure 16. Comparison of polygons used in DNR's original and supplemental analyses.

The most serious problem with DNR's supplemental analysis, though, is that given the methodology used, it fails to fulfill its purported purpose, which is to also "account for the frequency with which a receptor registers a daily maximum concentration."[20] Accordingly, DNR's supplemental analysis provides no new information about whether the Rush Island SO_2 monitors are properly sited.

DNR performed the modeling necessary to determine the frequency with which a receptor registers a daily maximum concentration. It then calculated receptor scores, which account for this frequency as well as modeled design value. However, those scores did not have any bearing on the outcome of DNR's analysis because DNR ultimately ignored them and based its conclusions solely on the number of top receptors (i.e., those with the highest design values) in each of the five polygons shown in Figure 15. DNR did break out the number of top receptors in each polygon by score in Table S-1, listing the number of receptors in each of five scoring ranges, but it used *total* receptor counts to rank the polygons. Hence, receptor scores did not factor into the polygon ranks at all.

It is no surprise, then, that DNR's supplemental analysis supports the conclusions of its original analysis as they are, in fact, identical in that both base their conclusions solely on modeled design values. The supplemental analysis is just limited to the top 300 receptors, which has no

[20] 2016 Monitoring Network Plan, Appendix 2 at 2.

effect on the results because the high-concentration receptors DNR based its polygon rankings on originally were all top 300 receptors as well.

VI. A Supplemental Analysis Properly Conducted Pursuant To EPA's Monitoring TAD Demonstrates that the Natchez and Weaver-AA Monitors Are Not Properly Sited.

Had DNR followed the scoring strategy described in the TAD through to the end, and ranked receptors by their scores to come up with a list of locations ranked in general order of desirability with regard to monitor siting, its supplemental analysis would have reached a different conclusion regarding the siting of the Rush Island monitors. Figure 17 shows the 10, 25, 50, and 100 receptors with the highest score ranks superimposed on the peak concentration areas (design value >90 ug/m^3). The 10 receptors with the highest score ranks would be the most desirable monitor locations, and all but one are clustered in the three largest peak concentration areas, which are where the Rush Island SO_2 monitors should have been sited. The fact that almost all of the 10 highest ranked receptors – taking into account modeled design values *and* frequency of having the highest 1-hour daily maximum concentration – are located in these areas only reinforces that point. Similar results are obtained by looking further down the priority list at the 25, 50, and 100 highest ranked receptors, the vast majority of which are located in the same three peak concentration areas.

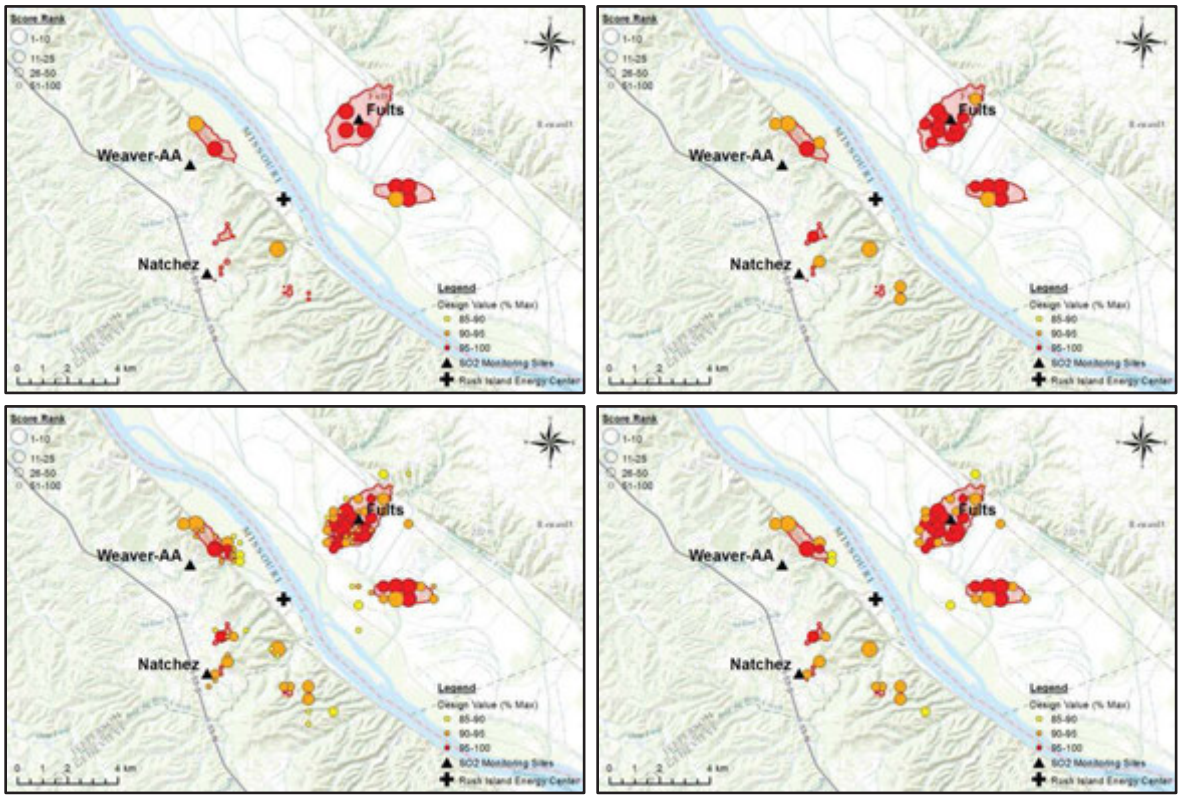

Figure 17. Receptors with the 10, 25, 50, and 100 highest score ranks (clockwise from upper left). Peak concentration areas (design value >90 ug/m^3) are shaded red.

Only one of the three Rush Island monitors is sited in these peak concentration areas. The Fults monitor is sited in the large peak concentration area located northeast of the plant, which contains three of the 10 highest ranked receptors and upwards of half of the 100 highest ranked receptors. The Natchez and Weaver-AA monitors, however, are located outside of the large peak concentration areas east and northwest of the plant, which collectively contain six of the 10 highest ranked receptors about 25 of the 100 highest ranked receptors. DNR should require Ameren to relocate the Natchez and Weaver-AA monitors to these areas, as they clearly represent – along with the area where the Fults monitor is located – the areas where peak concentrations are expected to occur based on DNR's own modeling and the receptor scoring strategy described in the TAD.

VII. Modeling Based On Updated Emissions And Meteorological Data Calls For At Least One Additional Monitor At Rush Island.

DNR used 2011-2013 emissions data in its analyses of the Rush Island monitoring sites. However, Rush Island's emissions profile has changed in recent years due to Ameren's switch to ultra-low sulfur coal at all of its un-scrubbed plants (Labadie, Meramec, and Rush Island). In recent comments to EPA on the agency's proposed nonattainment designation for Labadie, Ameren said the following regarding modeling of the plant's emissions: "[I]n 2011, Ameren entered into a long-term contract for the use of ultra-low sulfur coal at Labadie. Ameren began burning significant quantities of ultra-low sulfur coal in *2013*, and intends to continue to do so in the future ... Therefore, modeling that relies on emissions data from 2013 forward is far more representative of actual conditions at Labadie than pre-2013 data."[21] Given that Ameren is also burning ultra-low sulfur coal at Rush Island, data from 2013 forward should also be more representative of current conditions at Rush Island.[22] DNR's supplemental analysis did not evaluate the effect of using updated (2013-2015) emissions on the location of the Rush Island monitoring sites.

Updating DNR's modeling to use 2013-2015 emissions and meteorological data results in markedly different results from those obtained using 2011-2013 data. Figure 18 shows the 300 receptors with the highest modeled design values when 2013-2015 data are used; Figure 19 shows the frequency of having the highest 1-hour daily maximum concentration among these receptors; and Figure 20 shows their scores, which were calculated by adding their respective concentration ranks and day ranks per the scoring strategy described in the TAD.

[21] Ameren Missouri, Comments on EPA Responses to Certain State Designation Recommendations for the 2010 Sulfur Dioxide National Ambient Air Quality Standard: Notice of Availability and Public Comment Period (March 31, 2016) at 35.

[22] It is not clear whether current conditions are representative of future conditions, however, because Ameren's five-year contract for ultra-low sulfur coal will expire in 2017 and the provider of the coal, Peabody Energy, is now in bankruptcy and the nature and extent of its future operations is uncertain.

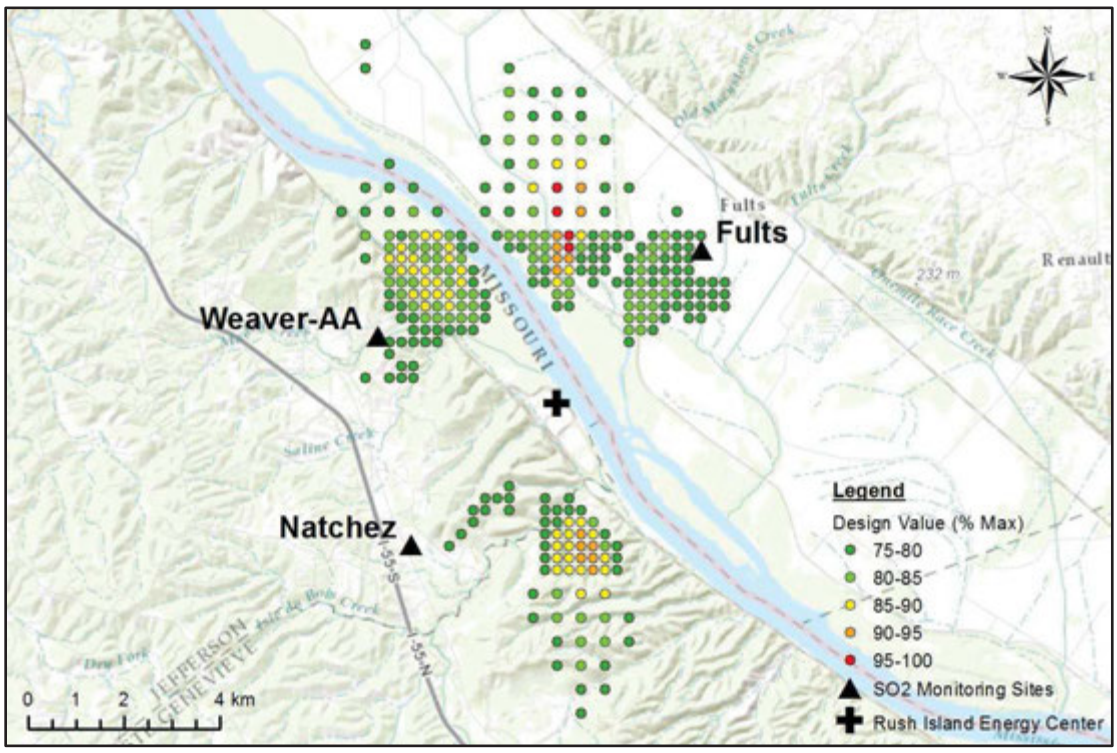

Figure 18. Top 300 receptors based on 2013-2015 data.

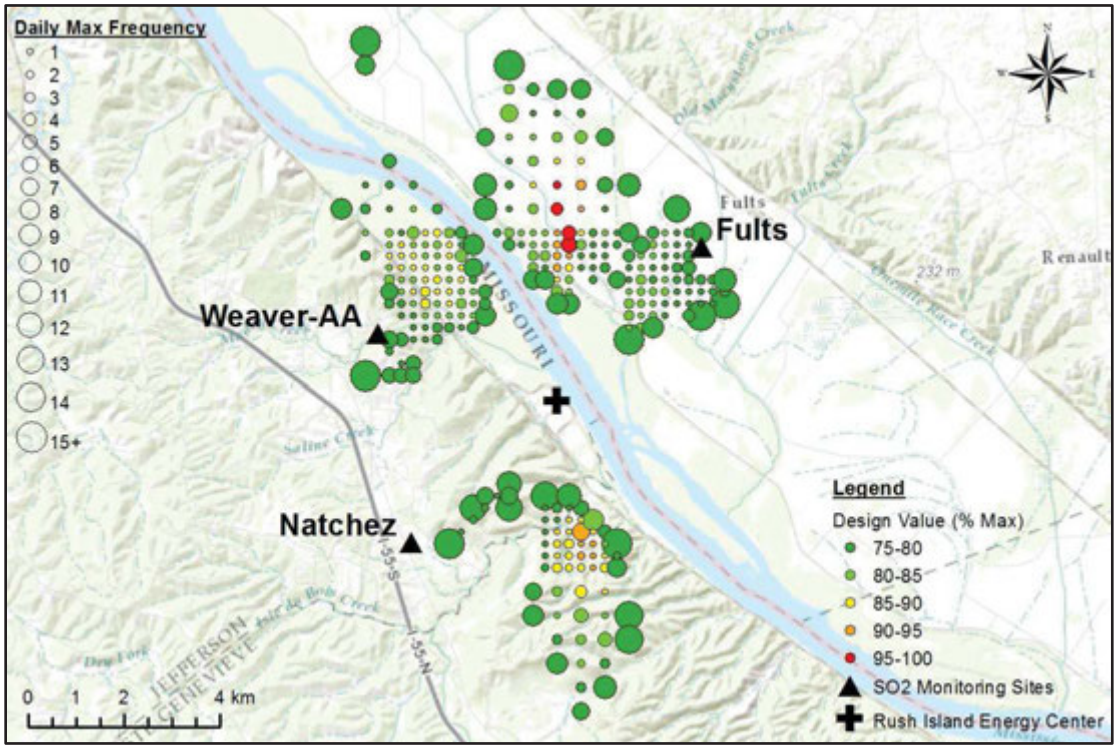

Figure 19. Frequency of having the 1-hour daily maximum concentration based on 2013-2015 data.

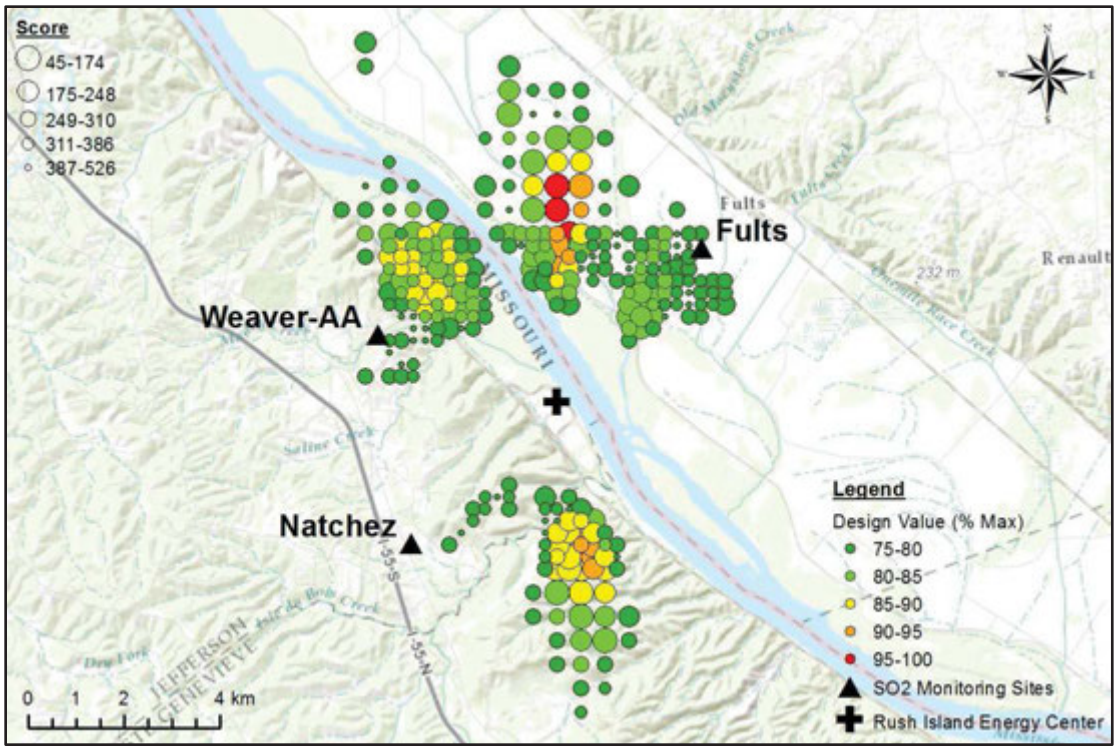

Figure 20. Receptor scores (concentration rank + day rank) based on 2013-2015 data.

When 2013-2015 data are used, the highest concentration areas shift and are located immediately north and south of the plant instead of to the east, northeast, and northwest, as shown in Figure 18. The receptors with the lowest scores – i.e., those with the highest combined concentration rank (based on modeled design value) and day rank (based on frequency of having the highest 1-hour daily maximum concentration) – are similarly located north and south of the plant, as shown in Figure 20. Furthermore, when the top receptors are ranked by score so as to provide a list ranked in general order of desirability with regard to siting monitors in accordance with the Monitoring TAD, there are no high-ranking receptors near any of the existing monitors. Figure 21 shows the 10, 25, 50, and 100 receptors with the highest score ranks based on modeling using 2013-2015 data.

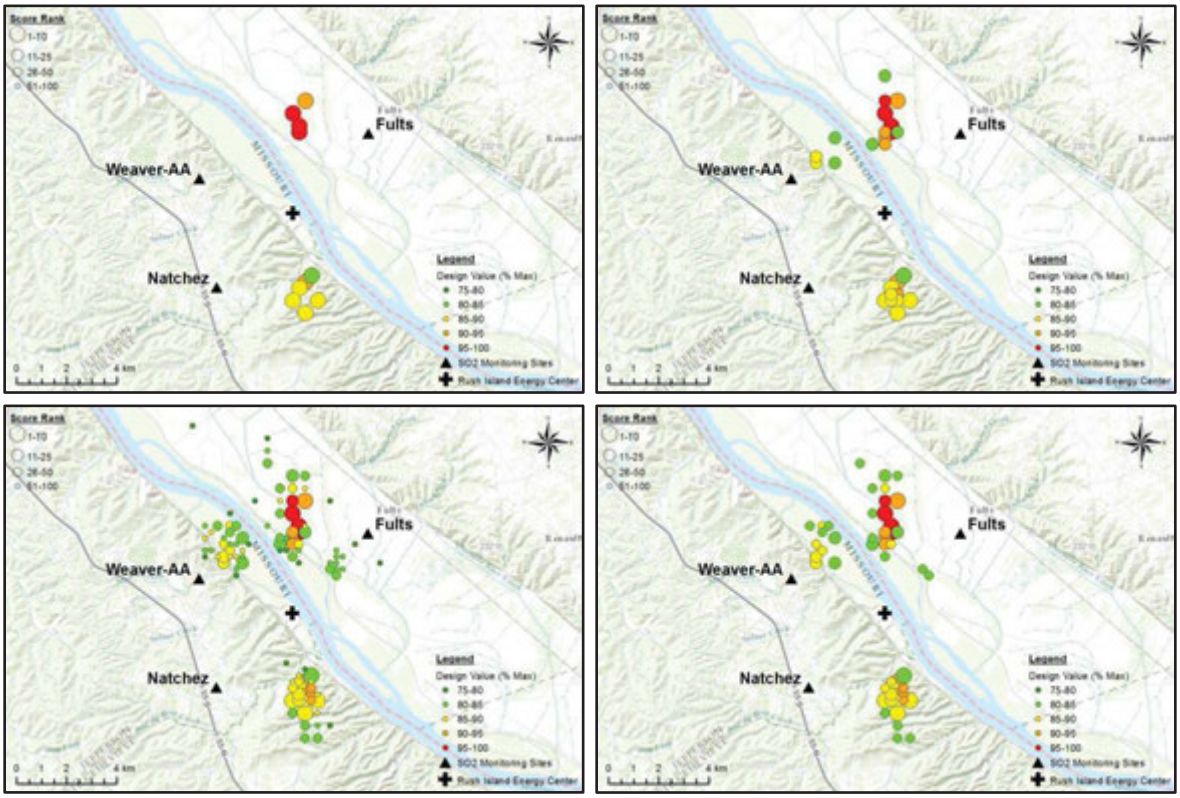

Figure 21. Receptors with the 10, 25, 50, and 100 highest score ranks (clockwise from upper left) based on 2013-2015 data

The significant difference in modeled peak concentration areas when 2013-2015 data are used in lieu of 2011-2013 data demonstrates one of the major drawbacks (besides providing data at only a limited number of discrete points) of using monitoring as a means of determining NAAQS compliance. As emissions and meteorological conditions change over time, peak concentration areas can shift, leaving monitors that may have been properly sited at one time in areas that are no longer appropriate. For example, the Fults monitor is appropriately sited based on modeling using 2011-2013 data but is not in a peak concentration area at all – let alone at a high priority location based on the scoring strategy described in the TAD – based on modeling using 2013-2015 data. This points to the need for additional monitors at Rush Island to ensure that the network is capable of adequately characterizing peak concentrations around the plant, which could easily shift again in the future. In addition to requiring relocation of the Natchez and Weaver-AA monitors to peak concentration areas as discussed above, DNR should require the addition of monitors immediately north and south of the plant, in peak concentration areas based on modeling using 2013-2015 data.

Conclusion

Ameren's Labadie and Rush Island power plants are the two largest sources of sulfur dioxide emissions in the State. While virtually all other plants of their size across the nation have already adopted or made binding commitments to adopt scrubber technology to dramatically reduce their sulfur dioxide emissions, Ameren instead has installed monitors designed not to capture peak

SO_2 concentrations around these two plants. Sierra Club urges DNR to require Ameren to relocate the existing monitors (except for the Northwest monitor at Labadie and the Fults monitor at Rush Island) and expand the monitoring networks at both plants as described above. Sierra Club also urges EPA to make clear to DNR that the existing monitoring networks at the Labadie and Rush Island plants do not satisfy the criteria for SLAMS monitors for source-oriented ambient SO_2 monitoring purposes and that data from the monitors will not be used for regulatory decision-making.

Sincerely yours,

Maxine I. Lipeles, Director
Kenneth Miller, P.G., Environmental Scientist
Interdisciplinary Environmental Clinic
Washington University School of Law
One Brookings Drive – CB 1120
St. Louis, MO 63130
314-935-5837 (phone); 314-935-5171 (fax)
milipele@wustl.edu

Attorneys for the Sierra Club

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Michael Jay, Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR
Darcy Bybee, Chief, Air Quality Planning Section, Air Pollution Control Program, DNR

Washington University in St. Louis
SCHOOL OF LAW

Interdisciplinary Environmental Clinic

April 13, 2015

Ms. Patricia Maliro
Chief, Air Quality Monitoring Unit
Air Pollution Control Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176
Via email to patricia.maliro@dnr.mo.gov

Re: Comments on Ameren Missouri's Labadie Sulfur Reduction Project Quality Assurance Project Plan

Dear Ms. Maliro:

On behalf of the Sierra Club, we submit the following comments on Ameren Missouri's Labadie Sulfur Reduction Project Quality Assurance Project Plan (QAPP). The QAPP describes the methodology Ameren used to determine the locations of two proposed ambient sulfur dioxide (SO_2) monitoring stations around its Labadie Energy Center in connection with the 1-hour SO_2 National Ambient Air Quality Standard (NAAQS). We believe the QAPP should be disapproved because the proposed monitoring stations are improperly sited; they are outside areas where peak 1-hour SO_2 concentrations are expected to occur based on the modeling described in the QAPP. Furthermore, the modeling described in the QAPP does not comport with EPA guidance on characterizing ambient air quality in areas around or impacted by significant SO_2 emission sources such as the Labadie Energy Center and therefore may have failed to correctly identify areas of expected ambient, ground-level SO_2 concentration maxima.

I. Based on the Modeling Described in the QAPP, the Proposed Monitoring Stations are Improperly Sited Outside Areas Where Peak 1-Hour SO_2 Concentrations are Expected to Occur

Appendix 10 of the QAPP describes the modeling performed to determine the locations of the proposed ambient SO_2 monitoring stations around the Labadie Energy Center. The modeling was used to determine locations where peak 1-hour SO_2 concentrations are expected to occur due to the plant's SO_2 emissions given that the primary objective of source-oriented monitoring is to identify peak SO_2 concentrations in ambient air that are attributable to an identified emission source or group of sources.[1] Figure 1 shows all receptors with modeled design values greater than or equal to 75 percent of the maximum modeled design value. Figure 2 shows the receptors with the top 200, 100, 25, and 10 modeled design values.

[1] U.S. EPA, SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, at 2.

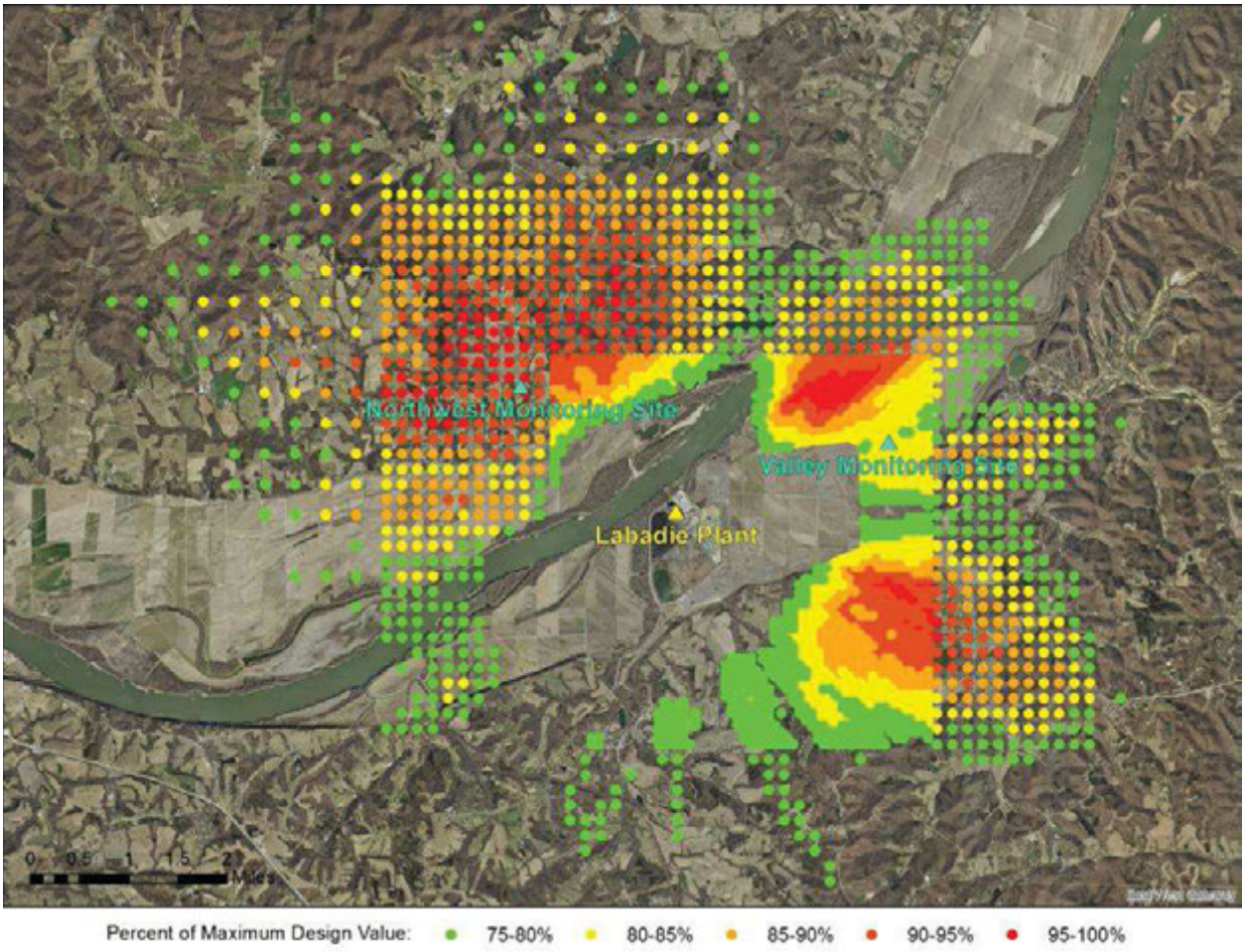

Figure 1. Receptors with modeled design values ≥75 percent of the maximum design value.

The modeling was also used to determine locations where elevated SO_2 concentrations are expected to occur most frequently given that the site selection process also needs to account for the frequency with which an area sees the daily maximum concentration.[2] Normally this involves counting the number of times each receptor sees the daily maximum 1-hour SO_2 concentration predicted by the model. However, the QAPP looks at it differently, counting instead the number of times the daily maximum 1-hour SO_2 concentration at each receptor exceeds 75 percent of the maximum modeled design value. Figure 3, which is reproduced from the QAPP,[3] shows the number of daily maximum 1-hour SO_2 concentrations at each receptor that exceed 75 percent of the maximum modeled design value.

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[2] *Id.* at A-6.

[3] See Appendix 10, Figure 6, "Counts of Max Daily 1-Hour Concentrations Greater Than 75% of the Max Modeled Design Value* (Years 2005-2009)."

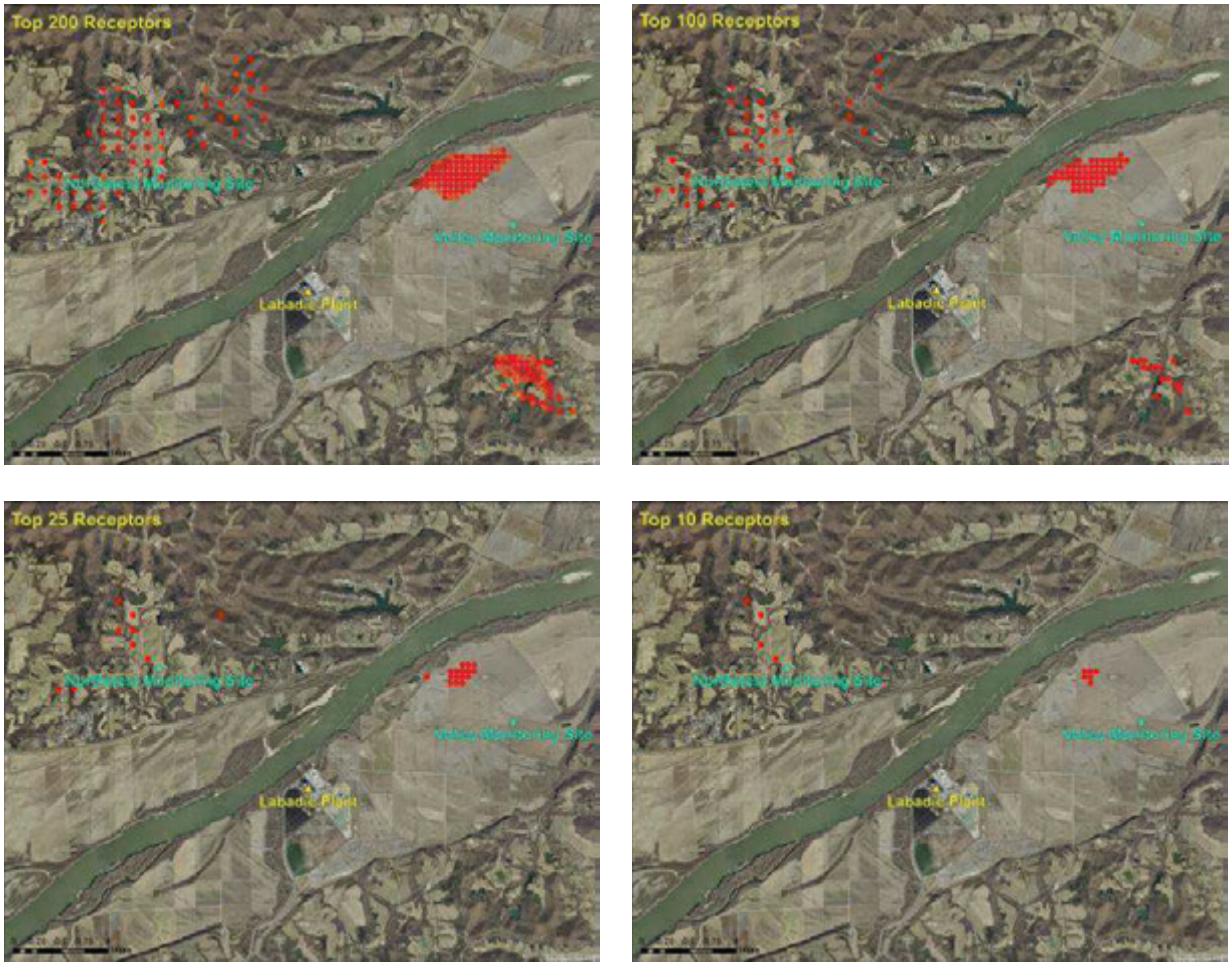

Figure 2. Receptors with the top 200, 100, 25, and 10 modeled design values.

Figures 1 and 2 reveal three distinct areas where modeled design values are in excess of 95 percent of the maximum modeled design value and where the majority of the top 200 receptors (and all of the top 100, 25 and 10 receptors) lie. These areas, located northwest, northeast, and southeast of the Labadie Energy Center, are where the modeling predicts peak 1-hour SO_2 concentrations are expected to occur. Furthermore, although a rigorous comparison is not possible without detailed receptor data, a simple visual comparison of Figures 1 and 3 indicates that the areas where peak 1-hour SO_2 concentrations are expected to occur (i.e., where modeled design values are in excess of 95 percent of the maximum modeled design value) overlap with the areas where daily maximum 1-hour SO_2 concentrations most frequently exceed 75 percent of the maximum modeled design value. Monitoring stations located in these areas would have the greatest chance of identifying peak SO_2 concentrations in ambient air, which is the primary objective of source-oriented monitoring and an absolute necessity when monitoring to assess compliance with the NAAQS.

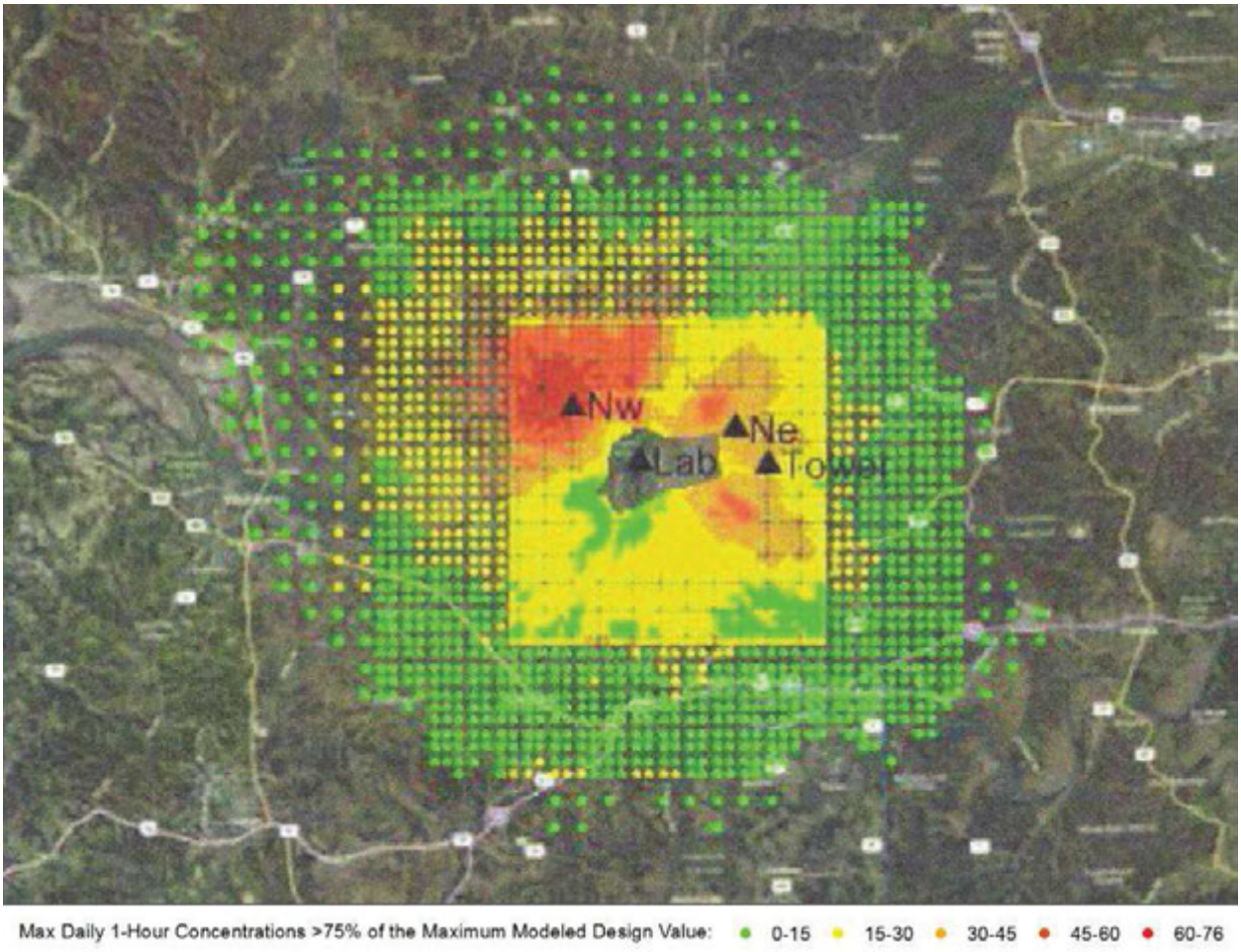

Figure 3. Number of maximum daily 1-hour SO_2 concentrations at each receptor that exceed 75 percent of the maximum modeled design value.

However, only one of Ameren's proposed monitoring sites, the northwest site, is located in one of the three peak concentration/high frequency areas predicted by the modeling (the one located northwest of the plant). No monitoring sites are proposed in the peak concentration/high frequency areas located northeast or southeast of the plant. Instead, Ameren's only other proposed monitoring site, the valley site, is located in an area where modeled design values are only about 80 percent of the maximum modeled design value and where daily maximum 1-hour SO_2 concentrations exceed 75 percent of the maximum modeled design value about half as often as they do in areas where this occurs with the greatest frequency. This makes the valley site an inappropriate site for a monitor to assess compliance with the NAAQS. Ameren's modeling predicts that ambient SO_2 concentrations will be as much as 25 percent higher in several areas around the plant than they will be at the valley site, meaning a monitoring station at the valley site could be in compliance with the NAAQS while significant violations were occurring nearby.

The QAPP states that a monitor could not be sited in the peak concentration/high frequency area northeast of the plant because it is an actively farmed area, physical access is almost impossible

without building additional infrastructure, and electric power is not available. These justifications do not stand up to the barest scrutiny. The entire Labadie Bottoms is an actively farmed area, accessible only by unimproved roads that severely limit vehicular access during wet weather conditions. As such, the proposed valley monitoring site is no more accessible than a site within the peak concentration/high frequency area northeast of the plant would be, and additional road infrastructure will likely be necessary for all-weather access regardless of where in the Labadie Bottoms the monitor is located.[4] Furthermore, electric power is not available anywhere within the Labadie Bottoms, including at the proposed valley monitoring site. Therefore, distribution infrastructure will have to be built to deliver power to any monitoring site in the Labadie Bottoms regardless of where it is located. The St. Albans Water and Sewer Authority/Franklin County PWSD #3 wastewater treatment facility, located approximately 1 kilometer east of the proposed valley monitoring site, appears to be the closest available source of electric power for monitoring sites in the Labadie Bottoms, and only a minimal amount of additional line would be necessary to deliver power to a monitor located in the peak concentration/high frequency area northeast of the plant compared to one located at the proposed valley monitoring site.

The QAPP's justification for not siting a monitor in the peak concentration/high frequency area southeast of the plant is equally flimsy. The QAPP states that the primary reason a monitor is not proposed in that area – despite the model predicting high design values and a high number of daily maximum 1-hour SO_2 concentrations in excess of 75 percent of the maximum modeled design value in that area – is because the elevated terrain there is similar to the terrain at the proposed northwest monitoring site and it was believed an additional elevated terrain site was not necessary. However, AERMOD accounts for terrain influences when calculating modeled design values, and variations in meteorological parameters, most notably wind direction, often result in peak 1-hour SO_2 concentrations occurring in different areas that have similar terrain (e.g., areas in different cardinal directions from the source). Therefore, the peak concentration/high frequency area southeast of the plant cannot be ignored simply because the terrain there is similar to the terrain in the peak concentration/high frequency area northwest of the plant. The purpose of an ambient SO_2 monitoring network is not to monitor different terrain types, but to monitor areas where peak 1-hour SO_2 concentrations are expected to occur regardless of the terrain in those areas. The QAPP also suggests that the high concentrations and frequencies predicted by the model southeast of plant are merely an artifact of the Jefferson City, MO Airport meteorology, which is influenced by the local orientation of the Missouri River valley at that met station. However, the wind roses provided in the QAPP for a number of met stations in eastern Missouri that are closer to Labadie, which the QAPP states better reflect the expected meteorology at Labadie, all show significant winds from the north or northwest, which is consistent with an area of peak concentration/high frequency southeast of the plant.

[4] The peak concentration/high frequency area northeast of the plant is arguably more accessible than the proposed valley monitoring site given its proximity to the agricultural levee adjacent to the south bank of the Missouri River. The road on the crest of this levee is higher and most likely drier than other unimproved roads in the Labadie Bottoms, including those roads leading to the proposed valley monitoring site.

II. The Modeling Described in the QAPP Does Not Comport With EPA's Source-Oriented SO_2 Monitoring Guidance and Therefore May Not Correctly Identify Areas of Expected Ambient, Ground-Level SO_2 Concentration Maxima

EPA's SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (TAD) provides guidance on how to "appropriately and sufficiently monitor ambient air in areas proximate to or impacted by an SO_2 emissions source to create ambient monitoring data for comparison to the SO_2 NAAQS" and presents "recommended steps to aid in identifying source-oriented SO_2 monitor sites."[5] The modeling described in the QAPP fails to adhere to the TAD in one critical respect: it does not use hourly emission rates, which are readily available for Labadie's boilers from EPA's online Air Markets Program Data tool. Instead it uses constant emission rates, which the QAPP states were "selected to produce rational ambient levels to be used for establishing monitoring locations and does not reflect actual emissions." The consequence of using constant rather than hourly emission rates is that the effects of the interaction between hourly emissions and hourly variations in meteorological parameters is ignored completely, so that the predicted areas of peak concentration and/or high frequency are primarily a function of the meteorology used. For example, if peak hourly emissions coincide with times when strong winds blow from a direction other than the prevailing wind direction, a model that uses hourly emission rates might predict high concentrations in different areas than the same model would predict using constant emission rates. Therefore, using hourly emissions allows the areas where peak 1-hour SO_2 concentrations are expected to occur to be determined with greater confidence.

III. DNR Should Not Deprive The Public and EPA of an Opportunity to Participate in the Monitoring Site Selection Process.

While the area around the Labadie plant will necessarily be evaluated for nonattainment designation purposes based on modeling in order to meet the July 2016 deadline set by *Sierra Club et al. v. McCarthy*, Civil Action No. 3:13–cv–3953–SI (N.D. Cal., March 2, 2015), it is difficult to imagine why DNR and Ameren would agree to install monitoring sites near the Labadie plant unless they expect to consider using the results for future NAAQS compliance evaluations. Monitoring sites used for such purposes must be included in the state's monitoring network plan, which must be proposed by DNR after public notice and the opportunity for public comment, and submitted to EPA for its review and approval. 40 CFR § 58.10.

Contrary to these requirements, DNR has been working with Ameren to select the Labadie monitoring sites and allow Ameren to commence monitoring at these inappropriate locations without public notice and opportunity for public comment, and without submitting the plans to EPA for its review and approval. Documents obtained recently from DNR suggest that Ameren is already preparing to construct the monitoring sites identified in the Labadie QAPP. In addition, the Consent Agreement attached as Appendix J to the proposed Jefferson County State Implementation Plan requires Ameren to submit "final network site recommendations" to DNR regarding the Rush Island plant by May 1, 2015, with equipment to be installed and calibrated by

[5] U.S. EPA, SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, at 2.

December 31, 2015 – with no provisions for public comment or for EPA review and approval. Unlike Labadie, where Ameren has provided documentation to DNR as to its (flawed) basis for monitoring site selection, Ameren appears to be developing its "final network site recommendations" for Rush Island without the prior submission to DNR of modeling data to support the site selection.[6]

DNR should not approve monitoring locations for the Labadie or Rush Island plants without first providing public notice and opportunity for comment, and without submitting the proposed locations to EPA for its review and approval.

Conclusion

Based on the modeling described in the QAPP, Ameren's proposed valley monitoring site is improperly located in an area where peak 1-hour SO_2 concentrations are **not** expected to occur. Furthermore, Ameren has failed to propose monitoring sites in peak concentration/high frequency areas located northeast and southeast of the Labadie Energy Center, citing justifications that don't withstand the barest scrutiny, despite the facts that there are numerous private residences within the peak concentration/high frequency area southeast of the plant and the peak concentration/high frequency area northeast of the plant is situated between the nearby communities of St. Albans and Augusta Shores. Therefore, we urge DNR to disapprove the QAPP and require Ameren to make the following changes:

1) Relocate the proposed valley monitoring site to the peak concentration/high frequency area northeast of the plant; and
2) Add a third monitoring site in the peak concentration/high frequency area southeast of the plant.

We also urge DNR to require Ameren to rerun the air dispersion model described in the QAPP using hourly emission rates in order to determine whether the model correctly identified the areas of expected ambient, ground-level SO_2 concentration maxima around the plant and to require a wholesale reevaluation of potential monitoring sites if the model used for the QAPP failed to correctly identify such areas.

Finally, we urge DNR to provide public notice and opportunity for comment, and to submit the proposed monitoring locations to EPA for its review and approval, in accordance with 40 CFR Part 58.

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[6] On behalf of the Sierra Club, the Clinic has submitted Sunshine Law requests for documents related to possible SO_2 monitoring at Labadie and Rush Island. The most recent request to which DNR has responded (submitted on February 19, 2015, with responsive documents provided April 2, 2015), requested: "All documents regarding the possible installation of SO_2 monitors at the Labadie and/or Rush Island power plants, including but not limited to Quality Assurance Project Plans and all related documents, and all AERMOD input and output files used in any modeling analysis performed to determine the locations of any proposed SO_2 monitoring sites." As of DNR's latest response (April 2, 2015), it has not provided any documents discussing or attempting to justify the selection of possible modeling sites at the Rush Island plant.

Respectfully submitted,

Interdisciplinary Environmental Clinic
Washington University School of Law
Maxine I. Lipeles, J.D.
Ken Miller, P.G.*
Alexander Chang, Mo.Sup.Ct.R.13 certified law student
Danelle Gagliardi, Mo.Sup.Ct.R.13 certified law student

On behalf of the Sierra Club

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Josh Tapp, Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR
Wendy Vit, Chief, Air Quality Planning Section, Air Pollution Control Program, DNR

*Engineering student Xiaodi "Daniel" Sun also participated in the preparation of this letter

Washington University in St. Louis
SCHOOL OF LAW
Interdisciplinary Environmental Clinic

July 20, 2015

Mr. Stephen Hall
Chief, Air Quality Analysis Section
Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102
Via email to: cleanair@dnr.mo.gov

Re: 2015 Monitoring Network Plan

Dear Mr. Hall:

On behalf of the Sierra Club, we urge the Missouri Department of Natural Resources ("DNR") to revise the proposed 2015 Monitoring Network Plan[1] in order to satisfy the requirements of the Clean Air Act. In particular, DNR should refrain from proposing new sulfur dioxide ("SO_2") monitoring sites near Ameren's Labadie power plant until EPA completes an area designation for the plant. Monitors near Labadie should be sited based on the modeling that is used to determine the nonattainment area boundary, which will identify areas of expected peak ambient SO_2 concentrations around the plant based on current EPA guidance. Should DNR persist in proposing new SO_2 monitoring sites near the Labadie plant in the 2015 Monitoring Network Plan, then based on currently-available modeling, one of the two proposed new monitoring sites near the plant is not located in an area where peak SO_2 concentrations are expected to occur and should be relocated. A third monitoring site should also be added southeast of the plant. Similarly, based on currently-available modeling, two of the three proposed new monitoring sites near Ameren's Rush Island plant are not located in areas where peak SO_2 concentrations are expected to occur and should be relocated.[2] These changes are necessary to ensure that the Labadie and Rush Island monitors capture maximum ambient SO_2 concentrations near these large sources.

This letter highlights the following key points:

- It is premature to site and install new SO_2 monitors at the Labadie plant until EPA completes an area designation for the plant.
- While DNR plans to use the proposed new Labadie and Rush Island monitors as State and Local Air Monitoring Stations ("SLAMS"),[3] it is not submitting them for EPA approval as required for SLAMS.

[1] MO DEP'T OF NATURAL RES. AIR POLLUTION CONTROL PROGRAM, 2015 MONITORING NETWORK PLAN, June 12, 2015 ("2015 Monitoring Network Plan").
[2] The three proposed new SO_2 monitoring sites that should be relocated, as discussed more fully below, are the Valley site near Ameren's Labadie plant and the Natchez and Weaver-AA sites near Ameren's Rush Island plant.
[3] 2015 Monitoring Network Plan at 12.

- Based on currently-available modeling, one of the two proposed new Labadie monitoring sites and two of the three proposed new Rush Island monitoring sites are unlikely to capture maximum ambient SO_2 concentrations because they are not located in areas where peak SO_2 concentrations are expected to occur.
- DNR has not adequately justified the locations of the proposed new Labadie and Rush Island monitoring sites. The support offered for the monitoring site locations in DNR's plan was provided by Ameren (Appendices 2 and 4). DNR visually observed the proposed sites at both plants but only performed independent modeling - which does not entirely support Ameren's proposed locations - regarding the Rush Island sites (Appendix 5). DNR did not perform independent modeling regarding the Labadie sites.

I. DNR Should Refrain From Proposing New SO_2 Monitoring Sites Near Ameren's Labadie Plant Until EPA Completes An Area Designation For The Plant.

It is premature to determine SO_2 monitoring site locations near the Labadie plant. DNR is about to propose a nonattainment area boundary recommendation for the Labadie plant,[4] and EPA must make a final area designation for the plant by July 2016.[5] While the Ameren modeling used to site the Labadie monitors in the 2015 Monitoring Network Plan was performed in a manner inconsistent with current EPA guidance, the modeling used to determine the nonattainment area boundary will identify areas of peak ambient SO_2 concentrations around the plant using current EPA guidance. It is likely that the Labadie monitors will ultimately be used to determine whether the nonattainment area comes into attainment, and they must be properly sited in order to provide reliable data.

The only modeling offered to support the proposed new Labadie monitoring sites was performed by Ameren in 2012.[6] Whereas DNR performed independent modeling to assess Ameren's proposed Rush Island monitoring sites (discussed in III.B. below), DNR did not perform independent modeling to assess Ameren's proposed Labadie monitoring sites. The 2015 Monitoring Network Plan states that DNR conducted "a review of relative dispersion modeling, local meteorological evaluation methodology submitted by Ameren UE, historical departmental SLAMS SO_2 monitoring data, nearby meteorological stations, and local topography."[7] However, only Ameren's modeling pointed to the proposed monitor locations. The other information either pointed to different locations or supported no particular monitoring site location. For example, the historical analysis of the former Augusta and Augusta Quarry monitors concluded where *not* to place monitors,[8] but did not point to a location that would accurately represent the highest ambient SO_2 concentration near the Labadie plant.[9] In addition, the analysis of wind

[4] DNR has announced that it will propose a Labadie designation by July 27, 2015.
[5] Sierra Club v. Gina McCarthy, No. 3:13-cv-3953-SI (Consent Decree, March 2, 2015).
[6] 2015 Monitoring Network Plan, Appendix 3.
[7] 2015 Monitoring Network Plan at 14.
[8] The Augusta Quarry data analysis suggests that the plant was responsible for high concentrations near the quarry. *Id.* at 15-19. Without comparative conditions between current proposed monitor locations and the historical monitor locations, the historical data is irrelevant to locating the proper sites for new monitors.
[9] *Id.*

direction through the valley points to placing monitor(s) either to the northeast or southwest of the plant,[10] but it is too vague to support any specific monitoring site location.

The reliance upon Ameren's modeling would not be so concerning if Ameren had proposed monitors in locations with the highest modeled SO_2 concentrations around Labadie. However, one of Ameren's two proposed monitoring sites is outside any of the three areas where its modeling predicted peak SO_2 concentrations are expected to occur, leaving two of the three peak concentration areas completely unmonitored. In addition, Ameren's modeling does not comport with EPA guidance.

In sum, DNR should not propose any Labadie monitoring sites until EPA completes an area designation for the plant because 1) DNR will have to perform modeling that comports with EPA guidance as part of the Labadie designation process; 2) DNR intends to use the Labadie monitoring data in assessing whether the nonattainment area ultimately comes into attainment;[11] and 3) the Clean Air Act requires that monitors sited for National Ambient Air Quality Standard ("NAAQS") compliance purposes be incorporated into the state's monitoring network, subject to EPA review and approval.[12]

II. DNR Should Seek EPA Approval For The Proposed New Labadie And Rush Island SO_2 Monitors Because It Intends To Use Them As SLAMS.

The 2015 Monitoring Network Plan adds two new SO_2 monitors near Ameren's Labadie plant[13] and three new SO_2 monitors near Ameren's Rush Island plant.[14] The plan labels these as Special Purpose Monitors ("SPMs"), but states that "it is the intention to convert these monitors to SLAMS" once EPA finalizes the proposed Data Requirements Rule.[15]

Because DNR plans to use data from these new monitors to assess compliance with the 2010 1-hour SO_2 NAAQS, and because the Rush Island monitors are part of the Jefferson County Nonattainment State Implementation Plan ("SIP"), the siting of these monitors should be subject to EPA approval as required for SLAMS.[16] Indeed, it is unclear why the 2015 Monitoring Network Plan does not formally propose these new monitors as SLAMS.

Ameren proposed the Labadie monitoring sites to DNR and then constructed and began operating them just before the 2015 Monitoring Network Plan was published.[17] DNR approved the Labadie monitoring sites without conducting an independent modeling analysis to determine whether they are located in areas where peak SO_2 concentrations are expected to occur, without

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[10] *Id.* at 19-20.
[11] 2015 Monitoring Network Plan at 12.
[12] Clean Air Act § 110 (a)(2)(B), 42 U.S.C. § 7410(a)(2)(B); 40 CFR § 58.10.
[13] 2015 Monitoring Network Plan at 12-21.
[14] *Id*. at 22-23.
[15] EPA expects to publish the final Data Requirements Rule in October 2015. http://yosemite.epa.gov/opei/rulegate.nsf/byRIN/2060-AR19.
[16] 40 C.F.R. § 58.10(a)(2) and (e).
[17] DNR approved Ameren's proposed Labadie monitoring sites on May 1, 2015, and published the 2015 Monitoring Network Plan on June 12, 2015.

providing for public notice and comment, and without submitting the proposed monitor locations to EPA for its review and approval.

With respect to Rush Island, DNR submitted the Jefferson County Nonattainment SIP to EPA for review and approval on or about June 1. While it contained the requirement for Ameren to propose, build, and operate SO_2 monitoring sites at Rush Island, it did not identify the proposed Rush Island monitoring sites included in the 2015 Monitoring Network Plan published 11 days later on June 12, 2015.

Given DNR's stated intention to convert these monitors to SLAMS once EPA finalizes the proposed Data Requirements Rule – which it is expected to do in the next few months – the only salient difference between proposing them as SPMs rather than SLAMS in the 2015 Monitoring Network Plan is that EPA does not have to approve their locations. If DNR were to propose them as SLAMS in the 2015 Monitoring Network Plan or simply wait a few months and propose them as SLAMS after the final Data Requirements Rule is published, EPA *would* have to approve their locations. Proposing them as SPMs now when they will likely be converted to SLAMS in just a few months is suspect because, practically, it will be more difficult for EPA to object to the poor siting of the monitors and require that they be relocated after they are in operation.

The purpose of the NAAQS is to protect the public health.[18] Therefore, NAAQS compliance decisions must be based on properly-sited monitors designed to record maximum ambient SO_2 concentrations. Because one of the proposed new Labadie monitoring sites and two of the proposed new Rush Island monitoring sites are not located in areas of anticipated maximum ambient SO_2 concentrations (based on currently-available modeling), those monitors should be relocated – regardless of whether they are currently labeled SPMs or SLAMS. And EPA should notify DNR and Ameren that it will not accept data from those monitors for NAAQS compliance purposes unless they are appropriately relocated. Moreover, EPA should notify DNR and Ameren that it is premature to determine appropriate monitoring site locations for the Labadie plant until it completes an area designation for the plant.

III. Based On Currently-Available Modeling, Three Of The Five Proposed New Labadie And Rush Island Monitoring Sites Are Not Located In Areas Of Anticipated Maximum Ambient SO_2 Concentrations.

EPA regulations and guidance require ambient SO_2 monitors to be sited where peak concentrations are expected to occur.[19] With respect to source-oriented SO_2 monitoring, EPA guidance states:

> The primary objective is to place monitoring sites at the location or locations of expected peak concentrations.[20]

[18] Clean Air Act § 109(b)(1), 42 U.S.C. § 7409(b)(1).
[19] 40 C.F.R. Part 58, Appendix D, § 1.1.1(a), (c). See also U.S. EPA: OFFICE OF AIR AND RADIATION, OFFICE OF AIR QUALITY PLANNING AND STANDARDS, AIR QUALITY ASSESSMENT DIVISION, SO_2 NAAQS DESIGNATIONS SOURCE-ORIENTED MONITORING TECHNICAL ASSISTANCE DOCUMENT, Dec. 2013 ("SO_2 Monitoring TAD").
[20] SO_2 Monitoring TAD at 16.

Further, the Consent Agreement between DNR and Ameren that is included in both the Jefferson County SIP and the 2015 Monitoring Network Plan requires that the monitoring at Rush Island "represents ambient air quality in areas of maximum SO_2 impact from the Rush Island Energy Center."[21]

However, one of the two proposed new Labadie monitoring sites and two of the three proposed new Rush Island monitoring sites are not located in the areas where peak SO_2 concentrations are expected to occur based on Ameren's and DNR's modeling.

On behalf of the Sierra Club, we previously critiqued Ameren's proposed Labadie and Rush Island monitoring site locations in letters submitted to DNR. Those letters are attached as Exhibits 1 and 2 and hereby incorporated by reference.

A. Based On Currently-Available Modeling, One Of The Two Proposed New Labadie Monitoring Sites Should Be Relocated, And A Third Monitor Should Be Added Southeast of the Plant.

In our April 13, 2015 comments to DNR on Ameren's proposed new Labadie monitoring sites, attached as Exhibit 1, we demonstrated that one of the proposed sites – the Valley site – is not located in any of the areas where Ameren's modeling predicts peak SO_2 concentrations are expected to occur. Ameren's modeling identified three distinct areas where the highest SO_2 concentrations are expected to occur and where high concentrations are expected to occur most frequently. These areas are located northwest, northeast, and southeast of the plant and are shown in Figure 1 below. However, only one of the two proposed Labadie monitoring sites – the Northwest site – is located in one of these peak concentration areas (the one located northwest of the plant). The Valley site is located between the other two peak concentration areas, in an area where the modeled concentration is only about 80 percent of the maximum concentration predicted by the model. As a result, it is unlikely to capture maximum ambient SO_2 concentrations and should be relocated to the peak concentration area northeast of the plant.

In addition, DNR should also require the installation of a third monitor in the peak concentration area southeast of the plant lest anticipated maximum ambient SO_2 concentrations in this area – which are likely to have implications for NAAQS compliance – go undetected by the Labadie SO_2 monitoring network.

B. Two Of The Three Proposed New Rush Island Monitors Should Also Be Relocated.

In our May 29, 2015 comments to DNR on Ameren's proposed new Rush Island monitoring sites, attached as Exhibit 2, we demonstrated that all three of the proposed sites, but especially the Natchez and Weaver-AA sites, are located outside areas where Ameren's modeling predicts peak SO_2 concentrations are expected to occur. DNR has since performed an independent modeling evaluation of the proposed sites which follows EPA guidance more closely and is

[21] 2015 Monitoring Network Plan, Appendix 3, 2015 Ameren Missouri and Missouri Department of Natural Resources Consent Agreement, Appendix A, ¶ b, at 13 of 15.

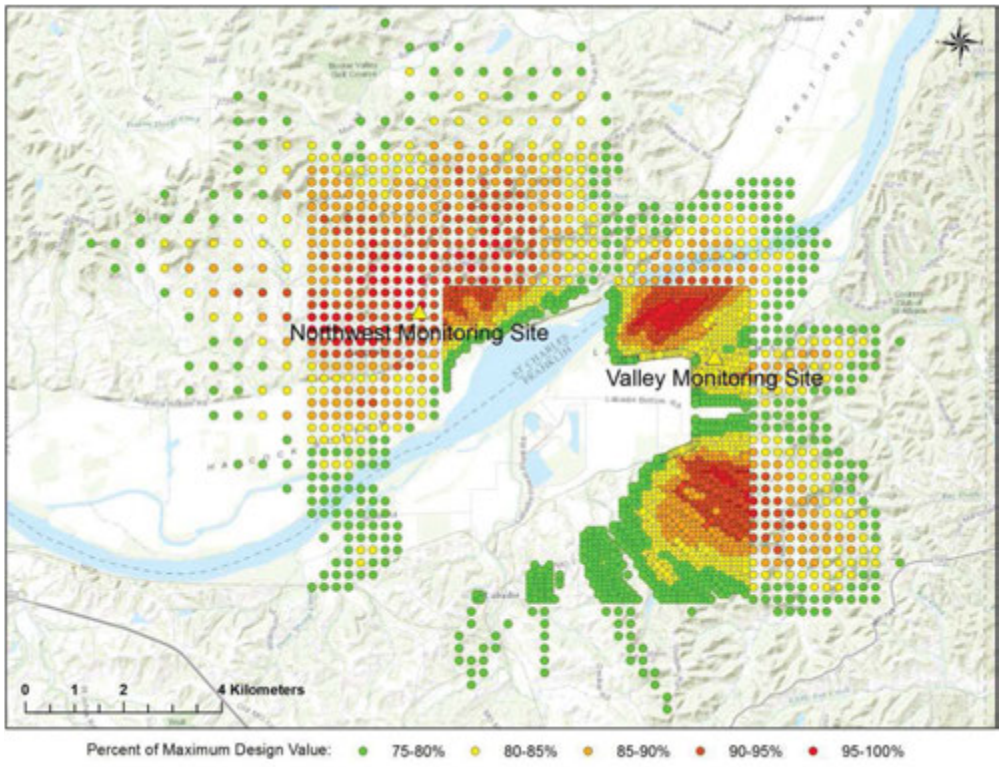

Figure 1. Modeled peak concentration areas near Ameren's Labadie plant.

therefore more reliable than Ameren's modeling. While DNR concluded that the proposed sites are properly located in areas where peak SO_2 concentrations are expected to occur, there is a significant flaw in DNR's analysis that, when corrected, confirms that the Natchez and Weaver-AA sites are located outside of peak concentration areas and should be relocated.

The stated purpose of DNR's evaluation of the proposed new Rush Island monitoring sites was to determine if the sites "will adequately represent Rush Island Energy Center's SO_2 air quality impact." DNR used hourly emission rates from EPA's Air Markets Program in its modeling as recommended in EPA's SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document whereas Ameren used constant emission rates.[22]

However, DNR's analysis of its modeling is based on a methodology that inherently biases the results. DNR used a telescoping receptor grid in its modeling; specifically, it used a 100-meter receptor spacing out to 1 kilometer, a 250-meter spacing out to 3.5 kilometers, a 500-meter spacing out to 10 kilometers, and a 1,000-meter spacing out to 50 kilometers. In order to identify areas where peak SO_2 concentrations are expected to occur, it plotted the predicted SO_2 design value at each receptor and drew polygons around high concentration areas by including all receptors with concentrations greater than 90 ug/m^3. This is shown in Figure 2 below. DNR then

[22] However, neither Ameren nor DNR included interactive sources as recommended by EPA guidance. See Exhibit 2 at 9.

counted the number of high concentration receptors (i.e., receptors with concentrations greater than 90 ug/m^3) in each polygon and ranked the polygons from highest to lowest in terms of the number of high concentration receptors they contained. The results of this analysis are summarized in Table 1 below.

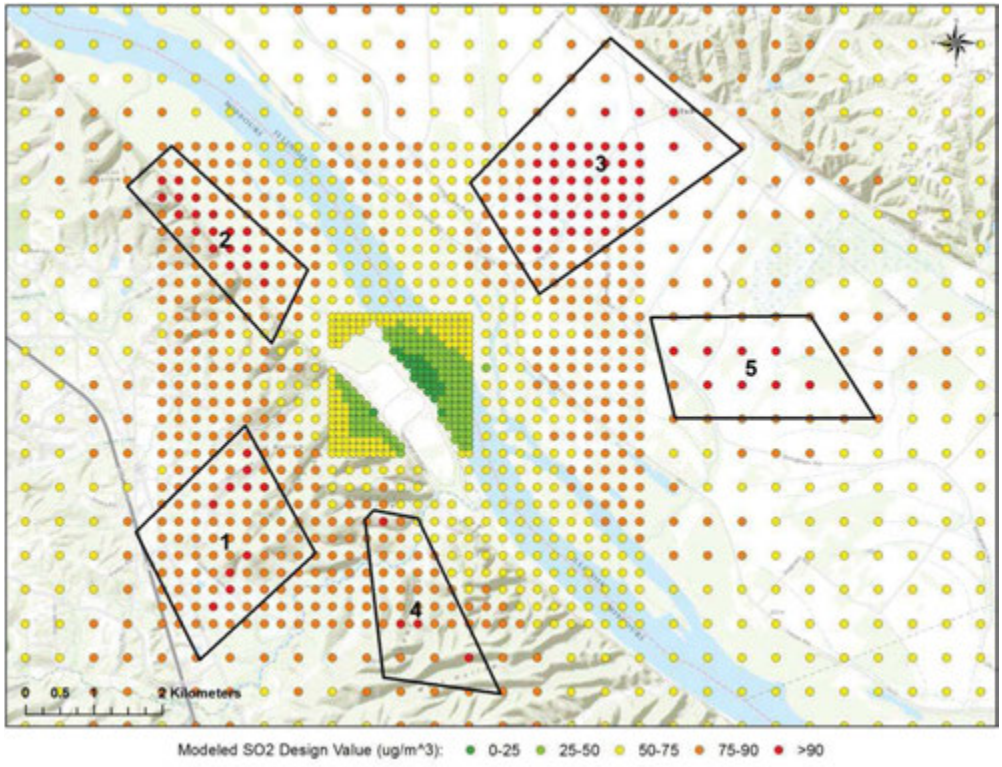

Figure 2. DNR model results and polygons drawn around high concentration areas.

Table 1. Number of high concentration receptors in DNR's polygons.

	Polygon 1	Polygon 2	Polygon 3	Polygon 4	Polygon 5
# of Receptors >90 ug/m^3	10	18	45	4	8
Ranking: 3>2>1>5>4					

Based on this analysis, DNR concluded that polygons 3 and 2, which contained the highest and second-highest number of high concentration receptors, represented "areas of maximum concentration" and were therefore "candidates for the location of SO_2 monitors."[23] It then determined, based on a qualitative analysis of wind speed and direction and the number of high

[23] 2015 Monitoring Network Plan, Appendix 5, Review of Proposed SO_2 and Meteorological Monitoring Stations Around Ameren Missouri's Rush Island Energy Center, at 4.

concentration receptors in the remaining three polygons (i.e., 1, 4 and 5), that polygon 1 was the best candidate of the remaining three for the location of a third SO_2 monitor. Based on these findings, DNR concluded that because the three new monitoring sites proposed by Ameren are located within polygons 1, 2 and 3, they are within areas where peak SO_2 concentrations are expected to occur and are therefore appropriately sited.

However, because DNR used a telescoping receptor grid, and because the polygons it drew to indicate areas of high concentration are located in a region where the receptor grid spacing varies from 250 to 500 meters, DNR's counts of high concentration receptors in each polygon and its subsequent ranking of the polygons based on those counts are significantly biased. Some of DNR's polygons are likely to have more high concentration receptors than others just by virtue of the fact that the receptors in those polygons are spaced more closely together than they are in other polygons. For example, almost all of the receptors in polygons 1 and 2 are spaced 250 meters apart, whereas all of the receptors in polygon 5 are spaced 500 meters apart. As a result there are many more receptors – including more high concentration receptors – in polygons 1 and 2 than in polygon 5 despite the fact that all three polygons are similar in size (polygon 5 is slightly larger than polygon 2 and slightly smaller than polygon 1).

One way to eliminate the counting bias resulting from DNR's use of a telescoping receptor grid is by ranking the polygons based on the percentage instead of the absolute number of high concentration receptors within each one. This effectively adjusts for the fact that certain polygons, e.g., polygons 1 and 2, are likely to have more high concentration receptors than others, e.g., polygon 5, just by virtue of the fact that the receptors in those polygons are spaced more closely together. The results of this analysis are summarized in Table 2 below. Polygon 3 is still ranked the highest. However, polygon 5 is ranked second-highest instead of polygon 2, which drops to third-highest – displacing polygon 1 from the top three.

Table 2. Percentage of high concentration receptors in DNR's polygons.

	Polygon 1	Polygon 2	Polygon 3	Polygon 4	Polygon 5
% of Receptors >90 ug/m^3	15	44	67	14	62
Ranking: 3>5>2>1>4					

A better way to eliminate the counting bias resulting from DNR's use of a telescoping receptor grid is to replace the telescoping grid with a uniform grid so the receptor spacing is the same in all five polygons. To determine how this would affect receptor counts and polygon ranks, we re-ran DNR's model using a uniform 250-meter receptor spacing and analyzed the results using DNR's methodology. The results are shown in Figure 3 below, and the number of high concentration receptors in each polygon and the ranking of polygons from highest to lowest in terms of the number of high concentration receptors they contain are summarized in Table 3 below. We also ranked the polygons based on the percentage instead of the absolute number of

high concentration receptors within each one. The results of this analysis are summarized in Table 4 below.

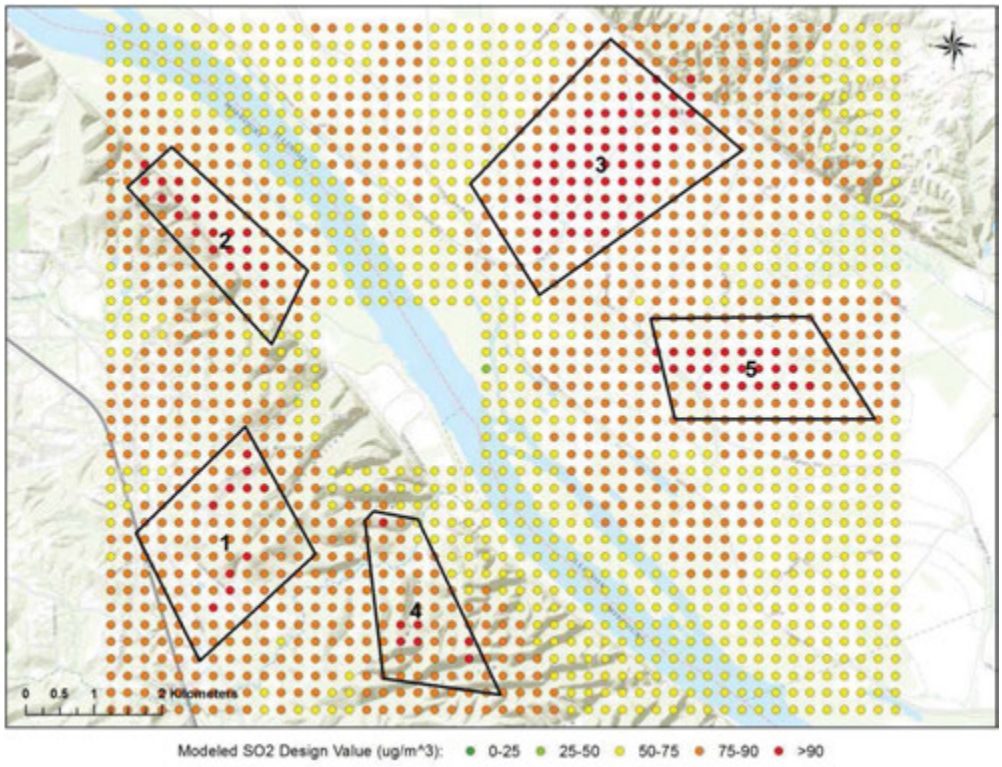

Figure 3. DNR model results for uniform 250-meter receptor grid.

Table 3. Number of high concentration receptors in DNR's polygons when modeled with a uniform receptor grid.

	Polygon 1	Polygon 2	Polygon 3	Polygon 4	Polygon 5
# of Receptors >90 ug/m^3	10	20	63	7	22
Ranking: 3>5>2>1>4					

Table 4. Percentage of high concentration receptors in DNR's polygons when modeled with a uniform receptor grid.

	Polygon 1	Polygon 2	Polygon 3	Polygon 4	Polygon 5
% of Receptors >90 ug/m^3	14	45	55	16	39
Ranking: 3>2>5>4>1					

When modeled with a uniform receptor grid, the three highest ranking polygons – both in terms of the number and percentage of high concentration receptors they contain – are 2, 3 and 5, **not** 1, 2 and 3 as DNR's flawed analysis concluded. These are the areas predicted to have the highest modeled impacts and thus where SO_2 monitoring sites should be located. An analysis of the top 10, 25, and 50 receptors supports this conclusion. All but one of the top 10 receptors are located within polygon 3, all but one of the top 25 receptors are located within polygons 2 and 3, and all but one of the top 50 receptors are located within polygons 2, 3 and 5. This is shown in Figure 4 below, which includes a filled contour plot of modeled design values that clearly shows how much larger the peak concentration areas are in polygons 2, 3 and 5 compared to the other polygons.

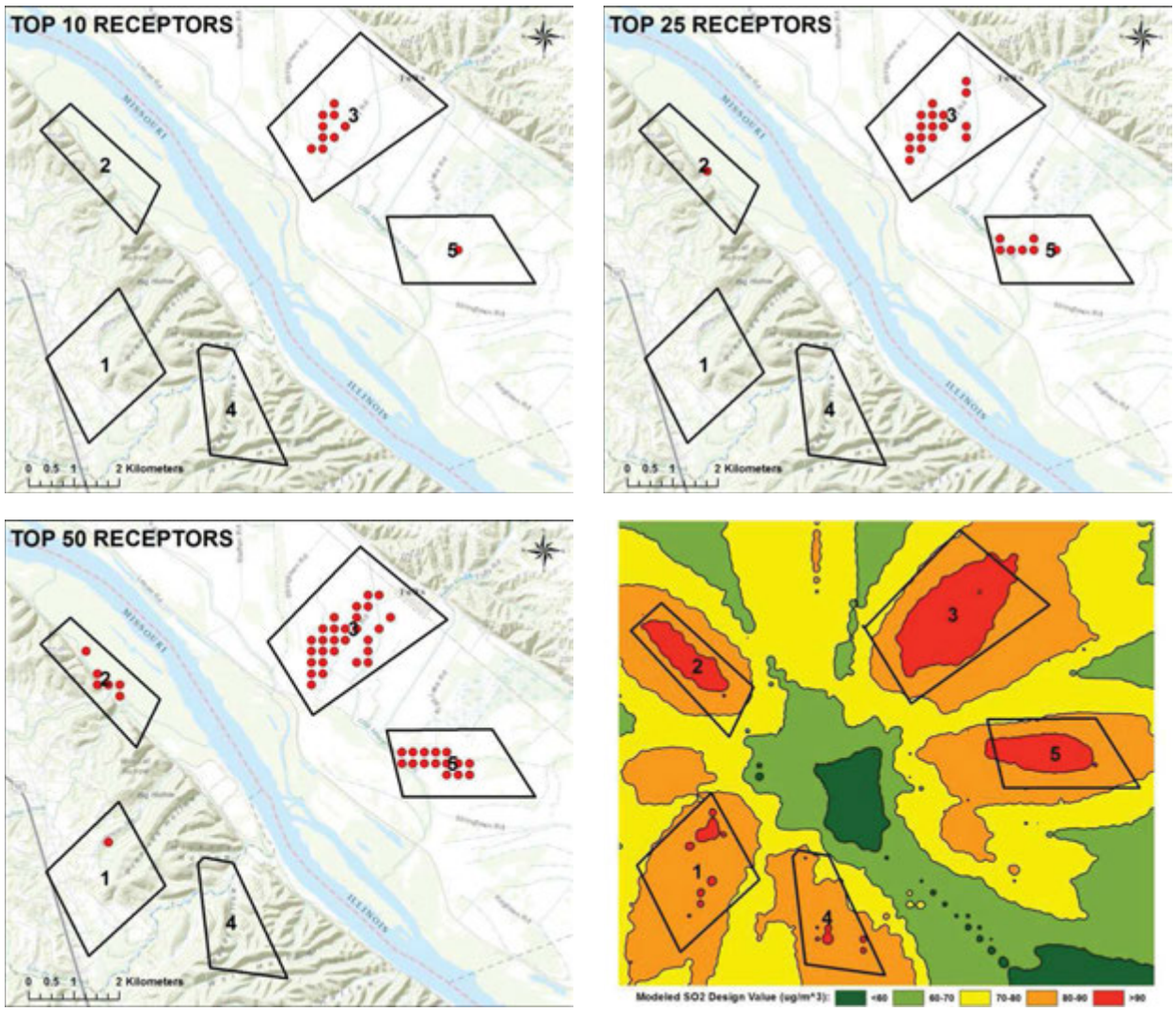

Figure 4. Top 10, 25 and 50 receptors and filled contour plot of modeled design values.

The locations of Ameren's proposed SO_2 monitoring sites – dubbed Fults, Natchez and Weaver-AA – relative to DNR's polygons are shown in Figure 5 below. Of the three proposed sites, only the Fults site, which is inside the peak concentration area within polygon 3, is properly located. The Weaver-AA site, which Figure 2 of Monitoring Network Plan Appendix 5 incorrectly shows being within polygon 2, is actually located outside of it based on the site coordinates provided in Plan Appendix 1. Hence it is not properly located. Nor is the Natchez site, which should be located within polygon 5 instead of polygon 1 because polygon 5 has higher modeled impacts.

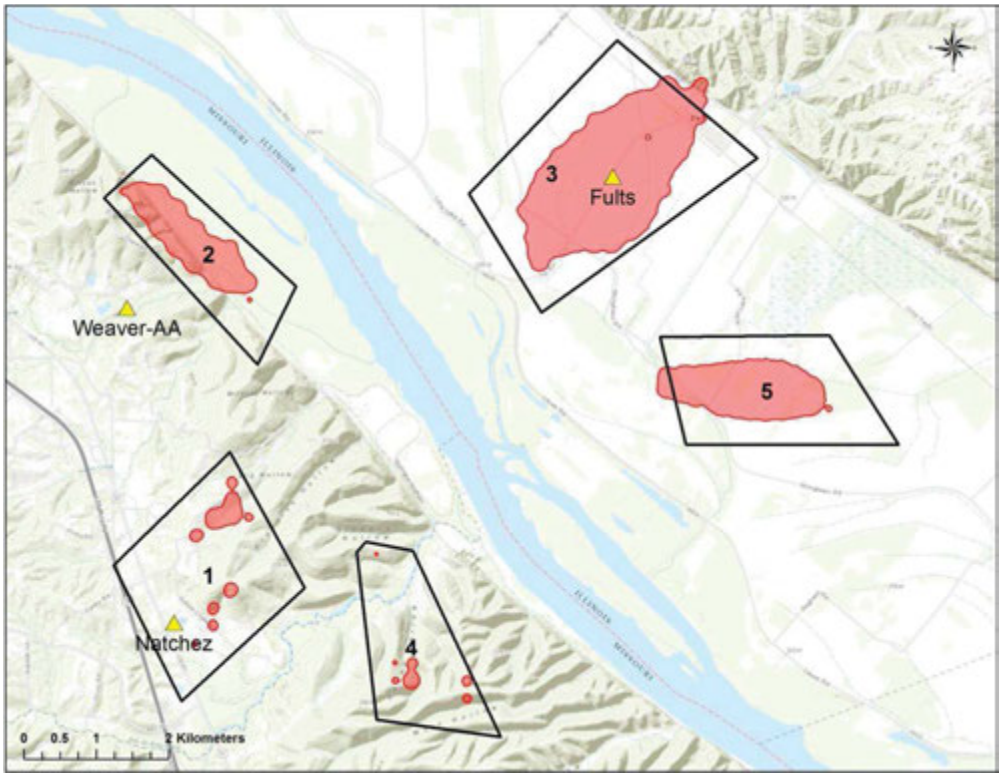

Figure 5. Ameren's proposed SO_2 monitoring sites relative to DNR's polygons. Peak concentration areas (>90 ug/m^3) are shaded red.

Because they are not properly located, neither the Natchez nor Weaver-AA monitoring sites will adequately represent Rush Island's SO_2 air quality impact. Therefore, both sites should be relocated. The Weaver-AA site should be located inside the peak concentration area within polygon 2 and the Natchez site should be located inside the peak concentration area within polygon 5 as shown in Figure 6 below. Alternatively, the Natchez site could be moved inside the peak concentration area within polygon 1 and a fourth monitor added inside the peak concentration area within polygon 5 as shown in Figure 7 below. The recommended monitor locations shown in Figures 6 and 7 are easily accessible and appear to meet EPA siting criteria and have ready access to power.

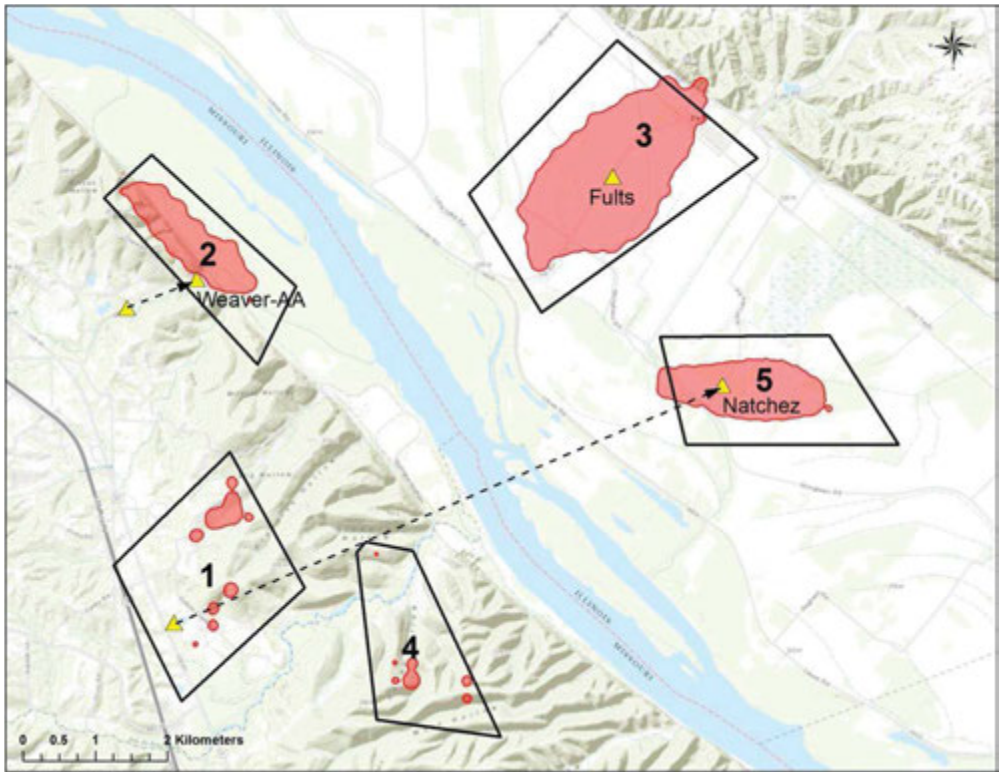

Figure 6. Appropriately located Rush Island monitors (three monitor configuration).

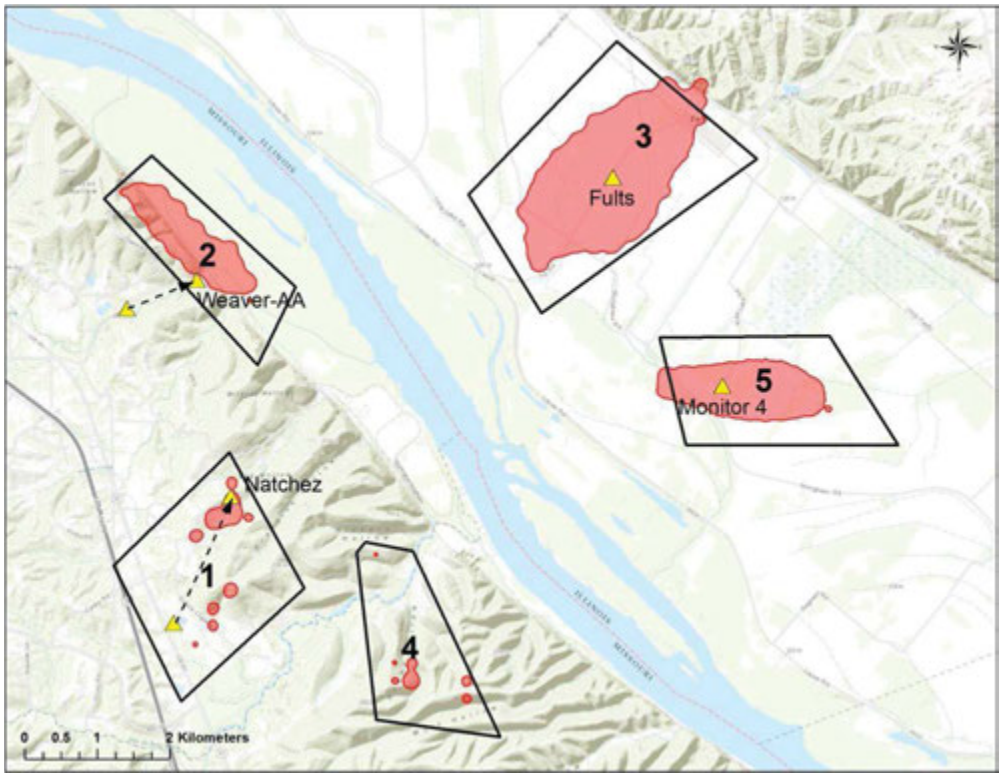

Figure 7. Appropriately located Rush Island monitors (four monitor configuration).

IV. Conclusion

For the reasons set forth above, DNR should withdraw the proposed Labadie SO_2 monitoring sites and EPA should not approve the 2015 Monitoring Network Plan with the inclusion of such sites pending the completion of the Labadie area designation process and the performance of appropriate modeling to determine the areas of peak ambient SO_2 concentrations around the plant using current EPA guidance. With respect to the Rush Island monitoring sites in the 2015 Monitoring Network Plan (and the Labadie monitoring sites if DNR does not withdraw them), DNR should not submit the plan to EPA, and EPA should not approve it, unless and until the proposed monitoring sites are relocated to areas of expected peak ambient SO_2 concentrations.

Sincerely yours,

Maxine I. Lipeles, Co-Director
Kenneth Miller, P.G., Environmental Scientist
Interdisciplinary Environmental Clinic
Washington University School of Law
One Brookings Drive – CB 1120
St. Louis, MO 63130
314-935-5837 (phone); 314-935-5171 (fax)
milipele@wustl.edu

Attorneys for the Sierra Club

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Josh Tapp, Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR
Wendy Vit, Chief, Air Quality Planning Section, Air Pollution Control Program, DNR

Washington University in St. Louis
SCHOOL OF LAW
Interdisciplinary Environmental Clinic

August 11, 2015

Mr. Stephen Hall
Chief, Air Quality Analysis Section
Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102
Via email to: stephen.hall@dnr.mo.gov

Re: Supplemental Comments on 2015 Monitoring Network Plan

Dear Mr. Hall:

On behalf of the Sierra Club, we submit these supplemental comments on the Missouri Department of Natural Resources' ("DNR") proposed 2015 Monitoring Network Plan.[1] We previously submitted comments on the plan on July 20, 2015, urging DNR to refrain from proposing new sulfur dioxide ("SO_2") monitoring sites near Ameren's Labadie power plant until EPA completes an area designation for the plant by July 2016.

These supplemental comments are based on new information provided in DNR's proposed 2010 1-Hour Sulfur Dioxide Standard, Proposed Options for Area Boundary Recommendations, July 2016 Designations.[2] This information includes new modeling of Labadie's emissions performed by DNR, as well as new wind climatology data from a recently-installed meteorological monitoring station near the plant. The new DNR modeling confirms that at least one of the two new Labadie SO_2 monitoring sites is unlikely to capture maximum ambient SO_2 concentrations because it is not located in an area where peak SO_2 concentrations are expected to occur. The new wind climatology data calls into doubt the siting of the other Labadie SO_2 monitoring site as well and suggests that neither monitor may be appropriately sited for use in future NAAQS compliance evaluations. This further demonstrates why DNR should wait until EPA completes an area designation for Labadie before proposing new SO_2 monitoring sites near the plant.

I. New Modeling By DNR Confirms That The Valley Monitoring Site Is Not Located In An Area Where Peak SO_2 Concentrations Are Expected To Occur.

As described in our July 20, 2015 comments on the proposed 2015 Monitoring Network Plan, Ameren's modeling of Labadie's emissions for purposes of locating the new monitoring sites

[1] DNR, 2015 Monitoring Network Plan, June 12, 2015, available at http://dnr.mo.gov/env/apcp/docs/2015-monitoring-network-plan.pdf.
[2] DNR, 2010 1-Hour Sulfur Dioxide Standard, Proposed Options For Area Boundary Recommendations, July 2016 Designations, July 24, 2015 ("2016 Area Boundary Recommendations"), available at http://dnr.mo.gov/env/apcp/docs/2010-so2-options-for-july-2016-desig-aug-27-2015-pub-hrg.pdf.

identified three distinct areas where peak SO_2 concentrations are expected to occur. These areas, demarcated by orange and red receptors, are located northwest, northeast, and southeast of the plant and are shown in Figure 1 below. However, only one of the two new monitoring sites – the Northwest site – is located in a peak concentration area as modeled by Ameren. The Valley monitoring site is located between the other two Ameren-modeled peak concentration areas, in an area where the modeled concentration is only about 80 percent of the maximum concentration predicted by Ameren's model.

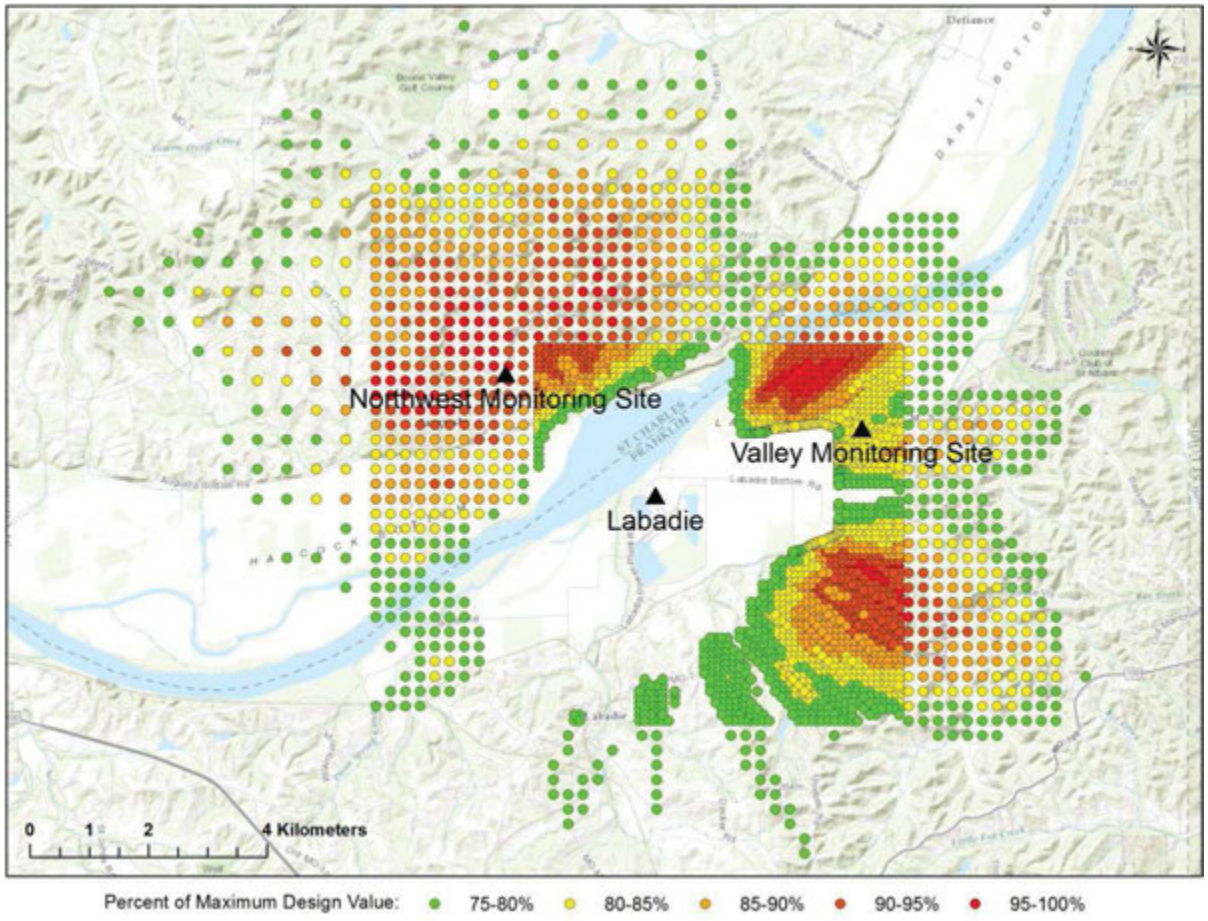

Figure 1. Expected peak SO_2 concentration areas per Ameren's modeling.

Moreover, Ameren's modeling was inconsistent with EPA guidance. In more detailed comments we submitted to DNR on April 13, 2015 critiquing Ameren's proposed monitoring site locations,[3] we noted that Ameren had failed to adhere to EPA's source-oriented SO_2 monitoring guidance in its modeling of the plant's emissions and therefore may have failed to correctly identify areas where peak concentrations are expected to occur. In particular, Ameren's modeling

[3] These comments were attached to and incorporated by reference into our July 20 comments on the 2015 Monitoring Network Plan.

used constant emission rates instead of hourly emission rates as recommended by EPA.[4] Using hourly emission rates, which are readily available from EPA's online Air Markets Program Data tool, allows areas where peak SO_2 concentrations are expected to occur to be determined with greater confidence because the interaction between hourly emissions and hourly variations in meteorological parameters is accounted for by the model. This interaction is ignored when constant emission rates are used.

In its recently-proposed 2010 1-Hour Sulfur Dioxide Standard, Proposed Options for Area Boundary Recommendations, July 2016 Designations ("2016 Area Boundary Recommendations"), DNR describes the modeling of Labadie's emissions that it performed for purposes of making an SO_2 area designation and boundary recommendation to EPA for the area around the plant. DNR's modeling is identical to Ameren's in most respects and uses meteorological data from the same National Weather Service site (Jefferson City Memorial Airport in Jefferson City, MO).[5] However, unlike Ameren, DNR used hourly emission rates per EPA guidance in its modeling. The peak concentration areas, demarcated by orange and red receptors, predicted by DNR's model are shown in Figure 2 (see next page). DNR's receptors violating the 2010 1-hour SO_2 NAAQS are shown in Figure 3 (see page 5).

DNR's modeling, as illustrated by Figures 2 and 3, confirms that the Valley monitoring site is not located in an area where peak SO_2 concentrations are expected to occur. To the contrary, the Valley site is in an area where the modeled concentration is less than 75 percent of the maximum concentration predicted by DNR's model. DNR's modeling also confirms that there is an expected peak concentration area southeast of the plant with considerably higher modeled SO_2 design values than at the Valley monitoring site, yet with no monitor. DNR's model predicts NAAQS exceedances in this other area, but not at the Valley site.

In summary, DNR's modeling – which, unlike Ameren's, adhered to EPA guidance as to the use of variable hourly emission rates – makes clear that the Valley site is not an appropriate location for an SO_2 monitor.

II. New Wind Climatology Data From the Valley Monitoring Site Demonstrates The Need To Collect Additional On-Site Meteorological Data Before DNR Proposes New SO_2 Monitors Near The Labadie Plant.

The Valley monitoring site, which began operating in April, includes both an ambient SO_2 monitor and a meteorological monitoring station that monitors various meteorological parameters including horizontal wind speed and direction. Preliminary data from the Valley meteorological monitoring station for the period April 22 – July 13, 2015 is included in Appendix F of DNR's 2016 Area Boundary Recommendations. Analysis of this data suggests

[4] U.S. EPA, SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, Dec. 2013 Draft, at 11, referencing U.S. EPA, SO2 NAAQS Designations Modeling Technical Assistance Document, Dec. 2013 Draft, at 10, available at http://epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf.

[5] DNR's modeling includes an emergency diesel generator at Labadie and a pair of interactive sources south of the plant that were not included in Ameren's modeling. However, these sources have very low emissions and do not contribute significantly to modeled concentrations near the plant.

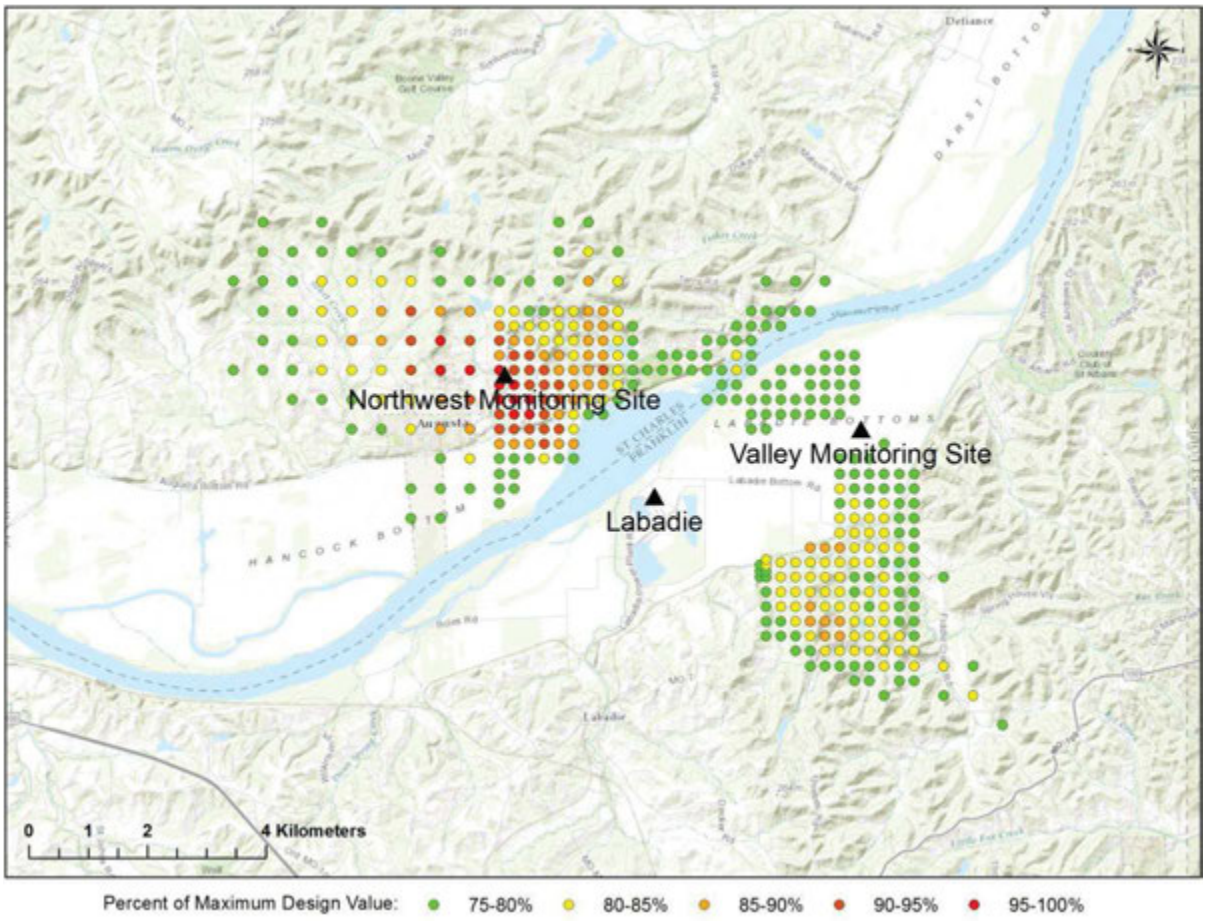

Figure 2. Expected peak SO_2 concentration areas per DNR's modeling.

that the surface meteorological data used in both Ameren's and DNR's modeling of Labadie's emissions may not be representative of the area.

Ameren and DNR both used surface meteorological data from the Jefferson City Memorial Airport ("KJEF"), located approximately 115 kilometers west of Labadie, in their modeling of the plant's emissions instead of data from the much closer Spirit of St. Louis Airport ("KSUS"), located just 19 kilometers northeast of the plant. In making the decision to use KJEF instead of KSUS surface meteorological data, DNR relied exclusively on a comparison of surface characteristics (surface roughness, Bowen ratio, and albedo) at each airport to surface conditions at Labadie. Despite stating in its 2016 Area Boundary Recommendations that "other meteorological parameters, including wind speed and direction as influenced by terrain, must also be used when choosing a representative meteorological site,"[6] DNR did not compare available wind climatology data from the Valley monitoring site to contemporaneous wind climatology data from KJEF and KSUS to see which airport's winds are most similar to those at Labadie.

[6] 2016 Area Boundary Recommendations at D-2.

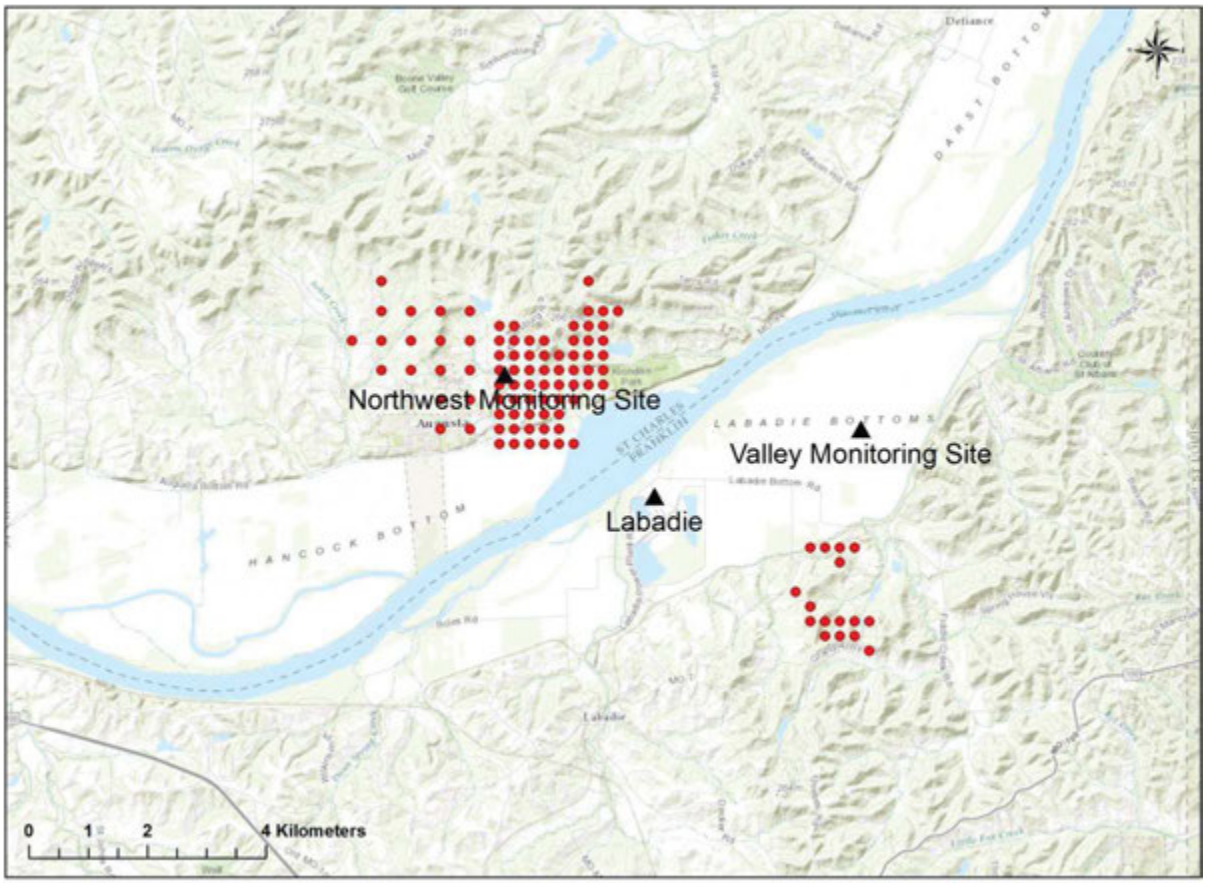

Figure 3. DNR receptors violating the 2010 1-hour SO_2 NAAQS.

Figures 4 and 5 (see next page) show the wind rose for the Valley monitoring site compared to the wind roses for KSUS and KJEF, respectively, for the period April 22 – July 13, 2015. As illustrated by Figures 4 and 5, during the first few months the Valley meteorological monitoring station was in operation, the most frequent winds at both Labadie and KSUS were from the south, south-southwest, and southwest, whereas the most frequent winds at KJEF were from the east and east-southeast. Furthermore, the strongest winds at both Labadie and KSUS were generally from the predominant wind directions whereas the strongest winds at KJEF were from the south and south-southwest, orthogonal to the predominant wind directions.

Therefore, the preliminary meteorological data from the Labadie area suggest that the winds at Labadie may be more similar to the winds at KSUS than the winds at KJEF, which in turn suggests that KSUS surface meteorological data may be more representative of the area and more appropriate for modeling Labadie's emissions than KJEF data.

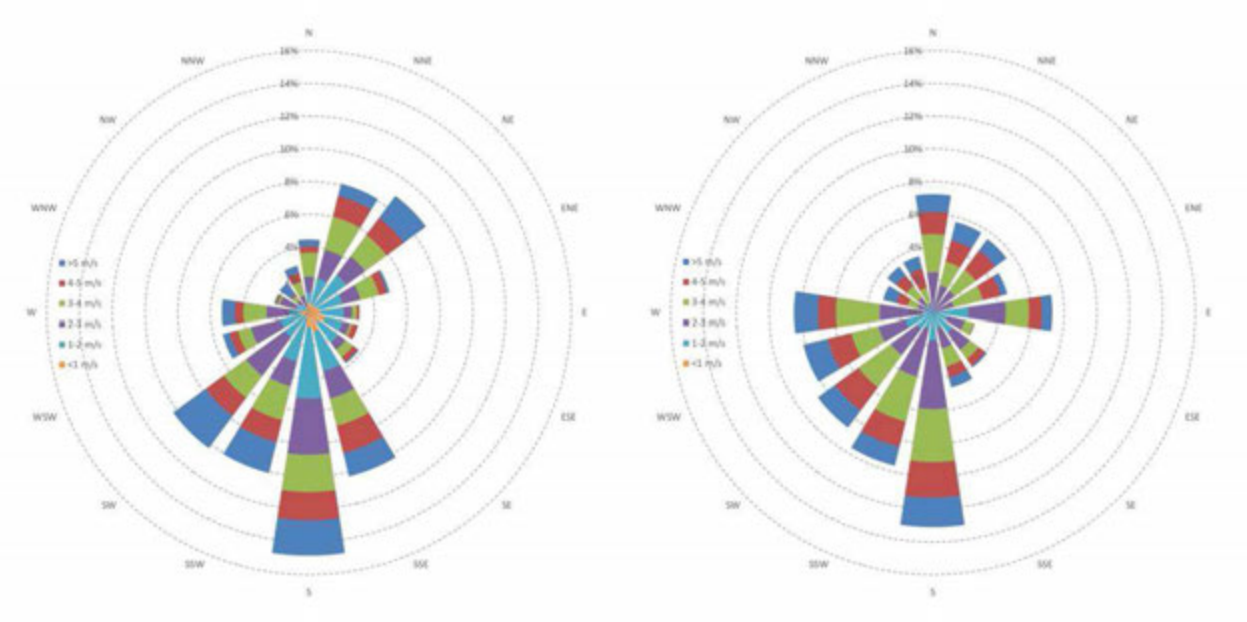

Figure 4. Valley monitoring site (left) and KSUS (right) wind rose comparison.

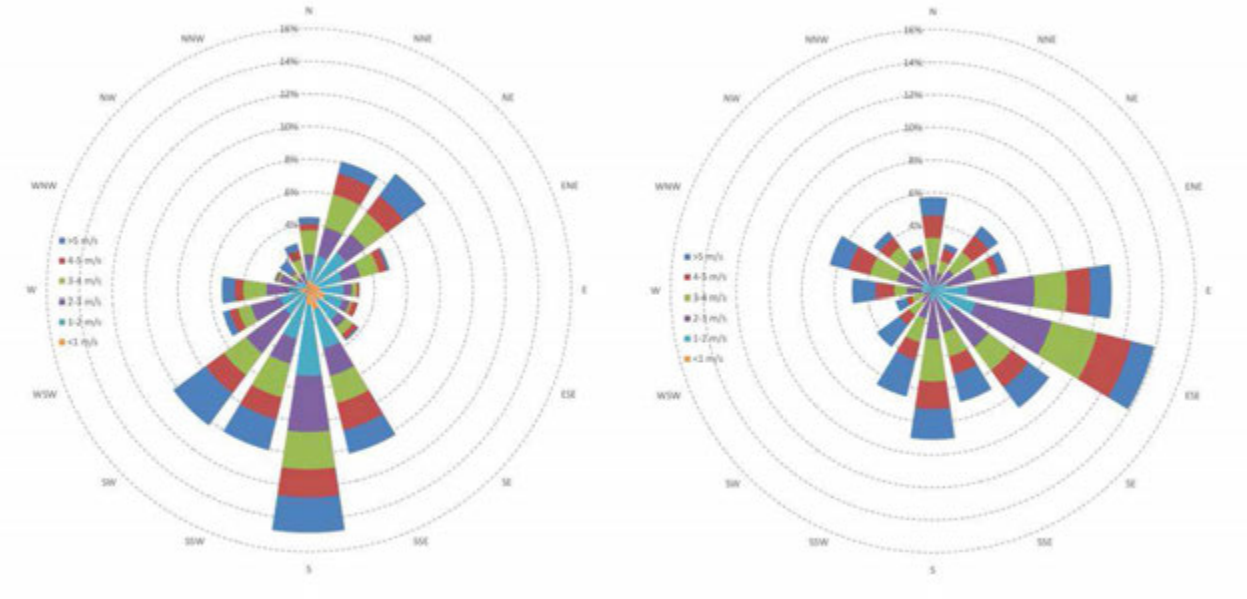

Figure 5. Valley monitoring site (left) and KJEF (right) wind rose comparison.

Figure 6 (see next page) shows peak concentration areas, demarcated by orange and red receptors, predicted by DNR's model when KSUS surface meteorological data is used instead of KJEF data. The results are striking; *if KSUS data is in fact more representative of the area than KJEF data, then neither the Valley monitoring site nor the Northwest monitoring site is located in an area where peak SO_2 concentrations are expected to occur and neither is appropriately sited for use in future NAAQS compliance evaluations*.

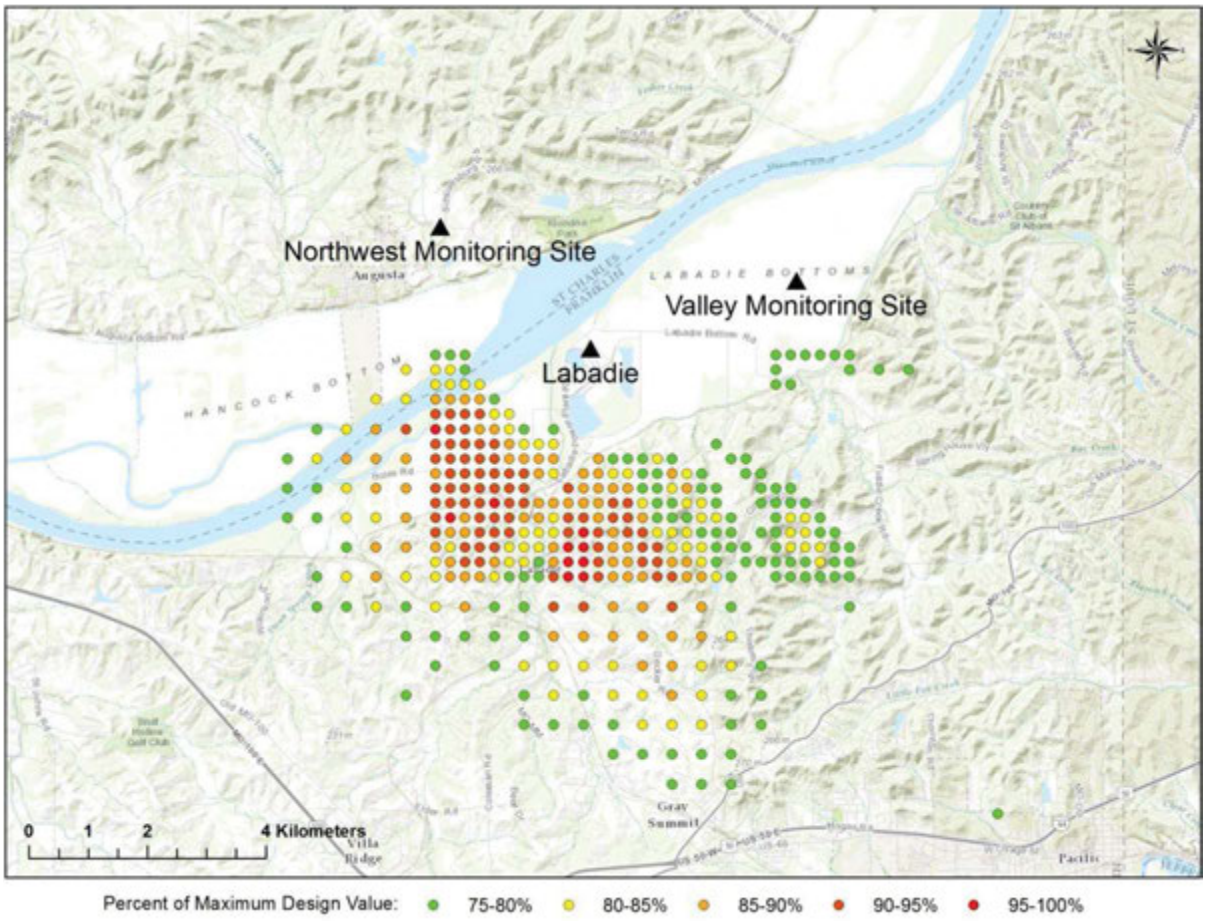

Figure 6. Expected peak SO_2 concentration areas per DNR's modeling using KSUS instead of KJEF surface meteorological data.

We recognize that the wind climatology data from the Valley meteorological monitoring site included in Appendix F of DNR's 2016 Area Boundary Recommendations is not yet quality assured and that, given the short-term nature of the data, it is by no means certain that the winds at Labadie will prove to be more similar to the winds at KSUS than at KJEF over the long term. However, this only demonstrates further why DNR should wait until EPA completes an area designation for Labadie before proposing new SO_2 monitoring sites near the plant. EPA must make a final area designation for the plant by July 2016.[7] By that time, DNR will have over a year of on-site meteorological data from the Valley monitoring site and a second meteorological monitoring station at the nearby Osage Ridge monitoring site,[8] which it can then use to model Labadie's emissions for monitor-siting purposes or to make a more definitive determination regarding which airport site has the most representative meteorological data and should be used in such modeling.

[7] *Sierra Club v. Gina McCarthy*, No. 3:13-cv-3953-SI (Consent Decree, March 2, 2015).
[8] No data from the Osage Ridge site was included in the 2016 Area Boundary Recommendations so it is unknown how winds at the site compare to winds at the Valley monitoring site, KSUS, or KJEF.

Conclusion

For the reasons set forth above and in our July 20 comments on the 2015 Monitoring Network Plan, DNR should withdraw both of the new Labadie SO_2 monitoring sites pending the completion of the Labadie area designation process, the collection of additional on-site meteorological data from the Valley and Osage Ridge meteorological monitoring stations, and the performance of additional modeling using the most representative surface meteorological data to determine the areas of expected peak ambient SO_2 concentrations around the plant. Furthermore, EPA should not approve the 2015 Monitoring Network Plan with the inclusion of the new Labadie SO_2 monitoring sites and should reject it pending their withdrawal by DNR.

Sincerely yours,

Maxine I. Lipeles, Director
Kenneth Miller, P.G., Environmental Scientist
Interdisciplinary Environmental Clinic
Washington University School of Law
One Brookings Drive – CB 1120
St. Louis, MO 63130
314-935-5837 (phone); 314-935-5171 (fax)
milipele@wustl.edu

Attorneys for the Sierra Club

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Josh Tapp, Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR
Wendy Vit, Chief, Air Quality Planning Section, Air Pollution Control Program, DNR

Washington University in St. Louis
SCHOOL OF LAW
Interdisciplinary Environmental Clinic

September 3, 2015

Ms. Wendy Vit
Chief, Air Quality Planning Section
Air Pollution Control Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176
Via email to apcpsip@dnr.mo.gov

Re: 2010 1-Hour Sulfur Dioxide Standard, Proposed Options for Area Boundary Recommendations, July 2016 Designations

Dear Ms. Vit:

On behalf of the Sierra Club, we submit the following comments on the 2010 1-Hour Sulfur Dioxide Standard, Proposed Options for Area Boundary Recommendations, July 2016 Designations.[1] We strongly urge the Department of Natural Resources ("DNR") to propose and the Air Conservation Commission to adopt and submit to the Environmental Protection Agency ("EPA") a recommended designation of nonattainment based on modeling for the Ameren Labadie Energy Center in Franklin County, Missouri.

The Labadie plant is far-and-away the largest source of SO_2 pollution in the state. It is calculated to be responsible for more premature deaths than any other coal plant in the nation without scrubbers.[2] While Ameren has installed scrubbers – which are long-proven, highly-effective SO_2 controls – on its Sioux plant, it appears to be spending considerable money on consultants and poorly-sited monitors to try to avoid installing scrubbers at Labadie.

Because three years of source-oriented monitoring data are not available for the Labadie plant, the designation must be based on modeling in order to meet the July 2016 deadline in the March 2, 2015 federal Consent Decree for the next round of sulfur dioxide ("SO_2") designations.[3] DNR's modeling demonstrates that the area surrounding the Labadie plant is not attaining the 2010 1-hour SO_2 national ambient air quality standard ("NAAQS") based on the most recent three years of the Labadie plant's actual emissions.

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[1] DNR, 2010 1-Hour Sulfur Dioxide Standard, Proposed Options for Area Boundary Recommendations, July 2016 Designations, July 24, 2015("Proposed 2016 Designation Options"), available at http://dnr.mo.gov/env/apcp/docs/2010-so2-options-for-july-2016-desig-aug-27-2015-pub-hrg.pdf.

[2] Environmental Integrity Project, *Net Loss: Comparing the Cost of Pollution vs. the Value of Electricity from 51 Coal-Fired Plants* (June 2012) at i-ii.

[3] *Sierra Club v. McCarthy*, No. 3:13-cv-3953-SI, Consent Decree filed March 2, 2015, available at http://www.epa.gov/so2designations/pdfs/201503FinalCourtOrder.pdf.

DNR's alternative option of an unclassifiable designation is not appropriate because unclassifiable only applies when there is insufficient data to support a nonattainment or attainment decision, and in this case DNR's modeling provides ample data to support a nonattainment designation. Ameren's suggestion that the area be designated attainment is directly refuted by DNR's modeling. Ameren's consultant made numerous questionable changes to DNR's modeling approach, without providing adequate justification or obtaining the necessary approval from EPA, for the apparent purpose of obtaining an attainment result. Ameren's modeling should be disregarded.

I. The Area Around The Labadie Energy Center Must Be Designated Nonattainment.

When the U.S. Environmental Protection Agency ("EPA") established the 1-hour SO_2 NAAQS in 2010, it emphasized the value of modeling in making area designations.

> [I]n areas without currently operating monitors but with sources that might have the potential to cause or contribute to violations of the NAAQS, we anticipate that the identification of NAAQS violations and compliance with the 1-hour SO2 NAAQS would primarily be done through refined, source-oriented air quality dispersion modeling analyses …
>
> Compared to other NAAQS pollutants, we would not consider ambient air quality monitoring alone to be the most appropriate means of determining whether all areas are attaining a short-term SO_2 NAAQS. Due to the generally localized impacts of SO_2, we have not historically considered monitoring alone to be an adequate, nor the most appropriate, tool to identify all maximum concentrations of SO_2.[4]

While EPA allows the use of modeling or monitoring to support a designation, a monitoring approach is only valid when it is based on three years of quality-assured data from appropriately-sited monitors.[5] Because the monitors at the Labadie plant[6] did not begin operating until April 2015, and the Consent Decree requires EPA to make an SO_2 designation for the Labadie plant by July 2, 2016, the Labadie designation must be based on modeling, not monitoring. EPA recognized this in Guidance issued shortly after the Consent Decree became final:

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[4] EPA, Primary National Ambient Air Quality Standard for Sulfur Dioxide, Final Rule, 75 Fed. Reg. 35520, 35551 (June 22, 2010).

[5] EPA, Data Requirements Rule for the 2010 1-Hour Sulfur Dioxide (SO_2) Primary National Ambient Air Quality Standard (NAAQS), Final Rule, 80 Fed. Reg. 51052 (Aug. 21, 2015); EPA, Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard (Mar. 20, 2015) ("Updated SO_2 Designations Guidance"), available at http://www.epa.gov/airquality/sulfurdioxide/pdfs/20150320SO2designations.pdf.

[6] The SO_2 monitors that Ameren recently constructed near the Labadie plant are not sited in areas of expected peak SO_2 concentrations and their locations were not approved by EPA. Therefore, the data they are generating should not in any event be relied upon for regulatory decisions. See comments previously submitted to DNR on behalf of the Sierra Club regarding the Ameren's "Labadie Sulfur Reduction Quality Assurance Project Plan," (Apr. 1, 2015), DNR's 2015 Monitoring Network Plan (July 20, 2015), and supplemental comments regarding the 2015 Monitoring Network Plan (Aug. 11, 2015). Copies of those letters are attached hereto as Exhibits 1, 2, and 3.

> We recognize that the timeline for designations by July 2, 2016, does not provide for establishment and use of data from new ambient monitors. Therefore, **we anticipate that in many areas the most reliable information for informing these designations will be source modeling**. The EPA has issued guidance on the use of source modeling for this purpose in the SO_2 NAAQS Designations Modeling Technical Assistance Document (Modeling TAD).[7]

Pursuant to EPA Guidance,[8] DNR performed dispersion modeling that compels a nonattainment designation. According to DNR:

> The area containing the Ameren Labadie Energy Center models violations of the 2010 1-hour SO_2 standard using actual emissions.[9]

Using 9 ppb as the regional background concentration, DNR's "maximum modeled concentration for the area was 234.5 $\mu g/m^3$ or 89 ppb, which is not in compliance with the 1-hour SO_2 standard of 75 ppb."[10] DNR also considered using the Mott Street monitor in Herculaneum for "a more conservative background concentration" of 18 ppb, which "would yield a maximum modeled concentration of 98 ppb."[11]

Sierra Club retained a modeling consultant to conduct independent modeling regarding the Labadie plant. Modeling performed by Wingra Engineering confirms that the area around the Labadie plant violates the 1-hour SO_2 NAAQS.[12]

Pursuant to section 107(d)(1) of the Clean Air Act and EPA guidance applicable specifically to the 1-hour SO_2 NAAQS, the area around the Labadie plant must be designated nonattainment.

II. The Unclassifiable Option in DNR's Proposal is Inappropriate.

The unclassifiable designation applies only "[i]n the absence of information clearly demonstrating a designation of 'attainment' or 'nonattainment.'"[13] Because DNR's modeling

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[7] Updated SO_2 Designations Guidance at 3 (emphasis supplied).
[8] Updated SO_2 Designations Guidance and EPA, SO_2 NAAQS Designations Modeling Technical Assistance Document ("Modeling TAD"), available at http://www.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf.
[9] Proposed 2016 Designation Options at 26.
[10] *Id*. at 27.
[11] *Id*.
[12] The Wingra Engineering modeling report is submitted herewith as Exhibit 4. Wingra Engineering determined that meteorological data from the Spirit of St. Louis airport was more representative of site conditions than the Jefferson City airport data used by DNR in its modeling. Although the NAAQS exceedances modeled by Wingra Engineering are almost identical to those modeled by DNR, the area boundaries based on Wingra's modeling would differ in part from those proposed by DNR. The geographic scope of the appropriate nonattainment area boundary is discussed below.
[13] Updated SO_2 Designations Guidance at 5.

demonstrated NAAQS violations near the Labadie plant compelling a nonattainment designation, the unclassifiable option in DNR's proposal is inapplicable and inappropriate.

DNR's unclassifiable option relies on (1) three months of not quality-assured data from monitors recently constructed by Ameren near the Labadie plant and (2) monitoring data from long-inactive monitors that documented high concentrations of SO_2. DNR's suggestion that the monitoring data casts doubt on the conclusions of its modeling falls far short of the mark.

First, the Labadie monitoring data cannot and do not undermine the nonattainment designation compelled by DNR's modeling. *Three months* of preliminary data from the new Labadie monitors are meaningless; *three years* of quality-assured monitoring data are required in order to determine whether an area complies with the 1-hour SO_2 NAAQS.[14] Accordingly, EPA Guidance recognizes that modeling, not monitoring, will be the principal basis for making designations for areas subject to the July 2016 deadline.[15]

In addition, the fact that Ameren's Labadie monitors have not recorded any SO_2 concentrations above the NAAQS during their first three months of operation should come as no surprise to DNR. Using the MAXDAILY output option, DNR's modeling – which documents nonattainment for a three-year period – predicts no NAAQS exceedances during the three-month time period of the Labadie monitoring data in any of the modeled years at Ameren's Northwest monitoring site, and no NAAQS exceedances in two of the three modeled years (2013 and 2014) at Ameren's Valley monitoring site.

Moreover, the data from Ameren's Labadie monitors should not be relied upon for NAAQS compliance purposes because the monitors are not sited in areas of expected peak concentrations. The modeling conducted by DNR for the Proposed 2016 Designation Options (after Ameren sited its Labadie monitors) makes clear that the Valley monitor is not sited in an area of expected peak concentrations. Furthermore, preliminary meteorological data collected by Ameren at the Valley monitoring site suggests that the meteorological data used in DNR's modeling[16] is not as representative of site conditions as meteorological data collected at the Spirit of St. Louis Airport. Modeling conducted with meteorological data from the Spirit of St. Louis Airport demonstrates that neither of Ameren's monitors is located in an area of expected peak concentrations.[17]

Second, monitoring data from the long-inactive Augusta and Augusta Quarry SO_2 monitors similarly fail to undermine the nonattainment designation required by DNR's modeling. There is no indication that either of those monitors was sited in areas of expected peak concentrations caused by the Labadie plant's emissions. To the contrary, DNR's modeling indicates that they were not sited in areas of expected peak concentrations associated with Labadie's emissions. This is shown in Figure 1, below.

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[14] The form of the 1-hour SO_2 NAAQS is the three-year average of the 99th percentile of 1-hour daily maximum concentrations.

[15] Updated SO2 Designations Guidance at 3.

[16] DNR used meteorological data collected at Jefferson City Memorial Airport in its modeling.

[17] See Exhibits 1, 2, and 3 submitted herewith.

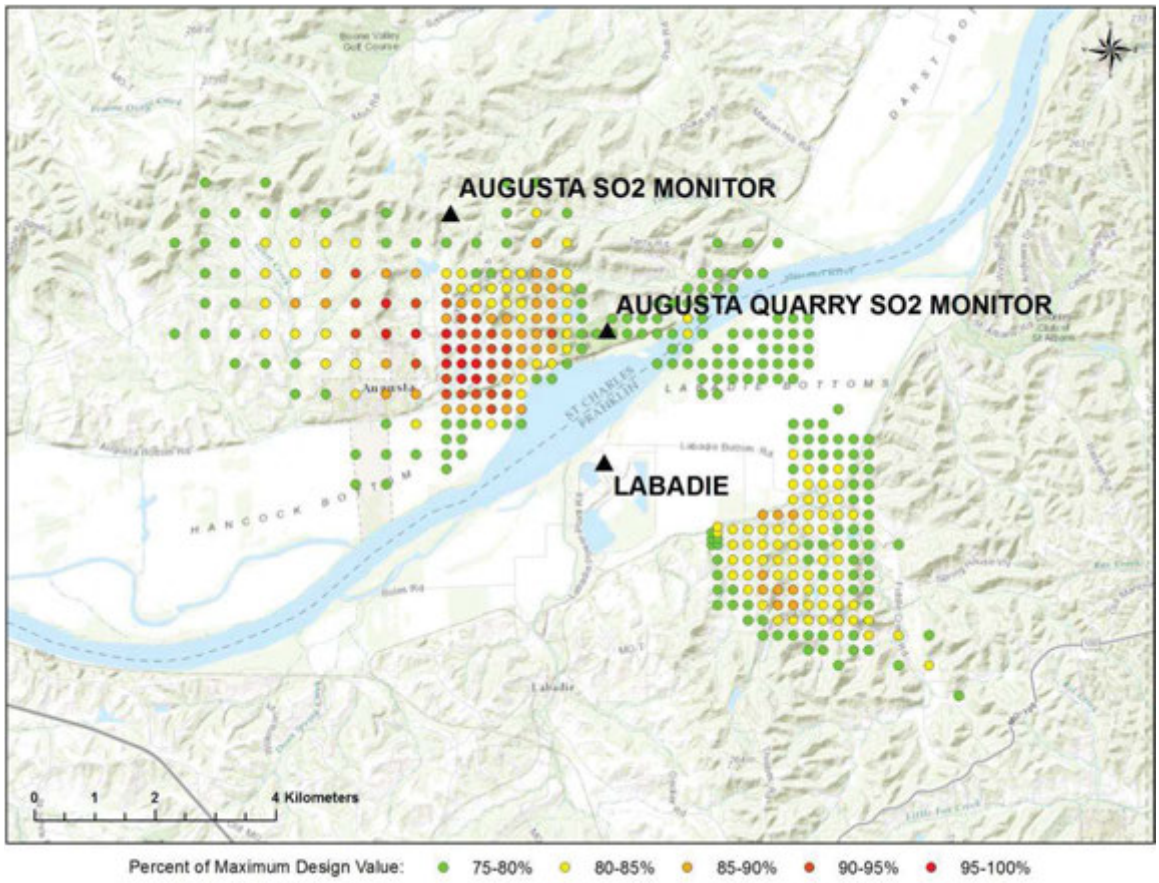

Figure 1. Augusta SO_2 monitors in relation to DNR's modeled peak concentration areas.

Furthermore, the data from the Augusta monitors reveal high 1-hour SO_2 concentrations, with consistent violations of the NAAQS. The Augusta monitor operated from July 1, 1987 until December 19, 1994. The design values for every three-year period during the monitor's operation were well above the 1-hour SO2 NAAQS – ranging from 259 ppb for 1987-1989 to 114 ppb for 1992-1994.[18] The Augusta Quarry site operated for three full years (1995-1997) and portions of two additional years (1994 and 1998). The design value for the only complete three-year period was 78 ppb, exceeding the 1-hour SO_2 NAAQS. The fourth-highest one-hour readings during two of the three complete data years were well above the 1-hour SO_2 NAAQS (86 ppb in 1995 and 80 ppb in 1997).[19]

In sum, there is no legitimate reason for an unclassifiable designation for the area around the Labadie plant.

[18] Proposed 2016 Designation Options, Appendix F, at F-3.
[19] *Id*. at F-2.

III. Ameren's Modeling Purporting To Support An Attainment Designation Actually Shows NAAQS Violations Near The Labadie Plant When Appropriate Inputs Are Used.

Ameren provided DNR with its own modeling using the latest release of AERMOD (v15181) that purports to support an attainment designation for the Labadie plant. We obtained a copy of Ameren's modeling data just before DNR's September 3 comment deadline, so our ability to comment on it in this letter is limited. Based on a cursory review and Ameren's consultant's description of it in his public hearing testimony at the August 27 Missouri Air Conservation Commission meeting, we believe that Ameren's modeling would actually show NAAQS violations near the Labadie plant if appropriate inputs were used. Therefore, it actually supports a nonattainment designation as DNR's option #1 proposes.

There are three key differences between Ameren's new modeling and DNR's. First, Ameren merged the emissions from Units 3 and 4 in a common stack, whereas DNR modeled the emissions from Units 3 and 4 separately. Second, Ameren used a pair of non-default beta options, ADJ_U* in AERMET and LowWind3 in AERMOD, which were added to the latest model release to address concerns regarding model performance under low wind speed conditions. Finally, Ameren used a background concentration based on a monitor in Nilwood, Illinois, that varies by season and hour-of-day instead of the uniform 9 ppb background concentration used by DNR, based on the monitor in East St. Louis.

As justification for merging the emissions from Units 3 and 4 in a common stack, Ameren cites EPA Model Clearinghouse Report 91-II-01. Model Clearinghouse Reports provide EPA's interpretation of modeling guidance as it applies to specific applications of air dispersion models. While often relevant to other, similar applications, Model Clearinghouse Reports do not serve as guidance of general applicability. EPA issues general guidance related to the Guideline on Air Quality Models ("Guideline") and technical aspects of dispersion models in formal "Clarification Memos." Furthermore, Model Clearinghouse Report 91-II-01 relates to the modeling of an unspecified stationary source using an unspecified model different from AERMOD.[20] Its relevance, if any, to the application of AERMOD to evaluate NAAQS compliance around the Labadie plant is speculative at best.[21] Therefore, it should not be relied upon as justification for merging the emissions from Units 3 and 4 in a common stack.

Regarding Ameren's use of non-default beta options in the latest release of AERMOD, EPA has acknowledged issues with the performance of AERMOD under low wind conditions and has proposed that these options be included as regulatory default options in a 2016 version of

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[20] Development of AERMOD did not commence until 1991 and it was not adopted as EPA's preferred model for regulatory dispersion modeling until 2005. Therefore, it is inconceivable that AERMOD was used in the permit application that was the subject of Model Clearinghouse Report 91-II-01.

[21] The configuration of the stacks at the source discussed in the report was different from the configuration of the stacks at Labadie, and the report concluded that they could be merged based on an unverified assumption about the separation distance between the stacks relative to the lesser dimension of nearby structure(s), and only if the flow rates and temperatures were always the same for all three stacks. It is not known whether these conditions are met at Labadie.

AERMOD associated with a potential future final rule revising the Guideline.[22] However, they are only proposed options at this time, and EPA may or may not ultimately include either or both as regulatory defaults in the next version of AERMOD.[23] Furthermore, since they are non-default beta options in the latest release of AERMOD, their use presently requires an alternate model demonstration per Section 3.2.2 of the Guideline, which must be approved by the EPA Regional Administrator. Ameren's submission of its new modeling to DNR did not include an alternate model demonstration.

Apart from these questionable changes, the fatal flaw in Ameren's new modeling is the use of a cherry-picked "background" concentration below that used by DNR.

Ameren's background concentration is based on a monitor in Nilwood, Illinois, and varies by season and hour-of-day. This and other temporally-varying background options have been available in AERMOD since v11059. During most hours and seasons, Ameren's background concentration is significantly lower than DNR's uniform 9 ppb background concentration, which is the design value for the nearest ambient monitor (East St. Louis) based on readings for the sector with the least source influence.[24] (DNR also noted that it might be appropriate to use a more conservative background concentration of 18 ppb based on the fourth-high value of the Mott Street monitor in 2014.[25]) EPA guidance currently recommends using the overall highest hourly background SO_2 concentration from a representative monitor as a "first tier" background concentration,[26] which is a more conservative approach than DNR's. EPA's proposed revised Guideline regulations recommend using the design value as a uniform monitored background contribution across the project area, as DNR did. Ameren's use of temporally-varying background concentration does not comport with either EPA's current guidance or its proposed revised Guideline regulations.

In addition, it is noteworthy that the design value for the Nilwood monitor for the most recent three year period (2012-2014) was 9.3 ppb, slightly higher than the 9 ppb background concentration DNR used in its modeling. Previous design values for the Nilwood monitor were 8 ppb (2011-2013), 10 ppb (2010-2012), and 13 ppb (2009-2011).

The peak SO_2 concentration predicted by Ameren's new model is 73.7 ppb (approximately 193.3 ug/m^3) at a point roughly 3 kilometers northwest of the plant. This is slightly below the NAAQS, but only because Ameren used a less conservative background concentration than that used by DNR. **Using DNR's background concentration, the peak SO_2 concentration predicted by Ameren's new model exceeds the NAAQS.**

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[22] EPA published a notice of proposed rulemaking proposing enhancements to the AERMOD dispersion modeling system and revisions to the Guideline on July 29, 2015. 80 Fed. Reg. 45399, available at http://www.gpo.gov/fdsys/pkg/FR-2015-07-29/pdf/2015-18075.pdf.

[23] George Bridgers, personal communication, September 1, 2015.

[24] Proposed 2016 Designation Options, Appendix A, at A-12.

25 Proposed 2016 Designation Options at 27.

[26] EPA, Applicability of Appendix W Modeling Guidance for the 1-hour $S0_2$ National Ambient Air Quality Standard, Aug. 23, 2010, at 3.

Ameren's new modeling appears to be "results-oriented" in that its inputs were apparently tailored to yield a desired result –the appearance of no NAAQS violations near the Labadie plant – and not to accurately determine the attainment status of the area. Most egregious is the substitution of a more favorable background concentration, in a form not sanctioned by EPA guidance or regulations, instead of the background concentration used by DNR. Ameren's request for an attainment designation based on its manipulated modeling should be rejected.

IV. DNR's Proposed Nonattainment Boundaries Should Be Modified.

In addition to recommending a designation of nonattainment around the Labadie plant, DNR should modify the proposed boundaries of the nonattainment area. Per EPA guidance, the analytical starting point for determining SO_2 nonattainment areas is county boundaries.[27] Modeled NAAQS violations due to Labadie occur in both Franklin and St. Charles Counties, making these counties the starting point for the nonattainment area boundary. Partial county boundaries are appropriate in this instance, however, due to the fairly limited geographic scope of the modeled violations. For defining partial county boundaries, EPA recommends the use of well-defined jurisdictional lines such as township borders or other geopolitical boundaries, immovable landmarks, and readily identifiable physical features.[28] DNR's proposed boundary includes only portions of the two townships containing the modeled violations – Boles Township in Franklin County and Boone Township in St. Charles County – cutting off portions of both townships along transecting roadways.[29] This results in dividing up the communities of Gray Summit and Pacific in the south and New Melle in the north, creating the potentially confusing situation where some portions of each community are inside the nonattainment area and other portions are outside. To avoid this situation, we recommend modifying the proposed boundaries of the nonattainment area to include all of Boone and Boles Townships. These townships encompass just 20 percent of the total combined area of Franklin and St. Charles Counties, and therefore represent reasonable partial county boundaries for the nonattainment area.

Alternatively, DNR should consider modifying the proposed boundaries of the nonattainment area to encompass a larger portion of northeast Franklin County, which DNR's modeling suggests encompasses most if not all modeled violations when potentially more representative meteorological data from the Spirit of St. Louis Airport in Chesterfield is used.[30] With Spirit of St. Louis Airport meteorological data, the locus of modeled violations shifts to the south and southwest of the plant. A more appropriate nonattainment area boundary based on these modeled violations would encompass Boles Township, a small portion of Boone Township (south of

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[27] Updated SO_2 Designations Guidance at 5.
[28] *Id.* at 6.
[29] The northern portion of Boone Township is cut off by Missouri Route D and Highway 94; the southern portion of Boles Township is cut off by Interstate 44.
[30] Preliminary meteorological data from Ameren's Valley monitoring site suggest that the winds at Labadie may be more similar to the winds at Spirit of St. Louis Airport ("KSUS") in Chesterfield than the winds at Jefferson City Memorial Airport ("KJEF") in Jefferson City, which in turn suggests that KSUS surface meteorological data may be more representative of the area and more appropriate for modeling Labadie's emissions than KJEF data. See supplemental comments previously submitted to DNR on behalf of the Sierra Club regarding DNR's 2015 Monitoring Network Plan, attached hereto as Exhibit 3.

Missouri Highway 94), and the area west of Boles Township bounded by Missouri Route 47 and the municipal boundaries of Washington and Union, Missouri. This is shown in Figure 2, below.

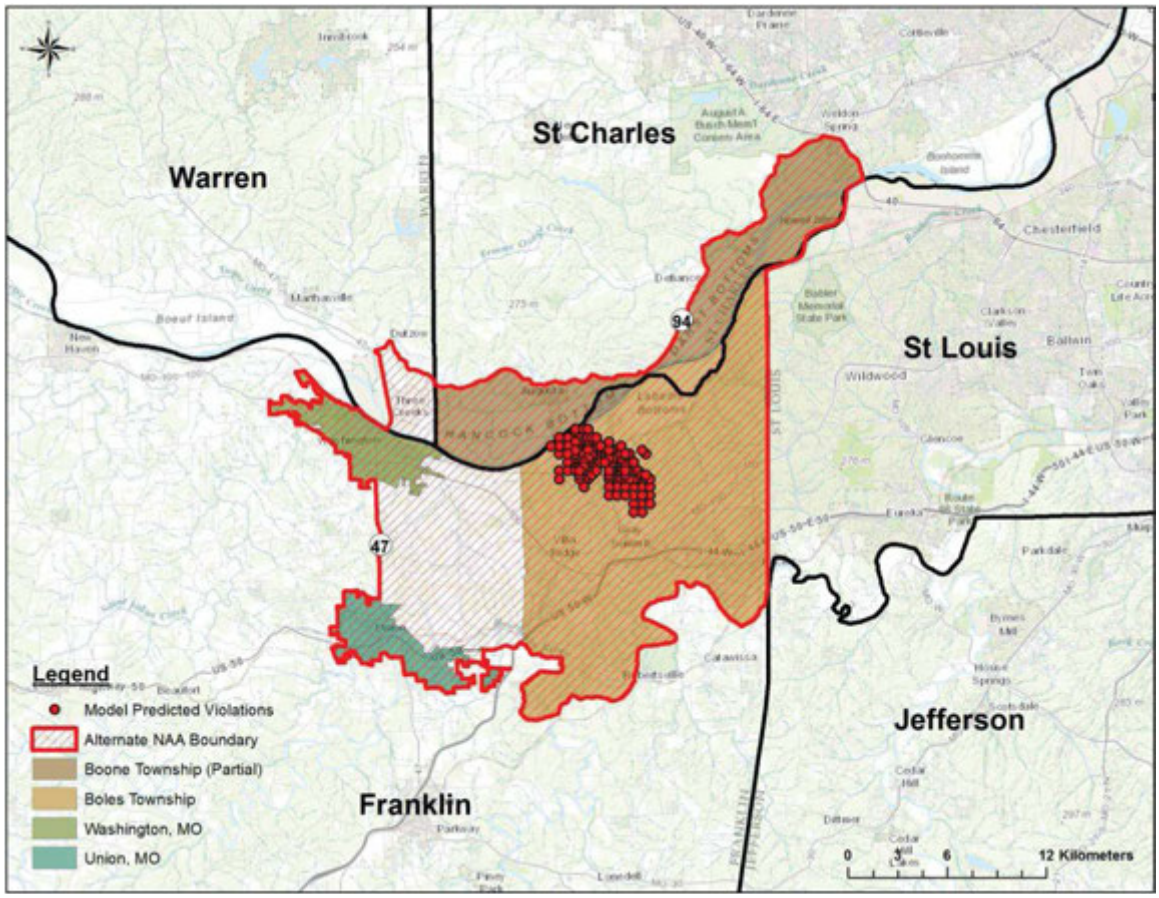

Figure 2. Alternative nonattainment area boundary based on Spirit of St. Louis Airport meteorological data.

Conclusion

We strongly urge the DNR to propose and the Air Conservation Commission to approve and submit to the EPA a recommended designation of nonattainment based on modeling for the Ameren Labadie Energy Center in Franklin County, Missouri. DNR's modeling demonstrates that the area surrounding the Labadie plant is not attaining the 2010 1-hour SO_2 national ambient air quality standard ("NAAQS") based on the most recent three years of actual emissions. This compels a nonattainment designation.

For the reasons set forth above, the unclassifiable designation option is inapplicable and inappropriate, and Ameren's suggestion for an attainment designation is fanciful.

Sincerely yours,

Maxine I. Lipeles, Director
Kenneth Miller, P.G., Environmental Scientist
Interdisciplinary Environmental Clinic
Washington University School of Law
One Brookings Drive – CB 1120
St. Louis, MO 63130
314-935-5837 (phone); 314-935-5171 (fax)
milipele@wustl.edu

Attorneys for the Sierra Club

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR

Washington University in St. Louis
SCHOOL OF LAW
Interdisciplinary Environmental Clinic

Appendix C—Sierra Club Comments on the Proposed Area Designation under the 2010 SO_2 NAAQS for the Area Around the Labadie Energy Center in Franklin County, Missouri

Summary of Comments—EPA Should Finalize Its Proposed Nonattainment Designation for Portions of Franklin and St. Charles Counties Located in Proximity to the Labadie Energy Center in Franklin County, Missouri

Sierra Club strongly supports the U.S. Environmental Protection Agency's ("EPA") intended designation of the area around Ameren Missouri's Labadie Energy Center, including portions of Franklin and St. Charles Counties, as a nonattainment area for the 2010 1-hour sulfur dioxide ("SO_2") National Ambient Air Quality Standard ("NAAQS"). The evidence supporting a nonattainment designation is overwhelming, and EPA should finalize its proposed decision so that residents living and recreating in the shadow of the Labadie plant—one of the largest unscrubbed coal-fired power plants in the country—can obtain the public health protection that the SO_2 NAAQS is designed to provide.

In order to protect public health with an adequate margin of safety, the EPA revised the SO_2 primary NAAQS in 2010, replacing 24-hour and annual standards with a 1-hour standard.[1] In an exposure analysis focused on at-risk populations in St. Louis, EPA found that SO_2 exposure for as short as 5-10 minutes can cause adverse health effects to asthmatics.[2] Based on the latest scientific and medical research, EPA determined that the 1-hour SO_2 NAAQS is necessary to protect public health and limit adverse respiratory effects on at-risk populations, including children, the elderly, and asthmatics.[3]

As EPA is well aware, short-term SO_2 exposure is associated with a variety of negative health effects, including narrowing of the airways which can cause difficulty breathing (bronchoconstriction) and increased asthma symptoms. These effects are particularly important for asthmatics during periods of faster or deeper breathing (e.g., while exercising or playing).[4] Studies also show an association between short-term SO_2 exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses – particularly in at-risk populations including children, the elderly, and asthmatics.[5]

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[1] EPA, Primary National Ambient Air Quality Standard for Sulfur Dioxide; Final Rule, 75 Fed. Reg. 35520 (June 22, 2010).
[2] *Id.* at 35536.
[3] *Id.* at 35550.
[4] EPA, Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, available at http://www.epa.gov/airquality/sulfurdioxide/pdfs/20100602fs.pdf.
[5] *Id*.

Additionally, SO_2 emissions contribute to the formation of fine particulate matter ($PM_{2.5}$), exposure to which is linked to numerous serious health effects and premature death. The public health threats posed by $PM_{2.5}$ pollution include aggravated asthma, heart attacks, difficulty breathing, and decreased lung function.[6] According to EPA, "evidence is sufficient to conclude that the relationship between long-term $PM_{2.5}$ exposures and mortality is causal."[7]

In the case of Labadie, concerns regarding the health impacts of SO_2 are heightened by the fact that the plant is far and away the largest source of SO_2 pollution in Missouri. According to EPA's Air Markets Program Data, Labadie's annual SO_2 emissions are nearly double those of the second-largest source in the state, Ameren's Rush Island plant in Jefferson County, and have been since 2011 when Ameren installed scrubbers on what had previously been the second-largest source, its Sioux plant in St. Charles County (the only plant in Ameren Missouri's fleet with any SO_2 controls installed).[8] Indeed, Labadie's annual SO_2 emissions are among the highest in the country. In 2015, Labadie's SO_2 emissions were the fifth-highest of all power plants nationwide, and its annual emissions have been in the top ten nationally for four of the past seven years (and ranked no lower than 16th in any of the other three).[9]

Labadie, which is the 14th largest coal-fired power plant in the country on the basis of capacity,[10] is unique among large coal plants in not having any SO_2 controls installed. Of the 39 largest coal plants in the country, Labadie is the only one that lacks SO_2 controls of any kind on any of its units.[11] Every other one of the 39 largest coal plants has scrubbers on some or all units except for one—Rockport in Indiana—which has dry sorbent injection and is under a Consent Decree to install scrubbers or close.[12] The next-largest coal plant without any SO_2 controls installed is Entergy's Independence plant near Newark, Arkansas, which has roughly a third less capacity than Labadie.[13] Therefore, it is not surprising that Labadie is calculated to be responsible for more premature deaths than any other coal plant in the nation without scrubbers.[14]

In light of the public health impacts of excessive SO_2 concentrations, Labadie's status as the largest coal plant in the country without SO_2 controls, and the fact that Ameren already anticipates installing scrubbers at Labadie,[15] it is remarkable that Ameren is spending untold

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[6] EPA, Health information on Particulate Matter, available at http://www.epa.gov/pm/health.html.
[7] EPA, Integrated Science Assessment for Particulate Matter, EPA/600/R-08/139F (Dec. 2009), at 7-96, available at http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM_ISA_full.pdf.
[8] EPA, Air Markets Program Data, available at https://ampd.epa.gov/ampd/ (Query: Program = Acid Rain Program (AMP); Data Set = Emissions, Unit Level; Time Frame = Annual, 2006-2015; Emissions Criteria = State, All States; Aggregate Criteria = Facility; Variables = State, Facility Name, Facility ID (ORISPL), Year, SO2 (tons)).
[9] *Id*.
[10] EPA, National Electric Energy Data System (NEEDS) database v.5.15 (Aug. 3, 2015), available at https://www.epa.gov/sites/production/files/2015-08/needs_v515.xlsx. Plant rankings based on aggregated dependable net summer capacity of individual units.
[11] *Id.*
[12] *Id*. Re Rockport, see also http://www.epa.gov/sites/production/files/2015-01/documents/aep-cdmod3.pdf; http://valleywatch.net/?p=3116; and http://www.power-eng.com/articles/2015/01/indiana-michigan-nears-permit-for-rockport-unit-1-scr-project.html.
[13] *Id*.
[14] Environmental Integrity Project, Net Loss: Comparing the Cost of Pollution vs. the Value of Electricity from 51 Coal-Fired Plants (June 2012) at i-ii.
[15] Ameren's construction permit application submitted to MDNR for a utility waste landfill ("UWL") at the Labadie plant states: "A new flue gas desulfurization (FGD) system is scheduled to be built at the plant in the future. The FGD

amounts on creative modeling ventures to avoid the nonattainment designation virtually compelled by the modeling performed not only by the Missouri Department of Natural Resources ("MDNR") and Sierra Club, but by Ameren itself using AERMOD's regulatory default options. The weight of the evidence considered by EPA solidly supports a nonattainment designation:

- Modeling performed by MDNR, using AERMOD's regulatory default options, shows nonattainment.
- Modeling performed by Sierra Club, using AERMOD's regulatory default options, shows nonattainment.
- Modeling performed by Ameren, using AERMOD's regulatory default options, shows nonattainment.

Apparently unsatisfied with a nonattainment result, Ameren is engaged in an ongoing modeling marathon to attempt to show that the air around its unscrubbed Labadie plant complies with the SO_2 NAAQS. This is no small task. To achieve its desired result, Ameren's modelers:

- Used the beta LOWWIND3 option in AERMOD and the beta ADJ_U* option in AERMET instead of the regulatory default options.
- Merged the emissions from units 3 and 4 and modeled them as a single release point.
- Used lower background concentration data from a remote, agriculturally-sited monitor.
- Calculated "actual" stack flows using temperatures not representative of likely exit temperatures, thereby exaggerating exit velocities and the extent of plume dispersion.

Without each and every one of these model alterations, Ameren's modeling could not and does not show attainment. As a result, Ameren is expending considerable effort in a vain attempt to justify its modeling, particularly its use of beta options. Notwithstanding Ameren's unrelenting effort to obtain approval for its use of beta options, the fact is that using them is not by itself enough to get to an attainment result. Neither MDNR's nor Sierra Club's modeling shows attainment when run with Ameren's proposed beta options. Only Ameren's beta options modeling does, thanks largely to the *other* model alterations listed above. Therefore, in addition to not approving Ameren's proposal to use beta options, EPA should continue to critically evaluate Ameren's modeling and should not rely on it for purposes of making its final designation decision.

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will generate an estimated maximum of 280,000 additional dry tons of CCPs per year. The UWL design includes the capacity to manage the FGD byproduct, as well as the other CCPs (e.g., fly ash and bottom ash) currently being produced by the plant." Ameren Missouri Labadie Energy Center, Construction Permit Application for a Proposed Utility Waste Landfill, Jan. 2013, Revised Aug. 2013, Revised Nov. 2013, Section 1.1 (p. 1-2).. See also: "Ameren Missouri is planning to install air emissions controls on the coal-fired boilers at the Labadie Energy Center in the future consisting of FGD systems to reduce sulfur dioxide emissions. FGD systems will produce byproducts that may require disposal in the UWL." *Id*., Section 3.5 (p. 3-16). See also Sections 3.1.2 (p. 3-3) and 3.2.1 (p.3-6). See also Ameren Missouri's 2014 Integrated Resource Plan, Ch. 5, Appendix B, filed with the Missouri Public Service Commission and available at https://q9u5x5a2.ssl.hwcdn.net/-/Media/Missouri-Site/Files/environment/renewables/irp/irp-chapter5-appendixb.pdf?la=en.

As discussed below and in our attached comments submitted to MDNR in advance of its designation recommendation,[16] EPA should finalize its intended nonattainment designation for the area around the Labadie plant.

I. All Modeling Using AERMOD's Regulatory Default Options Supports a Nonattainment Designation Around the Labadie Plant.

MDNR's and Sierra Club's modeling evaluations are straightforward exercises that adhere to EPA's SO_2 NAAQS Designations Modeling Technical Assistance Document ("Modeling TAD")[17] and also to the Guideline on Air Quality Models, 40 CFR Part 51 Appendix W ("Guideline" or "Appendix W"). Both use the regulatory default options in AERMET and AERMOD and, although they were performed independently of each other, generally use the same inputs. The only significant difference between them is the meteorological ("met") data used.[18] MDNR used met data from Jefferson City Memorial Airport in Jefferson City, Missouri, approximately 115 kilometers west of Labadie, while Sierra Club used met data from Spirit of St. Louis Airport in Chesterfield, Missouri, approximately 19 kilometers northeast of the plant.

Despite the difference in met data, MDNR's and Sierra Club's modeling predict very similar peak 99th percentile 1-hour average concentrations: 234.5 ug/m^3 and 235.7 ug/m^3, respectively. While the area of peak modeled impact is not identical, all violating receptors in both MDNR's and Sierra Club's modeling are within EPA's proposed nonattainment area boundary. Thus, as explained in EPA's Draft Technical Support Document ("TSD"), "[o]verall . . . the Sierra Club modeling supports and complements the MDNR modeling analysis, with the overall conclusion supporting a nonattainment recommendation."[19]

Ameren also performed modeling using the regulatory default options in AERMET and AERMOD. Although its inputs differ significantly from those used by MDNR and Sierra Club (as described above and discussed further below), Ameren's default options modeling also shows nonattainment with a predicted peak 99th percentile 1-hour average concentration of 282.9 ug/m^3.[20] EPA's Draft TSD (at 22) noted that while Ameren's "default regulatory option modeling also provided weight of evidence supporting a nonattainment designation," EPA did not rely on Ameren's modeling to support its intended nonattainment designation due to the

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[16] Comments submitted to MDNR by the Washington University Interdisciplinary Environmental Clinic on behalf of Sierra Club, Sept. 3, 2016, together with Exhibits 1-4 submitted therewith, are attached hereto as Appendix C, Exhibit 1. Supplemental comments submitted to USEPA Region 7 on Sept. 18, 2016 are attached hereto as Appendix C, Exhibit 2.

[17] EPA, SO_2 NAAQS Designations Modeling Technical Assistance Document (Feb. 2016), available at https://www3.epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf.

[18] Other, less significant differences include Sierra Club's use of flagpole receptor heights and its omission of building downwash parameters.

[19] EPA, Draft Technical Support Document, Area Designations for the 2010 SO_2 Primary National Ambient Air Quality Standard (Feb. 2016) at 20, available at https://www3.epa.gov/airquality/sulfurdioxide/designations/round2/07_MO_tsd.pdf ("*Draft TSD*").

[20] The Draft TSD incorrectly characterizes this as a 1st rather than a 4th high value. While its occurrence near a minor source (N.B. West Contracting) suggests a problem with that source's release parameters, it is a 4th high value as indicated by the PLOTFILE keyword in the AERMOD input file (OU PLOTFILE 1 ALL 4 Labadie_SO2_1HR_34comb_12-14_JEF.PLT).

other alterations Ameren made—without adequate justification—to its default (and non-default beta options) modeling.

II. Ameren's Non-Default Beta Options Modeling Evaluation Suggests a Deliberate Effort to Achieve a Desired Result, Is Inadequately Supported, and Should Be Rejected.

Ameren's non-default beta options modeling evaluation differs significantly from MDNR's and Sierra Club's in several important respects. These include:

- Ameren used non-default beta options, specifically ADJ_U* in AERMET and LOWWIND3 in AERMOD, instead of regulatory default options.
- Ameren merged and modeled as a single release point the emissions from units 3 and 4, which have separate flues housed in a common shell.
- Ameren used temporally varying background concentrations based on an agriculturally-sited ambient monitor in Nilwood, Illinois, approximately 130 kilometers northeast of Labadie, instead of a uniform background concentration based on the much closer and more appropriately-sited East St. Louis monitor, approximately 60 kilometers east of the plant.
- Ameren used hourly stack parameters (temperature and exit velocity) instead of fixed values, with hourly exit velocities based on (calculated) "actual" flows instead of standard flows.

A. Use of Non-Default Beta Options Should Not Be Allowed.

We have commented on most of these changes in previous submittals to both MDNR and EPA. Our previous comments to EPA focused exclusively on Ameren's use of ADJ_U* and LOWWIND3, non-default beta options included in the latest versions of AERMET and AERMOD. EPA has proposed that these beta options be included as regulatory default options in a future version of the AERMOD modeling system expected to be released with a future final rule revising the Guideline.[21] However, they are only proposed options at this time, and EPA may change their formulation or decide not to include them as regulatory defaults in the next version of AERMOD when it finalizes its Appendix W rulemaking. Furthermore, since they are non-default beta options in the latest release of AERMOD, their use presently requires an alternate model demonstration per Section 3.2.2 of the Guideline, which must be approved by the Regional Administrator.

According to the Draft TSD, MDNR formally requested that EPA consider the use of beta options to model emissions from the Labadie Energy Center on December 9, 2015.[22] We find this curious given that MDNR did not use beta options in its own modeling evaluation. Clearly the request was aimed at getting EPA to consider Ameren's modeling, the results of which are at odds with MDNR's own modeling results. Nevertheless, the Draft TSD states that the beta

[21] EPA published a notice of proposed rulemaking proposing enhancements to the AERMOD dispersion modeling system and revisions to the Guideline on July 29, 2015. 80 Fed. Reg. 45399, available at http://www.gpo.gov/fdsys/pkg/FR-2015-07-29/pdf/2015-18075.pdf.
[22] *Draft TSD* at 22.

LOWWIND3 option has not been demonstrated to have statistically improved performance over the regulatory default option and has not yet fully received scientific peer review, and therefore cannot be used at this time "as a reliable indicator of attainment status in the area around the Labadie Energy Center."[23]

Sierra Club supports this decision and believes the use of LOWWIND3 should not be allowed under any circumstances until EPA has completed its Appendix W rulemaking following full scientific peer review and consideration of all comments received. Due to the potential changes to LOWWIND3 that may occur prior to finalization of the Appendix W rulemaking, any designation decision based on a case-specific approval to use LOWWIND3 granted before the rulemaking is finalized could be called into question later, as the final version of LOWWIND3—even if it is ultimately approved as a regulatory default—could yield different results from the version in the latest release of AERMOD. Furthermore, as noted in the Draft TSD, MDNR used a minimum wind speed threshold of 0.5 meters per second in processing its met data "as a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions."[24] Hence, MDNR took steps to improve the performance of its model under low wind conditions, which is the purpose of the beta LOWWIND3 option.

In its September 3, 2015 comments to MDNR on the state's proposed area designation and boundary recommendations, Ameren stated, "The AERMOD modeling data relied on by MDNR to support its proposed options for designation overestimates SO_2 ambient air emissions and, therefore, is too unreliable to serve as the primary or sole basis for a nonattainment designation recommendation . . . MDNR should use EPA's updated AERMOD modeling software. The current software – which is expected to become effective prior to EPA's July 2, 2016, designation deadline under its federal Consent Decree – produces modeling results concluding the Labadie area is attaining the 2010 SO_2 NAAQS" because it "corrects the tendency of the model to over-predict ambient SO_2 concentrations in low wind speed conditions."[25]

Ameren's statement is wrong. First, both the current version of AERMOD (15181) and the previous version (14134) produce identical results when run using the regulatory default options. Hence, even if MDNR had used the current version, its model still would have predicted a peak 99th percentile 1-hour average concentration of 234.5 ug/m^3.

Second, and most importantly**, even using the current version of AERMOD with the beta LOWWIND3 option employed, MDNR's model does not produce results concluding that the Labadie area is attaining the NAAQS**. On the contrary, using the current version of AERMOD with LOWWIND3 employed, MDNR's model predicts a peak 99th percentile 1-hour average concentration of 211.7 ug/m^3, which exceeds the NAAQS. Violating receptors under this

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[23] *Id*.
[24] *Id*. at 15-16.
[25] Ameren Services, Ameren Missouri's Comments on Missouri Department of Natural Resources' Proposed Area Boundary and Designation Recommendations for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard (Sept. 3, 2015) at 7-8, available at http://dnr.mo.gov/env/apcp/docs/appndx-g-modeling-reports.pdf (see pp. G-15, 16).

scenario are shown in Figure 1, below.[26] Sierra Club's modeling analysis also shows nonattainment using the current version of AERMOD with LOWWIND3 employed, predicting a peak 99th percentile 1-hour average concentration of 211.9 ug/m^3. Violating receptors under this scenario are shown in Figure 2, below.[27] This only reinforces EPA's conclusion that MDNR's and Sierra Club's modeling support a nonattainment recommendation.

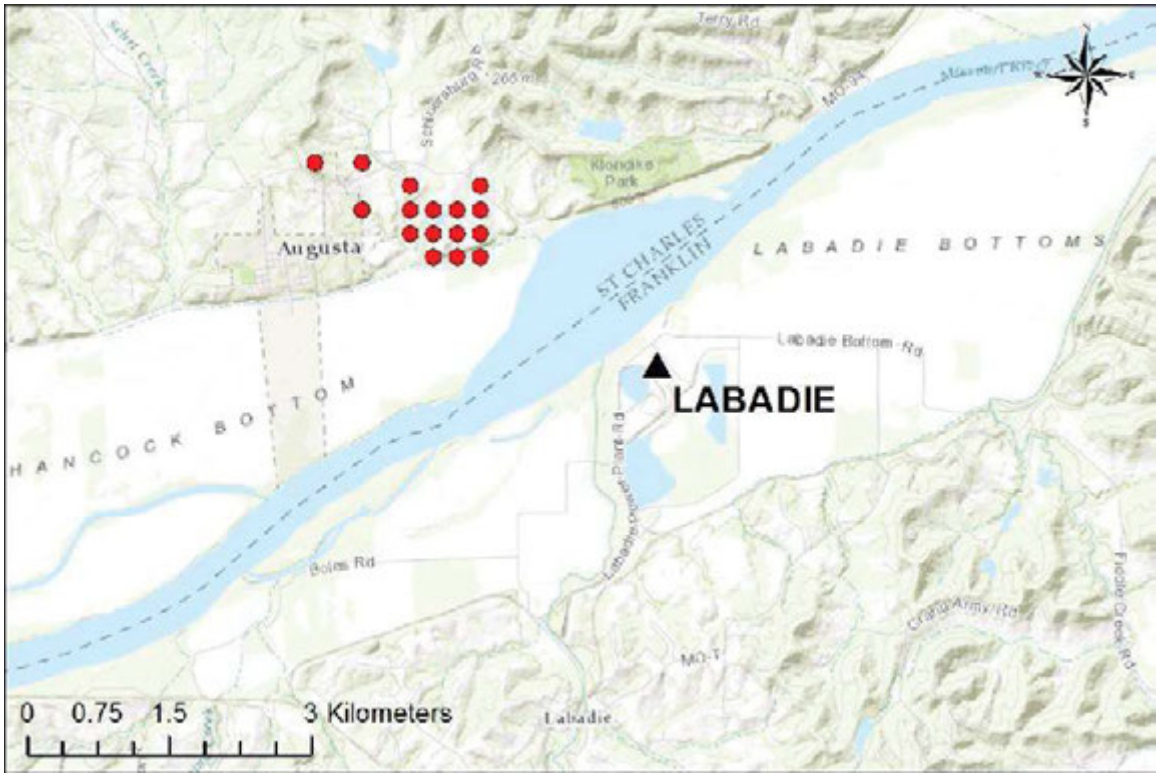

Figure 1. Violating receptors in MDNR's modeling of Labadie's emissions using the current version of AERMOD with the beta LOWWIND3 option employed.

[26] Modeling files that reflect MDNR's modeling with the use of beta options proposed by Ameren are attached hereto as Appendix C, Exhibit 3.
[27] Modeling files that reflect Sierra Club's modeling with the use of beta options proposed by Ameren are attached hereto as Appendix C, Exhibit 4

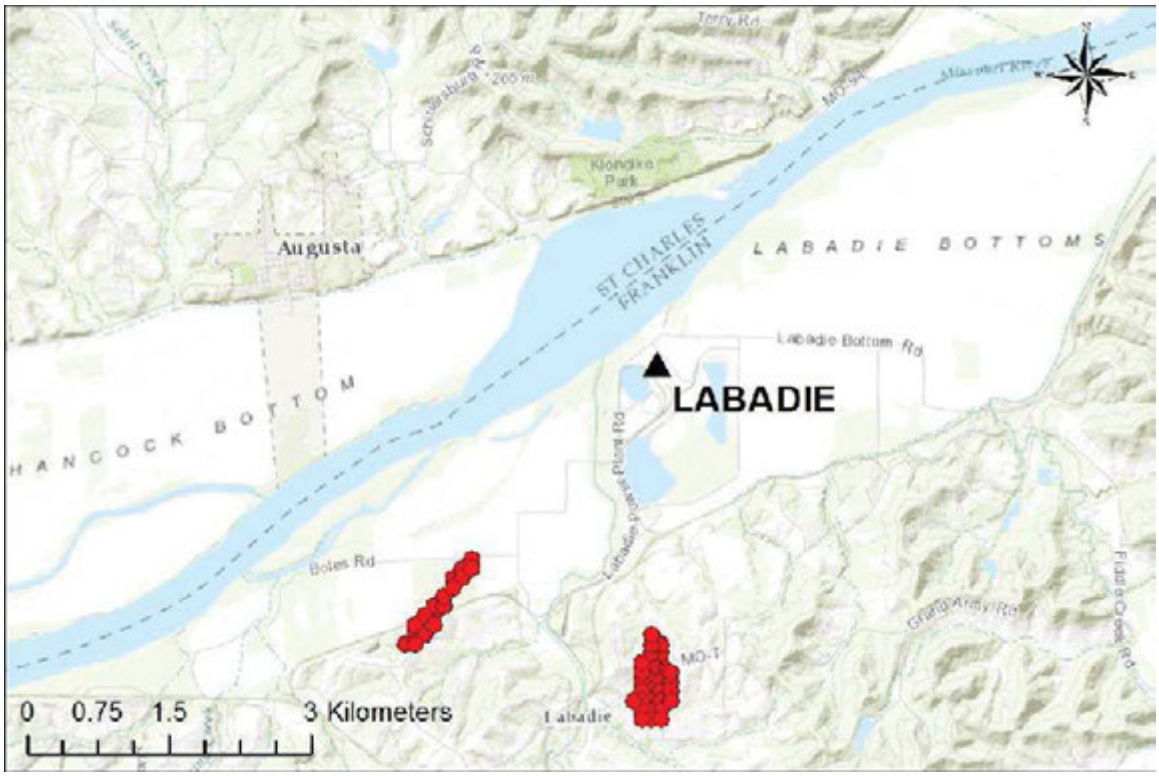

Figure 2. Violating receptors in Sierra Club's modeling of Labadie's emissions using the current version of AERMOD with the beta LOWWIND3 option employed.

B. Ameren's Modeling Inappropriately Relies Upon Other Changes to MDNR's Model, In Addition to the Use of Beta Options.

Favorable disposition of MDNR's request that EPA consider the use of beta options to model Labadie's emissions would not, by itself, get Ameren to its desired goal of an attainment (or unclassifiable) designation at Labadie. Ameren's modeling shows attainment not strictly because it used the beta options, but also because it made several other changes to MDNR's model in a seemingly deliberate effort to achieve its desired result. That is, it appears to have worked backwards from the result it wanted the model to show (i.e., attainment) to the inputs necessary to obtain those results. This is not how a legitimate modeling evaluation is performed, and EPA should reject it.

That Ameren may have worked backwards from its desired result is strongly suggested by the scant justification provided for two of the changes it made to MDNR's model. Ameren did not provide any justification for merging the emissions from units 3 and 4, which have separate flues housed in a common shell, and modeling them as a single release point. It simply stated that merging the flues "is allowed by EPA precedent" and cited EPA Model Clearinghouse Report 91-II-01.[28] However, Model Clearinghouse Reports provide EPA's interpretation of modeling

[28] Ameren Services, Key to Files, 1-Hour SO2 Modeling for Labadie Power Plant, Dispersion Modeling Files (Aug. 2015) at 1, available at http://dnr.mo.gov/env/apcp/docs/appndx-g-modeling-reports.pdf (see page G-352).

guidance as it applies to specific applications of air dispersion models. While often relevant to other, similar applications, they do not serve as guidance of general applicability. Furthermore, Model Clearinghouse Report 91-II-01 relates to the modeling of an unspecified stationary source using an unspecified model, years before AERMOD was developed and adopted as a preferred model by EPA.[29] Therefore, its relevance, if any, to merging the emissions from units 3 and 4 when using AERMOD to model Labadie's emissions for purposes of determining NAAQS compliance is speculative at best.[30]

Likewise, as justification for using background concentrations based on an ambient monitor in Nilwood, Illinois instead of the closer East St. Louis monitor used by MDNR, Ameren simply stated that because Labadie is in a rural area with no other nearby sources, "using background data from an urban monitor such as East St Louis is conservative," and that the Nilwood monitor "is located in a rural area of Illinois, similar to that of Labadie."[31] However, while Nilwood is in agricultural Macoupin County, manufacturing is the dominant industry in Franklin County.[32] Moreover, Labadie is just a few miles west of St. Louis County, the most populous county in the St. Louis Metropolitan Area, and directly south of St. Charles County, one of the fastest-growing counties in the country.[33] This suggests that background concentrations in the Labadie area may be influenced by nearby urban and manufacturing sources that do not affect the more distant, agriculturally-based Nilwood monitor, which would make background concentrations based on the Nilwood monitor unrepresentative of the Labadie area. Sierra Club believes MDNR's sector analysis effectively eliminated known SO_2 source influences on the East St. Louis monitor and that, given its closer proximity to Labadie, the East St. Louis monitor is more representative of background concentrations in the Labadie area than the Nilwood monitor.

Ameren's breezy explanation of its changes to MDNR's model inputs led EPA to state, "we believe further justification would be needed to support the background value used and the merging of adjacent stacks."[34] Sierra Club agrees.

In addition, further justification is needed to support Ameren's calculated hourly exit velocities. Sierra Club does not object to Ameren's use of hourly stack parameters (temperature and exit velocity). However, Ameren's hourly exit velocities were calculated from "actual" stack flows, which were calculated from standard stack flow data available from EPA's Emissions Modeling Clearinghouse using the formula:

$V_a = T_a * V_s / T_s$

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[29] Development of AERMOD did not commence until 1991 and it was not adopted as EPA's preferred model for regulatory dispersion modeling until 2005. Therefore, it could not have been used in the permit application that was the subject of Model Clearinghouse Report 91-II-01.

[30] The configuration of the stacks at the source discussed in the report was different from the configuration of the stacks at Labadie, and the report concluded that they could be merged based on an unverified assumption about the separation distance between the stacks relative to the lesser dimension of nearby structure(s), and only if the flow rates and temperatures were always the same for all three stacks. It is not known whether these conditions are met at Labadie.

[31] AECOM, Characterization of 1-Hour SO_2 Concentrations in the Vicinity of the Labadie Energy Center (September 2015) at 2-2, available at http://dnr.mo.gov/env/apcp/docs/appndx-g-modeling-reports.pdf (see page G-260).

[32] St. Louis Regional Chamber, Demographics, available at http://www.stlregionalchamber.com/regional-data/demographics, attached hereto as Appendix C, Exhibit 5.

[33] *Id*.

[34] *Draft TSD* at 22.

where
V_a = actual stack flow (acfh)
V_s = standard stack flow (scfh)
T_a = actual stack temperature (absolute Rankine or Kelvin)
T_s = standard stack temperature (absolute Rankine or Kelvin)

Based on information provided by EPA, the stack temperatures Ameren used in its "actual" stack flow calculations were measured about half-way up the stack, at or near the center.[35] However, recent CEMS Relative Accuracy Test reports for Labadie generally show a decreasing temperature gradient from the center of the stack to the stack wall.[36] Temperatures in tall stacks also tend to decrease from base to tip.[37] Therefore, the stack temperatures Ameren used to calculate "actual" stack flows were most likely higher than true exit temperatures, resulting in artificially high "actual" stack flows. And because Ameren used its calculated "actual" stack flows to calculate its hourly exit velocities, those velocities are most likely artificially high as well, resulting in greater dispersion and lower modeled concentrations than is truly occurring. Sierra Club believes that absent accurate temperature data, standard stack flows should be used to calculate hourly exit velocities.

C. Absent Each and Every One of Ameren's Poorly-Justified Changes to MDNR's Model, Ameren's Beta Options Model Shows Nonattainment.

Unpacking Ameren's modeling reveals why, in addition to employing the beta options, Ameren made other poorly-justified changes to MDNR's model. It took using the current version of AERMOD with the beta LOWWIND3 option employed, coupled with merging the emissions from units 3 and 4, changing the background concentration data source to a remote, agriculturally-sited monitor, and calculating actual stack flows in a manner that inflates exit velocities and dispersion in order for Ameren's modeling to (just barely) suggest attainment. With these changes Ameren's model predicts a peak 99th percentile 1-hour average concentration of 193 ug/m^3, which is just 3.2 ug/m^3 below the NAAQS.

Reverse *any* of the changes Ameren made to MDNR's model and its demonstration of attainment collapses like a house of cards. We ran Ameren's beta options model three times using all of Ameren's inputs, except that we reversed, one at a time, the three changes Ameren made to MDNR's model (beyond the use of the current version of AERMOD with the beta options employed). When Ameren's model is run exactly as Ameren ran it, except that units 3 and 4 are modeled as separate release points, it predicts a peak 99th percentile 1-hour average concentration of 225.2 ug/m^3.[38] When Ameren's model is run exactly as Ameren ran it, except

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[35] Lance Avey, personal communication, January 15, 2016.
[36] *Id*.
[37] *Id*.
[38] Modeling files that show Ameren's beta options model except that units 3 and 4 are modeled as separate release points are attached hereto as Appendix C, Exhibit 6. Because units 3 and 4 are combined in Ameren's hourly rate file, we do not have hourly stack temperatures and velocities (based on actual stack flows) for units 3 and 4, nor are we able to back-calculate them. Therefore, we used the hourly stack parameters for the combined stack ("lab34") for both units to evaluate the effect of modeling them separately. Given that the combined stack parameters were derived by averaging the parameters for units 3 and 4, this should provide a reasonable approximation.

that hourly velocities are calculated from standard stack flows from EPA's Emissions Modeling Clearinghouse, it predicts a peak 99th percentile 1-hour average concentration of 226.4 ug/m3.[39] And when Ameren's model is run exactly as Ameren ran it, except using MDNR's background concentration based on the East St. Louis monitor, it predicts a peak 99th percentile 1-hour average concentration of 198 ug/m3.[40] These results, all of which are above the NAAQS, are summarized in Table 1. Violating receptors under each scenario are shown in Figures 3, 4, and 5, below.

Table 1. Results of Ameren's Beta Options Model With Each Change Separately Reversed

Modeling Run	Emissions From Units 3 & 4	Flow Used to Calculate Exit Velocities	Background Monitor Used	Peak 99th Percentile 1-Hour Concentration (µg/m3)	Attainment? (Yes/No)
Ameren's Modeling as Submitted	Merged	Actual	Nilwood, IL	193.0	Yes
Emissions From Units 3 & 4 Split	Split	Actual	Nilwood, IL	225.2	No See Figure 3
Standard Flow Used to Calculate Velocities	Merged	Standard	Nilwood, IL	226.4	No See Figure 4
MDNR Background Monitor	Merged	Actual	East St. Louis, IL	198.0	No See Figure 5

[39] Modeling files that show Ameren's beta options model except that hourly velocities are calculated from standard stack flows are attached hereto as Appendix C, Exhibit 7.
[40] Modeling files that show Ameren's beta options model except using MDNR's background concentrations from the East St. Louis monitor are attached hereto as Appendix C, Exhibit 8.

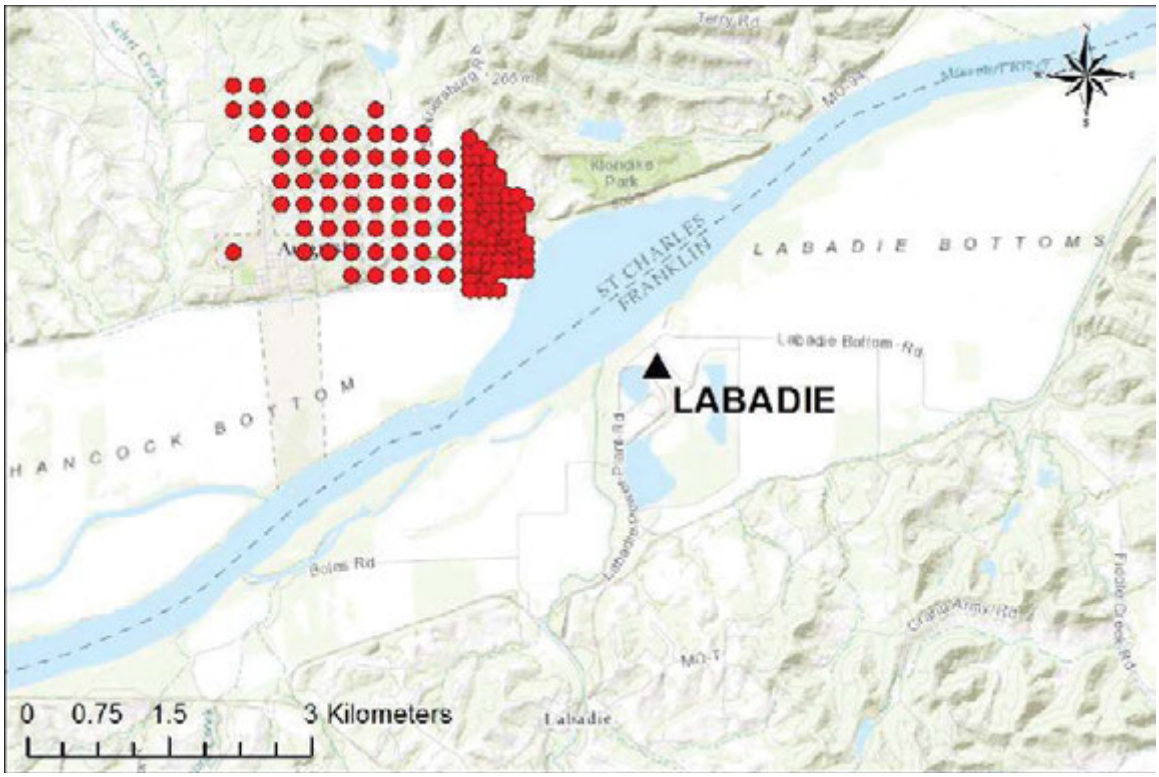

Figure 3. Violating receptors in Ameren's beta options modeling of Labadie's emissions when units 3 and 4 are modeled as separate release points.

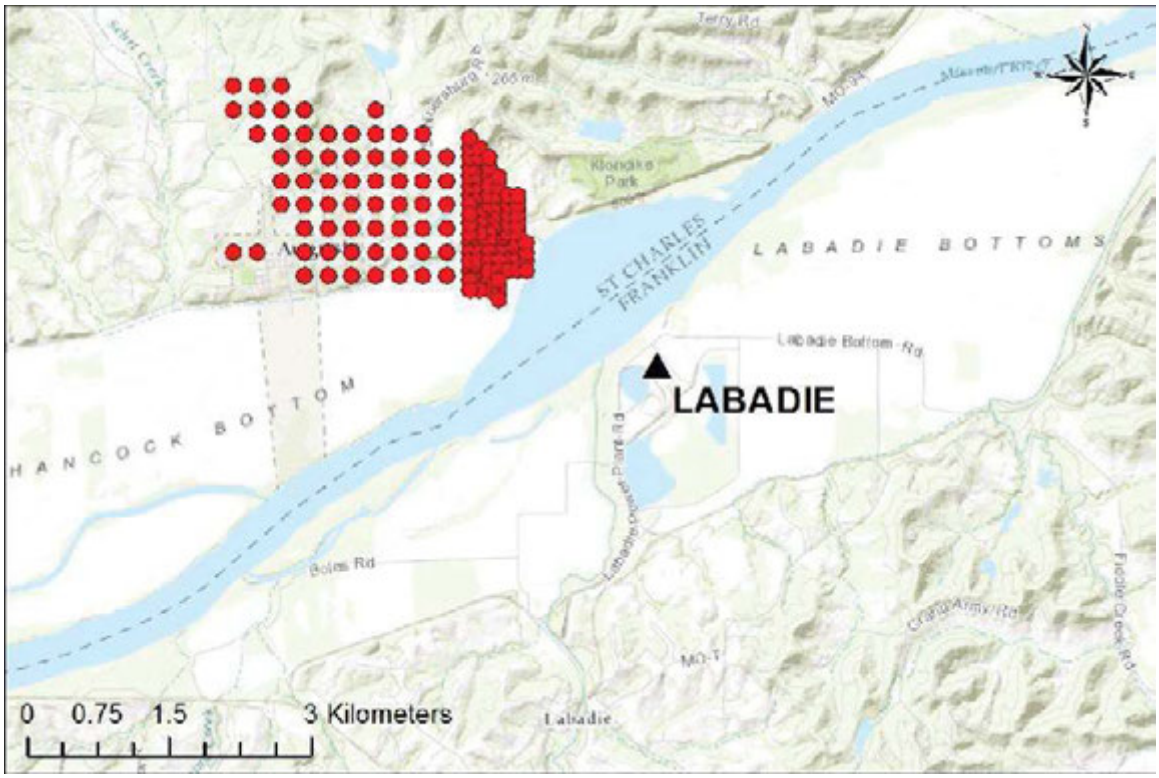

Figure 4. Violating receptors in Ameren's beta options modeling of Labadie's emissions when velocities calculated from standard stack flows are used.

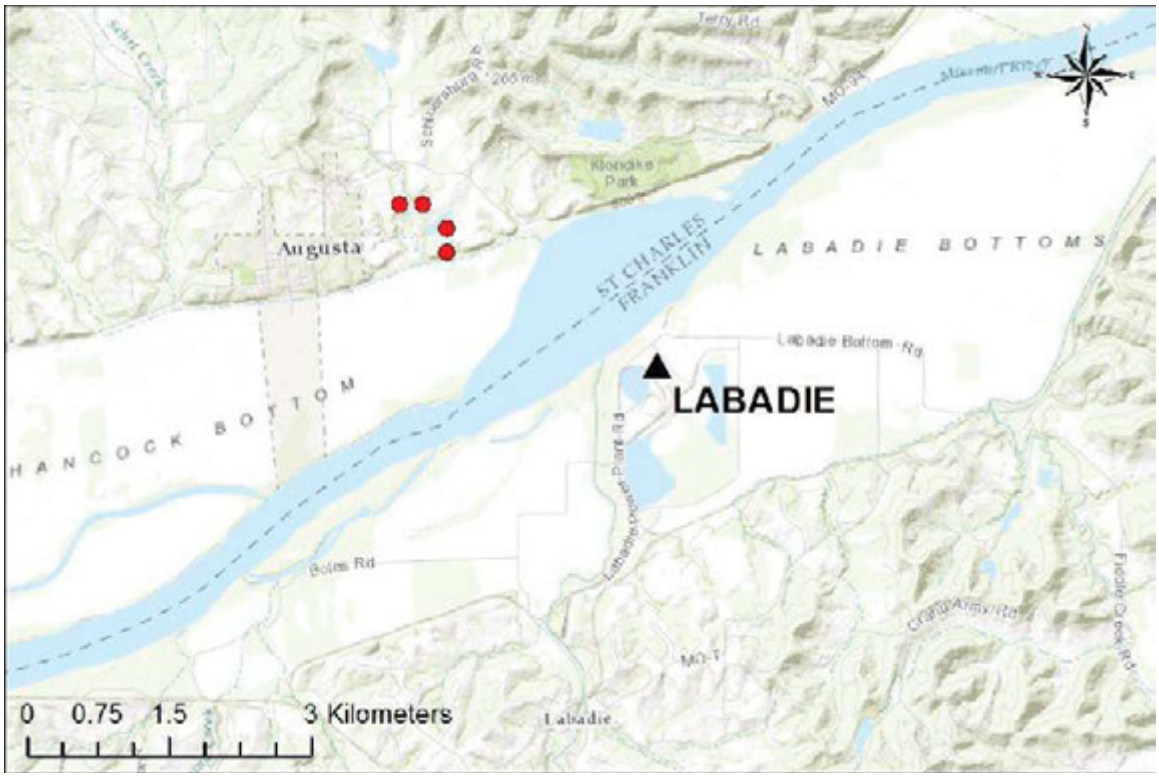

Figure 5. Violating receptors in Ameren's beta options modeling of Labadie's emissions when MDNR's fixed background based on the East St. Louis monitor is used.

III. Ameren's Monitoring Data Do Not Provide Convincing Evidence That The Area Around the Labadie Plant Is In Attainment.

In addition to modeling, Ameren is attempting to use limited monitoring data it has collected to characterize SO_2 concentrations around the Labadie plant and argue that the area is in attainment. Ameren has installed two monitors near Labadie—dubbed Valley and Northwest—and has been collecting ambient SO_2 data since April 2015. Ameren has also been collecting met data at the Valley site since that time.[41]

For the 8-month period ending in December 2015, neither the Valley nor the Northwest monitor recorded any 1-hour SO_2 concentrations above the NAAQS. The highest concentrations recorded at the Valley and Northwest sites during that time were 56 ppb and 38 ppb, respectively, levels Ameren claims "clearly indicate attainment by a wide margin."[42] However, eight months of monitoring data do not and cannot demonstrate attainment of the NAAQS. Because the form of the NAAQS is the three-year average of the 99th percentile of daily maximum 1-hour SO_2 concentrations, three full years of monitoring data are required to calculate a design value for comparison to the NAAQS. Hence, the eight months of data on which Ameren places great reliance is less than 25 percent of the data necessary to calculate a design value. If monitored

[41] The Valley monitor has not been in operation since late December 2015 due to flood damage.
[42] AECOM, Modeling and Monitoring SO_2 Characterization for the Labadie Energy Center (Feb. 9, 2016) at 6.

concentrations are higher in 2016 and/or 2017 than they were in 2015, the design value for one or both monitors could exceed the NAAQS once the requisite three years of data have been collected.

Furthermore, the Labadie monitors are not sited in areas of expected peak SO_2 concentrations – based on modeling performed by Ameren itself for monitor siting purposes and also based on the modeling performed more recently by MDNR for area designation purposes – and therefore should not be relied upon for determining NAAQS compliance.[43]

Ameren now claims that their monitor locations "correspond to distances and directions expected to be in peak impact locations based upon sectors of peak frequencies of wind data from an historical 85-m on-site meteorological tower."[44] It also claims that winds at the 94-m level predicted by recent Weather Research Forecast ("WRF") modeling for 2015 are consistent with the historical 85-m on-site wind data and that both data sets "support the selection of the monitor sites due to frequent winds from the south and the west."[45]

Not so. Wind roses for the historical on-site meteorological tower and the recent WRF modeling show that *the sectors of peak wind frequencies do not include either of the Labadie monitors*, further evidence that the monitors are not located in expected peak SO_2 concentration areas. These wind roses and the five peak wind frequency sectors for each are shown in Figures 6 and 7, below. The peak wind frequency sectors (N, NNE, NE, E, and NNW) collectively contain upwards of 50 percent of all hourly winds but do not include either of the monitors. The same wind roses and the wind frequency sectors that do include the monitors are shown in Figures 8 and 9, below. The two sectors that include the monitors each contain just 6 percent (+/-) of all hourly winds.

The wind rose for Ameren's Valley met station shows a similar pattern. This wind rose and the five peak wind frequency sectors for it are shown in Figure 10, below. The peak wind frequency sectors (N, NNE, NE, SSW, and NNW) are the same as the peak wind frequency sectors for the historical on-site meteorological tower and the recent WRF modeling with one exception—the the SSW sector replaces the E sector—and they collectively contain over 50 percent of all hourly winds but do not include either of the monitors. The same wind rose and the wind frequency sectors that do include the monitors are shown in Figure 11, below. The two sectors that include the monitors each contain closer to 5 percent of all hourly winds.

[43] In addition to the comments herein, Sierra Club's critique of the monitor locations are set forth in comments previously submitted to MDNR and attached hereto as Attachment C, Exhibit 9.
[44] AECOM, Modeling and Monitoring SO2 Characterization for the Labadie Energy Center (Feb. 9, 2016) at at 5.
[45] *Id*. at 12.

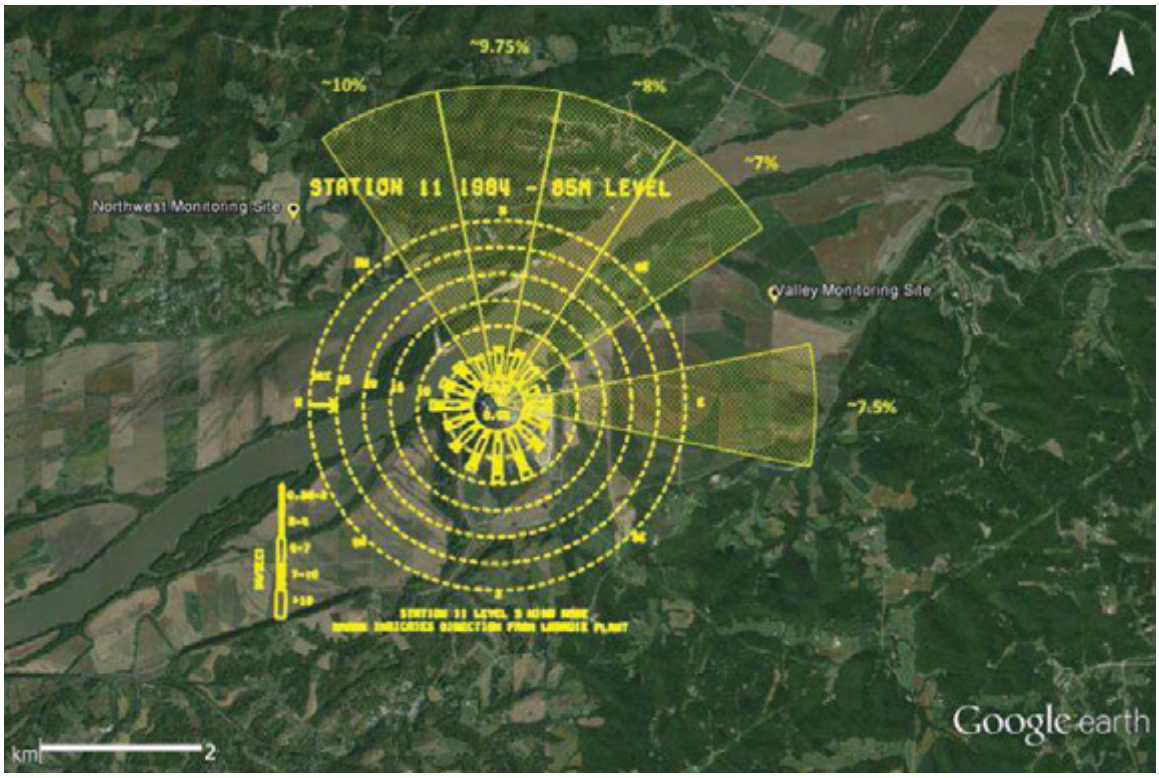

Figure 6. Wind rose for the historical on-site meteorological tower showing the five highest frequency wind sectors and the percent of hourly winds each sector contains.

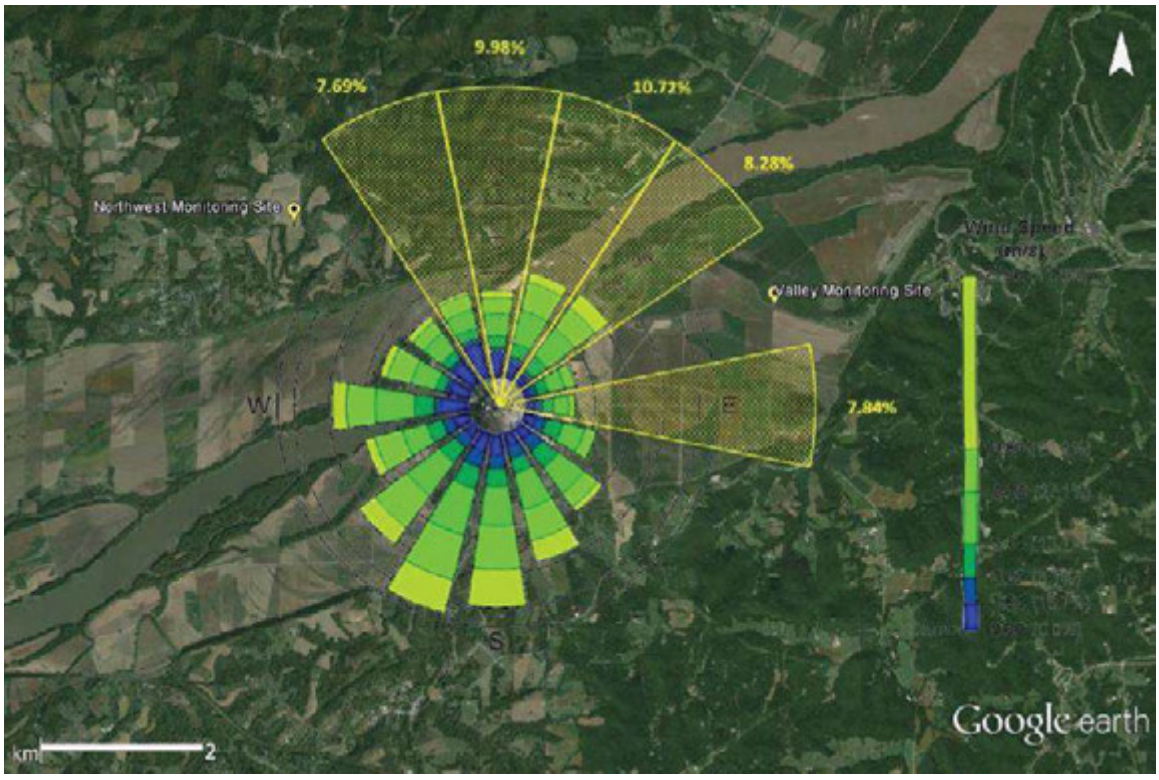

Figure 7. Wind rose for Ameren's WRF modeling showing the five highest frequency wind sectors and the percent of hourly winds each sector contains.

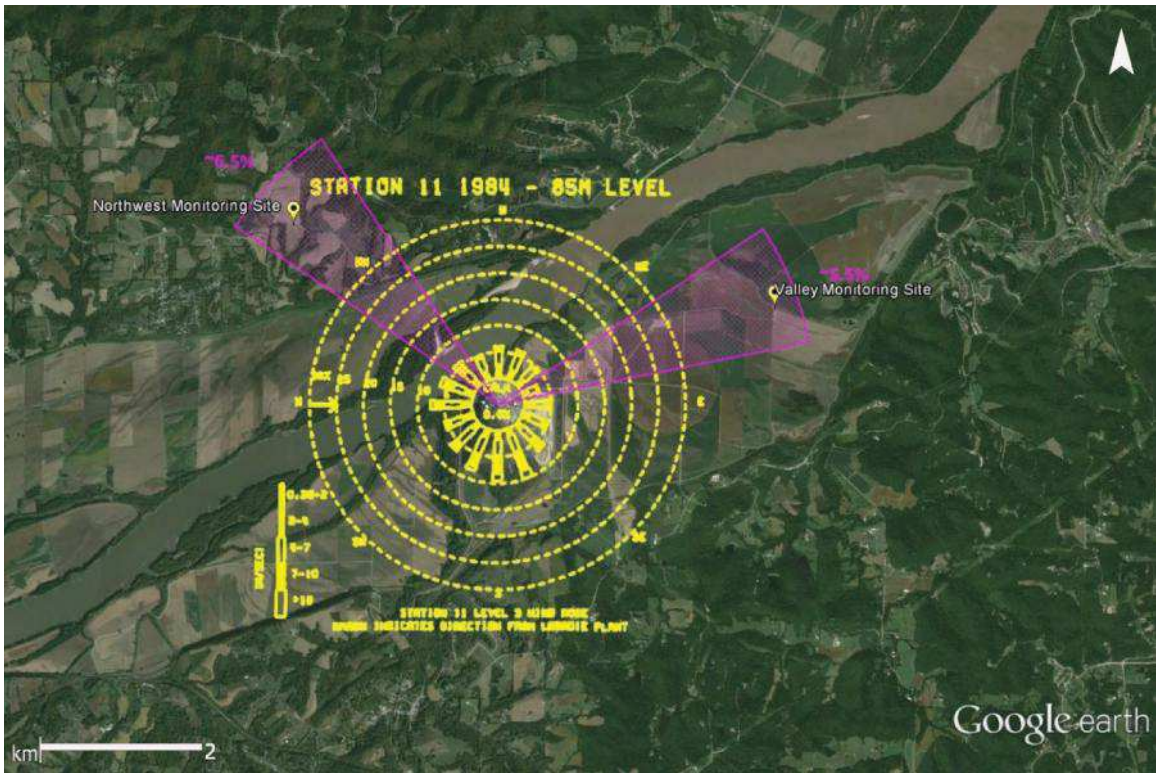

Figure 8. Wind rose for the historical on-site meteorological tower showing the wind frequency sectors containing the Labadie monitors and the percent of hourly winds those sectors contain.

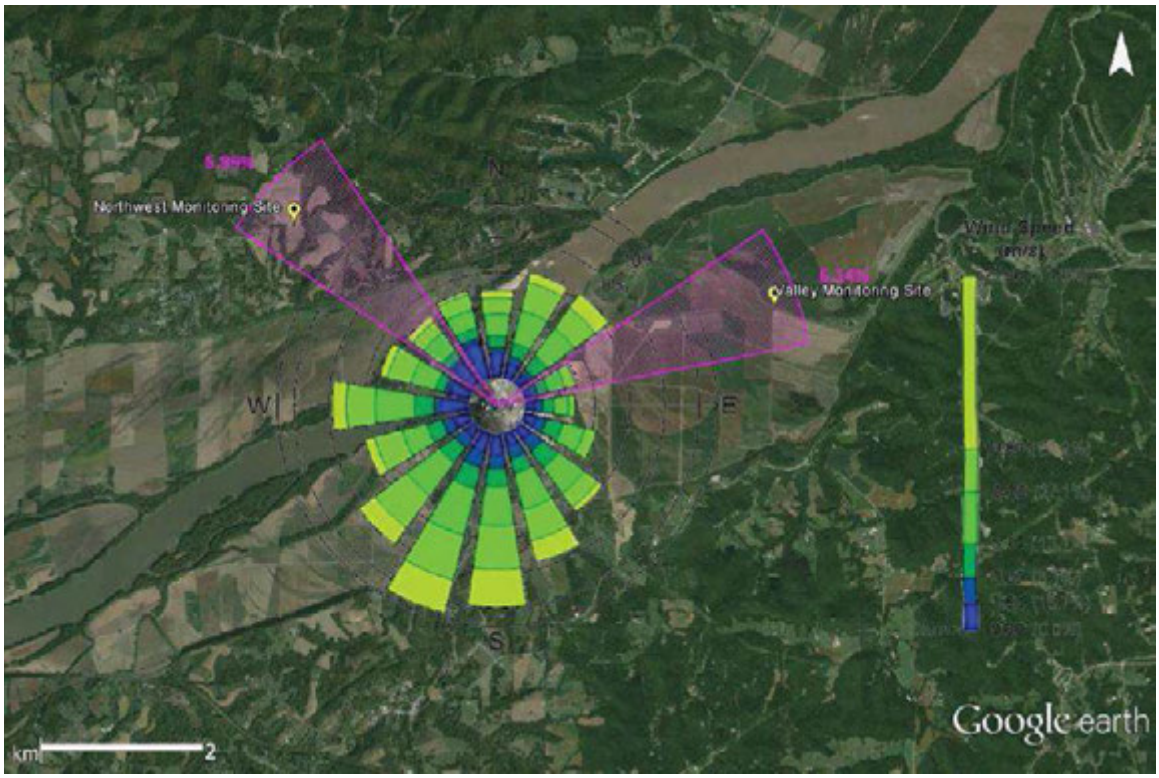

Figure 9. Wind rose for Ameren's WRF modeling showing the wind frequency sectors containing the Labadie monitors and the percent of hourly winds those sectors contain.

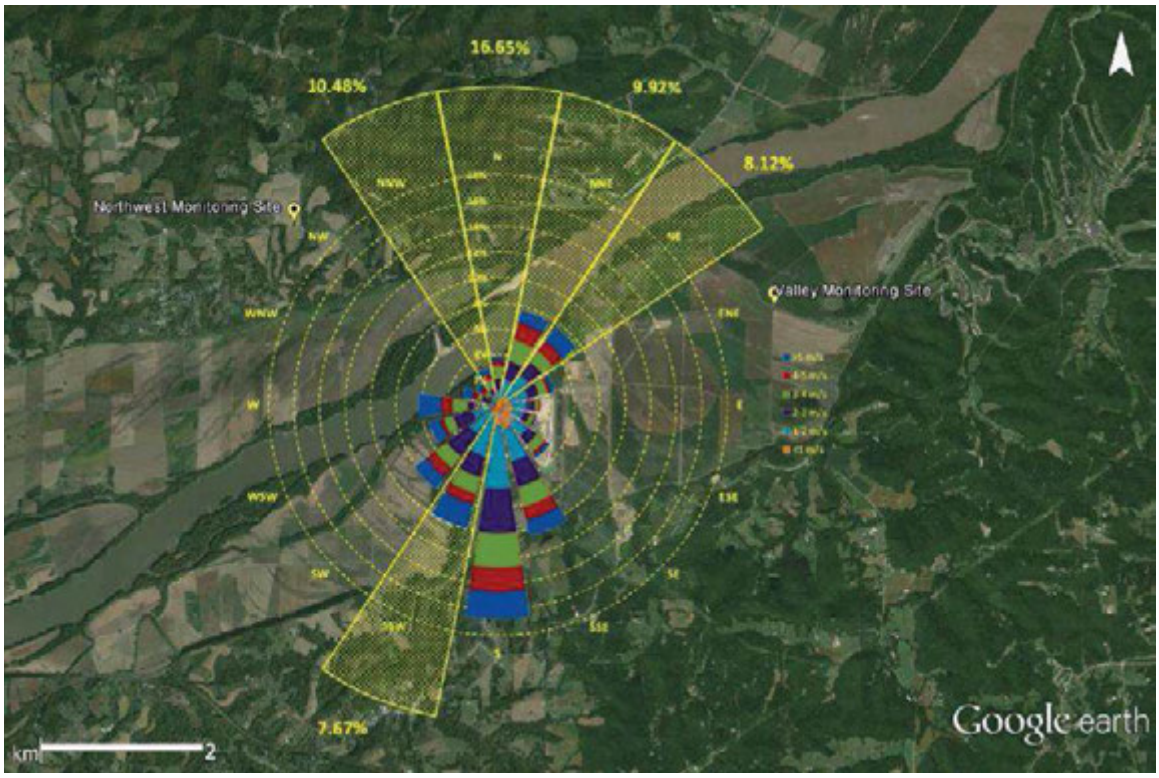

Figure 10. Wind rose for Ameren's Valley met station showing the five highest frequency wind sectors and the percent of hourly winds each sector contains.

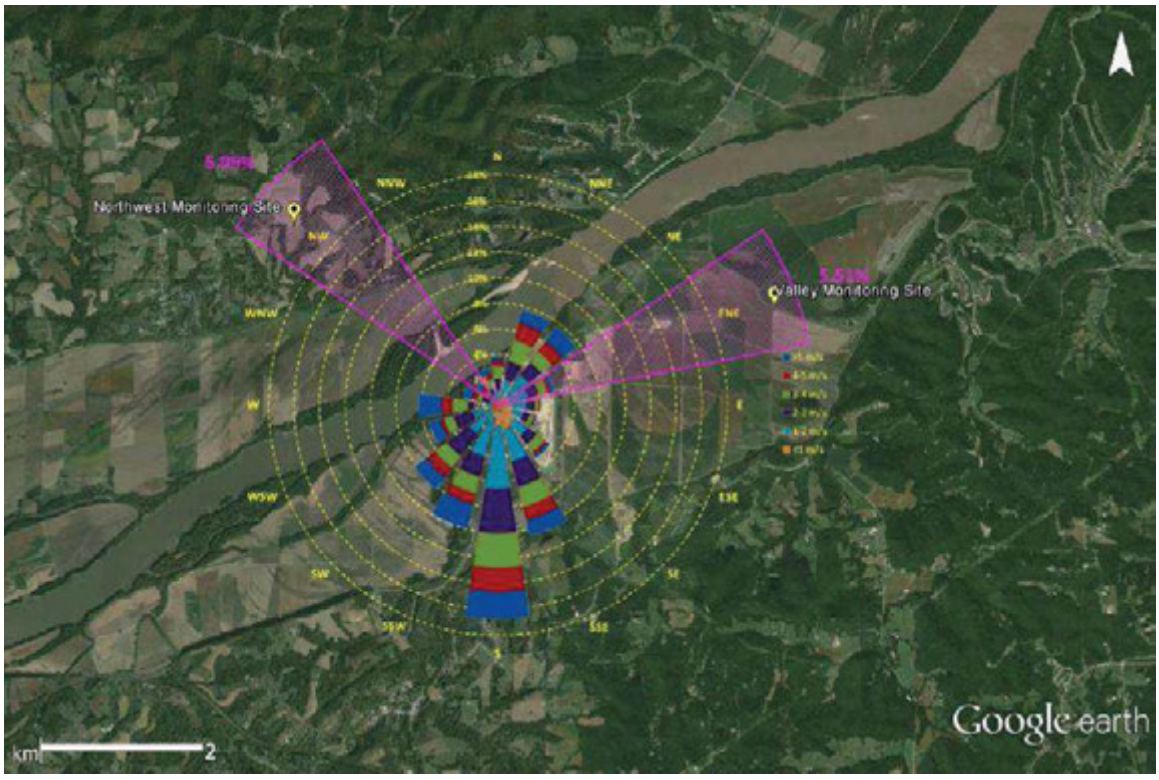

Figure 11. Wind rose for Ameren's Valley met station showing the wind frequency sectors containing the Labadie monitors and the percent of hourly winds those sectors contain.

Conclusion

The weight of evidence overwhelmingly supports EPA's proposed nonattainment designation of portions of Franklin and St. Charles Counties around the Labadie Energy Center for purposes of the 1-hour SO_2 NAAQS. The sound rationale set forth in EPA's Draft TSD is not undermined by Ameren's modeling machinations, using unapproved beta options as well as critical, unsupported changes to key model inputs, or by the limited monitoring data from Ameren's monitors, which are not sited in areas of expected peak SO_2 concentrations. Sierra Club urges EPA to finalize its proposed nonattainment designation for the area around the Labadie Energy Center.

Respectfully submitted,

Maxine I. Lipeles, Director
Kenneth Miller, P.G., Environmental Scientist
Interdisciplinary Environmental Clinic
Washington University School of Law
One Brookings Drive – CB 1120
St. Louis, MO 63130
314-935-5837 (phone); 314-935-5171 (fax)
milipele@wustl.edu

Attorneys for the Sierra Club

Washington University in St. Louis
SCHOOL OF LAW
Interdisciplinary Environmental Clinic

May 29, 2015

Ms. Patricia Maliro
Chief, Air Quality Monitoring Unit
Air Pollution Control Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176
Via email to patricia.maliro@dnr.mo.gov

Re: Comments on Ameren Missouri's Analysis of SO_2 and Meteorological Monitoring Stations Around Its Rush Island Energy Center

Dear Ms. Maliro:

On behalf of the Sierra Club, we submit the following comments on the report by Ameren Missouri titled Analysis of SO_2 and Meteorological Monitoring Stations Around Ameren Missouri's Rush Island Energy Center (Ameren's Monitoring Stations Analysis), which it submitted to DNR on or about April 29, 2015. The report describes the methodology Ameren used to determine the locations of three proposed ambient SO_2 monitoring stations and one meteorological monitoring station around its Rush Island Energy Center in Jefferson County, Missouri. Pursuant to a March 23, 2015 Consent Agreement with DNR, Ameren is required to install and begin operation of an SO_2 monitoring network around the Rush Island plant on or before December 31, 2015.

We believe Ameren's proposed monitoring sites should be rejected because they are located outside areas where peak 1-hour SO_2 concentrations are expected to occur based on the modeling described in Ameren's report. Furthermore, the modeling described in the report does not comport with EPA guidance on characterizing ambient air quality in areas around or impacted by significant SO_2 emission sources such as the Rush Island Energy Center and therefore may have failed to correctly identify areas of expected ambient, ground-level SO_2 concentration maxima. We also have concerns regarding the appropriateness of the meteorological data used in the modeling.

I. Based on the Modeling Described in Ameren's Report, the Proposed Monitoring Sites are Located Outside Areas Where Peak 1-Hour SO_2 Concentrations are Expected to Occur

The Consent Agreement (Appendix 1, ¶b) requires that "the number and location of SO_2 monitors and meteorological station(s) shall ensure that the approved SO_2 monitoring network represents ambient air quality in areas of maximum SO_2 impact from the Rush Island Energy Center." Ameren's Monitoring Stations Analysis (p. 3) describes the modeling it performed to

"delineate areas where maximum concentrations are expected to occur for this type of source and thus where SO_2 monitoring systems should be placed."

Unfortunately, the monitoring sites proposed by Ameren are not, in fact, located in "areas of maximum SO_2 impact from the Rush Island Energy Center," as required by the Consent Agreement.

Figures 1 through 4 below show the results of Ameren's modeling, which we derived using model input files provided by DNR. Figure 1 shows modeled SO_2 design values in the vicinity of the plant; Figure 2 shows receptors with modeled design values greater than or equal to 75 percent of the maximum modeled design value (146.1 ug/m^3); Figure 3 shows the number of times the model-derived maximum daily 1-hour concentration exceeded 75 percent of the maximum modeled design value at each receptor; and Figure 4 shows the receptors with the top 200, 100, 25, and 10 modeled design values. The locations of the plant and the proposed Fults, Natchez, and Weaver-AA SO_2 monitoring stations and the proposed Tall Tower meteorological monitoring station are shown on all figures for reference.

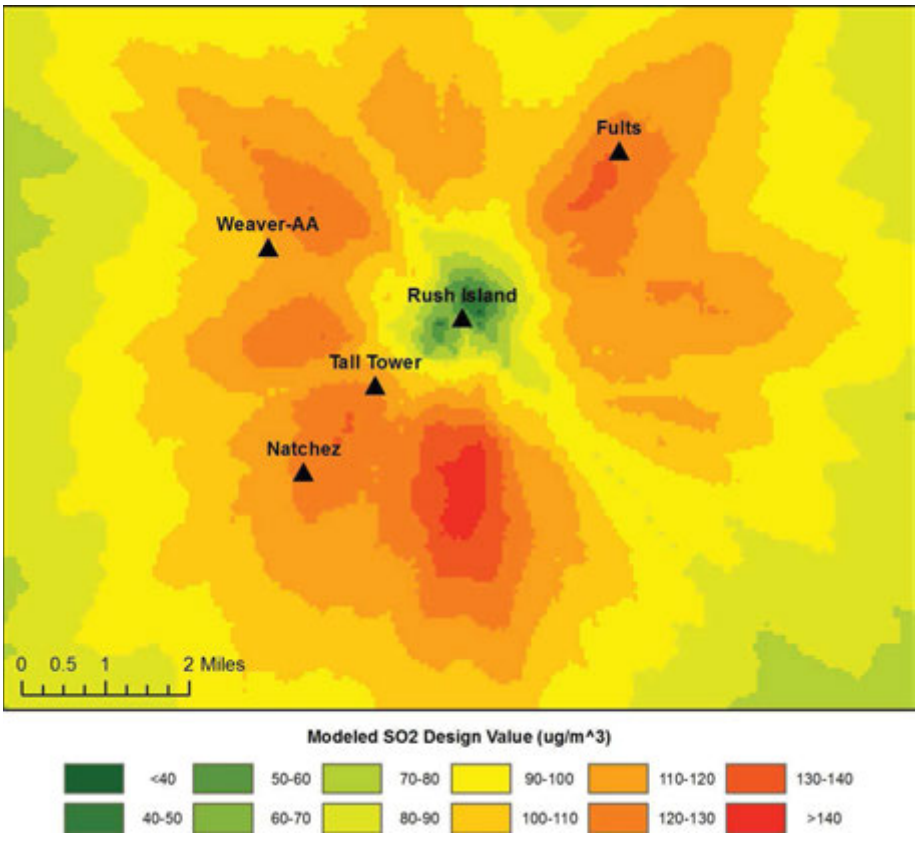

Figure 1. Modeled SO_2 design values in the vicinity of the Rush Island Energy Center.

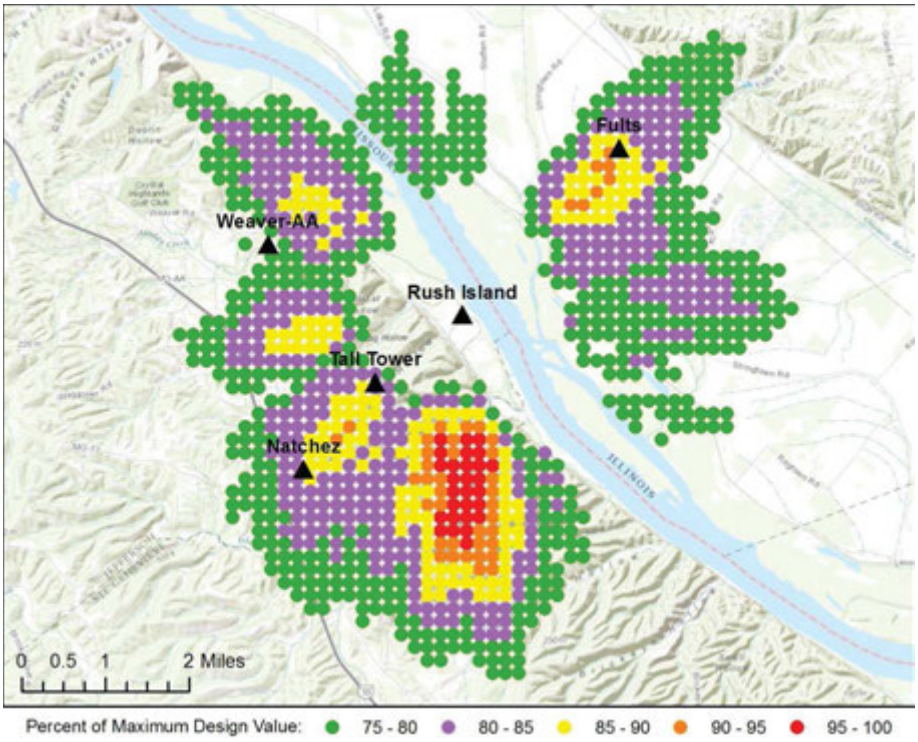

Figure 2. Receptors with modeled design values ≥75 percent of the maximum modeled design value.

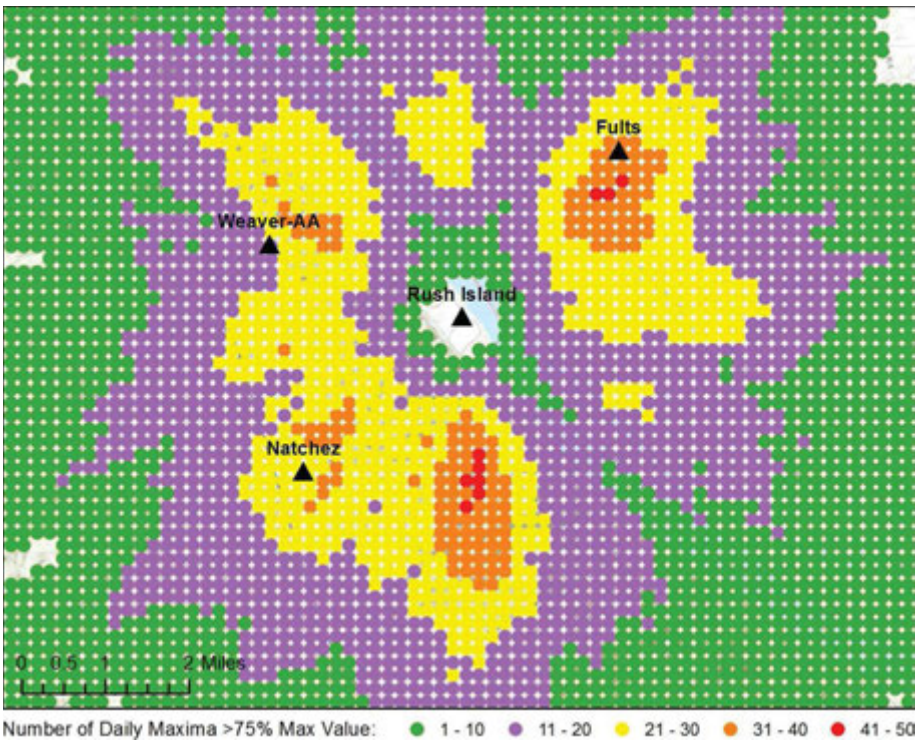

Figure 3. Number of maximum daily 1-hour concentrations ≥75 percent of the maximum modeled design value.

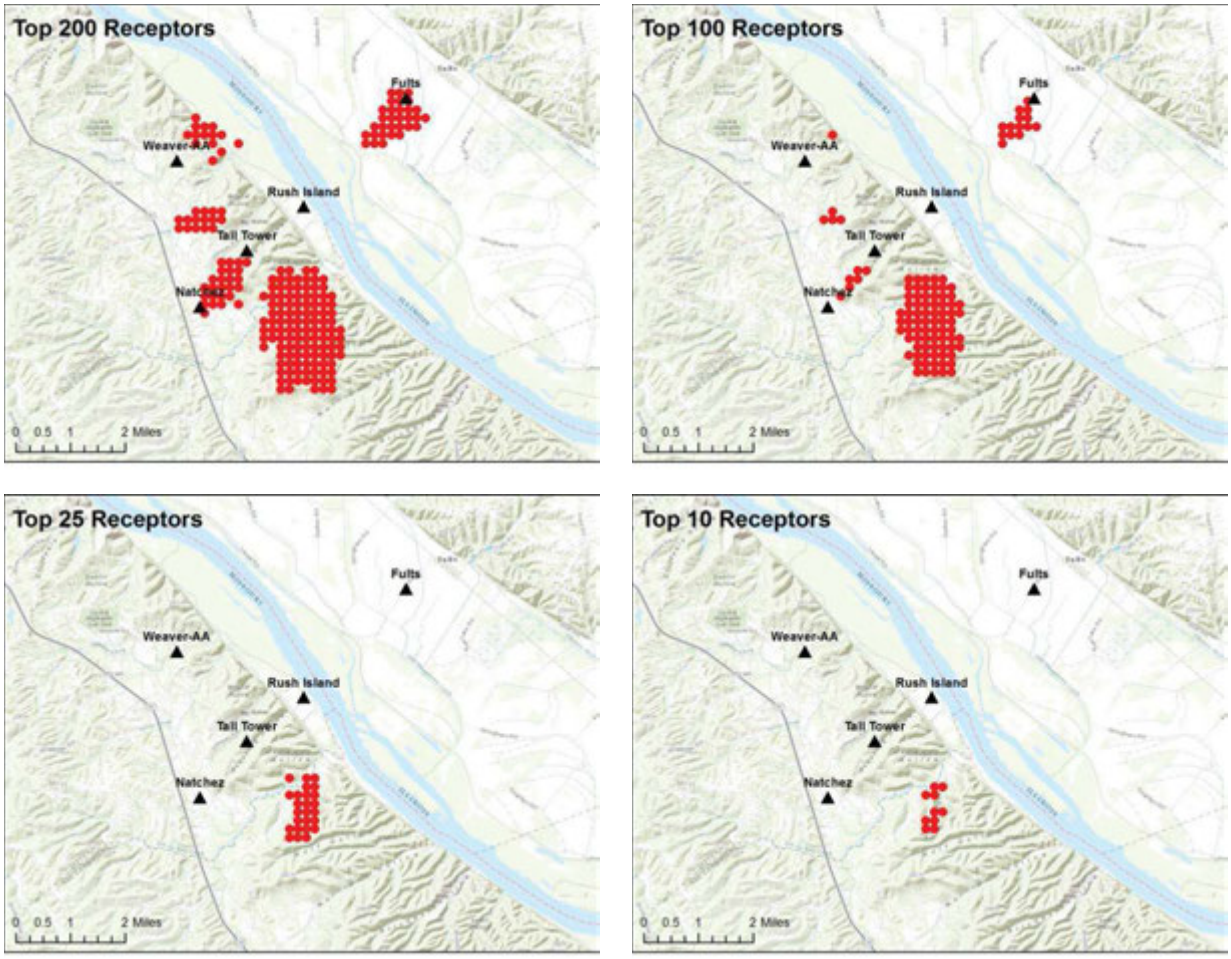

Figure 4. Receptors with the top 200, 100, 25, and 10 modeled design values.

Figures 1 through 4 all reveal a strikingly similar pattern regarding the areas where peak 1-hour SO_2 concentrations are expected to occur around the Rush Island Energy Center. There is a large area due south of the plant where modeled design values are the highest (in excess of 95 percent of the maximum modeled design value), where modeled maximum daily 1-hour concentrations frequently exceeded 75 percent of the maximum modeled design value, and where over half of the top 200 receptors (including all of the top 25 and three quarters of the top 100) are located. There are also four other areas where modeled design values are slightly lower but still very high (in excess of 85 percent of the maximum modeled design value), where modeled maximum daily 1-hour concentrations frequently exceeded 75 percent of the maximum modeled design value, and where the rest of the top 200 receptors are located. These four areas, located northeast, northwest, west, and southwest of the plant, plus the area south of the plant where modeled design values are the highest, are where Ameren's modeling predicts peak 1-hour SO_2 concentrations are expected to occur. Monitoring stations located in these areas would have the greatest chance of identifying peak SO_2 concentrations in ambient air, which is the primary objective of source-oriented monitoring and an absolute necessity when monitoring to assess

compliance with the NAAQS. However, none of Ameren's proposed monitoring stations is located in any of these areas of highest expected concentrations.

The most glaring omission is that there is no proposed monitoring station in the large area of highest expected concentrations south of the plant. This omission renders the proposed monitoring network inadequate for its intended purpose of assessing compliance with the NAAQS because a) NAAQS violations are most likely to occur in this area, and b) violations could occur in this area even when concentrations are below the NAAQS in other high concentration areas, given that the modeling predicts lower SO_2 concentrations in those areas. Ameren's Monitoring Stations Analysis claims that this area is "not accessible" because it hosts an industrial plant (Holcim). The Analysis does not indicate whether Ameren sought Holcim's permission to site a monitor on the Holcim property, and does not delineate the Holcim property boundary in terms of the modeling results. In other words, it does not document the claim that this large area of maximum expected concentrations is inaccessible for monitoring. Nor does it evaluate the nearest non-Holcim site that might be available.

While we understand that the Consent Agreement between DNR and Ameren calls for monitoring, it requires that such monitoring "represents ambient air quality in areas of maximum SO_2 impact from the Rush Island Energy Center." If no monitoring site is in fact accessible in this large area of the very highest expected concentrations, then the proposed monitoring network will not fulfill Ameren's obligation under the Consent Agreement. Instead, DNR should employ modeling, which provides 360-degree coverage and can predict concentrations at otherwise-inaccessible locations, to ensure that SO_2 emissions from the Rush Island plant do not cause or contribute to NAAQS exceedances either inside or outside of the Jefferson County nonattainment area.

Furthermore, two of the proposed monitoring stations – Fults and Natchez – are located near but outside of areas of modeled peak concentration/high frequency instead of near the center of such areas, where concentrations are expected to be higher. The third proposed station – Weaver-AA – is located entirely outside of modeled peak concentration/high frequency areas. Figure 5 shows the locations of the proposed monitoring stations on a hybrid basemap comprised of Figures 1 (modeled design values) and 2 (receptors with modeled design values ≥75 percent of the maximum design value). Receptors that are among the 200 with the highest modeled design values are outlined for reference. All three monitoring stations could easily be sited in areas where higher 1-hour SO_2 concentrations are expected to occur with greater frequency, thereby increasing their chances of detecting any NAAQS exceedances that might occur around the Rush Island Energy Center. As discussed below, we urge DNR to consider these proposed optimized locations in lieu of Ameren's proposed Fults, Natchez, and Weaver-AA locations.

Fults – Of the three proposed monitoring stations, the Fults monitoring station is closest to an area where peak 1-hour SO_2 concentrations are expected to occur. However, moving the monitor less than one kilometer southwest of its current location would move it from an area with modeled design values in the 120-130 ug/m^3 range to an area with modeled design values in the 130-140 ug/m^3 range and place it near the center of a small group of receptors with modeled design values equal to 90-95 percent of the maximum modeled design value (the receptors

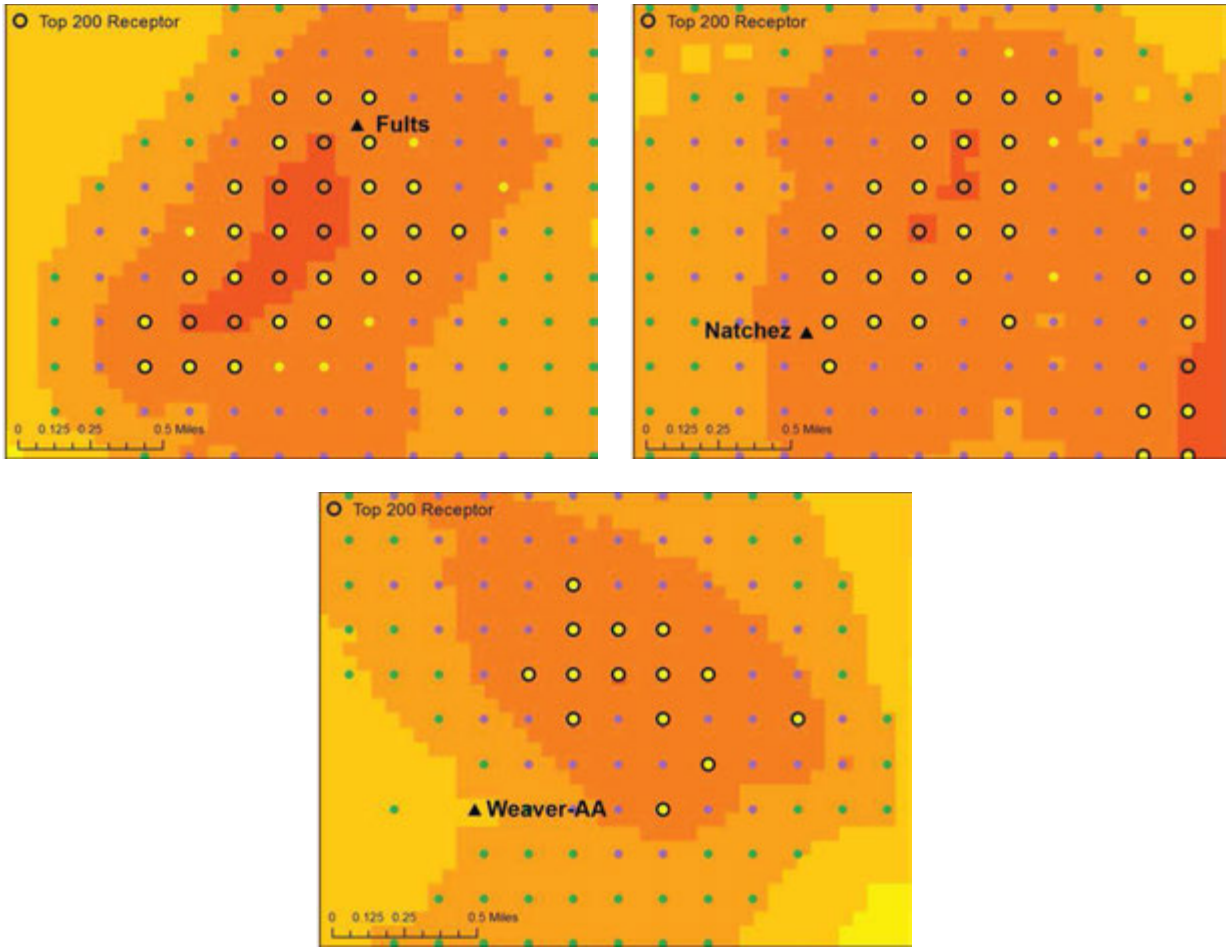

Figure 5. Modeled design values, receptors with design values ≥75 percent of the maximum modeled design value, and proposed monitoring station locations.

surrounding its current location generally have modeled design values equal to 85-90 percent of the maximum modeled design value). The entire area is floodplain/agricultural and Ivy Road, oriented northeast-southwest, runs through the middle of it, making the proposed optimized location as accessible as Ameren's proposed location and equally easy to provide power to.

Natchez – The Natchez monitoring station is outside/on the outer edge of an area where peak 1-hour SO_2 concentrations are expected to occur. Moving it approximately one kilometer northeast of its current location would move it from an area with modeled design values in the 120-130 ug/m^3 range to an area with modeled design values in the 130-140 ug/m^3 range, and place it between a pair of receptors with modeled design values equal to 90-95 percent of the maximum modeled design value (the receptors surrounding its current location have modeled design values equal to 80-90 percent of the maximum modeled design value). It would also move it to an area where higher concentrations are expected to occur with slightly greater frequency. The proposed optimized location is accessible via transmission right of way, and power is available along Dubois Creek Road to the south-southwest.

Weaver-AA – The Weaver-AA station is located completely outside of all areas where peak 1-hour SO2 concentrations are expected to occur. Modeled design values at its location are only in the 100-110 ug/m^3 range, and it is surrounded by receptors with modeled design values equal to just over 75 percent of the maximum modeled design value. Moving the monitor just over one kilometer east-northeast of its current location would place it in an area where modeled design values are 15-20 ug/m^3 higher, in the midst of a slightly dispersed group of receptors with modeled design values equal to 85-90 percent of the maximum modeled design value. At this optimized location, concentrations in excess of 75 percent of the maximum modeled design value are expected to occur roughly twice as often as at Ameren's proposed Weaver-AA location. The proposed optimized location is readily accessible via State Highway AA, and power is available along the highway.

Figure 6 compares the locations of Ameren's proposed Fults, Natchez, and Weaver-AA monitoring stations with optimized locations more likely to record maximum SO_2 concentrations in the area.

II. The Modeling Described in the Report Does Not Comport With EPA's Source-Oriented SO_2 Monitoring Guidance and Therefore May Not Correctly Identify Areas of Expected Ambient, Ground-Level SO_2 Concentration Maxima

EPA's SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (TAD) provides guidance on how to "appropriately and sufficiently monitor ambient air in areas proximate to or impacted by an SO_2 emissions source to create ambient monitoring data for comparison to the SO_2 NAAQS" and presents "recommended steps to aid in identifying source-oriented SO_2 monitor sites."[1] The modeling performed to determine the locations of the proposed ambient SO_2 monitoring stations around the Rush Island Energy Center fails to adhere to the TAD in two important respects: 1) it does not use hourly emission rates, which are readily available for Rush Island's boilers from EPA's online Air Markets Program Data tool; and 2) it does not include nearby sources that may contribute significantly to ambient SO_2 concentrations in the vicinity of the plant and therefore should be included in the modeling.

EPA suggests using hourly emissions when available in order to represent the variability of actual emissions as accurately as possible,[2] which is important given the short-term nature of the SO_2 NAAQS. However, instead of using readily-available hourly emissions as recommended by EPA's monitoring TAD, Ameren's modeling uses constant emission rates for Rush Island's boilers. The consequence of using constant rather than hourly emission rates is that the effects of the interaction between hourly emissions and hourly variations in meteorological parameters are not captured by the model, so that the predicted areas of peak concentration are primarily a function of the meteorology used. For example, if peak hourly emissions coincide with times when strong winds blow from a direction other than the prevailing wind direction, a model that uses hourly emission rates might predict peak concentrations in different areas than the same

[1] U.S. EPA, SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, Dec. 2013 Draft, at 2, available at http://epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf.
[2] *Id*. at 11, referencing U.S. EPA, SO_2 NAAQS Designations Modeling Technical Assistance Document, Dec. 2013 Draft, at 10, available at http://epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf.

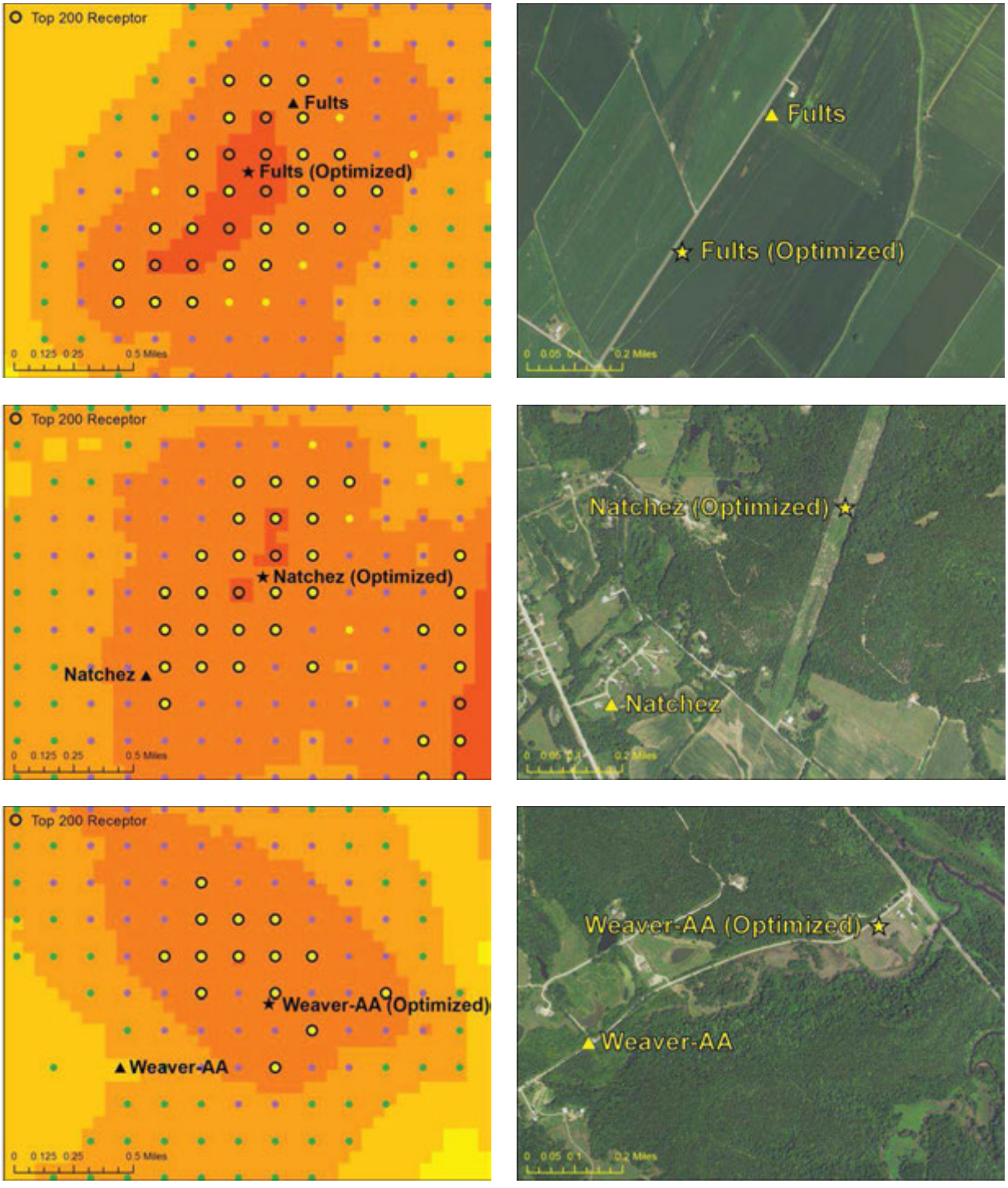

Figure 6. Current and optimized locations of the Fults, Natchez, and Weaver-AA monitoring stations

model would predict using constant emission rates. Therefore, using hourly emissions allows the areas where peak 1-hour SO_2 concentrations are expected to occur to be determined with greater confidence.

Regarding which sources to model, EPA suggests identifying and including all sources that may contribute significantly to ambient SO_2 concentrations – and thus to NAAQS exceedances – around the source of interest. The monitoring TAD notes that it is important to "understand the setting and surroundings of the SO_2 source" including determining "if the source is isolated or in an area with multiple SO_2 sources," and it affirms that the primary objective of monitoring is "to identify peak SO_2 concentrations in the ambient air that are attributable to an identified source *or group of sources*."[3] The Rush Island Energy Center is located in an SO_2 nonattainment area with numerous sources of varying magnitude. There are also a number of larger sources that are nearby but just outside of the nonattainment area, including River Cement, St. Gobain Containers, Holcim, Mississippi Lime, Dynegy's Baldwin Energy Complex, and Ameren's Meramec Energy Center. These sources may contribute significantly to ambient SO_2 concentrations in the vicinity of the Rush Island plant and should be included in the modeling unless it can be demonstrated that they do not have a significant influence on areas where peak 1-hour SO_2 concentrations are expected to occur.

III. The Meteorological Data Used in the Modeling May Not be Appropriate

Ameren's modeling uses National Weather Service (NWS) meteorological data from the Cahokia, Illinois airport located approximately 50 kilometers north of the plant. This is different from the meteorological data DNR used in its attainment demonstration modeling for the Jefferson County SO_2 nonattainment SIP. In its SIP modeling, DNR used onsite meteorological data from the now-closed Doe Run primary lead smelter in Herculaneum, approximately 18 kilometers northwest of the Rush Island plant. The Rush Island Energy Center is in the Jefferson County SO_2 nonattainment area, and the Jefferson County SIP states that the onsite meteorological data from Herculaneum is "considered more representative of the entire [nonattainment] area compared to a more distant NWS site."[4] Therefore, the Cahokia meteorological data used in Ameren's modeling may not be appropriate, particularly if – as suggested above – other nearby SO_2 sources are included in the modeling, given that DNR determined – based on the distribution of these sources – that the onsite Herculaneum meteorological data is more representative of the area that encompasses them.

Conclusion

Based on the modeling described in Ameren's report, the proposed locations of the Fults, Natchez, and Weaver-AA monitoring stations are not in modeled peak concentration/high frequency areas. Furthermore, Ameren has not proposed a monitoring station in the highest concentration area due south of the Rush Island Energy Center, citing the claimed but not

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[3] *Id*. at 2, 4 (emphasis added).

[4] DNR, Nonattainment Plan for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard, Jefferson County Sulfur Dioxide Nonattainment Area, May 28, 2015, at 26.

documented inaccessibility of potential monitoring sites in that area. The absence of a monitor in this large area of expected maximum concentration calls into question whether the proposed SO_2 monitoring network is an appropriate means of assessing compliance with the NAAQS in the area around the plant.

Ameren's proposed monitoring network does not fulfill its requirement under the Consent Agreement to install a monitoring network designed to record maximum expected SO_2 concentrations in the vicinity of the Rush Island plant. Nor is it designed to achieve Ameren's purported goal of obtaining "a good quality data set with representative SO_2 measurements and meteorological information"[5] or DNR's stated goal "to true-up modeling results further away from the Mott Street monitor … to confirm our assessment that the nonattainment area is in compliance with the 1-hour SO2 standard farther away from the violating monitor."[6]

We urge DNR to reject the proposed monitoring sites and require Ameren to add a monitoring station in the highest concentration area due south of the plant as well as to relocate the proposed Fults, Natchez, and Weaver-AA monitoring stations to the optimized locations shown in Figure 5. We also urge DNR to require Ameren to 1) rerun the air dispersion model described in the report using Rush Island's actual hourly emissions; 2) evaluate the effects of nearby interactive sources (including, at a minimum, River Cement, St. Gobain Containers, Holcim, Mississippi Lime, Dynegy's Baldwin Energy Complex, and Ameren's Meramec Energy Center) on modeled peak concentration/high frequency areas; and 3) evaluate the appropriateness of using meteorological data from the Cahokia, Illinois airport instead of Doe Run Herculaneum given DNR's determination that the latter is more representative of the modeled area.[7] We further urge DNR to require any necessary adjustments to the proposed monitoring network based on the results of these analyses.

Respectfully submitted,

Maxine I. Lipeles

Maxine I. Lipeles, J.D.
Ken Miller, P.G.
Interdisciplinary Environmental Clinic
Washington University School of Law

On behalf of the Sierra Club

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[5] DNR, Comments and Responses on Proposed Revision to Missouri State Implementation Plan – Nonattainment Plan for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard – Jefferson County Sulfur Dioxide Nonattainment Area, Comment #21, p. 10, available at http://dnr.mo.gov/env/apcp/docs/comments-and-responses-jeffco.pdf.

[6] *Id*., Response to Comment #4, p. 3.

[7] This analysis should consider and make use of the corrected Herculaneum meteorological data set processed in AERMET with the Bulk Richardson Number option invoked.

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Josh Tapp, Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR
Wendy Vit, Chief, Air Quality Planning Section, Air Pollution Control Program, DNR

June 28, 2016

Ms. Kyra Moore, Director
Air Pollution Control Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Re: Ameren's Comments on the MDNR 2016 Monitoring Network Plan

Dear Ms. Moore:

On behalf of Ameren Missouri, we appreciate this opportunity to comment on the "Missouri Department of Natural Resources, Air Pollution Control Program, 2016 Monitoring Network Plan" (monitoring plan) that details the establishment and maintenance of Missouri's air quality network.

After a careful review of the monitoring plan, Ameren offers these comments on the plan. Ameren fully supports the inclusion of the sulfur dioxide (SO2) monitoring networks for the Labadie and Rush Island Energy Centers. Ameren is committed to operate and maintain the monitoring networks consistent with requirements in federal regulation 40 CFR 58 as well as the state approved Quality Assurance Project Plans (QAPP) and the Department's Quality Management Plan (QMP). As indicated by the inclusion of the Labadie and Rush Island monitoring networks in the 2015 monitoring plan, the locations of the monitors are appropriate to determine compliance with the National Ambient Air Quality Standard (NAAQS) for SO2. The monitoring plan states on page 6 that: "For decades Missouri has overseen ambient air monitoring sites operated by industrial sources for NAAQS compliance." Ameren asserts that the primary purpose of the Labadie and Rush Island monitoring networks are to demonstrate compliance with the National Ambient Air Quality Standard for SO2.

Ameren would like to clarify that even though the Department has chosen not to classify the Labadie and Rush Island monitoring networks as State and Local Air Monitoring Stations (SLAMS), the monitoring networks fully meet the Network Design Criteria for Ambient Air Quality Monitoring in 40 CFR Part 58 Appendix D as well as the quality assurance provisions of 40 CFR Part 58 Appendix A. The Labadie and Rush Island monitoring networks meet the monitoring objectives and general criteria required of SLAMS ambient air quality monitoring stations as stated in Appendix D; the monitoring networks are designed to: (a) provide air pollution data to the general public in a timely manner; (b) support compliance with ambient air quality standards; (c) support air pollution research studies. Ameren suggests that the Department should classify the Labadie and Rush Island monitoring networks as SLAMS in lieu of industrial SO2 monitors. We make this assertion on the basis that the SO2 monitoring network design and Quality Assurance Project Plan, that meets the quality assurance provisions of 40 CFR Part 58 Appendix A, for both the Labadie and Rush Island SO2 monitoring networks were submitted to and approved by the MDNR prior to the promulgation of the revisions made to the provisions of 40 CFR 58 on March 28, 2016.

Specifically on page 18 of the monitoring plan states: "Regardless of EPA's designation status of the Labadie area, the department will continued to work with the Ameren UE to collect quality assured SO2 ambient air quality data and meteorological data near the Labadie Energy Center to provide quantifiable and useful technical information to supplement the ongoing 1-hour SO2 NAAQS implementation process." As you know the primary purpose of the Labadie monitoring network is to demonstrate compliance with the SO2 NAAQS. The monitoring network was in operation well in advance of the January 1, 2017 deadline under the final Data Requirements Rule (DRR).

Ameren would especially like to note that the one-hour SO2 ambient concentration data collected to date at each network are all below the SO2 NAAQS and have demonstrated a very high margin of compliance with the SO2 NAAQS.

Please contact me at your convenience if you have questions related to these comments or if you need any additional information.

Sincerely,

Steven C. Whitworth
Senior Director, Environmental Policy and Analysis

Cc: Patricia Maliro - MDNR