Appendix G: Written Public Comment Letters

This appendix provides copies of the 59 written comment letters received during the public comment period. In no particular order, they include:

- 4 letters (emails) from individual citizens - Fuller, Jones, Klein, and Leners.
- 1 letter from the National Park Service (NPS).
- 1 joint letter from the Conservation Organizations[1] (CO), which includes the March 14, 2023, *Review and Comments on Reasonable Progress Controls for the Iowa Regional Haze Plan for the Second Implementation Period,* by Victoria R. Stamper (the "Stamper Report"). The ~50 enclosures accompanying the joint letter and Stamper Report are available upon request.
- 1 letter from the Iowa Environmental Council (IEC).
- 52 letters from individual Sierra Club members.

[1] Sierra Club, National Parks Conservation Association, Coalition to Protect America's National Parks, and Iowa Interfaith Power & Light.

Johnson, Matthew <matthew.johnson@dnr.iowa.gov>

Sulfur dioxide emissions at MidAmerican plants

1 message

Patricia Fuller <patriciafuller1979@gmail.com>
To: matthew.johnson@dnr.iowa.gov

Thu, Feb 16, 2023 at 4:43 PM

Sulfur dioxide emissions at MidAmerican plants

Dear Mr. Johnson:
I am writing in response to the DNR's proposal to require MidAmerican to reduce their carbon dioxide emissions.. I live less than a mile from the Walter Scott Junior plant in Council Bluffs. I am 77 years old and currently getting yearly CT scans of my lungs. I am a non-smoker and my doctor has ordered the scans because of some possible pre-cancerous changes in my lungs. I often wonder if it's due to plant pollution from MidAmerican.

I am aware that sulfur dioxide does have the highest impact on the lungs for people who live near or work close to these pollution sources. I am also aware that it reduces lung function and may increase emergency room visitors visits for children, older adults and people with asthma. So I would welcome this reduction. There is no doubt that MidAmerican has the financial resources to correct this issue with major investors such as Berkshire Hathaway.

Sincerely
Patricia Fuller

--
Patricia Louise Fuller

Johnson, Matthew <matthew.johnson@dnr.iowa.gov>

Support for Clean Air Restrictions for MidAmerican Facilities

1 message

Leif Jones <leif.n.jones@gmail.com> Tue, Feb 14, 2023 at 7:31 AM
To: matthew.johnson@dnr.iowa.gov

Good morning Mr. Johnson,
I would like to register support for clean air requirements for the MidAmerican coal-powered plants in Iowa.
Leif Jones
1551 4th Ave SE
Cedar Rapids, IA 52403

Johnson, Matthew <matthew.johnson@dnr.iowa.gov>

Public Comment on MAE emissions clean-up in Council Bluffs coal fired plant.

1 message

John Klein <iowakleins70@gmail.com> Wed, Feb 15, 2023 at 7:23 PM
To: "matthew.johnson@dnr.iowa.gov" <matthew.johnson@dnr.iowa.gov>

Matthew Johnson
Iowa Department of Natural Resources
Des Moines, IA 50319

February 15, 2023

Matthew,
I would like this email to be included in the public comments concerning the DNR revision to air quality requirements for the next 10 years under the Clean Air Act.

As an Iowa resident living 12 miles straight east (in Treynor, Iowa) of the Walter Scott Energy Center (the Council Bluffs coal fired generation station of Mid-American Energy (MAE)) , I am often directly downwind of this plant. So, of course, I am always concerned about the air (and haze view) we receive. I would assume the multitude of Council Bluffs and Omaha residents, who live much closer, would be very concerned also. Certainly, the leaders in those cities do not want visual smog or unhealthy air.

My understanding is that MAE is not opposed to the new regulations and intends to beef up their scrubbers to meet the new regulatory requirements. I applaud that. I encourage the DNR to continue to be the watchdog of our environment for Iowans. I encourage DNR to go beyond federal Clean Air Act requirements for our benefit.

As we continue the approach to cleaner energy, and more efficient use, I hope DNR will be a strong advocate for the people of Iowa. Big business pressure is strong in Iowa, including in the Legislature, governor, and state government. Thank you for looking after the common man, like me.

Respectfully,

John Klein
30 N. Eyberg
Treynor, Iowa 51575

Johnson, Matthew <matthew.johnson@dnr.iowa.gov>

new regulations

1 message

debra.leners@gmail.com <debra.leners@gmail.com> Thu, Feb 16, 2023 at 11:51 AM
To: matthew.johnson@dnr.iowa.gov

Regarding the stated :

The DNR proposes to require operational improvements to existing control equipment at MidAmerican Energy Company's Louisa Generating Station (LGS) and Walter Scott Jr. Energy Center – Unit 3 (WSEC-3). The improvements would permanently reduce the combined SO2 emissions from these sources by approximately 9,700 tons per year. Implementation would begin later this year, as specified in draft permits 05-A-031-P6 and 75-A-357-P9 for LGS and WSEC-3, respectively. Find copies of the draft permits in Appendix E to the draft plan.

I would like to know what the impact is on the company, its budgetary implications to meet these new regulations, and the degree to which the inevitable 'cost' of the new regulations will be passed on to consumers. In these complex economic times, it is **incumbent** upon the DNR to engage more broadly with the implications of more and more regulations - and the COST of the regulations vs. BENEFIT.

I would like to see the DNR identify the cost-benefit ratio of the intended new regulations before simply passing new regulations with no discussion of what would be gained vs lost.

Debra Leners PhD, PNP, RN

Debraleners@atsu.edu

605-310-5655

United States Department of the Interior

NATIONAL PARK SERVICE
Interior Regions 3, 4, 5
601 Riverfront Drive
Omaha, NE 68102

1.A.1. (MWR-NRSS)

March 1, 2023

Iowa Department of Natural Resources (DNR)
Air Quality Bureau
c/o Matthew Johnson
502 East 9th Street
Des Moines, IA 50319-0034
Via email: matthew.johnson@dnr.iowa.gov

Re: Comments on Iowa's proposed Regional Haze State Implementation Plan for the Second Implementation Period

Dear Mr. Johnson,

Thank you for the opportunity to provide comments on the proposed Iowa Regional Haze State Implementation Plan (SIP) for the Second Implementation Period (2018–2028). National Park Service (NPS) staff consulted with the Iowa DNR regarding SIP development on November 29, 2022 and provided written comments by email on December 8, 2022. We appreciate your consideration of our consultation feedback and responses in the public review draft SIP.

Overall, the NPS commends Iowa DNR for developing a well written, technically sound SIP. We support Iowa DNR's selection of the Louisa Generating Station (LGS) and Walter Scott Energy Center (WSEC) facilities for four-factor analysis and sulfur dioxide (SO_2) control determinations. Iowa could improve the draft SIP and further reduce haze causing emissions from these facilities by requiring cost-effective nitrogen oxide (NO_x) emission controls as previously described in our consultation feedback.

Also, we continue to recommend that Iowa DNR evaluate opportunities to reduce haze causing SO_2 and NO_x emissions from the George Neal North and George Neal South facilities. Our preliminary assessment finds that SO_2 improvements, similar to those identified for LGS and WSEC, are likely feasible and extremely cost effective for these power plants.

The NPS manages 48 of the 156 mandatory Class I areas across the country where visibility is an important attribute. While Iowa does not contain any NPS-managed Class I areas, Iowa emissions impact Voyageurs National Park, in Minnesota, and Isle Royale National Park, in Michigan, as well as Badlands and Wind Cave National Parks, in South Dakota. We encourage Iowa to take advantage of the opportunity this SIP provides to obtain further emission reductions. Applying the reasonable controls available to Iowa DNR will make a difference for clear views in these parks and across the region.

We appreciate the opportunity to comment and look forward to continuing to work with Iowa DNR to improve and protect air quality and visibility in these Class I areas. If you have questions, don't hesitate to contact me or David Pohlman, Regional Air Resources Coordinator at 651-491-3497, david_pohlman@nps.gov.

Sincerely,

Digitally signed by HERBERT FROST
Date: 2023.03.07 11:26:31 -06'00'

Herbert C. Frost, Ph.D., Regional Director,
National Park Service, Interior Region 3, 4, 5

cc:
Nancy Finley, Associate Regional Director, Interior Regions 3, 4, 5
David Pohlman, Air Resources Specialist, Interior Regions 3, 4, 5
Bob DeGross, Superintendent, Voyageurs National Park
Denice Swanke, Superintendent, Isle Royale National Park
Brenda Todd, Superintendent, Badlands National Park
Leigh Welling, Superintendent, Wind Cave National Park
Kirsten King, Lead, NPS Air Resources Division (ARD)
Holly Salazer, Policy, Planning, and Permit Review Branch Lead, NPS ARD

March 16, 2023

Iowa Department of Natural Resources
Air Quality Bureau
c/o Matthew Johnson
502 East 9th Street
Des Moines, IA 50319-0034

Comments submitted via email: *matthew.johnson@dnr.iowa.gov*

Re: Conservation Organizations' Comments on Iowa's Draft State Implementation Plan Regional Haze Second Implementation Period (2019-2028)

Dear Mr. Johnson:

Sierra Club, National Parks Conservation Association, Coalition to Protect America's National Parks, Iowa Interfaith Power & Light ("Conservation Organizations") submit the following comments regarding the Iowa Department of Natural Resources' ("IDNR") Draft State Implementation Plan Regional Haze Second Implementation Period (2019-2028) ("Draft SIP"). We also submit the report of Victoria R. Stamper ("Stamper Report"), which is attached and incorporated by reference into these comments.[1]

[1] Attached to the comments is "*Review and Comments on Reasonable Progress Controls for the Iowa Regional Haze Plan for the Second Implementation Period*," which was prepared for Sierra Club by Victoria R. Stamper (March 14, 2023) (Enclosure 1, "Stamper Report"). Ms. Stamper is an

Sierra Club is a national nonprofit organization with 67 chapters and more than 832,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. Sierra Club's Iowa Chapter, which represents Iowa, has over 5,200 members. Sierra Club has long participated in Regional Haze rulemaking and litigation across the country in order to advocate for public health and our nation's national parks.

National Parks Conservation Association (NPCA) is a national organization whose mission is to protect and enhance America's national parks for present and future generations. NPCA performs its work through advocacy and education, with its main office in Washington, D.C. and 24 regional and field offices. NPCA has over 1.7 million members and supporters nationwide and more than 17,600 in Iowa. NPCA is active nationwide in advocating for strong air quality requirements to protect our parks, including submission of petitions and comments relating to visibility issues, regional haze State Implementation Plans, climate change impacts on parks, and emissions from power plants, oil and gas operations and other sources of pollution affecting national parks and communities. NPCA's members live near, work at, and recreate in all the national parks, including those directly affected by emissions from Iowa's sources.

The **Coalition to Protect America's National Parks** ("Coalition") is a non-profit organization composed of more than 2,100 retired, former and current employees of the National Park Service. The Coalition studies, speaks, and acts for the preservation of America's National Park System. As a group, we collectively represent over 40,000 years of experience managing and protecting America's most precious and important natural, cultural, and historic resources.

As described in our comments, the Conservation Organizations' have serious concerns with IDNR's Draft SIP. For example,

- IDNR's screening method contains a fatal flaw, which arbitrarily results in IDNR ignoring two sources with visibility impacts greater than the sources it selected for regulation.
- IDNR allows for use of an unreasonably high interest rate, truncated life of emission control equipment, low cost threshold and unreasonably high cost estimates to screen out cost-effective controls for its large coal-burning power plants.

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independent air quality consultant and engineer with extensive experience in the regional haze program. The exhibits to the Stamper Report are available in the folder at this location: https://drive.google.com/drive/folders/1_LP1IICja8jLmgywfzxIPY3QBXgeg6uB?usp=sharing.

- IDNR fails to consider all emissions control options for the Walter Scott Jr. and Louisa coal-burning power plants, including requiring better optimization of existing equipment.
- IDNR wrongfully exempts the George Neal North and George Neal South coal-burning power plants from controls based on erroneous use of visibility as a fifth factor and purported compliance by other states with the Uniform Rate of Progress.
- IDNR's interstate consultation consists of meetings to share updates, rather than engaging in the joint planning process as required by the Regional Haze Rule.
- IDNR inadequately considers and ignores the Federal Land Managers' comments.
- IDNR entirely failed to evaluate environmental justice impacts and issue a plan, which reduces emissions and minimize harms to disproportionately impacted communities, as EPA's regulations and guidance urge it to do.

The Regional Haze program offers a significant opportunity to improve visibility at the Class I areas impacted by Iowa's sources, and also improve air quality for Iowa's most vulnerable communities. Despite these opportunities, IDNR's Draft SIP does neither. Moreover, the Draft SIP fails to satisfy the requirements of the Clean Air Act. IDNR must revise its plan to address the fundamental flaws identified in these comments.

Table of Contents

I. INTRODUCTION AND BACKGROUND INFORMATION

Class I areas are iconic, treasured landscapes, and our country is rich in these resources. Congress set aside these and other national parks and wilderness areas to protect our natural heritage for generations. These protected areas provide habitat for a range of wildlife species, offer year-round recreational opportunities for residents and visitors, and generate millions of dollars in tourism revenue. The areas' status as "Class I" under the Clean Air Act entitles them to the highest level of air quality protection.

To improve air quality in our most treasured landscapes, Congress passed the visibility protection provisions of the Clean Air Act in 1977. These provisions established "as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in the mandatory class I Federal areas which impairment results from manmade air pollution."[2] "Manmade air pollution" is defined as "air pollution which results directly or indirectly from human activities."[3] To protect Class I areas' "intrinsic beauty and historical and archeological treasures," the Clean Air Act's regional haze program establishes a national regulatory floor and requires states to design and implement programs to curb, and prevent future, haze-causing emissions within their jurisdictions. Each state must periodically submit for EPA review a state implementation plan (SIP) designed to make reasonable progress toward achieving natural visibility conditions.[4]

A regional haze SIP must provide "emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal."[5] Two of the most critical features of a regional haze SIP are the requirements for installation of Best Available Retrofit Technology (BART) limits on pollutant emissions *and a long-term strategy for making reasonable progress toward the national visibility goal.*[6] Although many states addressed the Clean Air Act's BART requirements in their initial regional haze plans, EPA's 2017 revisions to the Regional Haze Rule make clear that BART was not a once-and-done requirement. Indeed, states "will need" to reassess "BART-eligible sources that installed only moderately effective controls (or no controls at all)" for any additional technically-achievable controls in the second planning period.[7] The haze requirements in the Clean Air Act present an unparalleled opportunity to protect

[2] 42 U.S.C. § 7491(a)(1).
[3] *Id.* § 7491(g)(3).
[4] *Id.* § 7491(b)(2).
[5] *Id.*
[6] *Id.* § 7491(b)(2).
[7] Regional Haze Amendments, 82 Fed. Reg. 3,078, 3,083 (Jan. 10, 2017); *see also id.* at 3,096 ("states must evaluate and reassess all elements required by 40 CFR 51.308(d)").

and restore regional air quality by curbing visibility-impairing emissions from a variety of polluting sources.

Implementing the regional haze requirements promises benefits beyond improving views. Pollutants that cause visibility impairment also harm public health. For example, oxides of nitrogen (NO_x) are a precursor to ground-level ozone, which is associated with respiratory disease and asthma attacks. NO_x also reacts with ammonia, moisture, and other compounds to form particulates that can cause and/or worsen respiratory diseases, aggravate heart disease, and lead to premature death. Similarly, sulfur dioxide (SO_2) increases asthma symptoms, leads to increased hospital visits, and can form particulates. NO_x and SO_2 emissions also harm terrestrial and aquatic plants and animals through acid rain as well as through deposition of nitrates, which in turn cause ecosystem changes including eutrophication of mountain lakes.

Unfortunately, the promise of natural visibility is unfulfilled because the air in most Class I areas, including Iowa's, remains polluted by industrial sources, such as fossil fuel-fired power plants, which are covered in our comments.

Iowa's Draft SIP explained that two sources were selected to conduct a Four-Factor Analysis. The sources selected were the Louisa Generating Station (LGS) and the Walter Scott Jr. Energy Center (WSEC), both are coal-fired EGUs operated by MidAmerican Energy Company (MidAmerican).[8] Each of these sources contribute visibility impairment Isle Royale. We urge IDNR to revise its SIP to require emissions controls on these facilities to clear the air in our national parks and wilderness areas and in our communities, including environmental justice communities.

II. LEGAL FRAMEWORK: REQUIREMENTS FOR PERIODIC COMPREHENSIVE REVISIONS FOR REGIONAL HAZE SIPS

A. Clean Air Act's Visibility Protections and the Regional Haze Rule

The CAA establishes "as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution."[9] To that end, EPA issued the Regional Haze Rule ("RHR"), which requires the states (or EPA where a state fails to act) to make incremental, "reasonable progress" toward eliminating human-caused visibility impairment at each Class I area by 2064.[10] Together, the CAA and EPA's RHR require states to periodically develop and implement state implementation plans ("SIPs"), each of which must contain a long-term strategy

[8] Draft SIP at 28.
[9] 42 U.S.C. § 7491(a)(1).
[10] 40 C.F.R. § 51.308(d)(1), (d)(3).

encompassing *enforceable* "emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward the national goal."[11]

In developing its long-term strategy, a state must consider its anthropogenic sources of visibility impairment and evaluate different emission reduction strategies including and beyond those prescribed by the best available retrofit technology ("BART") provisions.[12] A state should consider "major and minor stationary sources, mobile sources and area sources."[13] At a minimum, a state must consider the following factors in developing its long-term strategy:

> (A) Emission reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment;
> (B) Measures to mitigate the impacts of construction activities;
> (C) Emissions limitations and schedules for compliance to achieve the reasonable progress goal;
> (D) Source retirement and replacement schedules;
> (E) Smoke management techniques for agriculture and forestry management purposes including plans as currently exist within the State for these purposes;
> (F) Enforceability of emission limitations and control measures; and
> (G) The anticipated net effect on visibility due to projected changes in point, area, and mobile emissions over the period addressed by the long-term strategy.[14]

Additionally, a state:

> Must include in its implementation plan a description of the criteria it used to determine which sources or groups of sources it evaluated and how the four factors were taken into consideration in selecting the measures for inclusion in its long-term strategy.[15]

In developing its plan, the state must document the technical basis for the SIP, including monitoring data, modeling, and emission information, including the baseline emission inventory upon which its strategies are based.[16] All this information is part of a state's revised SIP and subject to public notice and

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[11] 42 U.S.C. § 7491(b)(2); *see also* 42 U.S.C. § 7410(a)(2); 40 C.F.R. § 51.308.
[12] 40 C.F.R. § 51.308(f).
[13] *Id.* § 51.308(f)(2)(i).
[14] *Id.* § 51.308(f)(2)(iv).
[15] 40 C.F.R. § 51.308(f)(2)(i).
[16] 40 C.F.R. § 51.308(f)(2)(i).

comment. A state's reasonable progress analysis must consider the four factors identified in the CAA and regulations.[17]

B. EPA's 2017 Revisions to the Regional Haze Rule

On January 10, 2017, the EPA revised the RHR to strengthen and clarify the reasonable progress and consultation requirements of the rule.[18] In particular, the rule revisions make clear that a state is to *first* conduct the required Four-Factor Analysis for its sources, considering the four statutory factors, and *then* use the results from its Four-Factor Analyses and determinations to develop the reasonable progress goals.[19] Thus, the rule "codif[ies]" EPA's "long-standing interpretation" of the SIP "planning sequence" states are required to follow:

> (1) [C]alculate baseline, current and natural visibility conditions, progress to-date and the [Uniform Rate of Progress] URP;
> (2) [D]evelop a long-term strategy for addressing regional haze by evaluating the four factors to determine what emission limits and other measures are necessary to make reasonable progress;
> (3) [C]onduct regional-scale modeling of projected future emissions under the long-term strategies to establish RPGs and then compare those goals to the URP line; and
> (4) [A]dopt a monitoring strategy and other measures to track future progress and ensure compliance.[20]

Although many states addressed the CAA's BART requirements in their initial regional haze plans, EPA's 2017 revisions to the RHR make clear that BART was not a once-and-done requirement. Indeed, states "will need" to reassess "BART-eligible sources that installed only moderately effective controls (or no controls at all)" for any additional technically-achievable controls in the second planning period.[21]

To the extent that a state declines to evaluate additional pollution controls for any source relied upon to achieve reasonable progress based on that source's planned retirement or decline in utilization, it must incorporate those operating parameters or assumptions as enforceable limitations in the second planning period SIP. The CAA requires that "[e]ach state implementation plan . . . *shall*" include "enforceable limitations and other control measures" as necessary to "meet the

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[17] *See* 42 U.S.C. § 7491(g)(1); 40 C.F.R. § 51.308(f)(2)(i) ("the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected anthropogenic source of visibility impairment.").
[18] *See generally* 82 Fed. Reg. 3,078 (Jan. 10, 2017).
[19] 82 Fed. Reg. at 3,090-91.
[20]*Id.*
[21] 82 Fed. Reg. at 3,083; *see also id.* at 3,096 ("states must evaluate and reassess all elements required by 40 CFR 51.308(d)").

applicable requirements" of the Act.[22] The RHR similarly requires each state to include "enforceable emission limitations" as necessary to ensure reasonable progress toward the national visibility goal.[23] Therefore, where the state relies on a sources' plans to permanently cease operations or projects that future operating parameters (*e.g.*, limited hours of operation or capacity utilization) will differ from past practice, or if this projection exempts additional pollution controls as necessary to ensure reasonable progress, then the state "must" make those parameters or assumptions into enforceable limitations.[24]

Finally, the state's SIP revisions must meet certain procedural and consultation requirements.[25] The state must consult with the FLM and look to the FLMs' expertise of the lands and knowledge of the way pollution harms them to guide the state to ensure SIPs do what they must to help restore natural skies. The rule also requires that in "developing any implementation plan (or plan revision) or progress report, the State must include a description of how it addressed any comments provided by the Federal Land Managers."[26]

C. EPA's 2021 Regional Haze Clarification Memorandum

On July 8, 2021, EPA issued a memo which additionally clarified certain aspects of the revised RHR and provided further information to states and EPA regional offices regarding their planning obligations for the Second Planning Period.[27] EPA's July 2021 "Clarification Memo" confirms that certain aspects of IDNR's proposed SIP are fundamentally flawed and cannot be approved.

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[22] 42 U.S.C. § 7410(a)(2)(A).

[23] *See* 40 C.F.R. § 51.308(d)(3) ("The long-term strategy must include enforceable emissions limitations, compliance schedules, and other measures as necessary to achieve the reasonable progress goals established by States having mandatory Class I Federal areas.")

[24] 40 C.F.R. §§ 51.308(i); (d)(3) ("The long-term strategy must include enforceable emissions limitations, compliance schedules . . ."); (f)(2) (the long-term strategy must include "enforceable emissions limitations"); *see also* Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 22, EPA-457/B-19-003 (Aug. 2019) [hereinafter, "2019 Guidance"] ("in selecting sources for control measure analysis," the state may choose "not selecting sources that have an enforceable commitment to be retired or replaced by 2028"); *id*. at 34 (To the extent a retirement or reduction in operation "is being relied upon for a reasonable progress determination, the measure would need to be included in the SIP and/or be federally enforceable.") (citing 40 C.F.R. § 51.308(f)(2)); 2019 Guidance at 43 ("[i]f a state determines that an in-place emission control at a source is a measure that is necessary to make reasonable progress and there is not already an enforceable emission limit corresponding to that control in the SIP, the state is required to adopt emission limits based on those controls as part of its long-term strategy in the SIP via the regional haze second planning period plan submission.").

[25] For example, in addition to the Regional Haze Rule requirements, states must also follow the SIP processing requirements in 40 C.F.R. §§ 51.104, 51.102.

[26] *Id.* § 51.308(i)(3).

[27] Memo from Peter Tsirogotis to Regional Air Directors, Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period at 3, (July 8, 2021), https://www.epa.gov/visibility/clarifications-regardingregional-haze-state-implementation-plans-second-implementation [hereinafter, "Clarification Memo"].

Particularly relevant here, EPA made clear that states must secure additional emission reductions that build on progress already achieved, and there is an expectation that reductions are additive to ongoing and upcoming reductions under other CAA programs.[28] In evaluating sources for emission reductions, EPA emphasized that:

> Source selection is a critical step in states' analytical processes. All subsequent determinations of what constitutes reasonable progress flow from states' initial decisions regarding the universe of pollutants and sources they will consider for the second planning period. States cannot reasonably determine that they are making reasonable progress if they have not adequately considered the contributors to visibility impairment. Thus, while states have discretion to reasonably select sources, this analysis should be designed and conducted to ensure that source selection results in a set of pollutants and sources the evaluation of which has the potential to meaningfully reduce their contributions to visibility impairment.[29]

Thus, it is generally not reasonable to exclude from further evaluation large sources or entire sectors of visibility impairing pollution.

For sources that have previously installed controls, states should still evaluate the "full range of potentially reasonable options for reducing emissions," including options that may "achieve greater control efficiencies, and, therefore, lower emission rates, using their existing measures."[30] Moreover, "[i]f a state determines that an in-place emission control at a source is a measure that is necessary to make reasonable progress and there is not already an enforceable emission limit corresponding to that control in the SIP, the state is required to adopt emission limits based on those controls as part of its long-term strategy in the SIP via the regional haze second planning period plan submission."[31] This means that so-called "on-the-way" measures, including anticipated shutdowns or reductions in a source's emissions or utilization, that are relied upon to forgo a four-factor analysis or to shorten the remaining useful life of a source "***must*** be included in the SIP" as enforceable emission reduction measures.[32] In addition, the Clarification Memo makes clear that a state should generally not reject cost-effective and otherwise reasonable controls merely because there have been emission reductions since the first planning period owing to other ongoing air pollution control programs or merely because visibility is otherwise projected to improve at Class I areas. Finally, the Clarification Memo confirms EPA's

[28] *Id*. at 2.
[29] *Id*. at 3.
[30] *Id*. at 7.
[31] *Id*. at 8.
[32] *Id*. at 8-9 (emphasis added).

recommendation that states take into consideration environmental justice concerns and impacts in issuing any SIP revision for the second planning period.

In sum, EPA's Clarification Memo makes clear that the states' regional haze plans for the second planning period must include meaningful emission reductions to make reasonable progress towards the national goal of restoring visibility in Class I areas. The Clarification Memo confirms that IDNR's efforts to avoid emission reductions—by asserting, for example, that reductions are not necessary because visibility has improved, because reductions are anticipated at some later date or due to implementation of another program, or because a source has some level of control—is at odds with Iowa's haze obligations under the Clean Air Act and the Regional Haze Rule itself.

D. States Must Ensure the SIP Satisfies the Requirements of the Regional Haze Rule

The duty to ensure that a SIP satisfies the requirements of the Regional Haze Rule ultimately rests with the state, not the source.[33] If IDNR, another state, or the FLMs identify a source as impacting visibility in a Class I area, thereby warranting a Four-Factor Analysis of potential reasonable progress controls, IDNR must conduct such an analysis or provide an adequate demonstration that any emission reductions or controls would be futile to inform its reasonable progress determination.[34] In the future, should sources submit a new, revised or supplemental information for the Four-Factor Analysis, IDNR has an obligation to independently review that analysis. The state must not rubber stamp a source's analysis. If a source prepares an inaccurate, incomplete, or undocumented Four-Factor Analysis, the state (or air district) must either require the source to make the necessary corrections or make the corrections itself. Where a source is unwilling to conduct the required reasonable progress analysis, the state must fulfill that obligation.

E. Emission Reductions to Make Reasonable Progress Must be Included in Practically Enforceable SIP Measures

The Clean Air Act requires states to submit implementation plans that "contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal" of achieving natural visibility conditions at all Class I Areas.[35] The Regional Haze Rule requires that states must revise and update its regional haze SIP, and the "periodic comprehensive revisions must include the "enforceable emissions limitations, compliance schedules, and other measures that are necessary to make reasonable progress as determined pursuant to [40 C.F.R. §§ 51.308](f)(2)(i) through

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[33] 40 C.F.R. § 51.308(d).
[34] Clarification Memo at 4.
[35] 42 U.S.C. §§ 7491(a)(1), (b)(2).

(iv)."[36] As discussed in our comments, specific required measures are missing from IDNR's Proposed SIP.

EPA issued regional haze guidance in 2019 and that guidance further explains these emission limitation requirements:

> This provision requires SIPs to include enforceable emission limitations and/or other measures to address regional haze, deadlines for their implementation, and provisions to make the measures practicably enforceable including averaging times, monitoring requirements, and record keeping and reporting requirements.[37]

Thus, while the SIP is the basis for demonstrating and ensuring state plans meet Regional Haze Rule requirements, state-issued permits must complement the SIP.[38] In addition, to the extent that a state relies on any expected retirement, reduction in utilization, or reduction in emissions as a result of a permit provision in its reasonable progress analysis, those emission reductions *must* be included as enforceable emission limitations in the SIP itself.[39] These specific required measures are missing from IDNR's Proposed SIP.

III. SOURCE-SPECIFIC CONCERNS

The Regional Haze rules require IDNR to engage in "Four-Factor Analysis" considering the following with respect to each source that may be causing visibility impairment in a Class I area: (1) the cost of compliance, (2) the time necessary for compliance, (3) the energy and non-air quality impacts of compliance, and (4) the remaining useful life of the pollution source. This Four-Factor Analysis is used "to determine what emission limits and other measures are necessary to make reasonable progress." The outcome of the Four-Factor Analysis must determine whether controls are implemented. Thus, if a control is cost-effective, it must be implemented.

As discussed further below, MidAmerican avoided finding that controls are cost-effective at certain units by inappropriately inflating the interest rate, truncating the useful life of controls, and understating the effectiveness of control options. In addition, a pound per hour SO2 emissions limit will result in exceedances of a pound per MMBtu SO2 rate and so cannot be used. IDNR must correct these deficiencies and find that:

[36] 40 C.F.R. § 51.308(f)(2); *see also id.* § 51.308(d)(3)(v)(F) (enforceability of emission limitations and control measures).
[37] 2019 Guidance at 42-43.
[38] 74 Fed. Reg. at 13,568.
[39] 42 U.S.C. §§ 7410(a)(2), 7491(b)(2); *see also* 40 C.F.R. § 51.308(d), (f).

- FGD upgrades to meet a 90% reduction level or an annual average emission rate of 0.05 lb/MMBtu at LGS and at WSEC Unit 3 are cost effective, and so IDNR must impose an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average basis at both units.
- SCR is cost effective at WSEC Unit 3 and at least SNCR is cost effective at LGS. IDNR must require WSEC 3 to meet an annual NOx rate of 0.04 lb/MMBtu, which would reduce NOx by over 4,100 tons per year of NOx on average, and require LGS to meet an annual NOx emission rate of 0.15 lb/MMBtu, which would reduce NOx emissions from the facility by 778 tons per year on average.
- IDNR should require WSEC 4 to meet an annual average SO2 rate of 0.05 lb/MMBtu, which reflects the upgrade to its dry FGD system.
- IDNR arbitrarily excluded George Neal South and George Neal North from Four-Factor Analysis. Upgrades to those plants' dry FGD systems would be highly cost effective. IDNR must adopt reasonable progress measures for the George Neal South and George Neal North power plants to reduce SO2 emissions based on the additional use of lime in the units' dry FGD systems to achieve annual SO2 rates at or below 0.05 lb/MMBtu while achieving 30-day average SO2 emission rates of 0.06 lb/MMBtu.

A. IDNR Must Correct the Cost Analyses for MidAmerican Energy Company's Louisa Generating Station and Walter Scott Jr. Energy Center Unit 3

The interest rate at which a source borrows money to pay for controls is a key variable in calculation of the annualized cost of a control, and impacts the cost-effectiveness of that control. EPA's Control Cost Manual explains that "the bank prime rate can be an appropriate estimate for interest rates given the potential difficulties in eliciting accurate private nominal interest rates since these rates may be regarded as confidential business information or difficult to verify."[40] States must not allow sources to develop "firm-specific" interest rates if the proposed interest rate fails to follow the methodology specified in EPA's Control Cost Manual, is inconsistent with prior EPA directions to states, and if the source fails to provide adequate documentation to the state (and the public) to ensure that the methods used meet the legal requirements. As explained in the Stamper Report,

> Until MidAmerican Energy and IDNR present sufficient documentation on the assumptions and costs underlying MidAmerican's stated cost of capital that ensures that the company's firm-specific interest rate is consistent with the requirements and methodology of EPA's Control Cost Manual, only the

[40] EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, at 15, (Nov. 2017).

> cost analyses done based on the prime lending rate should be considered in determining whether there are cost-effective controls for its facilities.[41]

The current bank prime lending interest rate which, as of the date of the Stamper Report, was 7.75%.[42] The Stamper Report presents the errors made by MidAmerican Energy in developing its firm-specific interest rate of 7.862% in determining annualized capital costs of control for the Louisa Generation Station and the Walter Scott Jr. Energy Center Unit 3.[43]

The first error highlighted in the Stamper Report is MidAmerican Energy's use of an interest rate that includes costs that are not allowed under EPA's Control Cost Manual. For example, Control Cost Manual uses an "overnight" estimation method, as if no interest was incurred during construction and thus estimates capital as if the project was completed "overnight."[44] Accordingly, Allowance for Funds Used During Construction (AFUDC), which is defined as "the amount credited to a firm's statement of income and charged to construction in progress on the firm's balance sheet" and which EPA acknowledges is considered a cost item within the electric power industry, should not be included in cost effectiveness analyses under the Control Cost Manual methodology.[45]

Second, IDNR must not allow use of "weighted cost of capital" because as the Stamper Report explains, that approach is inconsistent with EPA's Control Cost Manual and EPA final agency actions. For example, EPA's 2011 final action on the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan *disapproved* use of the Oklahoma Gas & Electric (OG&E) interest rate methodology that used a capital recovery factor that "include[d] not only recovery of principal but also a return on the principal, with the rate of return equal to the discount rate" and that "for an investor-owned utility such as OG&E, which is financed by a mix of debt and equity, the discount rate is equal to the weighted average of the equity return and debt return."[46]

Third, it is unreasonable for IDNR to determine that MidAmerican Energy's use of a firm-specific interest rate based approval by the Iowa Utilities Board and supplemental information[47] is appropriate for use in the Draft SIP. As the Stamper Report explains "MidAmerican Energy has not explained the details of how its cost of capital is calculated, other than to refer to the utility commission docket numbers

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[41] Stamper Report at 9.
[42] https://fred.stlouisfed.org/series/DPRIME.
[43] Stamper Report at 6-9.
[44] EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, at 11 (Nov. 2017).
[45] *See* EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, at 11 (Nov. 2017), and Section 4, Chapter 2 Selective Catalytic Reduction, at pdf 65 (June 2019), https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf.
[46] Stamper Report at 7, citing 76 Fed. Reg. 81,728 at 81,745 (Dec. 28, 2011).
[47] Draft SIP, Appendix D-2.

in which the cost of capital was approved."[48] MidAmerican Energy's calculations for cost of capital must be consistent with the methodology and requirements of the EPA Control Cost Manual. Because neither MidAmerican Energy nor IDNR demonstrates how the methodology used in the ratemaking case is consistent with EPA's requirements, the Four-Factor Analyses must only include the cost analyses done based on the prime lending rate in determining whether there are cost-effective controls for its facilities."[49]

B. IDNR Must Assume 30-Years for the Useful Life of Pollution Controls in the Cost Effectiveness Analyses

In conducting the Four-Factor Analyses, the life of all the pollution controls evaluated should be equivalent to the typical life of such controls. Where a SIP assumes a shorter life for pollution controls, the state's SIP must include justification for doing so.[50] MidAmerican Energy failed to justify use of a truncated life for numerous pollution controls. For example, contrary to the Control Cost Manual and determinations made in EPA rulemakings, which apply a 30-year useful life, MidAmerican and IDNR erroneously assume the following:

- 20-year useful life in determining annualized costs of the SO_2 controls evaluated. As the Stamper Report discusses, there is no justification for assuming such a short life of a new wet FGD system or for the operational upgrades to the existing DFGD system. Indeed, EPA has found that a FGD systems can last 30 years or longer.[51]
- 20-year useful life for controlling NOx emissions with SCR or SNCR systems. The Stamper report explains that EPA's Control Cost Manual indicates that, for EGUs, SCR has a useful life of 30-years.[52] For SNCR, EPA has assumed a 30-year life of SNCR in control cost calculations for coal-fired EGUs in the context of the regional haze program,[53] and therefore it is reasonable to assume a 30-year life of SNCR for application to LGS and WSEC Unit 3.[54]

Moreover, MidAmerican Energy did not identify any limitations on the remaining useful life of either LGS or WSEC Unit 3, stating that no specific retirement date is planned for either LGS or the WSEC units.[55] The Draft SIP fails to contain any enforceable limitations on the remaining useful life of the LGS or on WSEC Unit 3.

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[48] Stamper Report at 8; *see also* Draft SIP, Appendix D-2 at 2.
[49] Stamper Report at 9.
[50] *Id.*
[51] Stamper Report at 9.
[52] Stamper Report at 9, citing EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, at pdf 80 (June 2019); *see also* EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, at 1-54 (April 25, 2019).
[53] *See, e.g.*, 80 Fed. Reg. 18944 at 18968 (April 8, 2015).
[54] Stamper Report at 10.
[55] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 10, 12, and 19.

IDNR must revise the cost effectiveness analyses and the assumptions used for life of all the pollution controls evaluated. IDNR must use the typical life of such controls, which is 30 years or longer.[56]

C. IDNR Must Correct Deficiencies in the Regional Haze Control Evaluation for MidAmerican Energy Co – Louisa Generating Station and Walter Scott Jr. Energy Center

1. Analysis of SO2 Control Options for LGS and WSEC Unit 3

Louisa Generating Station (LGS) is an 811.9 MW unit that burns subbituminous coal and is equipped with a dry lime flue gas desulfurization (dry FGD) system, low NOx burners with overfire air, and a baghouse. Walter Scott Jr. Energy Center 3 (WSEC 3) is a 725.8 MW that burns subbituminous coal and is equipped with a dry FGD system, low NOx burners with overfire air, and a baghouse. LGS achieved an average 2017-2019 SO2 rate of 0.292 lbs/MMBtu (annual) and average NOx emissions rate of 0.183 tons per year (annual). WSEC 3 achieved an average 2017-2019 SO2 rate of 0.357 lbs/MMBtu (annual) and average NOx emissions rate of 0.223 tons per year (annual).

As part of the cost effectiveness evaluation, IDNR failed to evaluate reasonable SO2 emission rates that could be achieved with upgrades to the units' existing dry flue gas desulfurization (FGD) systems with the use of additional lime and also with new retrofit wet FGD systems. MidAmerican evaluated improvements to the dry FGD systems at these plants that would achieve an SO2 rate of 0.10 lb/MMBtu.[57] This reflects an SO2 control efficiency of approximately 78%.[58]

This SO2 control efficiency is unreasonably low. The existing systems at the plants were designed for efficiency greater than 90%.[59] Moreover, as presented in Table 3 of Ms. Stamper's report, several plants with dry FGD systems are achieving SO2 rates lower than 0.06 lb/MMBtu on an annual basis.[60] This data provides support that annual average SO2 emissions rates of 0.05 lb/MMBtu or lower can be met with dry FGD systems. IDNR must evaluate FGD upgrades to meet a 90% reduction level or an annual average emission rate of 0.05 lb/MMBtu at LGS and at WSEC Unit 3. IDNR must also impose an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average basis at both units.[61]

It also appears that the dry FGD system installed at LGS in 2007 is equipped with scrubber bypass. IDNR must evaluate the elimination of this FGD bypass, in

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[56] Stamper Report at 10.
[57] Stamper Report at 12.
[58] *Id.*
[59] *Id.*
[60] *Id.* at 13
[61] *Id.* at 14

addition to an increase in the amount of lime used, as a reasonable progress control.[62]

IDNR also failed to evaluate the lowest SO2 removal efficiency that could be achieved with a wet FGD system at the two plants. IDNR and MidAmerican Energy evaluated a wet FGD retrofit to achieve an SO2 rate of 0.06 lb/MMBtu. But data shows that several coal-fired power plant units with wet scrubbers achieve SO2 rates lower than 0.04 lb/MMBtu on an annual basis.[63] Further, those units also have achieved 30-boiler operating day averages of 0.04 lb/MMBtu or lower while meeting annual lb/MMBtu SO2 emission rates of 0.03 lb/MMBtu or lower.[64] Based on the average annual uncontrolled SO2 in the coal utilized at LGS and at WSEC Unit 3 of 0.46 lb/MMBtu, the units should readily be able to achieve an annual SO2 rate no higher than 0.03 lb/MMBtu and achieve a 30-boiler operating day average limit of 0.04 lb/MMBtu with a wet FGD retrofit.[65] Thus, IDNR must require an evaluation of a wet FGD retrofit to achieve an annual average SO2 rate of 0.03 lb/MMBtu at LGS and at WSEC Unit 3.

Ms. Stamper used corrected SO2 removal efficiencies to revise the cost analyses for dry FGD upgrades at LGS and WSEC Unit 3.[66]

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[62] *Id.* at 13
[63] *Id.* at 14.
[64] *Id.*
[65] *Id.* at 15.
[66] *Id.* at 16-19.

Table 5. Cost Effectiveness of SO2 Control Upgrade Options at Louisa Generating Station and at Walter Scott Jr. Energy Center Unit 3, Based on 30-Year Life of Controls and the EPA Cost Spreadsheets (2021 $)[68]

	Annual SO2 Rate, lb/MMBtu	Capital Cost	Net Increase in O&M Costs	Total Annualized Costs	SO2 Reduced, tpy	Cost Effectiveness, $/ton
Louisa Generating Station						
New Wet FGD	0.03	$411,250,091	$1,430,496	$37,204,832	5,340	$6,968/ton
Upgraded Dry FGD	0.05	$0	$1,384,818	$1,384,818	4,931	$281/ton
Walter Scott Jr. Unit 3						
New Wet FGD	0.03	$390,170,764	$2,198,820	$36,141,784	7,365	$4,907/ton
Upgraded Dry FGD	0.05	$0	$1,942,039	$1,942,039	6,914	$281/ton

The corrected cost analyses found that dry FGD upgrades designed to achieve an annual SO2 rate of 0.05 lb/mmbtu are extremely cost effective for LGS and WSEC Unit 3 and could achieve 4,900 to more than 6,900 tons per year of SO2 emission reduction at each unit from 2017-2019 baseline emissions, respectively, at a cost effectiveness of $281/ton. A new wet FGD should also be considered as a cost-effective option at WSEC Unit 3, as it could reduce SO2 emissions by 7,365 tons per year from 2017-2019 baseline emissions at a cost effectiveness of $4,907/ton (in 2021 dollars). A new wet FGD could also be considered cost-effective at LGS, at a cost effectiveness of $6,968/ton. Colorado and Nevada use a cost effectiveness threshold of $10,000/ton and New Mexico uses a threshold of $7,000/ton.[67]

IDNR must evaluate FGD upgrades to meet a 90% reduction level or an annual average emission rate of 0.05 lb/MMBtu at LGS and at WSEC Unit 3. Further, IDNR must impose an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average basis.

[67] *Id.* at 19.

2. IDNR Must Adopt a Reasonable Progress SO2 Emissions Limit for LGS and WSEC 3 in Units that Will Ensure Reductions in SO2 Emissions Over All Levels of Operation

IDNR is proposing a 30-day rolling average SO2 limit for LGS of 800 lb/hr and for WSEC Unit 3 of 770 lb/hr. IDNR's proposed SO2 emission limits in units of pounds per hour for LGS and WSEC Unit 3 must be revised to be in units of lb/MMBtu, which will be much more effective at ensuring SO2 emission reductions across all levels of operation and will result in greater SO2 emission reductions per year.

By imposing a lb/hour SO2 limit rather than a lb/MMBtu SO2 limit, IDNR's proposed limits fail to require the same level of control over all levels of operation and do not achieve the emissions rate IDNR said they are intended to achieve. As the Stamper Report explains, IDNR's proposed lb/hour limits will only reflect the assumed level of control when the units are operating at or near maximum hourly heat input capacity. The proposed limits are not sufficiently clear, lack enforceability, and do not mandate the same reduction in SO2 emission rates at all boiler loads.[68] They are therefore not sufficiently enforceable as required by 40 C.F.R. § 51.308(f)(2).

Ms. Stamper conducted an analysis to illustrate the difference in SO2 emission reductions between IDNR's proposed pound per hour 30-day average SO2 limits and a 0.10 lb/MMBtu SO2 limit that would ensure the same level of reductions in SO2 across all loads. This analysis demonstrates that a 0.10 lb/MMBtu limit would result in greater SO2 emission reductions than IDNR's pound per hour limits for LGS and WSEC Unit 3 (which were intended to reflect a 0.10 lb/MMBtu SO2 rate).[69] IDNR must thus impose SO2 limits for LGS and WSEC Unit 3 in terms of lb/MMBtu, rather than in lb/hr, to ensure that SO2 emissions are reduced over all levels of operation of these units.

3. Analysis of NOx Control Options for LGS and WSEC Unit 3

IDNR relied on MidAmerican Energy's Four-Factor Analysis of NOx control options for LGS and WSEC Unit 3. MidAmerican evaluated two NOx control options for LGS and WSEC Unit 3: 1) selective catalytic reduction (SCR) to achieve a NOx emission rate of 0.05 lb/MMBtu, and 2) selective noncatalytic reduction (SNCR) to achieve 15% reduction and a NOx emission rate of 0.157 lb/MMBtu at LGS and a NOx emission rate of 0.181 lb/MMBtu at WSEC Unit 3. However, MidAmerican once again used flawed assumptions for the level of control that could be achieved, and therefore its cost effectiveness analysis requires correction. IDNR must evaluate selective noncatalytic reduction (SNCR) and selective catalytic

[68] Stamper at 21-23.
[69] *Id.* at 23-24.

reduction at NOx removal efficiencies the control is capable of achieving at LGS and at WSEC Unit 3. As a result, IDNR inappropriately found that neither SCR nor SNCR are cost effective control options at LGS and WSEC 3.

IDNR and MidAmerican Energy evaluated SCR to achieve a NOx rate of 0.05 lb/MMBtu. This reflects only 73% control across the SCR system for the LGS facility and 77.6% across the SCR system for WSEC Unit 3. Yet, SCR systems are routinely designed to achieve 90% or greater NOx control efficiency. Annual average NOx emission rates with SCR, along with existing low NOx burners and overfire air, can be as low as 0.04 lb/MMBtu or even lower. For the reasons supplied in Ms. Stamper's report, "it is more than reasonable to evaluate the cost effectiveness of SCR at the LGS facility and WSEC Unit 3 to meet a NOx emission rate of 0.04 lb/MMBtu on an annual basis."[70]

MidAmerican also understated the NOx removal efficiency of SNCR at LGS and WSEC 3. MidAmerican Energy assumed only a 15% reduction would be achievable at LGS and WSEC Unit 3 with SNCR.[71] Using EPA's equation for estimating NOx removal efficiency achievable with SNCR, Ms. Stamper determined that SNCR at LGS should have an achievable NOx removal efficiency of 20.9% and a controlled annual NOx rate with SNCR of 0.15 lb/MMBtu. At WSEC Unit 3, she determined SNCR should have an achievable NOx removal efficiency of 21.7% and a controlled annual NOx rate of 0.17 lb/MMBtu.[72] She also found that MidAmerican's claims that SNCR cannot achieve more than 15% NOx reduction at large boilers is unfounded, noting that higher removal efficiencies have been achieved at large EGUs.[73]

Even when understating the NOx removal capabilities of SNCR, IDNR's and MidAmerican Energy's cost effectiveness analyses still show that both SNCR and SCR must be considered as cost effective controls for LGS and WSEC Unit 3. These cost effectiveness analyses are reflected in Stamper Table 9, with costs ranging between $5,616/ton (SNCR at WSEC 3) to $8,862/ton (SCR at Louisa).[74] These costs are within the range of the cost effectiveness thresholds used by Colorado, Nevada, Minnesota, New Mexico, Arizona, and Washington.[75] Thus, at the minimum, the cost effectiveness of SNCR at LGS and of SCR at WSEC Unit 3 must be considered to be reasonable.[76]

Moreover, when Ms. Stamper corrected MidAmerican's errors in removal efficiencies and expected life of controls, she found that, with the exception of SCR

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[70] Stamper Report at 27.
[71] *Id.* at 28
[72] *Id.*
[73] *Id.*
[74] *Id.* at 30.
[75] *Id.* at 30-31.
[76] *Id.* at 30.

at LGS, the revised cost effectiveness of SNCR and SCR show that the costs of these controls are more cost effective than shown in the IDNR and MidAmerican Energy costs. See Table 10, Stamper Report. In particular, SCR at WSEC Unit 3 is cost effective at $6,377/ton and that at least SNCR is cost effective at LGS at a cost of $4,598/ton. SCR at LGS would be considered cost effective under several states' cost effectiveness thresholds for their regional haze plans.[77] SCR installation at WSEC Unit 3 required to meet an annual NOx rate of 0.04 lb/MMBtu would reduce NOx by over 4,100 tons per year of NOx on average. SNCR installation at LGS required to meet an annual NOx emission rate of 0.15 lb/MMBtu would reduce NOx emissions from the facility by 778 tons per year on average.

For these reasons, IDNR must require that the emission reductions and emission rate is based on SCR installation at WSEC Unit 3 and at least require SNCR installation, if not SCR installation, at the LGS facility as cost-effective NOx controls.

D. IDNR Must Require that Walter Scott Jr. Unit 4 Meet a Lower SO_2 Emission Limit

Walter Scott Jr. Unit 4 is a 922.5 MW unit that burns subbituminous coal and is equipped with a dry FGD system, as well as LNB/OFA, SCR, and a baghouse. As presented in the Stamper Report, WSEC Unit 4 achieved 0.067 lb/MMBtu on an annual average basis over the 2017-2019 baseline period, however, the unit is subject to a much higher SO_2 limit of 0.1 lb/MMBtu in its permit.[78] Thus, there are no enforceable SIP requirements limiting emissions below the 0.067 lb SO2 per MMBtu average performance level. Further, a review of annual average SO_2 rates over the most recent three years shows that annual average SO_2 emission rates have been increasing at WSEC Unit 4. The annual average SO_2 rates in 2021 and 2022 were 0.081 lb/MMBtu and 0.090 lb/MMBtu.[79] Yet, a review of the coal data reported to the EIA's Coal Data Browser for WSEC does not show any increase in coal sulfur content to the WSEC plant.[80]

MidAmerican suggests that WSEC Unit 4 operates efficiently at an "extremely low emission rate".[81] However, as discussed in the Stamper Report, MidAmerican fails to mention that WSEC Unit 4 was designed to achieve greater control efficiency than current operations. The Stamper Report explains that dry FGD systems are routinely designed to achieve up to 95% control for a spray dryer

[77] *Id.* at 33-34.
[78] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix E, at pdf 37, Permit 03-A-425-P4 WSEC 4 Boiler, at 5.
[79] Stamper Report at 36, explaining this is based on data reported to EPA's Clean Air Markets Program Database.
[80] *See* Stamper Report, Ex. 3 with coal heat value and sulfur content of coals used at Walter Scott Jr. Energy Center, from the Energy Information Administration's Coal Data Browser.
[81] Draft SIP, Appendix D-1, at 6.

absorber[82] and it appears that the dry FGD scrubber that was installed at the WSEC Unit 4 was designed to achieve 92% SO2 removal.[83] Despite the design of WSEC Unit 4 and greater control efficiency overall for these systems, "on an annual average basis, the SDA system at WSEC Unit 4 was achieving approximately 85.5% SO2 removal during the 2017-2019 baseline period."[84]

MidAmerican and IDNR also suggest that since WSEC Unit 4's Best Available Control Technology (BACT) determination from 2003 is still consistent with recent BACT determinations, no further analysis or emission controls are needed. Only considering controls if they are in the RACT, BACT, LAER Clearinghouse ("RBLC") is inadequate given that the data it hosts is incomplete because states do not generally upload determinations and therefore the information is out of date.

Furthermore, contrary to the Regional Haze Rule requirements, neither MidAmerican nor IDNR support the proposed "do nothing" emission control approach for WSEC Unit 4 with robust technical analysis.[85] The Draft SIP also fails to contain the underlying data necessary to support a reasonable progress determination.[86] Instead, IDNR attempts to cherry-pick a statement from EPA's 2019 Guidance. This attempt also fails because IDNR did not follow all the statements in EPA guidance. If a state elects to use one of the examples EPA offers that may allow a source to escape a Four-Factor Analysis, a state must not stop there. Instead, EPA's 2019 Guidance also requires that:

> A state that does not select a source or sources for the following or any similar reasons should explain why the decision is consistent with the requirement to make reasonable progress, i.e., why it is reasonable to assume for the purposes of efficiency and prioritization that a full four factor analysis would likely result in the conclusion that no further controls are necessary.[87]

Instead of providing a reasoned analysis why its decision to require no controls and analysis at WSEC Unit 4 is consistent with the requirement to make reasonable progress, IDNR merely suggests one of the examples from EPA's 2019 Guidance applies. As clearly demonstrated in the Stamper Report, IDNR must require that MidAmerican investigate the optimization of the existing dry FGD system at WSEC

[82] EPA, Control Cost Manual, Section 5, Chapter 1, Wet and Dry Scrubbers for Acid Gas Control, April 2021, at 1-11, https://www.epa.gov/sites/default/files/2021-05/documents/wet_and_dry_scrubbers_section_5_chapter_1_control_cost_manual_7th_edition.pdf .
[83] *See* Weilert, Carl & Emily Meyer, Burns & McDonnell, Utility FGD Design Trends, at 25 (attached as Ex. 4).
[84] Stamper Report at 36.
[85] 40 C.F.R. § 51.308(f)(2).
[86] *Id.*
[87] 2019 Guidance at 23.

Unit 4 for SO2 removal because such upgrades are cost effective at $281/ton.[88] Additionally, upgrades would achieve significant reductions in SO_2 emissions if IDNR required MidAmerican Energy to meet the level of control that the dry FGDs should be capable of meeting: that is, a dry FGD upgrade to achieve an annual average SO2 rate of 0.05 lb/MMBtu which would, on average, remove 379 tons per year of SO2 from WSEC Unit 4.[89]

Because substantial gains in emission reductions from this source can be achieved cost-effectively by optimizing the EGU's existing pollution control system, IDNR must ensure that a Four-Factor Analysis is conducted for SO2 from the Walter Scott Jr. Unit 4 and include an enforceable annual emission rate of 0.05 lb/MMBtu in the SIP.

E. IDNR Must Evaluate Regional Haze Control Measures for George Neal South and George Neal North Power Plants

The George Neal South power plant is a single EGU facility with a nameplate generating capacity of 659.9 MW, and the unit burns refined coal and subbituminous coal. The George Neal North power plant also is a single EGU facility, with a nameplate generating capacity of 584.1 MW. The units are each equipped with a dry FGD system, a baghouse, an electrostatic precipitator (ESP), low NOx burners, overfire air, and SNCR.[90] George Neal South's baseline emissions rate for SO2 is 0.353 lb/mmbtu (annual) and 0.182 for NOx.[91] George Neal North's baseline emissions rate for SO2 is 0.343 lb/mmbtu (annual) and 0.202 for NOx.[92]

1. IDNR Arbitrarily Excludes George Neal South and George Neal North from a Four-Factor Analysis of Controls

States must identify sources for the Four-Factor Analysis and the screening methodology and threshold a state applies must ensure that the threshold is low enough to bring in most sources harming the Class I areas. A state must not simply eliminate evaluations of all or most sources for measures to reduce visibility impairing pollution. EPA's Clarification Memo emphasizes this requirement explaining that:

> [W]hile states have discretion to reasonably select sources, this analysis should be designed and conducted to ensure that source selection results in a set of pollutants and sources the evaluation of which has the potential to meaningfully reduce their contributions to visibility impairment.[93]

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[88] Stamper Report at 38.
[89] Stamper Report at 38.
[90] *Id.* at 40.
[91] *Id.* at 41.
[92] *Id.*
[93] Clarification Memo at 3.

IDNR's Draft SIP follows a highly convoluted process to identify sources for review, which involved the following steps:

- An analysis of each source's ' "Extinction Weighted Residence Time" or EWRT for sulfates (SO4) and nitrates (NO3) combined with distance-weighted emissions (Q/d) that was done by the Central States Air Resource Agencies (CenSARA) regional planning organization.[94]

- As described by IDNR, "[t]he CenSARA [Area of Influence (AOI)] study combined a residence time analysis using back-trajectory modeling with IMPROVE data to produce sulfate and nitrate extinction weighted residence times (EWRT). The EWRT data were augmented with SO2 and NOX emissions (Q) and inverse distance weighting (1/d) to produce EWRT*Q/d metrics for sulfates and nitrates. These metrics were used to identify emission sources with a higher probability of contributing to anthropogenically impaired visibility in Class I areas."[95]

- Next, IDNR evaluated the combined EWERT*Q/d metric for each source by adding these values for sulfates and nitrates together to arrive at a combined EWERT*Q/d.[96]

- IDNR then divided each source's combined EWRT*Q/d value by the sum of the combined EWRT*Q/d values for each specific Class I area across all grid cells in the continental US (CONUS) domain.[97] According to IDNR, "[t]his normalization simply converts each facility's EWRT*Q/d value into a percentage contribution to the total EWRT*Q/d for a given Class I area."[98]

- As presented in the Stamper Report, it appears that the next step take by IDNR was to rank the percent combined total EWRT*Q/d for each source in descending order, and then IDNR selected the first Iowa source that contributed to a cumulative percentage reflecting 50% or more of the cumulative EWRT*Q/d for each Class I area.[99]

In total, IDNR evaluated the EWRT*Q/d data for twelve Class I areas. Based on this multi-step analysis, IDNR selected only two Iowa sources to evaluate for

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[94] Draft SIP, Appendix B, Determining Areas of Influence – CenSARA Round Two Regional Haze, Final Report, (Nov. 2018).
[95] Draft SIP at 21.
[96] *Id.* at 25.
[97] *Id.*
[98] *Id.*
[99] *Id.*

regional haze controls: MidAmerican Energy Co – Louisa Generating Station and Walter Scott Jr. Energy Center.[100] IDNR's selection of only two sources does not consist of a set of sources and pollutants, which has the potential to meaningfully reduce their contributions to visibility impairment.[101] Indeed, as detailed in the Stamper Report and NPS consultation comments, IDNR's selection methodology results in ignoring two key sources.

The fatal flaw in IDNR's multi-step analysis to identify sources for regional haze controls was the last step, which only looked at the first Iowa source that contributed to a cumulative percentage reflecting 50% or more of the cumulative EWRT*Q/d at each of the 12 Class I areas. As the Stamper Report identifies, this methodology results in IDNR ignoring two sources that actually contributed a higher SWRT*Q/d value at Class I areas than the Louisa Generating Station and the Walter Scott Jr. Energy Center each contributed.[102] Those two sources are MidAmerican Energy's George Neil South and George Neal North Generating Stations. Thus, IDNR's methodology is arbitrary – the results do not produce a reasoned outcome. The State must not use a methodology that ignores sources with greater impacts than the sources it selected.

The Stamper Report explains that the George Neil South and George Neil North power plants each contributed between 1-2% of the EWRT*Q/d for two Class I areas: Badlands National Park and Wind Cave National Park.[103] In fact, both of these units contributed more to regional haze in these two Class I areas based on the EWRT*Q/d metric than the Louisa Station contributed to Isle Royale National Park or that the Walter Scott Jr. Energy Center contributed to Voyageurs National Park (the parks with highest impacts from each plant, respectively). This is additional evidence that IDNR's methodology is arbitrary because it fails to produce a reasoned outcome.

Further, the National Park Service, the Federal Land Manager for Badlands and Wind Cave National Parks, recommended that IDNR use a higher threshold of 80% of the cumulative EWRT*Q/d impacts to each Class I area for selecting Iowa sources to evaluate for controls, and stated that George Neal South and George Neal North, along with LSG and WSEC, are ranked "the top four most-impacting Iowa facilities and are on the 80% of the impact list for two or more NPS Class I areas."[104]

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[100] *Id.*

[101] Clarification Memo at 3.

[102] Stamper Report at 39.

[103] Draft SIP, Appendix C-2, at tabs for BADL and WICA.

[104] Draft SIP, Appendix F (Federal Land Manager Comments) at pdf page 10 (December 8, 2022 letter from the National Park Service to IDNR at 3).

IDNR's response to the National Park Service's comments was that the visibility impacts at Badlands and Wind Cave National Parks are dominated by "a small number of facilities, and none are in Iowa."[105] Specifically, IDNR relied in the CenSARA EWRT*Q/d analysis to claim that only eight to nine facilities contribute a cumulative of 50% of the visibility impacts at Badlands and Wind Cave national parks.[106] IDNR cites to EPA's 2019 regional haze guidance which states that a state can consider the number of emission sources affecting the Class I aeras at issue in setting a visibility threshold level for selecting sources.[107] However, EPA's supplemental regional haze memo issued in 2021 clarifies that "[i]n applying a source selection methodology, states should focus on the in-state contribution to visibility impairment and not decline to select sources based on the fact that there are larger out-of-state contributors."[108] EPA further states that a threshold that "excludes a state's largest visibility impairing sources from selection is more likely to be unreasonable."[109]

There are eighteen sources that contribute 1% or more to the cumulative EWRT*Q/d total at Wind Cave National Park and nineteen sources that contribute 1% or more to the cumulative EWRT*Q/d total at Badlands National Park.[110] Both George Neal South and George Neal North are among that list of sources contributing at least 1% to the cumulative EWRT*Q/d.[111]

As the National Park Service pointed out, the George Neal units both have dry FGD systems with relatively high SO2 emissions, given the SO2 controls.[112] Thus, at the minimum, these units must be evaluated for FGD upgrades such as those evaluated for the LGS and WSEC Unit 3 to improve SO2 removal efficiency. Otherwise, IDNR's exclusion of the George Neal units is arbitrary.

2. Regional Haze Control Evaluation for George Neal South and George Neal North Power Plants

The George Neal North and South plants are equipped with dry FGD systems that are not achieving the level of control that such systems are routinely designed to achieve, similar to the dry DFG systems at LGS and WSEC Unit 3. The Neal South FGD system is operating at an efficiency of only 23.3% SO2 removal, while the Neal North FGD system is operating at an only slightly higher efficiency of

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[105] Draft SIP at 64.
[106] *Id.*
[107] *Id.*
[108] Clarification Memo at 3.
[109] *Id.*
[110] Based on the EWRT*Q/d analyses provided in Appendix C-2 of the Draft SIP,
[111] Draft SIP, Appendix C-2, at tabs for BADL and WICA.
[112] Draft SIP, Appendix F (Federal Land Manager Comments) at pdf page 11 (December 8, 2022 letter from the National Park Service to IDNR at 4).

28.5%.[113] These removal rates are very low.[114] Given that these dry FGDs were installed within the last five to ten years, the dry FGDs at George Neal South and George Neal North are presumed to be capable of achieving at least ninety percent SO2 removal. Thus, IDNR should have evaluated the cost effectiveness of improving the SO2 removal across these two units' FGD systems to achieve ninety percent SO2 removal.

Ms. Stamper conducted a cost effectiveness analysis for dry FGD upgrades at George Neal South and at George Neal North based on this improved SO2 removal efficiency.[115] Her cost evaluation shows that dry FGD upgrades with the use of additional lime would reduce SO2 emissions by 3,618 tons per year at George Neal South and by 3,318 tons per year at George Neal North below 2017-2019 emissions, at a cost effectiveness of $278-$280/ton (2021 $).[116] She concludes that "Not only are these costs well within the range of cost thresholds that other states have used in their regional haze plans, but these costs are in the range of costs that IDNR has proposed to find as reasonable for the same type of SO2 upgrades at Louisa Generating Station and Walter Scott Jr. Energy Center Unit 3."[117] As a result, IDNR must ensure Four-Factor Analyses are conducted and adopt reasonable progress measures for the George Neal South and George Neal North power plants to reduce SO2 emissions based on the additional use of lime in the units' dry FGD systems to achieve annual SO2 rates at or below 0.05 lb/MMBtu while achieving 30-day average SO2 emission rates of 0.06 lb/MMBtu.

IV. LONG-TERM SIP STRATEGY ISSUES THAT MUST BE CORRECTED

A. IDNR erroneously uses visibility as an additional fifth factor beyond the Act's Four-Factor Analysis to reject controls and fails to include controls for all pollutants

Visibility is not a consideration on par with the four statutory reasonable progress factors as is plain in the Act, and as consistently stated by EPA. States may not purport a lack of perceptible or sufficient visibility improvements to excuse selecting emission controls. While visibility is the goal of the regional haze program, *id.* at 7491(a)(1), the four-factor reasonable progress evaluation does not itself incorporate visibility, and states may not give it the same weight as the four statutory factors. Regional haze is "visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic

[113] Stamper Report at 41-42
[114] *Id.* at 41.
[115] *Id.* at 42-45.
[116] *Id.* at 45.
[117] *Id.*

area."[118] At any given Class I area, hundreds or even thousands of individual sources may contribute to regional haze. As EPA's Clarification Memorandum provides, "…a state should not use visibility to summarily dismiss cost-effective potential controls. …a state that has identified cost-effective controls for its sources but rejects most (or all) such cost-effective controls across those sources based on visibility benefits is likely to be improperly using visibility as an additional factor."[119] Thus, it is not appropriate to reject a control measure for a single emission unit, a single source, or even a group of sources on the basis of the associated visibility benefits being imperceptible to the human eye or too small to justify emission reduction measures that would otherwise satisfy a Four-Factor Analysis.

Additionally, states must not ignore pollutants by focusing on only the dominant pollutant. EPA's expectation regarding the pollutants considered for source selection and control strategy analysis for the second planning period is that "each state will analyze sulfur dioxide (SO2) and nitrogen oxide (NOx) in selecting sources and determining control measures."[120] Moreover, "[a] state that chooses not to consider at least these two pollutants in the second planning period should show why such consideration would be unreasonable, especially if the state considered both these pollutants in the first planning period."[121]

Despite the fact that the degree of visibility benefits is not a statutory factor nor a justifiable criteria to excuse an otherwise valid control measures, IDNR's Draft SIP includes an analysis of what it calls the "Optional 5th Factor – Visibility Impacts."[122] In addition to MidAmerican's visibility impact assessment, IDNR conducted an independent analysis.[123] Then, in making its reasonable progress determinations, IDNR considers the impacts of visibility on par with the other four statutory factors. This it must not do.

For example, IDNR summarily explains that it relied on "visibility impacts data" as a basis to determine that the addition of SNCR or SCR systems on LGS to further control NOX emissions is not cost effective or reasonable at this time.[124]

IDNR also rejected controls at WSEC-3 and its bases for rejecting SNCR or SCR systems on WSEC-3 to further control NO_X emissions similarly considered the statutory factors and wrongly also relied on the visibility impacts data.

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118 40 C.F.R. § 51.301.
119 Clarification Memo at 13.
120 Clarification Memo at 4, citing 2019 Guidance at 12.
121 Clarification Memo at 4-5.
122 Draft SIP at 35-38.
123 *Id.* at 35.
124 *Id.* at 38.

Moreover, IDNR only requires emission controls on the dominant pollutant – SO_2. IDNR argues that "NO_X reductions from Iowa's EGUs are less effective at improving visibility versus SO2 reductions" and "the estimated visibility benefits from SO_2 reductions at Iowa EGU sources exceeding those of NO_X by greater than a factor of 4.[125] Assertions that reductions from one pollutant are less effective than another are not a reasonable basis for rejecting controls. IDNR must reconsider its determination of NOx controls at LGS and WSEC 3 and consistent with section II.C.3 above, IDNR must correct the Four-Factor Analyses to ensure that it comports with the legal requirements and require SCR installation at WSEC Unit 3 and at least require SNCR installation, if not SCR installation, at the LGS facility as cost-effective NOx controls.

B. Uniform Rate of Progress (URP) is not a "Safe Harbor" and IDNR must not rely on it to avoid robust Four-Factor Analyses and Emission Controls

IDNR asserts that because LADCO's regional modeling results predict that the average visibility conditions on the 20% most impaired days in 2028 will be better than the uniform rate of progress (URP) in each of the five downwind Class I areas linked to Iowa (*i.e.*, Isle Royale NP, Seney WA, Boundary Waters Canoe Area WA, Voyageurs NP, and Hercules-Glades WA) located in the states of Michigan, Minnesota and Missouri, the scrubber improvements at LGS and WSEC-3, in combination with existing state and federal programs, are sufficiently robust for downwind Class I areas to make reasonable progress."[126]

As EPA's 2021 July 2021 Clarification Memo stated, SIPs "that conclude that additional controls, including potentially cost-effective and otherwise reasonable controls, are not needed because the Class I areas in the state (and for Iowa, those out-of-state areas affected by emissions from the state) are below their uniform rates of progress (URPs)" have not "answer[ed] the question of whether the amount of progress made in any particular implementation period is 'reasonable progress.'"[127] EPA explained that its "2017 RHR preamble and the August 2019 Guidance clearly state that it is not appropriate to use the URP in this way, i.e., as a 'safe harbor.'"[128] The EPA Clarification memo provides:

> The URP is a planning metric used to gauge the amount of progress made thus far and the amount left to make. It is not based on consideration of the four statutory factors and, therefore, cannot answer the question of whether the amount of progress made in any particular implementation period is "reasonable progress." This concept was explained in the RHR preamble.

[125] *Id.* at 39.
[126] Draft SIP at 2; *see also id.* at 20; *see also id.* at 51-54.
[127] Clarification Memo at 15.
[128] Clarification Memo at 15-16; *see also* 2019 Guidance at 25.

> Therefore, states must select a reasonable number of sources and evaluate and determine emission reduction measures that are necessary to make reasonable progress by considering the four statutory factors.[129]

Therefore, it is inappropriate for IDNR to use the status of the glideslope in other states to justify inaction in this plan and in doing so fail to make reasonable progress to continue cleaning up haze pollution incrementally. We urge the state to modify the Draft SIP by requiring measures of pollution reduction to satisfy the requirement to make reasonable progress, and not lean improperly on the URPs in the other states to justify doing nothing.

C. IDNR's Consultation Process was Fundamentally Inadequate

1. IDNR Failed to Meaningfully Address and Incorporate Comments from the Federal Land Managers

The state must consult with the Federal Land Managers ("FLMs") and look to the FLMs' expertise regarding their resources and harms from air pollution to guide the state to ensure SIPs help restore natural skies.[130] The RHR requires that in developing any implementation plan (or plan revision) or progress report, the State must include a description of how it addressed any comments provided by the Federal Land Managers.[131] These requirements are further clarified by EPA.[132]

While IDNR engages in some type of consultation process with U.S. Forest Service ("FS") and National Park Service ("NPS") it disregards the FLM consultation/asks where it really matters—in the emission reductions requirements or as manifested by the lack thereof at visibility impairing sources—and proceeds as IDNR initially intended. Additionally, the FLM's expressed concerns regarding sources that IDNR failed to evaluate in the SIP. Furthermore, IDNR's responses are generally terse and it fails to engage with the FLM comments and fails to provide any meaningful explanation on why they ignore and/or disagree the FLM comments. Instead, IDNR largely reiterates what it has already been planning to do in the SIP. A mere indication that a state "considered" comments is not meaningful consideration of comments.[133]

The RHR and the CAA require that states consult with the FLMs that manage the Class I Areas impacted by a state's sources. Because the FLMs' role is

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[129] Clarification Memo at 15-16.

[130] FLMs have affirmative duties under 42 U.S.C. §§ 7492(a), (d) as well as mandates to protect and manage public lands under the Wilderness Act (16 U.S.C. §§ 1131-1136) and the Organics Act (54 U.S.C. § 100101).

[131] 40 C.F.R. § 51.308(i)(3); 40 C.F.R. § 51.308(f)(4).

[132] Clarification Memo at 16-17.

[133] *Home Box Office, Inc. v. Federal Communications Commission*, 567 F.2d 9, 35 (D.C. Cir. 1977).

to manage their resources – including air quality – IDNR must meaningfully consider and adapt its selection of sources and SIP measures to reflect comments and suggestions from the FLMs. Examples of the FLM comments that IDNR fails to fully address include the following:

- In responding to consultation comments that the State's source selection methodology should include more source, IDNR asserts that it used more sophisticated data from CenSARA's area of influence (AOI) analysis than the Q/d methods used by the FS and NPS.[134] A more convoluted source selection methodology does not necessarily mean the methodology is better. Iowa's short list of sources does not make it better list, particularly when the State's source selection methodology results contains a fatal flaw (as discussed earlier in these comments), which results in in screening out sources and significant emissions from consideration in a Four-Factor Analysis, which have greater impacts than the sources included in the Draft SIP and are of concern to the FLMs.

  Indeed, states must identify sources for the Four-Factor Analysis and the screening threshold a state applies must ensure that the threshold is low enough to bring in most sources harming the Class I areas; a state must not simply eliminate evaluations of all or most sources for measures to reduce visibility impairing pollution.[135]

  IDNR's response that it "found no compelling reason to expand the source selection process to include any other sources identified using less technical methods"[136] is contrary to the requirement to meaningfully reduce, which requires that states *comprehensively* identify sources of human-caused visibility-impairing emissions across source categories. Instead, IDNR's Draft SIPs uses methodology with a fatal flaw and IDNR's characterization of its approach as "reasonable" does not make it so.

  Similarly, IDNR rejects the NPS comments that suggests that the State use a higher screening threshold (such as 80% rather than the 50% used), explaining that this ensures that the sources with the most significant impacts to NPS Class I areas are selected for analysis and that a reasonable number of sources are evaluated.[137] IDNR's response fails to respond to the NPS comments, instead it summarizes the results from its AOI impacts analysis.[138] This is an example of IDNR failing to engage

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[134] Draft SIP at 61-62.
[135] Clarification Memo at 3.
[136] Draft SIP at 62.
[137] *Id*. at 63.
[138] *Id*. at 63.

with the FLM comments and failing to provide any meaningful explanation on why they ignore and/or disagree the FLM comments.

- Despite comments from the FS pointing out the similarities between the sources (*i.e.*, boiler features) covered by the Draft SIP and those excluded,[139] IDNR arbitrarily excludes the George Neal sources from consideration.

- IDNR's assertion that the modeling predictions in Class I area are better than required for URP purposes, thus a more "robust demonstration" as might otherwise be required under 40 CFR 51.308(f)(3)(ii)(B) is not applicable"[140] – is not an excuse for avoiding emission reductions at Iowa sources (as discussed earlier in these comments).

- NPS recommends that IDNR identify the criteria used when evaluating controls, including those for costs, as required under the RHR. The NPS specifically recommends that Iowa establish cost thresholds to aid in documenting the rationale behind its final reasonable progress determinations and that Iowa establish a cost threshold in line with other states.

  The NPS's recommendations comport with EPA's regional haze guidance and regulations that require that the SIP "explain why the selected [cost] threshold is appropriate for that purpose and consistent with the requirements to make reasonable progress."[141] And while the Clean Air Act does not mandate that IDNR "explain its cost-effectiveness decisions through use of a 'bright line" rule,' the Ninth Circuit explained that "the law does require EPA [and thus the states] to cogently explain why it has exercised its discretion in a given manner."[142] When the Four-Factor Analyses are conducted, IDNR must establish and provide a basis for its cost reasonableness threshold.

  IDNR also ignored the NPS's recommendation to consider and establish a cost threshold in line with other states, despite the NPS providing examples from seven other states. We strongly encourage that in making its cost-effective decisions, IDNR to take into consideration the thresholds established by other States. For example, Colorado and Oregon, are each using $10,000 per ton of regional haze pollutant as the nominal cost

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[139] Draft SIP at 63. A regional haze SIP must not treat similar sources differently. *Nat'l Parks Conservation Ass'n v. E.P.A.*, 788 F.3d 1134 (9th Cir. 2015).
[140] Draft SIP at 63.
[141] 2019 Guidance at 39.
[142] *Nat'l Parks Conservation Ass'n v. E.P.A.*, 788 F.3d 1134, 1142–43 (9th Cir. 2015) (citation and quotation omitted) (holding that BART determinations were arbitrary because EPA failed to provide a reasoned explanation for its cost-effectiveness conclusions).

threshold to determine cost effective control strategies for Round 2 RP.[143] Additionally, New Mexico applied a $7,000/ton threshold,[144] Arizona used a $6,500/ton threshold, [145] and Washington used $6,300/ton.[146]

Moreover, it is unreasonable for IDNR to assert that it can ignore the NPS comment to consider costs from the other states because those states all have at least one Class I area (and Iowa has none). All states are responsible for the requirements of the Act, Iowa cannot ignore determinations made by states with Class I areas because the State lacks a Class I area.

Finally, IDNR's assertion that none of NPS's examples are from Midwestern states also fails, the Clean Air Act's requirements create a level playing field across all states and thus cost-effectiveness ranges throughout the country are relevant to IDNR's determination. Indeed, IDNR provides no justification as to why the lack of Midwestern states is meaningful, and it was unreasonable for IDNR to suggest that only cost-effectiveness determinations from states in close geographic proximity to Iowa are relevant.

- IDNR's response to NPS Comments 4 and 5, where the NPS provided a detailed cost-effective analysis for SO2 controls at GNN and GNS (as well as the cost of reducing NOx emissions at GNN) are yet additional examples of the State failing to meaningfully engage and respond to the comments. IDNR's terse replies to the NPS's in depth engineering analyses fail to address and engage with the comments. The State must not ignore these comments as it has done.[147]

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[143] Prehearing Statement of the Colorado Department of Public Health and Environmental, at 7, (which explained that "[t]his threshold is applied to the individual pollutants in the control strategy analyses, specifically NOx, PM, and SO2. This threshold value is an increase from Round 1 and reflects the fact that with each successive round of planning, less costly and easier to implement strategies have already been adopted. Colorado has maintained this threshold throughout the planning process despite the fact that each of the Class I areas in Colorado is below the URP for 2028.") (Enclosure 2); *see also* Letter from Oregon Department of Environmental Quality to Collins Forest Products, (Sept. 9, 2020), at 1-2, https://www.oregon.gov/deq/aq/Documents/18-0013CollinsDEQletter.pdf (Enclosure 3); *see also* "Oregon Regional Haze State Implementation Plan, For the period 2018– 2028," (Aug. 27, 2021 Public Notice Draft) (Enclosure 4);

[144] *See* NMED and City of Albuquerque, Regional Haze Stakeholder Outreach Webinar #2, at 12. (Enclosure 5).

[145] *See* Arizona Department of Environmental Quality, 2021 Regional Haze Four-Factor Initial Control Determination, Tucson Electric Power Irvington Generating Station, https://www.azdeq.gov/2021-regional-haze-sip-planning. (Enclosure 6).

[146] *See, e.g.,* Washington Department of Ecology, Draft Responses to comments for chemical pulp and paper mills, at 5, 6, and 8, https://fortress.wa.gov/ecy/ezshare/AQ/RegionalHaze/docs/RespondFLM20210111.pdf. (Enclosure 7).

[147] Draft SIP at 65 ("The DNR appreciates the information provided, but concludes that neither GNN or GNS require a four-factor analysis at this time. Therefore, the estimated cost-effectiveness of SO2

2. IDNR Failed to Satisfy the Interstate Consultation Requirements

The Clean Air Act requires states to determine the measures necessary to make reasonable progress towards preventing future, and remedying existing, anthropogenic visibility impairment in all Class I areas.[148] Thus, "Congress was clear that both downwind states (*i.e.*, "a State in which any [mandatory Class I Federal] area . . . is located) and upwind states (*i.e.*, "a State the emissions from which may reasonably be anticipated to cause or contribute to any impairment of visibility in any such area") must revise their SIPs to include measures that will make reasonable progress at all affected Class I areas."[149]

According to EPA, "[t]his consultation obligation is a key element of the regional haze program. Congress, the states, the courts and the EPA have long recognized that regional haze is a regional problem that requires regional solutions."[150] Congress intended this provision of the Clean Air Act to "equalize the positions of the States with respect to interstate pollution,"[151] and EPA's interpretation of this requirement accomplishes this goal by ensuring that downwind states can seek recourse from EPA if an upwind state is not doing enough to address visibility transport.[152]

In developing a long-term strategy for regional haze, EPA's regulation 40 C.F.R. § 51.308(f)(2) requires that a state take three distinct steps: consultation; demonstration; and consideration. Specifically, the regulation requires:

> (ii) The State must consult with those States that have emissions that are reasonably anticipated to contribute to visibility impairment in the mandatory Class I Federal area to develop coordinated emission management strategies containing the emission reductions necessary to make reasonable progress.
> (A) The State must demonstrate that it has included in its implementation plan all measures agreed to during state-to-state consultations or a regional planning process, or measures that will provide equivalent visibility improvement.

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reductions need not be evaluated for either GNN or GNS."); *see also id.* ("The DNR appreciates the information provided, but concludes that GNN does not require a four-factor analysis at this time. Therefore, the estimated cost-effectiveness of NOX reductions need not be evaluated.")

[148] 42 U.S.C. § 7491(a)(1).

[149] 82 Fed. Reg. at 3,094.

[150] 82 Fed. Reg. at 3,085, citing *Vermont v. Thomas*, 850 F.2d 99, 101 (2d Cir. 1988)).

[151] S. Rep. No. 95-127, at 41 (1977).

[152] S. Rep. No. 95-127, at 41 (1977).

(B) The State must consider the emission reduction measures identified by other States for their sources as being necessary to make reasonable progress in the mandatory Class I Federal area.[153]

Under the Regional Haze Rule, "[w]here the State has emissions that are reasonably anticipated to contribute to visibility impairment in any mandatory Class I Federal area located in another State or States, the State must consult with the other State(s) in order to develop coordinated emission management strategies."[154] Moreover, plan revisions:

> [M]ust provide procedures for continuing consultation between the State … on the implementation of the visibility protection program required by this subpart, including development and review of implementation plan revisions and progress reports, and on the implementation of other programs having the potential to contribute to impairment of visibility in mandatory Class I Federal areas.[155]

In its 2017 amendments to the Regional Haze Rule, EPA explained that "states *must* exchange their four-factor analyses and the associated technical information that was developed in the course of devising their long-term strategies. This information includes modeling, monitoring and emissions data and cost and feasibility studies."[156] In the event of a recalcitrant state, "[t]o the extent that one state does not provide another state with these analyses and information, or to the extent that the analyses or information are materially deficient, the latter state should document this fact so that the EPA can assess whether the former state has failed to meaningfully comply with the consultation requirements."[157]

Finally, "[i]f a State contains sources which are reasonably anticipated to contribute to visibility impairment in a mandatory Class I Federal area in another State" that has established reasonable progress goals that are slower than the Uniform Rate of Progress, "the State must demonstrate that there are no additional emission reduction measures for anthropogenic sources or groups of sources in the State."[158] To that end, the "State must provide a robust demonstration, including documenting the criteria used to determine which sources or groups or sources were evaluated and how the four factors required by paragraph (f)(2)(i) were taken into

[153] 40 C.F.R. § 51.308(f)(2) (emphasis added); *see also*, 64 Fed. Reg. 35,765, 35,735 (July 1, 1999) (In conducting the Four-Factor Analysis, EPA explained that "…the State must consult with other States which are anticipated to contribute to visibility impairment in the Class I area under consideration … any such State must consult with other States before submitting its long-term strategy to EPA.").
[154] 40 C.F.R. § 51.308(f)(3)(i).
[155] 40 C.F.R. § 51.308(f)(4).
[156] 82 Fed. Reg. at 3,088 (emphasis added).
[157] 82 Fed. Reg. at 3,088.
[158] 40 C.F.R. § 51.308(f)(3)(ii)(B).

consideration in selecting the measures for inclusion in its long-term strategy."[159] In any event, "[a]ll substantive interstate consultations must be documented."[160]

IDNR's interstate consultations are flawed, incomplete and had no effect. IDNR's lackluster efforts fail to satisfy the 41 C.F.R. § 51.308(f)(2)(ii) requirement that states "develop coordinated emission management strategies." For example, since 2017 IDNR participated in what appears to be a voluminous number of conference calls with CenSARA member states and LADCO states. But the Draft SIP fails to provide details of these calls, rather indicates that "[c]all notes are available upon request."[161] The Draft SIP merely notes that

> The DNR provided updates on these calls regarding Iowa's progress in selecting sources for four-factor analysis and Iowa's intent to require SO2 emissions reductions from LGS and WSEC-3.[162]

IDNR fails to demonstrate that these regional calls resulted in "include[ing] in its implementation plan all measures agreed to during state-to-state consultations or a regional planning process."[163] Indeed, IDNR explains it only provided updates on its progress and its intentions regarding emission reductions, IDNR provides no information to document that the measures it intended to proposed were agreed to during the regional conference call. IDNR's characterizations of these conference calls does not indicate that the states engaged in any kind of discussion about whether and how the sources would be controlled. IDNR's state-to-state efforts fair no better.

IDNR responded to Minnesota's request for consultation. And during the one call the two states had, IDNR explains the two states exchanged information, there was no engagement between states to "develop coordinated emission management strategies." 41 C.F.R. § 51.308(f)(2)(ii). Instead, there appears to be an implicit agreement that neither state would ask anything of the other state. Moreover, rather than review Minnesota's "regional haze planning efforts and related technical data, including its own CAMx PSAT results and the outcomes of its source selection and four-factor analyses" against EPA's Regional Haze Regulations and guidance to determine whether there were any issues of concern, IDNR's Draft SIP explains that it used LADCO's modeling results and found the conclusions were consistent. Finally, the Draft SIP explains that Minnesota shared that it is on track to meet the 2064 goal and had no formal "asks" for Iowa.[164]

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[159] 40 C.F.R. § 51.308(f)(3)(ii)(B).
[160] 40 C.F.R. § 51.308(f)(2)(ii)(C).
[161] Draft SIP at 61.
[162] *Id.*
[163] 40 C.F.R. § 51.308(f)(2)(B).
[164] Draft SIP at 61.

IDNR's virtual consultation meetings with Missouri and Michigan followed the same format as its consultation with Minnesota.[165] The Draft SIP contains a high-level summary of its discussions with the other states – they presented information to each other. The states did not engage in discussions to develop coordinated emission management strategies. While IDNR went through the motions of requesting consultations, there also appears to be an implicit agreement with these states to require nothing from another state.

The Draft SIP fails to demonstrate compliance with Regional Haze Rule requirements for interstate consultation and IDNR must provide more substantive information about its consultations and include it clearly in the SIP for the public to review.

D. Iowa Must Analyze Environmental Justice Impacts of its Regional Haze SIP, and Must Ensure Its SIP Will Reduce Emissions and Minimize Harms to Disproportionately Impacted Communities

1. IDNR Completely Ignored the Environmental Justice Communities Impacted by Iowa's Polluting Sources

Sources that harm the air in our treasured Class I areas are also located in environmental justice areas. By evaluating the vulnerable communities and counties impacted by these sources, we believe IDNR will identify emission-reducing options that if required will improve air quality and help achieve reasonable progress in this round of regional haze rulemaking. Historically, conservation and environmental work has concerned itself with protecting nature from people and has thus "siloed" its work (*e.g.*, mainstream conservation vs. environmental justice.) While this siloed approach has led to the protection of many vulnerable habitats, it ignores the reality that people live in concert with and are a part of nature; to protect one and not the other is a job half done. By considering viewshed protection and environmental justice at the same time, we can collectively begin to dismantle the silos that exist in conservation and environmental work and chart a new path forward.

An examination of the communities within a 20-mile radius of the sources covered in these comments identifies disproportionate burden of environmental pollution on vulnerable environmental justice communities. EPA's EJSCREEN and Mapping Tool shows the communities surrounding George Neal North, Louisa Generating Station, and Walter Scott Jr. Energy Center rank on average in the 65 to 99 percentile risk range for respiratory health impacts as compared to the other

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[165] *Id.*

state census block groups.[166] Similarly, the $PM_{2.5}$ and ozone environmental justice indexes in the communities surrounding the Louisa Station are very high in the 90 and 93 percentile risk range respectively. For the communities around George Neal North, the ozone environmental justice index is of considerable concern at 92 percentile risk range, as is environmental justice index for air toxics respiratory health, which is at 90 percentile risk range. Additionally, the populations around the Walter Scott Jr. Energy Center, Louisa Generating Station, and George Neal North, have people of color percentiles ranging from 73 to 88 percent. For all three sources the socioeconomic indicator of low income is higher than 50 precent. Finally, the limited English-speaking households socioeconomic indicator for communities surrounding these sources range from 76 to 88 percent – yet there is no evidence in IDNR's Draft SIP package that IDNR ensured meaningful access to review and comment on the Draft SIP for persons with limited English proficiency.

2. IDNR Can Facilitate EPA's Consideration of Environmental Justice to Comply with Federal Executive Orders

There are specific legal grounds for considering environmental justice when determining reasonable progress controls. Under the CAA, states are permitted to include in a SIP measures that are authorized by state law but go beyond the minimum requirements of federal law.[167] Ultimately, EPA will review the Final Haze Plan that IDNR submits, and EPA will be required to ensure that its action on IDNR's Haze Plan addresses any disproportionate environmental impacts of the pollution that contributes to haze. Executive Orders in place since 1994, require federal executive agencies such as EPA to:

> [M]ake achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.[168]

On January 27, 2021, the President signed "Executive Order on Tackling the Climate Crisis at Home and Abroad."[169] The Executive Order on climate change and environmental justice amended the 1994 Order and provides that:

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[166] *See* EJScreen Reports for these sources. (Enclosures 8, 9, 10).
[167] *See Union Elec. Co v. EPA*, 427 U.S. 246, 265 (1976) ("States may submit implementation plans more stringent than federal law requires and . . . the Administrator must approve such plans if they meet the minimum requirements of §110(a)(2)."); *Ariz. Pub. Serv. Co. v. EPA*, 562 F.3d 1116, 1126 (10th Cir. 2009) (citing *Union Elec. Co.*, 427 U.S. at 265) ("In sum, the key criterion in determining the adequacy of any plan is attainment and maintenance of the national air standards . . . 'States may submit implementation plans more stringent than federal law requires and [ ] the [EPA] must approve such plans if they meet the minimum [CAA] requirements of § 110(a)(2).'").
[168] Exec. Order No. 12898, § 1-101, 59 Fed. Reg. 7,629 (Feb. 16, 1994), as amended by Exec. Order No. 12948, 60 Fed. Reg. 6,381 (Feb. 1, 1995).
[169] Exec. Order No. 14008, 86 Fed. Reg. 7,619 (Jan. 27, 2021).

> It is the policy of [this] Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; … protects public health … delivers environmental justice …[and that] … [s]uccessfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments.[170]

IDNR can facilitate EPA's compliance with these Executive Orders by considering environmental justice in its SIP submission.

3. IDNR Ignored EPA's 2019 Guidance and Clarification Memo, Which Directs States to Take Environmental Justice Concerns and Impacts Into Consideration

EPA's Clarification Memo directs states to take into consideration environmental justice concerns and impacts in issuing any SIP revision for the second planning period.[171] EPA's 2019 Guidance for the Second Planning Period specifies, "States may also consider any beneficial non-air quality environmental impacts."[172] This includes consideration of environmental justice in keeping with other agency policies. For example, EPA also pointed to another agency program that states could rely upon for guidance in interpreting how to apply the non-air quality environmental impacts standard:

> When there are significant potential non-air environmental impacts, characterizing those impacts will usually be very source- and place-specific. Other EPA guidance intended for use in environmental impact assessments under the National Environmental Policy Act may be informative, but not obligatory to follow, in this task.[173]

Additionally, a collection of EPA policies, guidance and directives related to the National Environmental Policy Act ("NEPA") is available at https://www.epa.gov/nepa/nationalenvironmental-policy-act-policies-and-guidance. One of the NEPA policies concerns environmental justice.[174] IDNR should consider these sources of information in conducting a meaningful environmental justice analysis.

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[170] Exec. Order No. 14008 at § 201.
[171] Clarification Memo at 16.
[172] 2019 Guidance at 49.
[173] *Id.* at 33.
[174] *See* EPA, "EPA Environmental Justice Guidance for National Environmental Policy Act Reviews," https://www.epa.gov/nepa/environmental-justice-guidance-national-environmental-policy-act-reviews.

4. EPA has a Repository of Directives and Material Available for IDNR to Use in Considering Environmental Justice

In addition to the NEPA guidance directives referenced above, EPA provides a wealth of additional material.[175] The most important aspect of assessing environmental justice is to identify the areas where people are most vulnerable or likely to be exposed to different types of pollution. EPA's EJSCREEN tool can assist in that task. It uses standard and nationally consistent data to highlight places that may have higher environmental burdens and vulnerable populations.[176]

5. EPA Must Consider Environmental Justice When it Reviews and Takes Action on IDNR's SIP

As occurred in the first planning period, if a state fails to submit its SIP on time, or if EPA finds that all or part of a state's SIP does not satisfy the Regional Haze regulations, then EPA must promulgate its own Federal Implementation Plan ("FIP") to cover the SIP's inadequacy. Should EPA promulgate a FIP that reconsiders a state's Four-Factor Analysis, it is completely free to reconsider any aspect of that state' analysis. The two Presidential Executive Orders referenced above require that federal agencies integrate environmental justice principles into their decision-making. EPA has a lead role in coordinating these efforts, and EPA Administrator Regan directed all EPA offices to clearly integrate environmental justice considerations into their plans and actions.[177] Consequently, should EPA promulgate a FIP for Iowa sources, it has an obligation to integrate environmental justice principles into its decision-making.

6. IDNR Must Consider Environmental Justice Under Title VI of the Civil Rights Act

As EPA must consider environmental justice, so must IDNR and all other entities that accept Federal funding. Under Title VI of the Civil Rights Act of 1964, "no person shall, on the ground of race, color, national origin, sex, age or disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity…" IDNR has an obligation to ensure the fair treatment of communities that have been environmentally impacted by

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[175] *See* EPA, "Learn About Environmental Justice," https://www.epa.gov/environmentaljustice/learn-aboutenvironmental-justice.
[176] *See* EPA, "EPA EJSCREEN: Environmental Justice Screening and Mapping Tool, Additional Resources and Tools Related to EJSCREEN," https://www.epa.gov/ejscreen/additional-resources-and-tools-related-ejscreen.
[177] *See* EPA News Release, "EPA Administrator Announces Agency Actions to Advance Environmental Justice,
Administrator Regan Directs Agency to Take Steps to Better Serve Historically Marginalized Communities," (April 7, 2021), https://www.epa.gov/newsreleases/epa-administrator-announces-agency-actions-advance-environmental-justice.

sources of pollution. That means ensuring "meaningful involvement" of impacted communities; environmental justice also requires the "fair treatment" of these communities in the development and implementation of agency programs and activities, including those related to the SIP.

IDNR must conduct a thorough analysis of the current and potential effects to impacted communities from sources considered in the SIP as well as those sources identified by commenters and other stakeholders but not reviewed by IDNR. By not conducting this analysis and including the benefits of projected decline in emissions to these communities in their determination of the included emission sources, IDNR is not fulfilling its obligations under the law. Moreover, the state is making a mockery of Title VI by not using the SIP requirements to bring about the co-benefits of stronger reductions measures and reduce harms based on continued emissions.

7. Lack of any Effort on Environmental Justice is Wholly Inadequate to Protect People Living in Environmental Justice Communities in Iowa Affected by Iowa's Sources

Iowa's Proposed SIP lacks any consideration of environmental justice. Iowa failed to consider any sources that impact the environmental justice communities. Moreover, Iowa's Proposed SIP failed to include enforceable emission limitations for the polluting sources that impact the environmental justice communities. Consistent with the legal requirements, government efficiency, and the year's of injustice these communities may have been subjected to emissions from Iowa's sources, we urge IDNR to fully and meaningfully consider all sources that impact the environmental communities. In establishing emission limitations in its SIP, IDNR must reduce impacts at *both* the Class I areas and environmental justice communities.

CONCLUSION

IDNR's Draft SIP will not result in reasonable progress towards improving visibility at the Class I areas its sources impact. Specifically, IDNR must make the following revisions to the Draft SIP before submitting to EPA:

- Revise the cost-effectiveness analysis using the assumption of a 30-year useful life for the pollution control equipment.
- Adjust the interest rate used in the cost-effectiveness analysis to reflect the current prime bank rate.
- FGD upgrades to meet a 90% reduction level or an annual average emission rate of 0.05 lb/MMBtu at LGS and at WSEC Unit 3 are cost effective, and so IDNR must impose an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average basis at both units. A pound per

hour SO2 emissions limit will result in exceedances of a pound per MMBtu SO2 rate and so cannot be used.

- SCR is cost effective at WSEC Unit 3 and at least SNCR is cost effective at LGS. IDNR must require WSEC 3 to meet an annual NOx rate of 0.04 lb/MMBtu, which would reduce NOx by over 4,100 tons per year of NOx on average, and require LGS to meet an annual NOx emission rate of 0.15 lb/MMBtu, which would reduce NOx emissions from the facility by 778 tons per year on average.
- Require WSEC 4 to upgrade its dry FGD system and must impose an annual average SO2 limit of 0.05 lb/MMBtu, and an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average.
- IDNR arbitrarily excluded George Neal South and George Neal North from Four-Factor Analysis. Upgrades to those plants' dry FGD systems would be highly cost effective. IDNR should adopt reasonable progress measures for the George Neal South and George Neal North power plants to reduce SO2 emissions based on the additional use of lime in the units' dry FGD systems to achieve annual SO2 rates at or below 0.05 lb/MMBtu while achieving 30-day average SO2 emission rates of 0.06 lb/MMBtu.
- Remove the inappropriate reference to the URP as a "safe harbor." That Class 1 areas in other states are on the so-called glidepath is not an excuse for avoiding emission reductions at Iowa sources.
- Include enforceable emission limitations in the SIP that require the Walter Scott Jr. Unit 4 to meet a lower annual average SO_2 emission rate of 0.05 lb/MMBtu.
- In evaluating the four factors, eliminate consideration of visibility as a fifth factor; and consider controls on all pollutants.
- Meaningfully consider and adapt the SIP to reflect comments from the FLMs.
- Analyze the environmental justice impacts of its Regional Haze SIP, and ensure its SIP will reduce emissions and minimize harms to disproportionately impacted communities.

Thank you for the opportunity to review the Draft SIP. We look forward to seeing a revised plan that takes our comments into consideration.

Sincerely,

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Review and Comments on Reasonable Progress Controls for the Iowa Regional Haze Plan for the Second Implementation Period

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Prepared for Sierra Club

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I. Introduction

The Clean Air Act's Regional Haze Program establishes a national goal of preventing future, and remedying any existing, impairment of visibility in mandatory class I Federal areas from manmade air pollution.[1] Every ten years, states must adopt periodic, comprehensive revisions to their regional haze state implementation plans (SIPs) that set forth a long-term strategy that includes enforceable emission limits and other measures as may be necessary to achieve reasonable progress towards the national visibility goal.[2] The deadline for the regional haze plan revision for the second implementation period to be submitted to EPA was July 31, 2021.[3]

To that end, in February of 2022, the Iowa Department of Natural Resources (IDNR) issued its draft regional haze SIP revision for the second implementation period.[4] IDNR selected sources for review based on the following analysis and criteria:

> (1) IDNR used an analysis of each facilities' "Extinction Weighted Residence Time" or EWRT for sulfates (SO4) and nitrates (NO3) combined with distance-weighted emissions (Q/d) that was done by the Central States Air Resource Agencies (CenSARA) regional planning organization.[5] As described by IDNR, "[t]he CenSARA [Area of Influence (AOI)] study combined a residence time analysis using back-trajectory modeling with IMPROVE data to produce sulfate and nitrate extinction weighted residence times (EWRT). The EWRT data were augmented with SO2 and NOX emissions (Q) and inverse distance weighting (1/d) to produce EWRT*Q/d metrics for sulfates and nitrates. These metrics were used to identify emission sources with a higher probability of contributing to anthropogenically impaired visibility in Class I areas."[6] IDNR evaluated the combined EWERT*Q/d metric for each source by adding these values for sulfates and nitrates together to arrive at a combined EWERT*Q/d.[7] Next, IDNR divided each facility's combined EWRT*Q/d value by the sum of the combined EWRT*Q/d values for each specific Class I area across all grid cells in the continental US (CONUS) domain.[8] According to IDNR, "[t]his normalization simply converts each facility's EWRT*Q/d value into a percentage contribution to the total EWRT*Q/d for a given Class I area."[9]

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[1] 42 U.S.C. § 7491(a)(1).

[2] 40 C.F.R. §51.308(f)(2)(i); 42 U.S.C. § 7491(b)(2). Under the Clean Air Act, state implementation plans must include "include enforceable emission limitations and other control measures, means, or techniques . . . , as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this chapter." 42 U.S.C. § 7491(a)(2)(A). An emission limitation is a "requirement" that "limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction." *Id*. § 7602(k).

[3] 40 C.F.R. § 51.308(f).

[4] February 13, 2023, IDNR, Iowa State Implementation Plan, Regional Haze, Second Implementation Period (2019-2028), Draft (hereinafter referred to as the "February 2023 Draft Iowa Regional Haze Plan").

[5] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix B, Determining Areas of Influence – CenSARA Round Two Regional Haze, Final Report, November 2018.

[6] February 2023 Draft Iowa Regional Haze Plan at 21.

[7] *Id.* at 25.

[8] *Id.*

[9] *Id.*

(2) It appears that the next step take by IDNR was to rank the percent combined total EWRT*Q/d for each source in descending order, and then IDNR selected first Iowa source that contributed to a cumulative percentage reflecting 50% or more of the cumulative EWRT*Q/d for each Class I area.[10] IDNR evaluated the EWRT*Q/d data for a total of twelve Class I areas. Based on this analysis, IDNR settled on two Iowa facilities to evaluate for regional haze controls: MidAmerican Energy Co – Louisa Generating Station and Walter Scott Jr. Energy Center.[11]

The four-factors that must be considered in determining appropriate emissions controls for the second implementation period are: (1) the costs of compliance, (2) the time necessary for compliance, (3) the energy and non-air quality environmental impacts of compliance, and (4) the remaining useful life of any source being evaluated for controls.[12] EPA has stated that it anticipates the cost of controls being the predominant factor in the evaluation of reasonable progress controls and that the other factors will either be considered in the cost analysis or not be a major consideration.[13] Specifically, the remaining useful life of a source is taken into account in assessing the length of time the pollution control will be in service to determine the annualized costs of controls. If there are no enforceable limitations on the remaining useful life of a source, the expected life of the pollution control is generally considered the remaining life of the source.[14]

In addition, costs of energy and water use of regional haze controls such as wet and dry flue gas desulfurization (FGD), selective noncatalytic reduction (SNCR), and selective catalytic reduction (SCR) at a particular source are considered in determining the annual costs of these controls, which means that the bulk of the non-air quality and energy impacts are generally taken into account in the cost effectiveness analyses as is the remaining useful life of a unit. The length of time to install controls is not generally an issue of concern for pollution controls, as FGD systems, SCR, and SNCR all can be and have been installed within three to five years of promulgation of a requirement to install such controls.[15] In any event, EPA's August 20, 2019 regional haze guidance states that, with respect to controls needed to make reasonable progress, the "time necessary for compliance" factor does not limit the ability of EPA or the states to impose controls that might not be able to be fully implemented within the planning period. More specifically, when considering the time necessary for compliance, a state may not reject a

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[10] *Id.*

[11] *Id.*

[12] 40 C.F.R. § 51.308(f)(2)(i).

[13] *See* U.S. EPA, August 20, 2019 Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 37.

[14] *Id.* at 33. While we are aware that some EGUs evaluated in this report have planned decommission dates, we are not aware that any of those dates are enforceable. Thus, for all of the EGUs evaluated for add-on NOx controls in this report, we assumed that the expected useful life of the pollution control being evaluated was the remaining useful life of the source, as directed to by EPA in its August 2019 guidance.

[15] For example, in Colorado, SCR was operational at Hayden Unit 1 in August of 2015 and at Hayden Unit 2 in June of 2016, according to data in EPA's Air Markets Program Database, within 3.5 years of EPA's December 31, 2012 approval of Colorado's regional haze plan. In Wyoming, SCR was operational at Jim Bridger Units 3 and 4 in 2015 and 2016, less than three years from EPA's January 30, 2014 final approval of Wyoming's regional haze plan. In addition, FGDs were installed in 3-4 years from design to operation at several coal-fired power plants, including Dan E Karn Units 1 and 2, Gallatin Units 1-4, Homer City Units 1 and 2, JH Campbell Units 2 and 3, La Cygne Units 1 and 2, Michigan City Unit 12, and RM Schahfer Units 14 and 15. As will be discussed below, SNCR installation are much less complex than SCR and FGD, requiring primarily a sorbent storage and distribution system and boiler/ductwork injection ports, and thus installation of SNCR will take less time than FGD and SCR.

control measure because it cannot be installed and become operational until after the end of the implementation period."[16]

This report evaluates IDNR's the four-factor analyses of pollution controls for the MidAmerican Energy Co – Louisa Generating Station and the Walter Scott Jr. Energy Center. This report also presents a four-factor analyses of controls for other plants that should have been evaluated for regional haze pollution controls: the Walter Scott Jr. Unit 4, George Neal South, and George Neal North power plants. In brief, this report finds the following issues with the reasonable progress controls analyses for these facilities:

Louisa Generating Station (LGS) and Walter Scott Jr. Energy Center (WSEC) Unit 3

- IDNR failed to evaluate the lowest SO2 emission rates that could be achieved with upgrades to the units' existing dry flue gas desulfurization (FGD) systems with the use of additional lime and also with new retrofit wet FGD systems.
- IDNR failed to evaluate selective noncatalytic reduction (SNCR) at NOx removal efficiencies the control is capable of achieving at LGS and at WSEC Unit 3.
- IDNR also took into account an unjustified interest rate and too short of a remaining useful life of a wet FGD system and of a selective noncatalytic reduction (SNCR) system for these units.
- Revised cost analyses show that dry FGD upgrades are extremely cost effective for LGS and WSEC Unit 3 and could achieve 4,900 to 6,900 tons per year of SO2 emission reduction at each unit from 2017-2019 baseline emissions, respectively, at a cost effectiveness of $281/ton.
- A new wet FGD should also be considered as a cost effective option at WSEC Unit 3, and it could reduce SO2 emissions by 7,365 tons per year from 2017-2019 baseline emissions at a cost effectiveness of $4,907/ton (in 2021 dollars).
- With respect to NOx, revised cost effectiveness analyses presented herein show that SCR at WSEC Unit 3 should be considered cost effective at $6,377/ton (2021 $)and that at least SNCR should be considered cost effective at LGS at a cost of $4,598/ton (2021 $).
- IDNR's proposed SO2 emission limits in units of pounds per hour for LGS and WSEC Unit 3 must be revised to be in units of lb/MMBtu, which will be much more effective at ensuring SO2 emission reductions across all levels of operation and will result in greater SO2 emission reductions per year.

Walter Scott Jr. Energy Center Unit 4

- IDNR should have evaluated a dry FGD upgrade with the use of additional lime at WSEC Unit 4, because that is a technically feasible control option for the unit.
- A cost analysis of an upgraded FGD with the use of additional lime at WSEC Unit 4 shows that it would be very cost effective at $281/ton (2021) and would reduce SO2 emissions from WSEC Unit 4 by 379 tons per year below 2017-2019 baseline emissions.

[16] *See* U.S. EPA, August 20, 2019 Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 41 (it would be inconsistent with the regional haze regulations to discount an otherwise reasonable control "simply because the time frame for implementing it falls outside the regulatory established implementation period.").

George Neal South and George Neal North Power Plants

- IDNR was not justified in not evaluating George Neal South and George Neal North for regional haze controls.
- These units are equipped with dry FGD systems that are not achieving the level of control that such systems are routinely designed to achieve, similar to the dry DFG systems at LGS and WSEC Unit 3.
- A cost evaluation shows that dry FGD upgrades with the use of additional lime would reduce SO2 emissions from George Neal South by 3,613 tons per year and from George Neal North by 3,318 tons per year below 2017-2019 emissions. These dry FGD upgrades would reduce SO2 emissions by 3,618 tons per year at George Neal South and by 3,318 tons per year at George Neal North below 2017-2019 emissions at a cost effectiveness of $278-$280/ton (2021 $).

These issues and analyses are detailed below.

II. Comments on IDNR's Four-Factor Analysis of Regional Haze Controls

IDNR evaluated regional haze controls for the MidAmerican Energy's Louisa Generating Station and Walter Scott Jr. Energy Center, based on four-factor analyses conducted on behalf of MidAmerican Energy. There are some overarching issues with the cost effectiveness analyses for controls for these two plants which are detailed below.

A. Interest Rate Used in Cost Analyses for MidAmerican Energy Company's Louisa Generating Station and Walter Scott Jr. Energy Center Unit 3.

MidAmerican used an interest rate of 7.862% in determining annualized capital costs of control for the Louisa Generation Station and the Walter Scott Jr. Energy Center Unit 3.[17] The company stated that this was a "firm-specific interest rate" and that it is the "'weighted average cost' of capital as documented in the most recent (2013) General Rate Case agreement approved by the Iowa Utilities Board…."[18] In an April 5, 2021 memo from MidAmerican Energy to IDNR, the company explains why it believes that the EPA Control Cost Manual allows for the use of this "firm-specific interest rate," and the company cites to EPA comments on the draft Ohio Regional Haze SIP as supporting this conclusion.[19]

Although EPA's Control Cost Manual states that "[i]n assessing the total capital investment, this [Control Cost] Manual takes the viewpoint of an owner, the firms making the investment, or those who have a material interest in the project," [20] this does not mean that the Control Cost Manual methodology includes <u>all</u> costs that a public utility would consider to be its total capital investment. As EPA explains, the Control Cost Manual uses an "overnight" estimation method, as if no interest was incurred during

[17] February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 10.
[18] *Id.*
[19] February 2023 Draft Iowa Regional Haze Plan, Appendix D-3.
[20] EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017, at 8.

construction and thus estimates capital as if the project was completed "overnight."[21] Accordingly, Allowance for Funds Used During Construction (AFUDC), which is defined as "the amount credited to a firm's statement of income and charged to construction in progress on the firm's balance sheet" and which EPA acknowledges is considered a cost item within the electric power industry, should not be included in cost effectiveness analyses under the Control Cost Manual methodology.[22] In addition, owner's costs (for owner activities related to engineering, management, and procurement) are not included in the EPA Control Cost Manual methodology.[23] Thus, while EPA describes the Control Cost Manual as taking the "viewpoint of an owner," that does not mean that the cost methodology is intended to take into account all costs in the viewpoint of the owner without question or justification, especially because the cost methodology used by the Control Cost Manual has limitations on costs that can be taken into account.

In addition, EPA has previously not accepted use of a utility's "weighted cost of capital" in a regional haze cost analysis. Specifically, in its 2011 action on the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan (FIP),[24] EPA did not agree with comments from Oklahoma Gas & Electric (OG&E) that EPA should have used OG&E's discount rate. OG&E argued that "'[b]ecause OG&E is an investor-owned utility company and not a governmental agency, the Control Cost Manual suggests that it use an appropriate discount rate that more accurately reflects OG&E's capital structure." According to EPA, OG&E also argued that "the [capital recovery factor] includes not only recovery of principal but also a return on the principal, with the rate of return equal to the discount rate" and that "for an investor-owned utility such as OG&E, which is financed by a mix of debt and equity, the discount rate is equal to the weighted average of the equity return and debt return." EPA's response was as follows:

> The calculation of capital costs in the Control Cost Manual includes two separate steps. First, the TCI is determined based on overnight costs with no inflation or interest during construction. Second the TCI is turned into an annual cost by multiplying it by a carrying charge that in normal utility practice would include the interest, equity return, recovery of the initial investment, and taxes, plus operating and maintenance expenses of the plant, once built. However, the Control Cost Manual does not seek to duplicate normal utility practice. Section 2.4.2. of the Manual [dated January 2002] states:
>
> [T]he industrial planner must…understand how the cost of each device fits into the financial structure of their business…. [T]he source may find it useful to apply their own interest rate to the calculation of control costs. Common interest rates used by industry and accepted by the EPA for source petitions include the business' current borrowing rate, the current prime rate, and other acceptable industrial rates of return.

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[21] *Id.* at 11.
[22] *See* EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017 at 11 and Section 4, Chapter 2 Selective Catalytic Reduction, June 2019 at pdf page 65, available at https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf.
[23] EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017 at 11 and Section 4, Chapter 2 Selective Catalytic Reduction, June 2019 at pdf page 65.
[24] 76 Fed. Reg. 81,728 at 81,745 (Dec. 28, 2011).

> Only debt is specifically listed in the allowed carrying costs. "Industrial rates of return" might include the utility's debt and equity, but there is no reference to taxes.

EPA, Response to Technical Comments for Sections E. through H. of the Federal Register Notice for the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan, Docket No. EPA-R06-OAR-2010-0190, at 33-34 (Ex. 1 to this report).[25]

EPA goes on to state that, in the OG&E documentation submitted to support its proposed cost of capital, income taxes were included as a significant component of the cost in levelized interest rate, and EPA states that the Control Cost Manual does not include income taxes.[26] The Control Cost Manual Cost Estimation chapter has been revised since EPA issued the final Oklahoma regional haze and visibility transport rulemaking, but the methodology of the Control Cost Manual has not changed.

Thus, while the Control Cost Manual does allow for the justification of using a firm-specific interest rate, the methodology of how the firm-specific interest rate was established must be reviewed to ensure it is consistent with the methodology of the Control Cost Manual. MidAmerican Energy has not explained the details of how its cost of capital is calculated, other than to refer to the utility commission docket numbers in which the cost of capital was approved. IDNR must collect more information on MidAmerican Energy's calculations for cost of capital to ensure that the cost of equity does not account for the cost of income taxes and to ensure that the cost of debt and the cost of equity does not take into account inflation. IDNR should not simply rely on the utility commissions' approval of a cost of capital for MidAmerican Energy to use in ratemaking cases to prove that MidAmerican's stated cost of capital is consistent with the methodology and requirements of the EPA Control Cost Manual.

With respect to the interest rate to be taken into account in financing costs, EPA's Control Cost Manual states: "[t]he appropriate interest rate in private cost assessment is the private interest rate for each firm affected. Determining private interest rates may be difficult due to the firm-specific nature of the private nominal interest rate faced by firms. If firm-specific interest rates are available, then the appropriate rates are simply the difference between the nominal interest rate minus the prevailing inflation in the industry."[27] EPA's Control Cost Manual also states "[i]f firm-specific nominal interest rates are not available, then the bank prime rate can be an appropriate estimate for interest rates given the potential difficulties in eliciting accurate private nominal interest rates since these rates may be regarded as confidential business information or difficult to verify."[28]

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[25] *See also* EPA, Control Cost Manual, , Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017, at 13 [explaining that "taxes are not uniformly applied, and subsidies, tax moratoriums, and deferred tax opportunities distort how the direct application of a tax works," which was EPA's justification in its January 2002 version of Chapter 2 in stating that income taxes are not included in the Control Cost Manual methodology). Available at https://www.epa.gov/sites/default/files/2017-12/documents/epaccmcostestimationmethodchapter_7thedition_2017.pdf.

[26] *See* EPA, Response to Technical Comments for Sections E. through H. of the Federal Register Notice for the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan, Docket No. EPA-R06-OAR-2010-0190, at 34 (Ex. 1). *See also* 76 Fed. Reg. 81,728 at 81,745 (Dec. 28, 2011).

[27] EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017 at 20.

[28] *Id.* at 15.

For the purpose of the cost effectiveness analyses, this report will present costs based on the current bank prime lending interest rate which, as of the date of this report, is 7.75% and only slightly lower than MidAmerican's firm specific interest rate of 7.862%.[29] Until MidAmerican Energy and IDNR present sufficient documentation on the assumptions and costs underlying MidAmerican's stated cost of capital that ensures that the company's firm-specific interest rate is consistent with the requirements and methodology of EPA's Control Cost Manual, only the cost analyses done based on the prime lending rate should be considered in determining whether there are cost-effective controls for its facilities.

B. Useful Life of Pollution Controls Assumed in Cost Effectiveness Analyses.

IDNR and MidAmerican Energy only assumed a 20-year life in determining annualized costs of the SO2 controls evaluated. There is no justification for assuming such a short life of a new wet FGD system. EPA has found that a FGD systems can last 30 years or longer. In fact, EPA has stated that "[m]anufacturers reportedly design scrubbers to be as durable as boilers, which are generally designed to operate for more than 60 years." Thus, there was no justification for only assuming a useful life of 20 years for a new wet FGD system or for the operational upgrades to the existing DFGD system.

EPA's Control Cost Manual indicates that, for EGUs, SCR has a useful life of 30-years and SNCR has a useful life of 20 years.[30] According to EPA, SCR has been used to control NOx emissions from fossil fuel-fired combustion units since the 1970's and has been installed on more than 300 coal-fired power plants in the U.S.[31] Thus, in its Control Cost Manual, EPA has found that the useful life of an SCR system at a power plant would be 30 years, and EPA cited one analysis that assumed a design lifetime of 40 years.[32] IDNR and MidAmerican did assume a life of SCR of 30 years.

With respect to SNCR, there is also ample support for assuming a useful life for SNCR of 30 years, so that is what I assumed in the SNCR cost effectiveness analysis. While EPA states in the SNCR Control Cost Manual chapter that it is assumed than an SNCR would have a life of 20 years, EPA also states: "As mentioned earlier in this chapter, SNCR control systems began to be installed in Japan the late 1980's. Based on data EPA collected from electric utility manufacturers, at least 11 of approximately 190 SNCR systems on utility boilers in the U.S. were installed before January 1993. In responses to another ICR, petroleum refiners estimated SNCR life at between 15 and 25 years."[33] Therefore, based on a 1993 SNCR installation date, these SCNR systems that EPA refers to are at least 28 years old, which strongly argues for a 30-year equipment life. Furthermore, an SNCR system is much less complicated than a SCR system, for which EPA clearly indicates the life should be 30 years. In an SNCR system, the only parts exposed to the exhaust stream are lances with replaceable nozzles. The injection lances must be regularly checked and serviced, but this can be done relatively quickly if necessary, is relatively inexpensive, and should be considered a maintenance item. In this regard, the lances are analogous to SCR catalyst, which is not considered when estimating equipment life. All other items, which comprise the vast majority of the SNCR system capital costs, are outside the exhaust stream and should be

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[29] https://fred.stlouisfed.org/series/DPRIME.

[30] *See* EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, June 2019, at pdf page 80, and *see* EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, revised 4/25/2019, at 1-54.

[31] EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, June 2019, at pdf page 5.

[32] *Id.* at pdf page 80.

[33] EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, revised 4/25/2019, at 1-54.

considered to last the life of the facility or longer. Given that EPA has assumed a 30-year life of SNCR in control cost calculations for coal-fired EGUs in the context of the regional haze program,[34] it is reasonable to assume a 30-year life of SNCR for application to LGS and WSEC Unit 3, as well as for SCR.

MidAmerican Energy did not identify any limitations on the remaining useful life of either LGS or WSEC Unit 3, stating that no specific retirement date is planned for either LGS or the WSEC units.[35] IDNR also did not propose any enforceable limitations on the remaining useful life of the LGS or on WSEC Unit 3. Thus, in the cost effectiveness analyses, the life of all the pollution controls evaluated should be equivalent to the typical life of such controls which, for the reasons discussed above, should be 30 years or longer.

C. Regional Haze Control Evaluation for MidAmerican Energy Co – Louisa Generating Station and Walter Scott Jr. Energy Center

The MidAmerican Energy Company's Louisa Generating Station (LGS) consists of one coal-fired electric utility steam generating unit (EGU) with a nameplate generating capacity of 811.9 megawatts (MW). The facility is located in Louisa County in southeastern Iowa. The facility burns subbituminous coal and is equipped with a dry lime flue gas desulfurization system (DFGD), low NOx burners with overfire air (LNB/OFA), and a baghouse. The Walter Scott Jr. Energy Center (WSEC) consists of two coal-fired EGUs, both of which burn subbituminous coal. WSEC Unit 3 has a generating capacity of 725.8 MW, while WCEC Unit 4 has a generating capacity of 922.5 MW. Both WSEC Units 3 and 4 are equipped with DFGD systems, LNB/OFA, and baghouses. WSEC Unit 4 is also equipped with a selective catalytic reduction (SCR) system.

IDNR identified the baseline emissions for the LGS facility and the WSEC Units 3 and 4 based on the three-year average of 2017-2019 emissions. IDNR did not use 2020 emissions because it found the data was not representative of normal operations due to the COVID-19 pandemic.

Table 1. IDNR's Baseline Emissions for Louisa Generating Station, 2017-2019 Average[36]

Year	Operating Time, hrs	Gross MW-hrs	Heat Input, MMBtu/year	SO2 Emissions, tpy	SO2 Rate, lb/MMBtu (annual)	NOx Emissions, tpy	NOx Emission Rate, tpy (annual)
2017	6,197	3,808,630	36,681,145	5,237	0.286	3,490	0.190
2018	7,980	5,239,237	51,727,847	7,332	0.283	4,871	0.188
2019	6,220	3,624,256	34,547,040	5,286	0.306	2,960	0.171
2017-2019 avg	*6,799*	*4,224,041*	*40,985,344*	*5,952*	*0.292*	*3,774*	*0.183*

[34] *See*, e.g., 80 Fed. Reg. 18944 at 18968 (April 8, 2015).
[35] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 10, 12, and 19.
[36] February 2023 Draft Iowa Regional Haze Plan at 30. Additional operational data from EPA's Air Markets Program Database at https://campd.epa.gov/.

Table 2. IDNR's Baseline Emissions for Walter Scott Jr. Energy Center Units 3 and 4, 2017-2019 Average[37]

Year	Operating Time, hrs	Gross MW-hrs	Heat Input, MMBtu/year	SO2 Emissions, tpy	SO2 Rate, lb/MMBtu (annual)	NOx Emissions, tpy	NOx Emission Rate, tpy (annual)
WSEC Unit 3							
2017	7,702	5,028,634	48,261,687	8,486	0.352	5,437	0.225
2018	6,873	4,550,012	45,240,043	8,118	0.359	5,186	0.229
2019	6,683	4,151,204	41,855,533	7,520	0.359	4,466	0.213
2017-2019 avg	7,086	4,576,617	45,119,088	8,041	0.357	5,030	0.223
WSEC Unit 4							
2017	5,642	4,186,460	36,887,210	1,291	0.070	1,044	0.057
2018	8,312	6,225,304	56,396,028	1,835	0.065	1,548	0.055
2019	6,531	4,491,437	41,913,267	1,375	0.066	1,126	0.054
2017-2019 avg	6,828	4,967,733	45,065,502	1,500	0.067	1,239	0.055

IDNR states that for the purpose of the four-factor analysis of controls, MidAmerican assumed that future boiler utilization and emissions will remain unchanged from baseline emissions, despite the company anticipating that utilization of LGS will decrease through 2028.[38] That is appropriate because EPA has stated that baseline emissions should be based on recent historical emissions in the absence of enforceable requirements restricting future operation or documented commitments to participate in energy efficiency or similar programs.[39]

IDNR and MidAmerican Energy did not evaluate control options for WSEC Unit 4, claiming that no additional technically feasible control measures were identified to reduce NOx or SO2 from the unit.[40] However, as is discussed further below in Section III. of this report, there are opportunities for reducing emissions by tightening emission limits applicable to WSEC Unit 4. For the LGS facility and WSEC Unit 3, IDNR and MidAmerican Energy evaluated SO2 and NOx control options to achieve reasonable progress towards the national visibility goal, which are detailed below.

1. Analysis of SO2 Control Options for LGS and WSEC Unit 3

The LGS began operation in 1983, and it was later retrofitted with a dry FGD system. According to the EPA's Clean Air Markets Program Database for LGS, the dry lime FGD system including the associated baghouse began operating on the unit in December of 2007. As previously stated, the unit burns

[37] *Id.*
[38] February 2023 Draft Iowa Regional Haze Plan at 32.
[39] August 20, 2019 EPA Guidance on Regional Haze Plans for the Second Implementation Period at 17.
[40] February 2023 Draft Iowa Regional Haze Plan at 32-33.

subbituminous coal. Based on a review of the coal data reported to the Energy Information Administration (EIA) for LGS, the weighted average uncontrolled SO2 emission rate based on EPA's AP-42 emission factors for subbituminous coal was 0.46 lb/MMBtu over 2017-2019 for the coals shipped to the plant.[41] Thus, on an annual average basis, the SDA system at LGS is achieving approximately 37% SO2 removal. This is a very low level of SO2 removal for a dry FGD system.

WSEC Unit 3 began operating in 1978. According to the Clean Air Markets Program Database, the dry lime FGD began operating at WSEC Unit 3 in 2009 including the associated baghouse. Subbituminous coal is also burned at the WSEC units. Based on a review of the coal data reported to the EIA for WSEC, the weighted average uncontrolled SO2 emission rate based on EPA's AP-42 emission factor for subbituminous coal was 0.46 lb/MMBtu over 2017-2019 for the coals shipped to the WSEC plant.[42] Thus, on an annual average basis, the SDA system at WSEC Unit 3 is achieving approximately 23% SO2 removal. This is also a very low level of SO2 removal for a dry FGD system.

IDNR relied on MidAmerican Energy's four-factor analyses of SO2 control options for LGS and WSEC Unit 3. MidAmerican evaluated two SO2 control options for these units: 1) Operational improvements to the existing dry FGD at LGS to increase the amount of lime injected to meet an SO2 rate of 0.10 lb/MMBtu. 2) Replace the existing DFGD system with a new Wet FGD system design to achieve an SO2 rate of 0.06 lb/MMBtu.[43] MidAmerican conducted cost effectiveness analyses of these two controls to meet the SO2 emission rates stated above, which IDNR relied on for its proposed regional haze plan without any changes. However, the assumptions for the level of control that could be achieved and for the cost effectiveness analysis are flawed, as is discussed below.

a) IDNR and MidAmerican Energy Should Have Evaluated Dry FGD Upgrades to Achieve at Least Ninety Percent SO2 Control.

IDNR and MidAmerican Energy evaluated improvements to the dry FGD system at LGS and at WSEC Unit 3 to achieve an SO2 rate of 0.10 lb/MMBtu, which would be achieved by increasing lime in the dry FGD.[44] An SO2 emission rate of 0.10 lb/MMBtu only reflects an SO2 control efficiency of approximately 78%, based on the weighted average uncontrolled SO2 emissions rate of 0.46 lb/MMBtu reflective of the coal used during the 2017-2019 baseline period at both LGS and WSEC Unit 3. Dry FGD systems are typically designed to achieve much higher rates of SO2 control, up to 95% control for a spray dryer absorber.[45] Indeed, it appears that the dry FGD scrubber that was installed at the LGS in 2007 was designed to achieve 90% SO2 reduction, and the FGD installed at WSEC Unit 3 in 2009 was designed to

[41] *See* Ex. 2 with coal heat value and sulfur content of coals used at Louisa Generating Station over 2017-2019, from the Energy Information Administration's Coal Data Browser.
[42] *See* Ex. 3 with coal heat value and sulfur content of coals used at Walter Scott Jr. Energy Center over 2017-2019, from the Energy Information Administration's Coal Data Browser.
[43] February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 (AECOM, Regional Haze Reasonable Further Progress Four Factor Analysis, MEC Louisa and Walter Scott Jr. Coal-Fired Boilers, prepared for MidAmerican Energy Company, August 9, 2021) at 6-7.
[44] February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 7-8.
[45] EPA, Control Cost Manual, Section 5, Chapter 1, Wet and Dry Scrubbers for Acid Gas Control, April 2021, at 1-11, available at https://www.epa.gov/sites/default/files/2021-05/documents/wet_and_dry_scrubbers_section_5_chapter_1_control_cost_manual_7th_edition.pdf .

achieve 93.6% SO2 removal.[46] It also appears that the dry FGD system installed at LGS in 2007 is equipped with scrubber bypass.[47] IDNR should have required that the elimination of FGD bypass, in addition to an increase in the amount of lime used, be evaluated as a reasonable progress control.

Documentation from 2017 for dry FGD controls for EPA's Integrated Planning Model indicates that the lowest SO2 emission rate guarantee from the original equipment manufacturers of dry FGD systems is 0.06 lb/MMBtu.[48] A review of the lowest emitting coal-fired power plant units with dry scrubbers shows that several achieve SO2 rates lower than 0.06 lb/MMBtu on an annual basis, as shown in the table below. Further, these units also have achieved 30-boiler operating day averages of 0.06 lb/MMBtu or lower while meeting annual lb/MMBtu SO2 emission rates of 0.05 lb/MMBtu or lower. Note that the table below does not include circulating fluidized bed boilers equipped with SDA systems.

Table 3. Lowest Annual SO2 Rates in 2020 at Coal-Fired EGUs with Dry FGD Systems with 30-Boiler Operating Day Average Rates at or Below 0.06 lb/MMBtu[49]

State	Facility Name	Unit ID	2020 SO2 Rate, lb/MMBtu	Max 30- Boiler Operating Day Avg, lb/MMBtu
NV	TS Power Plant	1	0.02	0.03
OK	Sooner	2	0.02	0.04
OK	Sooner	1	0.02	0.03
MN	Boswell Energy Center	4	0.02	0.03
KY	John S. Cooper	2	0.04	0.04
WI	Weston	4	0.04	0.04
AR	John W. Turk Jr. Power Plant	SN-01	0.04	0.05
WY	Wygen III	1	0.04	0.06
WI	Genoa	1	0.05	0.05
WI	Edgewater (4050)	5	0.05	0.06
IA	Lansing	4	0.05	0.05
AR	Flint Creek Power Plant	1	0.05	0.06

The majority of units equipped with dry scrubbers utilize spray dry absorbers (SDAs), although Sooner Units 1 and 2 with the lowest annual SO2 rate of 0.02 lb/MMBtu have circulating dry scrubbers, as does Flint Creek Power Plant and Lansing Unit 4. This data provides support that annual average SO2 emissions rates of 0.05 lb/MMBtu or lower can be met with dry FGD systems.

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[46] *See* Weilert, Carl & Emily Meyer, Burns & McDonnell, Utility FGD Design Trends, at 17 and at 25 (attached as Ex. 4).

[47] *Id.* at 18.

[48] *See* Sargent & Lundy, IPM Model – Updates to Cost and Performance for APC Technologies, SDA FGD Cost Development Methodology, January 2017, at 1 (available at https://www.epa.gov/airmarkets/retrofit-cost-analyzer and attached as Ex. 5.

[49] Based on data reported to EPA's Air Markets Program Database. *See* Ex. 6, which is a spreadsheet with the 30-boiler operating day average SO2 rates calculated for these EGUs.

For all of these reasons, IDNR should have required evaluation of FGD upgrades to meet a 90% reduction level or an annual average emission rate of 0.05 lb/MMBtu at the LGS and at WSEC Unit 3. Further, assuming this is the control that IDNR determines is the most appropriate based on a four-factor analysis, IDNR should impose an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average basis.

b) IDNR and MidAmerican Energy Should Have Evaluated a Wet FGD Retrofit to Achieve an Annual SO2 Rate of 0.03 lb/MMBtu.

IDNR and MidAmerican Energy evaluated the cost effectiveness replacing the dry FGD system with a wet FGD system at both LGS and WSEC Unit 3, but they failed to evaluate the top level of SO2 removal efficiency that is achievable with a wet FGD system at the LGS. Specifically, IDNR and MidAmerican Energy evaluated a wet FGD retrofit to achieve an SO2 rate of 0.06 lb/MMBtu.[50] While MidAmerican Energy cites to the EPA RACT/BACT/LAER Clearinghouse for the assumed 0.06 lb/MMBtu rate with a wet FGD retrofit,[51] there is much support that EGUs burning low sulfur coal like the LGS and WSEC Unit 3 can achieve a much lower SO2 limit with a wet FGD retrofit.

It must first be noted that the January 2017 IPM cost module for wet FGD systems states that the lowest SO2 emissions guarantees for wet FGD systems is 0.04 lb/MMBtu.[52] However, that is presumably an emission limit guarantee that would apply on a 30-boiler operating day average or shorter basis. A review of the lowest emitting coal-fired power plant units with wet scrubbers shows that several achieve SO2 rates lower than 0.04 lb/MMBtu on an annual basis, as shown in the table below. Further, these units also have achieved 30-boiler operating day averages of 0.04 lb/MMBtu or lower while meeting annual lb/MMBtu SO2 emission rates of 0.03 lb/MMBtu or lower.[53]

Table 4. Lowest Annual SO2 Rates in 2020 at Coal-Fired EGUs with Wet FGD Systems with 30-Boiler Operating Day Average Rates at or Below 0.04 lb/MMBtu[54]

State	Plant	Unit	2020 SO2 Rate, lb/MMBtu	Max 30- Boiler Operating Day Avg, lb/MMBtu
WI	South Oak Creek	5	0.001	0.001
WI	South Oak Creek	6	0.001	0.001
AZ	Coronado Generating Station	U2B	0.003	0.005
AZ	Coronado Generating Station	U1B	0.004	0.007
AL	James H Miller Jr	3	0.007	0.009
WI	South Oak Creek	7	0.007	0.009
WI	South Oak Creek	8	0.008	0.011
AL	James H Miller Jr	2	0.008	0.019
TX	J K Spruce	**2	0.009	0.014

[50] February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 9.
[51] *Id.* at 7.
[52] *Id.*
[53] *See* Ex. 7, spreadsheet with 30-boiler operating day average rates achieved in 2020 for these units, based on emissions data reported to EPA's Air Markets Program Database.
[54] Based on data reported to EPA's Air Markets Program Database.

AL	James H Miller Jr	1	0.01	0.02
IA	Muscatine	9	0.01	0.02
AL	James H Miller Jr	4	0.01	0.02
MS	Daniel Electric Generating Plant	1	0.01	0.03
WI	Elm Road Generating Station	1	0.01	0.02
MN	Boswell Energy Center	3	0.01	0.01
GA	Scherer	1	0.01	0.03
IN	R M Schahfer Generating Station	14	0.01	0.01
WI	Elm Road Generating Station	2	0.01	0.02
GA	Scherer	4	0.01	0.03
TX	Sam Seymour	1	0.01	0.02
IN	R M Schahfer Generating Station	15	0.02	0.02
TX	Sam Seymour	3	0.02	0.02
KS	La Cygne	2	0.02	0.03
MO	Iatan	1	0.02	0.03
KS	Lawrence Energy Center	4	0.02	0.03
GA	Scherer	2	0.02	0.02
GA	Scherer	3	0.02	0.02
SC	Wateree	WAT1	0.02	0.03
KS	Jeffrey Energy Center	2	0.02	0.04
AL	Barry	5	0.02	0.03
KS	Jeffrey Energy Center	3	0.02	0.04
KS	Lawrence Energy Center	5	0.02	0.04
TX	Sam Seymour	2	0.02	0.04
NC	G Allen	5	0.03	0.03
NC	Cliffside	6	0.03	0.04
KS	Jeffrey Energy Center	1	0.03	0.04
MN	Sherburne County	2	0.03	0.04
MO	Iatan	2	0.03	0.04
MN	Sherburne County	1	0.03	0.04
NC	G Allen	4	0.03	0.04

The majority of these units listed in Table 4 above utilize or blend with low sulfur coal such as from the Powder River Basin. The data presented above shows that wet FGD can work very effectively to reduce SO2 even when inlet sulfur content is low, to achieve long term average SO2 rates of 0.03 lb/MMBtu or lower, while still meeting no higher than a 0.04 lb/MMBtu 30-boiler operating day average emission rate. Based on the average annual uncontrolled SO2 in the coal utilized at LGS and at WSEC Unit 3 of 0.46 lb/MMBtu, the units should readily be able to achieve an annual SO2 rate no higher than 0.03 lb/MMBtu and achieve a 30-boiler operating day average limit of 0.04 lb/MMBtu with a wet FGD retrofit. Thus, IDNR must require an evaluate of a wet FGD retrofit to achieve an annual average SO2 rate of 0.03 lb/MMBtu at LGS and at WSEC Unit 3.

c) Revised Cost Effectiveness Analyses Show that the Costs of a Dry FGD Upgrade and also of a Wet FGD Retrofit Should be Considered as Cost Effective for the LGS Facility and at WSEC Unit 3.

To address the issues discussed above, I conducted revised cost effectiveness analyses for a dry FGD upgrade at LGS and at WSEC Unit 3 and for a wet FGD retrofit at both units. First, I used the dry FGD calculations of EPA's "Wet and Dry Scrubbers for Acid Gas Control Spreadsheet" (updated on 1/26/2023) which EPA has made available with its Control Cost Manual[55] to calculate the current annual average costs of operating the existing dry FGD. For these calculations, I assumed an average uncontrolled SO2 rate to each unit's dry FGD system of 0.46 lb/MMBtu, which was based on the use of AP-42 emission factors subbituminous coal-fired boilers and which reflects a weighted average of the various coals shipped to the Louisa facility during the baseline period of 2017-2019.[56] To determine average annual operational costs for the dry FGD system at LGS during the 2017-2019 baseline period, I input a controlled SO2 emission rates of 0.292 lb/MMBtu for LGS and a controlled SO2 emissions rate of 0.357 lb/MMBtu for WSEC Unit 3 which, as shown in Table 1 above, is the average of the actual annual SO2 rate from each unit over 2017-2019. In addition, I used operational data over the 2017-2019 baseline period to reflect actual annual MW-hours output as well as for heat rate at each unit. Based on these inputs, I calculated an annual average operating and maintenance cost of operating the existing dry FGD system at LGS of $11,040,836/year and an average annual operating and maintenance cost of $10,489,339 per year at WSEC Unit 3. [57]

Next, I used the EPA Wet and Dry Scrubber cost spreadsheet to calculate the increased annual operating and maintenance costs for a dry FGD upgrade and to calculate the annualized capital costs and increased annual operating and maintenance costs for a wet FGD retrofit at both units. For these spreadsheet calculations, I used the following input data:

a. **Retrofit Difficulty:** I used the default retrofit factor of "1" for all cost analyses for LGS and WCEC Unit 3, which is also what MidAmerican Energy assumed in its cost analyses.[58] The cost algorithms in the EPA cost spreadsheets and the underlying IPM cost modules are based on the actual cost data to retrofit these controls to existing coal-fired power plants, which generally were not designed to take into account the retrofit of future pollution controls.
b. **Unit Size:** 811.9 MW for LGS and 725.8 MW for WSEC Unit 3.

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[55] *See* https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.
[56] *See* Exs. 2 and 3 with coal heat value and sulfur content of coals used at Louisa Generating Station and Walter Scott Jr. Energy Center over 2017-2019, from the Energy Information Administration's Coal Data Browser.
[57] *See* spreadsheet entitled "Louisa current operational costs Dry FGD system_controlcostmanual spreadsheet_January 2023," at "SDA Cost Estimate" tab, cell C62. Attached as Ex. 8. *See also* spreadsheet entitled WSEC U3 current operational costs Dry FGD system_controlcostmanual spreadsheet_January 2023," at "SDA Cost Estimate" tab, cell C62. Attached as Ex. 9.
[58] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at p. A-5.2 and A-5.9

c. **Gross Heat Rate:** This was calculated from the Gross Load (MW-hours) and the heat input (MMBtu/hr) reported to EPA's Air Markets Program Database over 2017-2019 and averaged over the three-year period for each unit.

d. **SO2 Rate**: This input is used to calculate the rates for limestone (wet FGD)/lime (SDA), scrubber waste, auxiliary power, and makeup water, and also for base scrubber model and reagent handling capital costs. For this input, I used the weighted annual average uncontrolled SO2 emission rate based on EPA AP-42 emission factors and the coal shipped to each unit over 2017-2019, which was 0.46 lb/MMBtu for both the LGS facility[59] and for WSEC Unit 3.[60]

e. **Operating SO2 Removal**: For the wet FGD retrofit at LGS and at WSEC Unit 3, this was calculated based on the percent removal from 0.46 lb/MMBtu annual uncontrolled SO2 to achieve an annual SO2 rate of 0.03 lb/MMBtu (i.e., 93.5%). For the dry FGD upgrade, this was calculated based on the percent removal from 0.46 lb/MMBtu annual uncontrolled SO2 at LGS and at WSEC Unit 3 to achieve an annual SO2 rate of 0.05 lb/MMBtu (i.e., 89.1%). In comparison, MidAmerican Energy evaluated a wet FGD to achieve an SO2 removal efficiency of 88.058% and an upgraded dry FGD to achieve an SO2 removal efficiency of 80.1%.[61]

f. **Costs of Limestone (for Wet FGD) and lime (for SDA FGD), Waste Disposal, Makeup Water, and Operating Labor**: The default values from the EPA cost spreadsheets for Wet FGD and SDA FGD were used for these costs.

g. **Auxiliary Power Cost**: EPA's cost spreadsheet uses the average power plant operating expenses as reported to the Energy Information Administration for 2016 of $0.0361/kW-hr for auxiliary power cost calculations in its cost effectiveness spreadsheets provided with its Control Cost Manual.[62] I used the same 2016 EIA auxiliary power costs in all cost calculations including for the annual average costs of operating the dry FGD over the 2017-2019 baseline period. It must be noted that the most recent published final average cost of fossil-fueled steam electric plants from the EIA is slightly lower than the average 2016 average cost.[63] The most recent final EIA data for 2019 is $0.0367/kW-hr.[64] In all cases, I included auxiliary power costs in the variable operating and maintenance costs.

h. **Elevation:** 581 feet above sea level for LGS[65] and 1089 feet above sea level for WSEC Unit 3.[66]

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[59] *See* Ex. 2 with coal heat value and sulfur content of coals used at Louisa Generating Station over 2017-2019, from the Energy Information Administration's Coal Data Browser.

[60] *See* Ex. 3 with coal heat value and sulfur content of coals used at Walter Scott Jr. Energy Center over 2017-2019, from the Energy Information Administration's Coal Data Browser.

[61] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at pp. A-5.2 and A-5.7.

[62] Available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.

[63] *See* https://www.eia.gov/electricity/annual/html/epa_08_04.html.

[64] *See* EIA, October 2020, Electric Power Annual 2019, Table 8.4, available at https://www.eia.gov/electricity/data/eia923/.

[65] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at p. A-3.1

[66] *Id.* at A-4.1.

i. **Interest rate:** For the reasons discussed in Section II.A. above, the current bank prime interest rate of 7.75% was used for the cost effectiveness calculations,[67] as this is what EPA currently recommends for cost effectiveness analyses.

j. **Equipment lifetime**: A 30-year life was assumed in amortizing capital costs for wet FGD and dry FGD (although the capital costs were not applied in evaluating the costs of upgrading the dry FGD with an increased lime use, because the dry FGD already exists at LGS).

k. **Baseline emissions**: As discussed in Section I.C. above, 2017-2019 average emissions were used as baseline emissions and operational characteristics (heat input, heat rate, megawatt-hours generated). However, for calculating SO2 reductions that would result from a control evaluated (i.e., the denominator of the cost effectiveness calculation), emissions reductions were calculated from the 2017-2019 baseline SO2 emissions. For example, the tons per year of SO2 that would be reduced with a new wet FGD retrofit was calculated based on the SO2 removal efficiency from the current 2017-2019 average annual SO2 rate of 0.292 lb/MMBtu at LGS and of 0.357 lb/MMBtu at WSEC Unit 3 to the assumed annual average rate of the wet FGD system of 0.03 lb/MMBtu. Then the tons per year of SO2 reduced with a wet FGD was calculated by multiplying the 2017-2019 average annual SO2 emissions by the percent SO2 reduction that would occur from the 2017-2019 average annual SO2 rate. To be clear, the capital and operational expenses of the wet FGD system and of the dry FGD system are based on reductions from the uncontrolled emission rates at each unit (based on AP-42 emission factors and a weighted average uncontrolled SO2 rate based on the coal shipped to LGS and to WSEC over the baseline period of 2017-2019).

l. **Operation and Maintenance Costs**: As previously stated, the annual operation and maintenance costs were reduced by the annual average operation and maintenance costs currently being incurred at the LGS and at WSEC Unit 3 with the existing dry FGD systems.

m. **Cost basis**: Costs were escalated from the 2016 cost basis of EPA's cost spreadsheet to 2021 dollars based on changes in the Chemical Engineering Plant Cost Indices for those years.

The following table summarize the cost effectiveness calculations for SO2 controls at the LGS facility and WSEC Unit 3.

[67] https://www.federalreserve.gov/releases/h15/.

Table 5. Cost Effectiveness of SO2 Control Upgrade Options at Louisa Generating Station and at Walter Scott Jr. Energy Center Unit 3, Based on 30-Year Life of Controls and the EPA Cost Spreadsheets (2021 $)[68]

	Annual SO2 Rate, lb/MMBtu	Capital Cost	Net Increase in O&M Costs	Total Annualized Costs	SO2 Reduced, tpy	Cost Effectiveness, $/ton
Louisa Generating Station						
New Wet FGD	0.03	$411,250,091	$1,430,496	$37,204,832	5,340	$6,968/ton
Upgraded Dry FGD	0.05	$0	$1,384,818	$1,384,818	4,931	$281/ton
Walter Scott Jr. Unit 3						
New Wet FGD	0.03	$390,170,764	$2,198,820	$36,141,784	7,365	$4,907/ton
Upgraded Dry FGD	0.05	$0	$1,942,039	$1,942,039	6,914	$281/ton

While the upgraded dry FGD systems to achieve an annual average SO2 rate of 0.05 lb/MMBtu is the most cost effective control, it must be noted that the cost effectiveness of a new wet FGD system at LGS and at WSEC Unit 3 should also be considered as cost effective, as the costs are under the cost effectiveness thresholds used by several states in their regional haze plans for the second implementation period. For example, Colorado, and Nevada are using a cost effectiveness threshold of $10,000/ton.[69] New Mexico's threshold is $7,000 per ton.[70]

d) Consideration of Energy and Non-Air Environmental Impacts of SO2 Controls.

For the factor regarding energy and non-air quality impacts of a pollution control being considered, it must be noted that the SO2 controls that have been evaluated for the LGS facility and WSEC Unit 3 are widely used by coal-fired EGUs and have been for many years. Thus, in general, these SO2 controls do

[68] *See* EPA Control Cost Manual cost spreadsheets for Wet FGD scrubber retrofit and for dry FGD scrubber upgrade for Louisa and for WSEC Unit 3, attached as Exs. 10, 11, 12, and 13.
[69] See, e.g., September 9, 2020 letter from Oregon Department of Environmental Quality to Collins Forest Products, at 1-2, available at https://www.oregon.gov/deq/aq/Documents/18-0013CollinsDEQletter.pdf; Colorado Department of Public Health and Environment, In the Matter of Proposed Revisions to Regulation No. 23, November 17 to 19, 2021 Public Hearing, Prehearing Statement, at 7, available at https://drive.google.com/drive/u/1/folders/1TK41unOYnMKp5uuakhZiDK0-fuziE58v; Nevada Division of Environmental Protection, Nevada Regional Haze State Implementation Plan for the Second Planning Period at 5-6 (June 22, 2022 Draft), available at https://ndep.nv.gov/uploads/documents/1_all_sip_chpts_pn_draft.pdf.
[70] See NMED and City of Albuquerque, Regional Haze Stakeholder Outreach Webinar #2, at 12, available at https://www.env.nm.gov/air-quality/wp-content/uploads/sites/2/2017/01/NMED_EHD-RH2_8_25_2020.pdf.

not pose any unusual energy and non-air quality impacts. Further, the energy and non-air quality impacts are typically taken into account by including costs for additional energy use or for things like scrubber waste disposal is the analyses of the costs of control. MidAmerican Energy did identify additional environmental impacts that would exist with a new wet FGD retrofit at the two units compared to improvements to the existing dry FGD (such as greater volumes of waste to be dewatered and disposed and more water use in a wet FGD), but these are issues that would apply to any coal-fired EGU that installed a wet FGD system, and the costs of addressing these issues are included in the cost calculated by the EPA cost spreadsheet. However, in comparison to a new wet FGD retrofit, upgrading the SO2 removal efficiency of the existing dry FGD will have minimal non-air environmental impacts.

e) Consideration of the Length of Time to Install Controls.

MidAmerican Energy states that the upgrades to the dry FGD system could be implemented within six months of approval of the regional haze plan as part of the SIP, because "no physical modification is necessary to allow implementing improvements to the operation of the existing controls."[71] MidAmerican Energy assumes it would take five years to install a wet FGD system at LGS and at WSEC Unit 3.[72] However, during the adoption of the Mercury and Air Toxics Standards (MATS), EPA found that EGUs could install required controls, including scrubbers, within 3 years. Specifically, EPA stated in 2011 that "[u]nits that choose to install dry or wet scrubbing technology should be able to do so within the compliance schedule required by the [Clean Air Act] as this technology can be installed within the 3-year window."[73] In support of this claim, EPA referenced a letter to Senator Carper dated November 3, 2010, in which David Foerter, executive director of the Institute of Clean Air Companies (ICAC), stated that wet scrubbers could be installed in 36 months, dry scrubbing technology could be installed in 24 months, and dry sorbent injection could be installed in 12 months.[74]

f) Summary – SO2 Controls Are Cost-Effective for LGS and WSEC Unit 3.

As shown in Table 5 above, both the dry FGD upgrade with the use of additional lime and a new wet FGD system should be considered as cost effective controls for LGS and for WSEC Unit 3. However, the use of additional lime in the existing dry FGD system at LGS and at WSEC Unit 3 would be the most cost effective control at $281/ton and would achieve significant reductions in SO2 emissions if IDNR required MidAmerican Energy to meet the level of control that the dry FGDs should be capable of meeting: that is, a dry FGD upgrade to achieve an annual average SO2 rate of 0.05 lb/MMBtu which would, on average, remove 4,900 tons per year of SO2 from LGS and 6,914 tons per year of SO2 from WSEC Unit 3. These reductions are significantly greater than assumed by IDNR and MidAmerican Energy, which assumed that increased lime addition could only achieve an SO2 rate of 0.10 lb/MMBtu, or 78% overall SO2 reduction. As previously stated, the dry FGD for the LGS facility and WCES Unit 3 appear to have been designed for 90% - 93.6% SO2 removal efficiency,[75] and the control data for many coal-fired EGUs

[71] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 11.
[72] *Id.*
[73] 76 Fed. Reg. 24976, 25054 (May 3, 2011).
[74] *Id.*, fn 172.
[75] *See* Weilert, Carl & Emily Meyer, Burns & McDonnell, Utility FGD Design Trends, at 17and 25 (attached as Ex. 4).

that burn low sulfur coal shows that annual emission rates of 0.05 lb/MMBtu or lower can be achieved with dry FGD systems (see Table 3 above) while meeting 30-day average limits of 0.06 lb/MMBtu or lower. Thus, for these reasons, IDNR should require MidAmerican Energy to meet a lower SO2 emission limit at LGS and WSEC Unit 3 with dry FGD upgrades.

2. IDNR Must Adopt a Reasonable Progress SO2 Emissions Limit for LGS in Units that Will Ensure Reductions in SO2 Emissions Over All Levels of Operation.

IDNR proposes to adopt SO2 emission limits reflective of upgraded dry FGD systems at LGS and at WSEC Unit 3 to achieve an SO2 rate of 0.10 lb/MMBtu.[76] However, rather than impose SO2 emission limits for each unit in terms of lb/MMBtu, IDNR has imposed SO2 limits in units of lbs SO2 per hour.[77] Specifically, IDNR is proposing a 30-day rolling average SO2 limit for LGS of 800 lb/hr and for WSEC Unit 3 of 770 lb/hr.[78] Although IDNR did not make clear how its proposed limits were derived, the limits appear to reflect the maximum hourly heat input of each boiler (i.e., 8,000 MMBtu/hour for LGS and 7,700 MMBtu/hour for WSEC Unit 3[79] multiplied by the 0.10 lb/MMBtu assumed level of control with the upgraded FGD systems. By imposing a lb/hour SO2 limit rather than a lb/MMBtu SO2 limit, the limits fail to require the same control over all levels of operation and, instead, the limits will only reflect the assumed level of control when the units are operating at or near maximum hourly heat input capacity. IDNR states that "[e]ach new SO2 limit is comparable to a 0.10 lb/MMBtu load-varying limit because the modified permits further require that MidAmerican develop minimum additive injection rates to maintain high SO2 control efficiencies at all operating loads."[80] A review of the new draft permit conditions shows that the new conditions are not sufficiently clear, lack enforceability, and do not mandate the same reduction in SO2 emission rates at all boiler loads. Comments on these permit terms are detailed below.

a) The Terms of the Draft Permits Are Unclear and Lack Enforceability.

In addition to adding new SO2 limits for LGS of 800 lb/hour and for WSEC Unit 3 of 770 lb/hour and requirements for lime spray dryer enhancements to be done at each unit by December 31, 2023, IDNR has proposed to add the following conditions to the LGS Permit and the WSEC Permit:

> 5. Q. Within 60 operating days after completion of Lime Spray Dryer FGD [(CE1B for LGS, CE003B for WSEC Unit 3)] enhancements, the owner or operator shall conduct an SO2 emissions study to determine the minimum additive injection rate to achieve SO2 reduction of [65.6 percent for LGS and 72 percent for WSEC Unit 3] below the average of 2017-2019 baseline emissions. The minimum additive injection rate shall be determined during varying boiler operating loads. The study shall also include development and identification of an averaging period for the minimum additive injection rate, if applicable.

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[76] February 2023 Draft Iowa Regional Haze Plan at 40.
[77] *Id.*
[78] *Id.*
[79] *Id.* at 29.
[80] *Id.* at 40.

i. The owner or operator shall submit the SO2 study results to the Department for review and approval.

ii. The owner or operator shall maintain the SO2 study results onsite and make the results available for inspection.

R. The owner or operator shall maintain the Lime Spray Dryer FGD [(CE1B for LGS, CE003B for WSEC Unit 3)] minimum additive injection rate at the rates determined during the SO2 emissions study at corresponding boiler loads. The minimum additive injection rate shall be maintained at all times while [Louisa Boiler and WSEC Boiler 3 are] in operation except during periods of boiler start-up.

i. The owner or operator shall properly operate and maintain equipment to monitor the additive injection rate to the Lime Spray Dryer FGD [(CE1B for LGS, CE003B for WSEC Unit 3)]. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals or per written facility specific operation and maintenance plan.

ii. The owner or operator shall continuously collect and record the additive injection rate to Lime Spray Dryer FGD [(CE1B for LGS, CE003B for WSEC Unit 3)] . The owner or operator shall calculate and record the additive injection rate based on the averaging period determined during the SO2 study, if applicable. If the additive injection rate to Lime Spray Dryer FGD [(CE1B for LGS, CE003B for WSEC Unit 3)] falls below the value determined during the SO2 emissions study, the owner or operator shall investigate the Lime Spray Dryer FGD [(CE1B for LGS, CE003B for WSEC Unit 3)] and make corrections to it. The owner or operator shall maintain a record of all corrective actions taken.

See Draft Air Quality Construction Permit 05-A-031-P6, MidAmerican Energy Co. – Louisa Station, at p. 9, and Draft Air Quality Construction Permit 75-A-357-P9, MidAmerican Energy Co. – Walter Scott Jr. Energy Center at p.10, in Appendix E of February 2023 Draft Iowa Regional Haze Plan.

As previously stated, IDNR is relying on these conditions to ensure that the 800 lb/hr SO2 limit at LGS and the 770 lb/hr limit at WSEC Unit 3 are comparable to a 0.10 lb/MMBtu SO2 limit.[81] However, these conditions are not sufficient to ensure that the permits reflect compliance with a 0.10 lb/MMBtu SO2 limit. First, Condition 5.Q. states that MidAmerican Energy must conduct an SO2 study to determine the minimum injection rate needed to achieve a reduction of 65.6 percent for LGS and of 72 percent for WSEC Unit 3 below the "average of 2017-2019 baseline emissions." The term "2017-2019 baseline emissions" is not defined in the permit and is vague and open to interpretation. It is not clear whether this term is referring to 2017-2019 *average annual emissions* or if it is referring to 2017-2019 *hourly emissions* (given that the new SO2 limit applies on a lb/hour basis). It also is not clear if this term is referring to 2017-2019 baseline emissions in terms of lb/MMBtu or in terms of mass of SO2 per unit time. It is also unclear how MidAmerican Energy would distinguish between the quantity of lime injected to achieve the 65.6 percent for LGS (or 72 percent for WSEC Unit 3) additional SO2 removal below 2017-2019 baseline emissions from the quantity of lime injected to achieve the 2017-2019

[81] February 2023 Draft Iowa Regional Haze Plan at 40.

baseline emissions. IDNR should make clear whether it currently has the actual lime injection rate data for the 2017-2019 baseline period at LGS and WSEC Unit 3. Without knowing the baseline lime injection rate, it is not clear how the company would know with any measure of confidence the amount of additional lime being used to achieve 65.6 percent reduction a LGS (or 72 percent reduction at WSEC Unit 3) below 2017-2019 baseline emissions.

Condition 5.Q. further states that the "minimum additive injection rate shall be determined during varying boiler operating loads." This implies that IDNR envisions differences in the quantity of additives needed when the boiler is operating at lower loads (and compliance with the lb/hr SO2 limits would be comparably easier to achieve due to lower heat input to the boilers). This provision does not lend confidence to IDNR's claim that these permit conditions will ensure "high SO2 control efficiencies at all operating loads."

Condition 5.R. provides for a mechanism to memorialize the results of the SO2 emissions study, but it also is vague and lacks adequate terms to be enforceable. While condition 5.R.i. requires MidAmerican to operate and maintain equipment to monitor the additive injection rate, Condition 5.R.ii. does not clearly identify the time period (or boiler load) over which the additive injection rate must be recorded. Further, if the additive injection rate falls below the "value determined during the SO2 emissions study," Condition 5.R.ii. simply requires MidAmerican to investigate the FGD and "make corrections to it." These new permit conditions are too vague to ensure that SO2 emissions will be consistent reduced across all levels of boiler operation.

b) An SO2 Limit In Units of Pounds per Million Btu Will Ensure Greater SO2 Emission Reductions than IDNR's Proposed Pounds Per Hour Limit.

I conducted an analysis to illustrate the difference in SO2 emission reductions between IDNR's proposed pound per hour 30-day average SO2 limits and a 0.10 lb/MMBtu SO2 limit that would ensure the same level of reductions in SO2 across all loads. First, I obtained the daily emissions and operational data for LGS and WSEC Unit 3 for all operating days over the 2017 to 2019 baseline period from EPA's Clean Air Markets Program Database. I then calculated the total SO2 emissions over the 2017-2019 period that would occur if LGS could not emit above 800 lb/hr (or 9.6 tons per day if unit operated 24 hours in a day) and for WSEC Unit 3 if the unit could not emit above 770 lb/hr (or 9.2 tons per day if unit operated 24 hours in a day) for any day of 2017-2019. If SO2 emissions for a day were under the pound per hour limits, I used the actual emissions rate for that day. Next, I calculated the total SO2 emissions over the 2017-2019 period that would occur if LGS and WSEC Unit 3 could not emit more than 0.10 lb/MMBtu for any day of 2017-2019. I compared actual lb/MMBtu emission rates per day to a 0.10 lb/MMBtu rate. If daily emission rates were greater than 0.10 lb/MMBtu, I calculated SO2 mass emissions for the day based on the actual heat input for the day and a 0.10 lb/MMBtu rate. If the actual emission rate for the day was less than 0.10 lb/MMBtu, I used the actual emissions for the day. I then calculated the total SO2 emissions that would occur over 2017-2019 if the SO2 emission rate could not exceed 0.10 lb/MMBtu for any day over 2017-2019. These analyses showed how a 0.10 lb/MMBtu limit would result in greater SO2 emission reductions that IDNR's pound per hour limits for LGS and WSEC Unit 3 (that were intended to reflect a 0.10 lb/MMBtu SO2 rate).

Table 6. Analysis of Additional SO2 Reductions that Would Be Achieved at Louisa Station Under a 0.10 lb/MMBtu Limit Compared to IDNR's 800 Pound per Hour Limits from the 2017-2019 Baseline Period.[82]

Year	Annual SO2 under the 800 lb/hr limit, tpy	Annual SO2 under a 0.10 lb/MMBtu Limit, tpy	Additional Annual SO2 Reductions With an SO2 lb/MMBtu Limit, tpy
2017	2,414	1,834	580
2018	3,149	2,585	564
2019	2,416	1,727	688

Table 7. Analysis of Additional SO2 Reductions that Would Be Achieved at Walter Scott Jr. Energy Center Unit 3 Under a 0.10 lb/MMBtu Limit Compared to IDNR's 770 Pound per Hour Limits from the 2017-2019 Baseline Period.[83]

Year	Annual SO2 under the 770 lb/hr limit, tpy	Annual SO2 under a 0.10 lb/MMBtu Limit, tpy	Additional Annual SO2 Reductions With an SO2 lb/MMBtu Limit, tpy
2017	2,927	2,413	514
2018	2,611	2,262	349
2019	2,532	2,092	440

As the above tables demonstrate, an SO2 limit of 0.10 lb/MMBtu would result in, on average, 610 more tons per year reduced at LGS than an SO2 limit of 800 lb/hr from 2017-2019 average emissions. For WSEC Unit 3, an SO2 limit of 0.10 lb/MMBtu would result in, on average, 435 more tons per year reduced than an SO2 limit of 770 lb/hr from 2017-2019 average emissions. IDNR should thus impose SO2 limits for LGS and WSEC Unit 3 in terms of lb/MMBtu, rather than in lb/hr, to ensure that SO2 emissions are reduced over all levels of operation of these units.

3. Analysis of NOx Control Options for LGS and WSEC Unit 3

IDNR relied on MidAmerican Energy's four-factor analysis of NOx control options for LGS and WSEC Unit 3. MidAmerican evaluated two NOx control options for LGS and WSEC Unit 3: 1) selective catalytic reduction (SCR) to achieve a NOx emission rate of 0.05 lb/MMBtu, and 2) selective noncatalytic reduction (SNCR) to achieve 15% reduction and a NOx emission rate of 0.157 lb/MMBtu at LGS and a NOx emission rate of 0.181 lb/MMBtu at WSEC Unit 3.[84] However, the assumptions for the level of control that could be achieved and for the cost effectiveness analysis are flawed, as is discussed below.

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[82] *See* Ex. 14, spreadsheet with Louisa Daily 2017 to 2019 SO2 Reduced under Different Types of SO2 Limits.

[83] *See* Ex. 15, spreadsheet with Walter Scott Jr. Unit 3 Daily 2017 to 2019 SO2 Reduced under Different Types of SO2 Limits .

[84] February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 (AECOM, Regional Haze Reasonable Further Progress Four Factor Analysis, MEC Louisa and Walter Scott Jr. Coal-Fired Boilers, prepared for MidAmerican Energy Company, August 9, 2021) at 15-19.

a) *SCR Can Achieve Lower NOx Rate than Evaluated by IDNR and MidAmerican Energies*

SCR is the top add-on NOx control technology for the control of NOx from coal-fired EGUs like LGS and WSEC Unit 3. IDNR and MidAmerican Energy evaluated SCR to achieve a NOx rate of 0.05 lb/MMBtu. This reflects only 73% control across the SCR system for the LGS facility and 77.6% across the SCR system for WSEC Unit 3. Yet, SCR systems are routinely designed to achieve 90% or greater NOx control efficiency.[85] Annual average NOx emission rates with SCR, along with existing low NOx burners and overfire air, can be as low as 0.04 lb/MMBtu or even lower.[86]

SCR uses an ammonia-type reagent to reduce NOx to nitrogen gas and NOx removal is greatly enhanced with the use of a metal-based catalyst with activated sites which increase the rate of NOx removal. The ammonia-type reagent is injected into the flue gas downstream of the combustion process through injection sites in the ductwork, which then goes into an SCR reactor chamber that includes the catalyst. The hot gases and ammonia-type reagent diffuse through the catalyst and contact activated sites where NOx is reduced to nitrogen and water with the hot flue gases providing energy for the reaction.[87]

There are several EGUs that have achieved NOx emission rates of 0.04 lb/MMBtu or lower on an annual average basis. A review of the lowest-emitting 2020 annual NOx rates at coal-fired EGUs from EPA's Air Markets Program Database is provided in the table below.

Table 8. Coal-Fired EGUs with SCR Emitting 0.04 lb/MMBtu on an Annual Average Basis in 2020[88]

Power Plant	Unit	2020 Annual NOx Rate, lb/MMBtu
Edgewater	5	0.04
Trimble County	2	0.04
J K Spruce	**2	0.04
Dry Fork	1	0.04
Jeffrey Energy Center	1	0.04
E W Brown	3	0.04
Walter Scott Jr.	4	0.04
Lansing	4	0.04
John W Turk Jr	SN-01	0.04
W A Parish	WAP7	0.04
Sandy Creek Energy Station	S01	0.04

[85] *See* EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, June 2019, at pdf page 5 (available at https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf).
[86] *Id.*
[87] *Id.* at pdf page 13.
[88] Based on data reported to EPA's Air Markets Program Database for 2020.

In its recent regional haze revision for the Laramie River Station in Wyoming, EPA assumed 0.04 lb/MMBtu would be achieved with SCR on an annual average basis under a 0.06 lb/MMBtu NOx limit applicable on a 30-day average basis.[89] However, in its response to comments on its initial NOx BART finding for the San Juan Generating Station,[90] EPA found significant support in actual emissions data for its finding that a 0.05 lb/MMBtu NOx limit was achievable on a 30-boiler operating day average basis, including a study that identified 25 units that are achieving NOx emission rates less than 0.05 lb/MMBtu on an hourly basis.[91] EPA also cited to NOx emission rates at Seminole Units 1 and 2 (achieving 0.04 lb/MMBtu), Morgantown Units 1 and 2 (achieving 0.043 to 0.054 lb/MMBtu), Trimble Unit 1 (achieving 0.032 lb/MMBtu), as well as the Mountaineer plant and Cliffside Unit 5.[92] EPA also analyzed emissions data for the lowest NOx emitting units to calculate rolling 30-day averages (on both a calendar year basis and on a 30-boiler operating day basis).[93] EPA found several units emitting NOx at or below 0.05 lb/MMBtu, including Havana Unit 9, Parish Unit 7, and Parish Unit 8.[94]

All of this long term, actual emissions data for units equipped with SCR shows that those units with unit-specific emission limits that are more closely linked to the capabilities of the unit's NOx pollution controls consistently have met NOx rates at 0.04 lb/MMBtu on an annual average basis. Thus, for the purposes of the cost analyses of SCR for the LGS facility and WSEC Unit 3, it should have been assumed that the EGUs can meet a 0.04 lb/MMBtu NOx rate on an annual average basis. For an EGU that is already achieving a low NOx rate before the addition of SCR (like the LGS facility), it is possible that annual average rates as low as 0.03 lb/MMBtu could be achieved. Given that cost-effectiveness is based on annual average costs, it is most appropriate to evaluate the NOx emission reductions achievable on an annual average basis in determining cost effectiveness.

For LGS, an annual controlled NOx rate with SCR of 0.04 lb/MMBtu reflects an annual NOx reduction efficiency across the SCR of 78%. For WSEC Unit 3, an annual rate of 0.04 lb/MMBtu reflects 82.1% NOx removal across the SCR. These removal efficiencies are readily achievable with SCR. As EPA states in its Control Cost Manual, SCR systems are routinely designed to achieve 90% control.[95] Although EPA acknowledges that the design percent reduction may be less than 90% when the SCR is following

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[89] 83 Fed. Reg. 51,403 at 51,408 (Oct. 11, 2018).

[90] This NOx BART finding was subsequently replaced with a BART alternative, *see* 79 Fed. Reg. 60,985-60,993 (Oct. 9, 2014).

[91] *See* U.S. EPA, Complete Response to Comments for NM Regional Haze/Visibility Transport FIP, 8/5/11 (Docket EPA-R06-OAR-2010-0846) at 53 (Ex. 16). EPA also cites to Clay Erickson, Robert Lisauskas, and Anthony Licata, What New in SCRs, DOE's Environmental Control Conference, May 16, 2006., p. 28. Available here: http://www.netl.doe.gov/publications/proceedings/06/ecc/pdfs/Licata.pdf; LG&E Energy, Selective Catalytic Reduction: From Planning to Operation, Competitive Power College, December 2005, p. 75-77. (Ex. 17); and M.J. Oliva and S.R. Khan, Performance Analysis of SCR Installations on Coal-Fired Boilers, Pittsburgh Coal Conference, September 2005 (Ex. 18).

[92] *See* U.S. EPA, Complete Response to Comments for NM Regional Haze/Visibility Transport FIP , EPA-R06-OAR-2010-0846-0127, at 53-54 (Ex. 16).

[93] *Id.* at 56 -58.

[94] *Id.*

[95] *See* EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, June 2019, at pdf page 5.

combustion controls like low NOx burners,[96] that does not mean that high NOx removal efficiencies cannot be achieved by an SCR following combustion controls.

All major SCR catalyst vendors can and have guaranteed at least 90% efficiency for SCRs burning coals with a wide range of properties. Vendor experience lists[97] indicate that SCRs are routinely designed for 90% NOx control, depending on purchaser specifications. Back in 2003, Sargent and Lundy, an engineering firm that designs SCRs, stated:

> [A]ll Sargent & Lundy-designed SCR reactors at coal-fired units, which have been placed into service, have achieved their guaranteed NOx reduction efficiencies within the specified ammonia slip limits. The minimum design NOx reduction efficiency was 85% and the maximum reduction efficiency was in excess of 90%. Design ammonia slip levels ranged between 2 ppm and 3 ppm at the end of catalyst life. Although no SCR installations have yet operated for the guaranteed catalyst life duration, it is anticipated that the NOx reduction and ammonia slip performance guarantees will continue to be met over that period. Operational installations include pulverized coal units burning PRB coal, Illinois low- to high-sulfur coal, and eastern low to high-sulfur coal; one cyclone unit burning PRB coal; and two cyclone units burning Illinois low-sulfur coal. SCR reactor designs have included 2+1 and 3+1 catalyst level installation sequences and have used plate, honeycomb, and corrugated type catalysts. Design of SCR reactors for removal efficiencies greater than 90% at ammonia slip levels less than 2 ppm to 3 ppm has been demonstrated and should be considered as a feasible design criterion.[98]

Thus, for all of these reasons discussed above, it is more than reasonable to evaluate the cost effectiveness of SCR at the LGS facility and WSEC Unit 3 to meet a NOx emission rate of 0.04 lb/MMBtu on an annual basis.

b) SNCR Can Achieve Lower NOx Emission Rates than Evaluated By MidAmerican Energy.

SNCR is the next most effective add-on NOx reduction technology for coal-fired EGUs, but its NOx removal capabilities are much lower than achievable with SCR. SNCR involves injecting ammonia or an ammonia-type reactant into the furnace of a coal-fired boiler, similar to SCR, but there is no catalyst to enhance NOx removal as with SCR. In SNCR, the ammonia-type reagent mixes with hot flue gases, and

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[96] *Id.*

[97] *See, e.g.*, Haldor Topsoe, SCR Experience List, October 2009 (Ex. 19), Hitachi, NOx Removal Coal Plant Supply List, October 17, 2006 (Ex. 20); Argillon Experience List U.S. Coal Plants (Ex. 21); Hitachi, SCR System and NOx Catalyst Experience, Coal, February 2010 (Ex. 22).

[98] Kurtides, T., Sargent and Lundy, Lessons Learned from SCR Reactor Retrofit, COAL-GEN, Columbus, OH, August 6-8, 2003; http://www.adeq.state.ar.us/ftproot/pub/commission/p/Closed%20Permit%20Dockets%202006-2010/08-007-P%20AEP%20Service%20Corp%20&%20Swepco-Hempstead%20Co%20Hunting%20Club/2008-12-03, (Ex. 23).

the reagent reacts with NOx in the gas stream to convert some of it to nitrogen gas thereby reducing nitrogen oxides.

EPA describes the SNCR system as follows in its Control Cost Manual:

> The mechanical equipment associated with an SNCR system is simple compared to an SCR, semi-dry FGD, or wet scrubber and thereby requires lower capital costs ($/MMBtu/hr basis). Installation of SNCR equipment requires minimum downtime. Although simple in concept, it is challenging in practice to design an SNCR system that is reliable, economical, and simple to control and that meets other technical, environmental, and regulatory criteria. Practical application of SNCR is limited by the boiler design and operating conditions.[99]

The NOx reduction efficiency of SNCR can vary greatly. According to EPA, "[t]emperature, residence time, type of NOx reducing agent, reagent injection rate, uncontrolled NOx level, distribution of reagent in the flue gas, and [carbon monoxide and oxygen (CO and O2)] concentrations all affect the reduction efficiency of the SNCR."[100] EPA and states, in evaluating the NOx removal efficiency of SNCR in prior analyses under the regional haze program, have assumed NOx control efficiencies with SNCR at coal-fired EGUs in the range of 15% - 40%.[101] EPA's Control Cost Manual indicates that the majority of coal-fired boilers are achieving between 20%-40% NOx control with SNCR, and EPA provided a graph indicating a connection between the NOx inlet emission rate and the control efficiency, with higher NOx removal efficiencies achieved with higher inlet NOx emission rates.[102] EPA provided a best fit equation to estimate NOx removal efficiency achievable with SNCR based on NOx inlet level. That equation is:

> NOx Reduction Efficiency, %, = 22.554*Inlet NOx Rate, lb/MMBtu + 16.725.[103]

For the LGS facility which had an annual average NOx rate of 0.183 lb/MMBtu, the above equation would equate to an achievable NOx removal efficiency of 20.9%. For WSEC Unit 3, the above equation equates to an achievable NOx removal efficiency of 21.7%. Yet, MidAmerican Energy assumed only a 15% reduction would be achievable at LGS and WSEC Unit 3 with SNCR.[104]

MidAmerican Energy claimed that SNCR would not achieve more than 15% NOx reduction because SNCR is less effective on large boilers, that widely varying loads increases difficulty in determining the

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[99] *See* EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, revised 4/25/2019, at 1-6, available at https://www.epa.gov/sites/production/files/2017-12/documents/sncrcostmanualchapter7thedition20162017revisions.pdf.

[100] *Id.* at 1-1. *See also* Institute of Clean Air Companies White Paper, Selective Non-Catalytic Reduction (SNCR) for Controlling NOx Emissions, February 2008, at 5, attached as Ex. 24.

[101] For example, Colorado assumed, 29.5% NOx removal with SNCR for Comanche Unit 1, 15% NOx removal for SNCR at Craig Units 1, 2, and 3, 37% NOx removal with SNCR at Hayden Unit 1 and 43% removal at Hayden Unit 2, 30% NOx removal at Martin Drake Units 5 and 6 and 28% NOx removal at Martin Drake Unit 7 (77 Fed. Reg. 18066, 18068-72, 18087 (3/26/12).

[102] EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, 4/25/2019, at 1-3 to 1-4.

[103] *Id.* at Figure 1.1c (on page 1-4).

[104] February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 15-19.

appropriate amount of reagent to inject, and that removal efficiencies are typically lower at units that already low NOx emission rates.[105] MidAmerican Energy states that the "driving force for SNCR-type reactions falls off quickly when the baseline NOx concentration falls below about 0.2 lb/MMBtu."[106] A review of actual emissions data at EGUs with SNCR shows that SNCR has been successfully implemented at large EGUs. For example, SNCR was installed at Jeffrey Energy Center Units 2 and 3 in the 2012-2014 timeframe. Units 2 and 3 have generating capacities of 800 MW each, and thus are very comparable in size to LGS and WSEC Unit 3. Before SNCR was installed at the Jeffrey Energy Center units, each unit has installed new low NOx burners/separated overfire air for NOx control. Jeffrey Energy Center Unit 2 was achieving a 0.14 lb/MMBtu NOx rate (ozone season average) and Jeffrey Energy Center Unit 3 was achieving a NOx rate of 0.17 lb/MMBtu (ozone season average), based on data reported in the EPA's Clean Air Markets Program Database.[107] After installation of SNCR, the units have both been averaging about 0.12 lb/MMBtu across ozone seasons. For Jeffrey Energy Center Unit 2, the average NOx removal efficiency over the ozone season being achieved is approximately 18.2%. For Jeffrey Energy Center Unit 3, the NOx removal efficiency achieved on average over the ozone season is approximately 27.7%.[108] While the NOx control efficiency being achieved on Jeffrey Energy Center Unit 2 is lower than then being achieved at Unit 3, both units are achieving higher than the 15% removal efficiency assumed by MidAmerican Energy in its evaluation of SNCR for LGS and WSEC Unit 3. Further, both LGS and WSEC Unit 3 are currently emitting NOx at higher rates than Jeffrey Energy Center Unit 3 emitted before SNCR was installed at the unit, and Jeffrey Energy Center is achieving approximately 27.7% NOx removal with SNCR.

EPA's Control Cost Manual chapter on SNCR acknowledges that mixing of the reagent can be more difficult on large boilers, but EPA states that urea-based SNCR systems work most effectively on large boilers. Specifically, EPA states that urea droplets "can penetrate farther into the flue gas when injected into the boiler" which "enhances mixing with the flue gas."[109] EPA states that urea is more commonly used in large boiler applications, due to these qualities.[110] EPA also describes how the injectors for large boiler applications can be designed to enhance mixing:

> The urea solution flows from a given distribution module to a set of injectors. For large boiler applications, multiple injectors are located within several different zones of the boiler and can be operated independently or in groups (sub-zones) via the IZM. Controlling the amount and location of reagent injection gives the system flexibility to respond to variation in the boiler operating conditions and to maintain ammonia slip levels.
>
> The number and location of the zones is determined by the temperature and flow patterns of the boiler. The locations are optimized using numeric modeling of flow and chemical reactions….

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105 *Id.* at 14.
106 *Id.*
107 *See* Ex. 25, spreadsheet with Clean Air Markets Program Database emissions information for Jeffrey Energy Center Units 2 and 3 from 2007-2022.
108 *Id.*
109 EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, 4/25/2019, at 1-13.
110 *Id.*

EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, 4/25/2019, at 1-25.

There are also different types of injectors that can be used to assist with dispersing and mixing of the reagent with the flue gas.[111] Thus, with proper engineering and design, SNCR can be designed to achieve higher removal efficiencies than the 15% control evaluated by MidAmerican Energy.

For all of these reasons, it is more appropriate to use the best fit equation developed by EPA to estimate NOx removal efficiency achievable with SNCR based on NOx inlet level, rather than to simply assume that SNCR can only achieve 15% NOx reduction at LGS and WSEC Unit 3. For LGS, that equation would equate to an achievable NOx removal efficiency of 20.9% and a controlled annual NOx rate with SNCR of 0.15 lb/MMBtu. For WSEC Unit 3, the equation calculates a NOx removal efficiency of 21.7% and a controlled annual NOx rate with SNCR of 0.17 lb/MMBtu.

c) IDNR and MidAmerican Energy's SCR and SNCR Cost Effectiveness Analyses Show that There Are Cost-Effective NOx Control Options for LGS and WSED Unit 3.

Despite the IDNR and MidAmerican cost analyses failing to reflect the NOx removal capabilities that should be achievable at LGS and WSEC Unit 3, IDNR's and MidAmerican Energy's cost effectiveness analyses show that both SNCR and SCR should be considered as cost effective controls for LGS and WSEC Unit 3. The table below summarized IDNR's and MidAmerican's cost effectiveness analyses for these NOx control.

Table 9. IDNR and MidAmerican Energy's Cost Effectiveness Analyses Results for SNCR and SCR at LGS and at WSEC Unit 3.[112]

Plant/Unit	NOx Control	Total Annual Costs	NOx Reduced, tpy	Cost Effectiveness (2019 $)
LGS	SCR	$24,271,942	2,739 tpy	$8,862/ton
LGS	SNCR	$2,192,000	566 tpy	$6,398/ton
WSEC Unit 3	SCR	$24,771,688	3,849 tpy	$6,436/ton
WSEC Unit 3	SNCR	$4,240,300	755 tpy	$5,616/ton

These costs are within the range of cost effectiveness thresholds that are being used by other states in their regional haze plans. For example, Colorado, and Nevada are using a cost effectiveness threshold of

[111] *Id.* at 1-25 to 1-26.
[112] February 2023 Draft Iowa Regional Haze Plan at 34 and Appendix D-1 at 17.

$10,000/ton.[113] Minnesota is using a $7,600/ton cost threshold.[114] New Mexico's threshold is $7,000 per ton.[115] Arizona is using a cost threshold of $6,500/ton.[116] Washington is using $6,300/ton for Kraft pulp and paper power boilers.[117] At the minimum, the cost effectiveness of SNCR at LGS and of SCR at WSEC Unit 3 should be considered to be reasonable, given the cost effectiveness thresholds that other states are relying on in their regional haze plans for the second implementation period.

As discussed above, IDNR and MidAmerican Energy's assumed controlled NOx emission rates with these NOx controls are too high, and lower NOx emission rates should have been evaluated. Further, SNCR should have been evaluated based on a 30-year life of controls. The next section presents revised cost effectiveness analyses of SCR and SNCR taking into account these issues.

d) Revised Cost Effectiveness Analyses for SCR and SNCR at LGS and WSEC Unit 3.

To address the issues discussed above, I conducted revised cost effectiveness analyses for SCR and SNCR at the LGS facility and at WSEC Unit 3. EPA's cost calculation spreadsheets made available with its Control Cost Manual Chapters for SNCR and for SCR[118] were used for the cost effectiveness analyses presented herein. The following provides the other relevant inputs made to the cost modules to estimate NOx control costs for the LGS facility and for WSEC Unit 3:

a. **Retrofit Difficulty**: I used a retrofit factor of "1" for the SCR and SNCR cost analyses at both units, which is also what MidAmerican Energy assumed in its cost analyses.
b. **Unit Size**: 811.9 MW for LGS and 725.8 MW for WSEC Unit 3. Note that a review of MidAmerican Energy's SCR cost spreadsheet printouts shows that the company assumed a unit size of 777 MW for WSEC Unit 3.[119] It is not clear why a lower unit size was assumed for WSEC

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[113] See, e.g., September 9, 2020 letter from Oregon Department of Environmental Quality to Collins Forest Products, at 1-2, available at https://www.oregon.gov/deq/aq/Documents/18-0013CollinsDEQletter.pdf; Colorado Department of Public Health and Environment, In the Matter of Proposed Revisions to Regulation No. 23, November 17 to 19, 2021 Public Hearing, Prehearing Statement, at 7, available at https://drive.google.com/drive/u/1/folders/1TK41unOYnMKp5uuakhZiDK0-fuziE58v; Nevada Division of Environmental Protection, Nevada Regional Haze State Implementation Plan for the Second Planning Period at 5-6 (June 22, 2022 Draft), available at https://ndep.nv.gov/uploads/documents/1_all_sip_chpts_pn_draft.pdf.
[114] *See* December 20, 2022 Minnesota Pollution Control Agency, Comprehensive State Implementation Plan Update for the Second Regional Haze Implementation Period (2018-2028) at 108 (pdf page 124), available at https://www.pca.state.mn.us/sites/default/files/aq-sip2-19.pdf.
[115] See NMED and City of Albuquerque, Regional Haze Stakeholder Outreach Webinar #2, at 12, available at https://www.env.nm.gov/air-quality/wp-content/uploads/sites/2/2017/01/NMED_EHD-RH2_8_25_2020.pdf.
[116] *See* Arizona Department of Environmental Quality, State Implementation Plan Revision: Regional Haze Program (2018-2028), June 3, 2022 Proposed, Appendix C at 45, available at https://static.azdeq.gov/aqd/haze/az_regional_haze_proposed_sip_20220603.pdf.
[117] *See*, e.g., Washington Department of Ecology, Responses to comments for chemical pulp and paper mills, at 5, 6, and 8, available at https://protectnps.org/wp-content/uploads/2022/07/Ex-11_RespondFLM20210111.pdf.
[118] Available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.
[119] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at p. A-4.1

Unit 3 than the stated capacity of the unit of 725.8 MW. For the SNCR analysis, MidAmerican Energy assumed a unit size of 726 MW.[120]

c. **Higher heating value of the fuel and sulfur content**: I used the EPA default values for the heating value and sulfur content for subbituminous coal. That is, 8,826 Btu/lb, 0.41% sulfur, and 5.84% ash content were assumed.
d. **Actual MW-hours**: I used the average of 2017-2019 gross MW-hours reported for LGS and WSEC Unit 3 based on EPA's Clean Air Markets Program Database.
e. **Net Heat Rate**: This was calculated from the Gross Load (MW-hours) and the heat input (MMBtu/hr) reported to EPA's Clean Air Markets Program Database averaged over 2017-2019.
f. **Elevation**: 581 feet above sea level for LGS[121] and 1089 feet above sea level for WSEC Unit 3.[122]
g. **Number of Days SCR and SNCR operates per year**: 365 days.
h. **Inlet and Outlet NOx rates**: I used the 2017-2019 annual average NOx rates at LGS and WSEC Unit 3. I assumed an annual NOx rate with SCR of 0.04 lb/MMBtu. For SNCR, I assumed an NOx rate of 0.15 lb/MMBtu at LGS and of 0.17 lb/MMBtu at WSEC Unit 3, for the reasons stated above.
i. **Interest rate**: For the reasons discussed in Section II.A. above, the current bank prime interest rate of 7.75% was used for the cost effectiveness calculations,[123] as this is what EPA currently recommends for cost effectiveness analyses.
j. **Equipment life**: I used 30 years for both SCR and SNCR for the reasons discussed in Section II.B. above.
k. **Other inputs**: I used the defaults for the other cost inputs from EPA's SCR and SNCR spreadsheets for reagent, fuel costs, catalyst, labor, and water, and assumed use of 29.4% aqueous ammonia as the SCR reagent and use of urea as the SNCR reagent.
l. **Auxiliary Power Costs**: EPA's cost spreadsheet uses the average power plant operating expenses as reported to the Energy Information Administration for 2016 of $0.0361/kW-hr for auxiliary power cost calculations in its cost effectiveness spreadsheets provided with its Control Cost Manual.[124] I used the same 2016 EIA auxiliary power costs in all cost calculations including for the annual average costs of operating the dry FGD over the 2017-2019 baseline period. It must be noted that the most recent published final average cost of fossil-fueled steam electric plants from the EIA is slightly lower than the average 2016 average cost.[125] The most recent final EIA data for 2019 is $0.0367/kW-hr.[126] In all cases, I included auxiliary power costs in the variable operating and maintenance costs.
m. **Baseline emissions**: As discussed in Section I.C. above, 2017-2019 average emissions were used as baseline emissions and operational characteristics (heat input, heat rate, megawatt-hours generated).

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[120] *Id.* at A-2.2.
[121] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at p. A-3.1
[122] *Id.* at A-4.1.
[123] https://www.federalreserve.gov/releases/h15/.
[124] Available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.
[125] *See* https://www.eia.gov/electricity/annual/html/epa_08_04.html.
[126] *See* EIA, October 2020, Electric Power Annual 2019, Table 8.4, available at https://www.eia.gov/electricity/data/eia923/.

n. **Cost Basis**: Costs were escalated from the 2016 cost basis of EPA's cost spreadsheet to 2021 dollars based on changes in the Chemical Engineering Plant Cost Indices for those years. In comparison, IDNR and MidAmerican Energy's cost analyses were based on a 2019 dollar basis.

The following table summarizes the cost effectiveness calculations for these NOx controls at LGS and at WSEC Unit 3.

Table 10. Revised Cost Effectiveness of Post-Combustion NOx Controls at LGS and at WSEC Unit 3, Based on 30-Year Life of Controls and the EPA Control Cost Manual Spreadsheets[127]

Plant/ Unit	Control	Annual NOx Rate, lb per MMBtu	Capital Cost (2021$)	O&M Costs	Total Annualized Costs (2021$)	NOx Reduced, tpy	Cost Effective-ness, $/ton (2021 $)
LGS	SCR	0.04	$278,949,048	$3,251,878	$27,456,125	2,930 tpy	$9,371/ton
LGS	SNCR	0.15	$16,424,037	$2,162,828	$3,594,183	782 tpy	$4,598/ton
WSEC Unit 3	SCR	0.04	$264,636,374	$3,357,111	$26,319,591	4,127 tpy	$6,377/ton
WSEC Unit 3	SNCR	0.17	$16,048,978	$2,702,317	$4,100,985	1,042 tpy	$3,917/ton

With the exception of SCR at the LGS facility, the revised cost effectiveness of SNCR and SCR show that the costs of these controls are more cost effective than shown in the IDNR and MidAmerican Energy costs provided in Table 9 above. The primary reason the costs of SCR LGS are higher than calculated by MidAmerican Energy is because the costs in the above table reflect costs in a 2021 dollar basis, and MidAmerican Energy's costs are based in a 2019 cost basis. The Chemical Engineering Plant Cost Indices show an increase in costs of 16.5% between 2019 to 2021.[128]

However, for SNCR at LGS and for both SCR and SNCR at WSEC Unit 3, the revised cost effectiveness analyses show that the cost effectiveness of these controls are lower than estimated by IDNR and MidAmerican Energy, despite being based on 2021 dollars. That is because lower controlled emission rates were assumed and because a 30-year life of controls was assumed. It is also because for SCR, MidAmerican Energy inexplicably assumed a unit size of 777 MW, when the unit actually is rated at 725.8 MW.[129]

As shown above, SCR would reduce NOx emissions by almost 3,000 tons per year at LGS and by over 4,100 tons per year at WSEC Unit 3. Although the cost effectiveness of SCR is within the range of cost effectiveness thresholds established by other states in their regional haze plans as discussed above, the cost effectiveness of SCR at WSEC Unit 3 is particularly cost effective at under $6,400/ton. SNCR would achieve much lower NOx reductions of about 780 tons per year at LGS and of 1,042 tons per year at WSEC Unit 3, but SNCR is more cost effective at approximately $3,900/ton to $4,600/ton. These revised costs are much more cost effective than the costs calculated by IDNR and MidAmerican Energy as shown

[127] *See* SCR and SNCR Cost Manual Spreadsheets for LGS and WSEC Unit 3, attached as Exs. 26, 27, 28, and 29.
[128] The CEPCI value for 2021 is 708 and the CEPCI value for 2019 is 607.5.
[129] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 3 and at p. A-4.1

in Table 9 above. While SNCR is more cost effective, SCR would achieve much greater NOx reductions and the costs of SCR are within the range that other states are planning to identify as cost effective in their regional haze plans for the second implementation period. Arizona identified a cost effectiveness range of $4,000 to $6,500/ton.[130] New Mexico's threshold is $7,000 per ton,[131] and Oregon is using $10,000/ton or possibly even higher.[132] Washington is using $6,300/ton for Kraft pulp and paper power boilers.[133] Oregon has adopted a much higher regional haze cost-effectiveness threshold of $10,000/ton.[134] Colorado is also using a cost-effectiveness threshold of $10,000/ton.[135] SCR at WSEC Unit 3 would be considered cost effective under all of these state cost thresholds. Thus, IDNR should find SCR to be cost effective for WSEC Unit 3. IDNR should also at least find SNCR to be cost effective at LGS, although SCR at LGS would also be considered cost effective under several states' cost effectiveness thresholds for their regional haze plans.

e) Consideration of Energy and Non-Air Environmental Impacts of SCR and SNCR.

The use of SCR and SNCR presents several non-air quality and energy impacts, most of which are taken into account in EPA's SCR and SNCR cost spreadsheet in estimating the annualized costs of control. For SCR, those issues include the parasitic load of operating an SCR system, which requires additional energy (fuel and electricity) to maintain the same steam output at the boiler.[136] The costs for the additional fuel and electricity are taken into account in EPA's SCR cost spreadsheet. The spent SCR catalyst must be disposed of in an approved landfill if it cannot be recycled or reused, although it is not generally considered hazardous waste.[137] Further, the use of regenerated catalyst can reduce the amount of spent catalyst that needs to be disposed.[138] The EPA's SCR cost spreadsheet assumed regenerated catalyst will be used and includes costs for catalyst disposal. If anhydrous ammonia is used, which EPA acknowledges is commonly used at SCR installations, there would be increased need for risk management and implementation and associated costs.[139] If urea or aqueous ammonia is used as the

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[130] *See*, e.g., Arizona Department of Environmental Quality, 2021 Regional Haze Four-Factor Initial Control Determination, Tucson Electric Power Springerville Generating Station, at 15, available at https://www.azdeq.gov/2021-regional-haze-sip-planning.

[131] *See* NMED and City of Albuquerque, Regional Haze Stakeholder Outreach Webinar #2, at 12, available at https://www.env.nm.gov/air-quality/wp-content/uploads/sites/2/2017/01/NMED_EHD-RH2_8_25_2020.pdf.

[132] *See*, e.g., September 9, 2020 letter from Oregon Department of Environmental Quality to Collins Forest Products, at 1-2, available at https://www.oregon.gov/deq/aq/Documents/18-0013CollinsDEQletter.pdf.

[133] *See*, e.g., Washington Department of Ecology, Responses to comments for chemical pulp and paper mills, at 5, 6, and 8, attached as Ex. 25.

[134] *See* Oregon Regional Haze State Implementation Plan for the Period 2018-2028, Aug. 27, 2021 Public Notice Draft, at 35, 45.

[135] *See* Colorado Department of Public Health and Environment, In the Matter of Proposed Revisions to Regulation No. 23, November 17 to 19, 2021 Public Hearing, Prehearing Statement, at 7, available at https://drive.google.com/drive/u/1/folders/1TK41unOYnMKp5uuakhZiDK0-fuziE58v.

[136] EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, June 2019, at pdf pages 15-16, 48.

[137] *Id. a*t pdf 18.

[138] *Id.* at pdf 18-19.

[139] Anhydrous ammonia is a gas at standard temperature and pressure, and so it is delivered and stored under pressure. It is also a hazardous material and typically requires special permits and procedures for transportation,

reagent, the hazards from use of pressurized anhydrous ammonia do not apply. None-the-less, anhydrous ammonia is commonly used in SCR installations, because it lowers SCR control costs, and any issues with handling of pressurized ammonia are well known and commonly addressed. Indeed, SCR technology is widely used at coal-fired EGUs. There are typically not overarching non-air quality or energy concerns with this technology, and many of the concerns are addressed in the cost analysis.

SNCR reduces the thermal efficiency of the boiler, which requires additional energy (fuel and electricity) to maintain the same steam output at the boiler.[140] The EPA's cost spreadsheet also takes into consideration increased ash disposal as a result of burning more fuel, as well as increased water consumption and treatment costs.[141] It must also be noted that SNCR technology is widely used at coal-fired EGUs, and there are typically not overarching non-air quality or energy concerns with this technology.

Thus, the energy and non-air environmental impacts should not be considered as an impediment to requiring SCR or SNCR at LGS and at WSEC Unit 3 to achieve reasonable progress under the regional haze program.

f) Consideration of the Length of Time to Install Controls

SCR systems are typically installed within a 3 to 5 year timeframe. For example, in Colorado, SCR was operational at Hayden Unit 1 in August of 2015 and at Hayden Unit 2 in June of 2016, according to data in EPA's Air Markets Program Database, within 3.5 years of EPA's December 31, 2012 approval of Colorado's regional haze plan. In Wyoming, SCR was operational at Jim Bridger Units 3 and 4 in 2015 and 2016, less than three years from EPA's January 30, 2014 final approval of Wyoming's regional haze plan.

SNCR installation is much less complex than an SCR installation, and thus it can typically be installed more quickly. In a 2006 document, the Institute of Clean Air Companies indicated that SNCR could be installed in 10-13 months.[142]

Thus, the length of time to install controls should not be considered as an impediment to requiring SCR or SNCR at LGS and at WSEC Unit 3 to achieve reasonable progress under the regional haze program.

g) Summary – NOx Controls are Cost Effective for LGS and for WSEC Unit 3.

SCR should be considered as a cost-effective NOx control for at least WSEC Unit 3. A revised cost analysis based on the correct nameplate capacity of the unit and based on meeting an annual 0.04 lb/MMBtu NOx rate shows that the cost effectiveness of SCR would be $6,377/ton on a 2021 dollar cost

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handling, and storage. *See* EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction, June 2019, at pdf page 15.

[140] EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, revised 4/25/2019, at 1-28 to 1-29.

[141] *Id.* at 1-46, 1-49 to 1-53.

[142] Institute of Clean Air Companies, Typical Installation Timelines for NOx Emission Control Technologies on Industrial Sources, December 4, 2006, at 4-5, available at https://cdn.ymaws.com/www.icac.com/resource/resmgr/ICAC_NOx_Control_Installatio.pdf.

basis. SCR at WSEC Unit 3 to meet an annual NOx rate of 0.04 lb/MMBtu would reduce NOx by over 4,100 tons per year of NOx on average. SCR at LGS would also be considered as cost effective under some state's regional haze cost effectiveness thresholds, but at the minimum, SNCR should be considered as cost effective for LGS. SNCR to meet an emission rate of 0.15 lb/MMBtu would be very cost effective at $4,608/ton in 2021 dollars. SNCR at LGS to meet an annual NOx emission rate of 0.15 lb/MMBtu would reduce NOx emissions from the facility by 778 tons per year on average. For these reasons, IDNR should require SCR installation at WSEC Unit 3 and at least require SNCR installation at the LGS facility as cost-effective controls.

III. IDNR Should Have Evaluated Dry FGD Upgrades at Walter Scott Jr. Unit 4.

WSEC Unit 4 is a 922.5 MW unit that burns subbituminous coal and is equipped with a dry FGD system, as well as LNB/OFA, SCR, and a baghouse. As shown in Table 2 above, WSEC Unit 4 achieved 0.067 lb/MMBtu on an annual average basis over the 2017-2019 baseline period. However, WSEC Unit 4 is subject to a much higher SO2 limit of 0.1 lb/MMBtu.[143] Further, a review of annual average SO2 rates over the most recent three years shows that annual average SO2 emission rates have been increasing at WSEC Unit 4. The annual average SO2 rates in 2021 and 2022 were 0.081 lb/MMBtu and 0.090 lb/MMBtu.[144] Yet, a review of the coal data reported to the EIA's Coal Data Browser for WSEC does not show any increase in coal sulfur content to the WSEC plant.[145]

Based on a review of the coal data reported to the EIA for WSEC, the weighted average uncontrolled SO2 emission rate based on EPA's AP-42 emission factor for subbituminous coal was 0.46 lb/MMBtu over 2017-2019 for the coals shipped to the WSEC plant.[146] Thus, on an annual average basis, the SDA system at WSEC Unit 4 was achieving approximately 85.5% SO2 removal during the 2017-2019 baseline period. As discussed in Section II.C.1.a. above, dry FGD systems are routinely designed to achieve up to 95% control for a spray dryer absorber.[147] Indeed, it appears that the dry FGD scrubber that was installed at the WSEC Unit 4 was designed to achieve 92% SO2 removal.[148] As demonstrated in Table 3 above, many coal-fired EGUs equipped with dry FGD systems are achieving annual average SO2 emission rates at or below 0.05 lb/MMBtu while complying with 30-day average limits of 0.06 lb/MMBtu.

IDNR did not evaluate WSEC Unit 4 for any additional control or control upgrades, finding that "no additional technically feasible control options are identified" for the unit.[149] However, for all of the

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143 *See* February 2023 Draft Iowa Regional Haze Plan, Appendix E at pdf page 37, Permit 03-A-425-P4 WSEC 4 Boiler, at p 5.
144 Based on data reported to EPA's Clean Air Markets Program Database.
145 *See* Ex. 3 with coal heat value and sulfur content of coals used at Walter Scott Jr. Energy Center, from the Energy Information Administration's Coal Data Browser.
146 *See* Ex. 3 with coal heat value and sulfur content of coals used at Walter Scott Jr. Energy Center over 2017-2019, from the Energy Information Administration's Coal Data Browser.
147 EPA, Control Cost Manual, Section 5, Chapter 1, Wet and Dry Scrubbers for Acid Gas Control, April 2021, at 1-11, available at https://www.epa.gov/sites/default/files/2021-05/documents/wet_and_dry_scrubbers_section_5_chapter_1_control_cost_manual_7th_edition.pdf .
148 *See* Weilert, Carl & Emily Meyer, Burns & McDonnell, Utility FGD Design Trends, at 25 (attached as Ex. 4).
149 *See* February 2023 Draft Iowa Regional Haze Plan at 33.

reasons discussed above, IDNR should have evaluated requiring MidAmerican Energy to meet an annual average emission rate of 0.05 lb/MMBtu by increasing lime at the dry FGD at WSEC Unit 4.

I conducted such an analysis for WSEC Unit 4. First, I used the dry FGD calculations of EPA's "Wet and Dry Scrubbers for Acid Gas Control Spreadsheet" (updated on 1/26/2023) which EPA has made available with its Control Cost Manual[150] to calculate the current annual average costs of operating the existing dry FGD at WCEC Unit 4. For these calculations, I assumed an average uncontrolled SO2 rate to Unit 4's dry FGD system of 0.46 lb/MMBtu, which was based on the use of AP-42 emission factors subbituminous coal-fired boilers and which reflects a weighted average of the various coals shipped to the Louisa facility during the baseline period of 2017-2019.[151] To determine average annual operational costs for the dry FGD system at WCEC Unit 4 during the 2017-2019 baseline period, I input a controlled SO2 emission rates of 0.067 lb/MMBtu. In addition, I used operational data over the 2017-2019 baseline period to reflect actual annual MW-hours output as well as for heat rate at WSEC Unit 4. Based on these inputs, I calculated an annual average operating and maintenance cost of operating the existing dry FGD system at WSEC Unit 4 of $13,796,053/year.[152]

Next, I used the EPA Wet and Dry Scrubber cost spreadsheet to calculate the increased annual operating and maintenance costs for a dry FGD upgrade at WSEC Unit 4. For this spreadsheet calculations, I used the following input data:

a. **Retrofit Difficulty**: I used the default retrofit factor of "1."

b. **Unit Size:** 922.5 MW

c. **Gross Heat Rate**: This was calculated from the Gross Load (MW-hours) and the heat input (MMBtu/hr) reported to EPA's Air Markets Program Database over 2017-2019 and averaged over the three-year period.

d. **SO2 Rate**: This input is used to calculate the rates for limestone (wet FGD)/lime (SDA), scrubber waste, auxiliary power, and makeup water, and also for base scrubber model and reagent handling capital costs. For this input, I used the weighted annual average uncontrolled SO2 emission rate based on EPA AP-42 emission factors and the coal shipped to WSEC over 2017-2019, which was 0.46 lb/MMBtu.

e. **Operating SO2 Removal**: This was calculated based on the percent removal from 0.46 lb/MMBtu annual uncontrolled SO2 at WSEC Unit 4 to achieve an annual SO2 rate of 0.05 lb/MMBtu (i.e., 89.1%).

f. **Costs of Lime, Waste Disposal, Makeup Water, and Operating Labor**: The default values from the EPA cost spreadsheet for SDA FGD were used for these costs.

g. **Auxiliary Power Cost**: EPA's cost spreadsheet uses the average power plant operating expenses as reported to the Energy Information Administration for 2016 of $0.0361/kW-hr for auxiliary power cost calculations in its cost effectiveness spreadsheets provided with its Control Cost Manual. I used the same 2016 EIA auxiliary power costs in cost calculations of operating the dry FGD over the 2017-2019 baseline period. It must be noted that the most recent published final average cost of

[150] *See* https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.

[151] *See* Ex. 3 with coal heat value and sulfur content of coals used at WSEC over 2017-2019, from the Energy Information Administration's Coal Data Browser.

[152] *See* spreadsheet entitled with WSEC Unit 4 Current Operational Dry FGD Costs at "SDA Cost Estimate" tab, cell C62. Attached as Ex. 30.

fossil-fueled steam electric plants from the EIA is slightly lower than the average 2016 average cost. the most recent final EIA data which, for 2019, is $0.0367/kW-hr. In all cases, I included auxiliary power costs in the variable operating and maintenance costs.

h. Elevation: 1089 feet above sea level

i. Interest rate: For the reasons discussed in Section II.A. above, the current bank prime interest rate of 7.75% was used for the cost effectiveness calculation, although this input does not matter for the cost of dry FGD upgrades which have no capital costs.

j. Equipment lifetime: A 30-year life was assumed, although this input does not matter for the cost of dry FGD upgrades which have no capital costs.

k. Baseline emissions: WSEC Unit 4's 2017-2019 average emissions were used as baseline emissions and operational characteristics (heat input, heat rate, megawatt-hours generated). However, for calculating SO2 reductions that would result from a control evaluated (i.e., the denominator of the cost effectiveness calculation), emissions reductions were calculated from the 2017-2019 baseline SO2 emissions.

l. Operation and Maintenance Costs: As previously stated, the annual operation and maintenance costs were reduced by the annual average operation and maintenance costs currently being incurred at WSEC Unit 4 with the existing dry FGD system.

m. Cost basis: Costs were escalated from the 2016 cost basis of EPA's cost spreadsheet to 2021 dollars based on changes in the Chemical Engineering Plant Cost Indices for those years.

The following table summarize the cost effectiveness calculation an upgraded dry FGD system at WSEC Unit 4.

Table 11. Cost Effectiveness of an SO2 Control Upgrade at Walter Scott Jr. Energy Center Unit 4, Based EPA Cost Spreadsheet (2021 $)[153]

	Annual SO2 Rate, lb/MMBtu	**Capital Cost**	**Net Increase in O&M Costs**	**Total Annualized Costs**	**SO2 Reduced, tpy**	**Cost Effectiveness, $/ton**
Upgraded Dry FGD	0.05	$0	$106,651	$106,651	379	$281/ton

As demonstrated in the table above, the use of additional lime in the existing dry FGD system at WSEC Unit 4 would be very cost effective control at $281/ton and would achieve significant reductions in SO2 emissions if IDNR required MidAmerican Energy to meet the level of control that the dry FGDs should be capable of meeting: that is, a dry FGD upgrade to achieve an annual average SO2 rate of 0.05 lb/MMBtu which would, on average, remove 379 tons per year of SO2 from WSEC Unit 4. If IDNR imposed a requirement on WSEC Unit 4 to achieve 0.05 lb/MMBtu on an annual average basis through dry FGD upgrades, it would not only ensure significant SO2 reductions from 2017-2019 emissions, but it would

[153] *See* EPA Control Cost Manual cost spreadsheets for dry FGD scrubber upgrade for WSEC Unit 4, attached as Ex. 31.

also ensure that the dry FGD was operated to achieve the SO2 removal capabilities that the FGD was designed to achieve. The costs for additional lime at WSEC Unit 4 reflect only a 0.8% increase in annual operating and maintenance costs at WSEC Unit 4 to achieve annual emission reductions that the major source new source review permitting threshold of 250 tons per year. Since WSEC Unit 4 is already equipped with a dry FGD system, the energy and non-air environmental impacts of this control upgrade should not be an impediment to implementing the upgrade. In addition, this dry FGD upgrade should be able to be implemented relatively quickly, as MidAmerican Energy stated that similar improvements to the dry FGD systems at Louisa and at Walter Scott Jr. Energy Center Unit 3 could be achieved within six months of EPA's approval of the regional haze plan.[154] For these reasons, IDNR should require MidAmerican Energy to meet a lower SO2 emission limit at WSEC Unit 4 with dry FGD upgrades.

IV. IDNR Should Have Evaluated Regional Haze Control Measures for George Neal South and George Neal North Power Plants.

A. IDNR Was Not Justified in Excluding George Neal South and George Neal North from a Four-Factor Analysis of Controls.

As previously discussed, IDNR's process for selecting sources to evaluate in a four-factor analysis of controls was based a selection of the first Iowa source that contributed to a cumulative percentage reflecting 50% or more of the cumulative EWRT*Q/d for each Class I area.[155] IDNR's methodology of only looking at the first Iowa source that contributed to a cumulative percentage reflecting 50% or more of the cumulative EWRT*Q/d resulted in IDNR ignoring two facilities that actually contributed a higher SWRT*Q/d value at Class I areas than the Louisa Generating Station and the Walter Scott Jr. Energy Center each contributed. Those two facilities are the George Neil South and George Neal North Generating Stations. Specifically, the George Neil South and George Neil North power plants each contributed between 1-2% of the EWRT*Q/d for two Class I areas: Badlands National Park and Wind Cave National Park.[156] In fact, both of these units contributed more to regional haze in these two Class I areas based on the EWRT*Q/d metric than the Louisa Station contributed to Isle Royale National Park or that the Walter Scott Jr. Energy Center contributed to Voyageurs National Park (the parks with highest impacts from each plant, respectively). Further, the National Park Service, the Federal Land Manager for Badlands and Wind Cave National Parks, recommended that IDNR use a higher threshold of 80% of the cumulative EWRT*Q/d impacts to each Class I area for selecting Iowa sources to evaluate for controls, and stated that George Neal South and George Neal North, along with LSG and WSEC, are ranked "the top four most-impacting Iowa facilities and are on the 80% of the impact list for two or more NPS Class I areas."[157]

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[154] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 11.
[155] February 2023 Draft Iowa Regional Haze Plan at 25.
[156] February 2023 Draft Iowa Regional Haze Plan, Appendix C-2, at tabs for BADL and WICA.
[157] February 2023 Draft Iowa Regional Haze Plan, Appendix F (Federal Land Manager Comments) at pdf page 10 (December 8, 2022 letter from the National Park Service to IDNR at 3).

IDNR's response to the National Park Service's comments were that the visibility impacts at Badlands and Wind Cave National Parks are dominated by "a small number of facilities, and none are in Iowa."[158] Specifically, IDNR relied in the CenSARA EWRT*Q/d analysis to claim that only eight to nine facilities contribute a cumulative of 50% of the visibility impacts at Badlands and Wind Cave national parks.[159] IDNR cites to EPA's 2019 regional haze guidance which states that a state can consider the number of emission sources affecting the Class I aeras at issue in setting a visibility threshold level for selecting sources.[160] However, EPA's supplemental regional haze guidance issued in 2021 states that "[i]n applying a source selection methodology, states should focus on the in-state contribution to visibility impairment and not decline to select sources based on the fact that there are larger out-of-state contributors."[161] EPA further states that a threshold that "excludes a state's largest visibility impairing sources from selection is more likely to be unreasonable."[162] Based on the EWRT*Q/d analyses provided in Appendix C-2 of the draft Iowa Regional Haze Plan, there are eighteen sources that contribute 1% or more to the cumulative EWRT*Q/d total at Wind Cave National Park and nineteen sources that contribute 1% or more to the cumulative EWRT*Q/d total at Badlands National Park. Both George Neal South and George Neal North are among that list of sources contributing at least 1% to the cumulative EWRT*Q/d.[163]

As the National Park Service pointed out, the George Neal units both have dry FGD systems with relatively high SO2 emissions, given the SO2 controls.[164] Thus, at the minimum, these units should have been evaluated for FGD upgrades such as those evaluated for the LGS and WSEC Unit 3 to improve SO2 removal efficiency. Such analyses are provided below.

B. Regional Haze Control Evaluation for George Neal South and George Neal North Power Plants

The George Neal South power plant is a single EGU facility with a nameplate generating capacity of 659.9 MW, and the unit burns refined coal and subbituminous coal.[165] The George Neal North power plant also is currently a single EGU facility, and it has a nameplate generating capacity of 584.1 MW.[166] The units each burns refined coal and subbituminous coal. The units are each equipped with a dry FGD system, a baghouse, an electrostatic precipitator (ESP), low NOx burners, overfire air, and SNCR.[167] The George Neal South and North units are located south of Sioux City Iowa. Although MidAmerican Energy

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[158] February 2023 Draft Iowa Regional Haze Plan at 64.
[159] *Id.*
[160] *Id.*
[161] EPA, Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period, July 8, 2021, at 3.
[162] *Id.*
[163] February 2023 Draft Iowa Regional Haze Plan, Appendix C-2, at tabs for BADL and WICA.
[164] February 2023 Draft Iowa Regional Haze Plan, Appendix F (Federal Land Manager Comments) at pdf page 11 (December 8, 2022 letter from the National Park Service to IDNR at 4).
[165] Per data in Energy Information Administration (EIA) form 860 and EIA Form 923.
[166] Per data in Energy Information Administration (EIA) form 860 and EIA Form 923.
[167] Based on information in the EPA's Clean Air Markets Program Database.

operates both plants and they are located very near to each other, the plants are considered separate sources according to IDNR.[168]

For the LGS and WSEC units, IDNR relied on 2017-2019 as baseline emissions, and thus the same period of emissions was evaluated as baseline emissions for George Neal South and George Neal North, which is presented below.

Table 12. Baseline Emissions for George Neal South, 2017-2019 Average[169]

Year	Operating Time, hrs	Gross MW-hrs	Heat Input, MMBtu/year	SO2 Emissions, tpy	SO2 Rate, lb/MMBtu (annual)	NOx Emissions, tpy	NOx Emission Rate, tpy (annual)
2017	4,977	2,678,373	24,495,403	4,381	0.358	2,316	0.189
2018	6,753	3,386,456	31,378,659	5,628	0.359	2,751	0.175
2019	3,435	1,705,488	15,250,259	2,617	0.343	1,382	0.181
2017-2019 avg	6,926	2,659,890	42,657,601	4,638	0.353	2,582	0.182

Table 13. Baseline Emissions for George Neal North, 2017-2019 Average[170]

Year	Operating Time, hrs	Gross MW-hrs	Heat Input, MMBtu/year	SO2 Emissions, tpy	SO2 Rate, lb/MMBtu (annual)	NOx Emissions, tpy	NOx Emission Rate, tpy (annual)
2017	5,398	2,321,644	24,747,639	4,203	0.340	2,534	0.205
2018	5,902	2,472,185	25,303,920	4,336	0.343	2,498	0.197
2019	4,464	1,774,805	17,928,951	3,113	0.347	1,836	0.205
2017-2019 avg	*5,255*	*2,189,544*	*22,660,170*	*3,884*	0.343	*2,289*	0.202

Based on a review of the coal data reported to the EIA for George Neal South, the weighted average uncontrolled SO2 emission rate based on EPA's AP-42 emission factors for subbituminous coal was 0.46 lb/MMBtu over 2017-2019 for the coals shipped to the plant.[171] Thus, on an annual average basis, the SDA system at George Neal South is achieving approximately 23.3% SO2 removal. This is a very low level of SO2 removal for a dry FGD system.

A review of the coal data reported to the EIA for George Neal North shows that the weighted average uncontrolled SO2 emission rate based on EPA's AP-42 emission factors for subbituminous coal was 0.48

[168] February 2023 Draft Iowa Regional Haze Plan at 63.
[169] Data from EPA's Air Markets Program Database at https://campd.epa.gov/.
[170] Data from EPA's Air Markets Program Database at https://campd.epa.gov/.
[171] *See* Ex. 32 with coal heat value and sulfur content of coals used at George Neal South over 2017-2019, from the Energy Information Administration's Coal Data Browser.

lb/MMBtu over 2017-2019 for the coals shipped to the plant.[172] Thus, on an annual average basis, the SDA system at George Neal North is achieving approximately 28.5% SO2 removal, which is somewhat better than George Neal South but still reflects a very low level of SO2 removal for a dry FGD system.

While data on the design of the dry FGD systems at George Neal South and George Neal North are not currently known, the dry FGD and baghouse began operating at George Neal South in January 2014 and at George Neal North in May of 2018. As discussed in Section II.C. above, dry FGDs are routinely designed to achieve ninety-five percent SO2 removal. Data from the design of dry FGDs shows that most dry FGDs installed after 2005 had design removal efficiencies no less than ninety percent removal.[173] Given that these dry FGDs were installed within the last five to ten years, the dry FGDs at George Neal South and George Neal North are presumed to be capable of achieving at least ninety percent SO2 removal. Thus, IDNR should have evaluated the cost effectiveness of improving the SO2 removal across these two units' FGD systems to achieve ninety percent SO2 removal. As shown in Table 3 above, there are numerous examples of coal-fired EGUs with dry FGD systems achieving annual SO2 rates at or below 0.05 lb/MMBtu while achieving 30-day average SO2 emission rates of 0.06 lb/MMBtu.[174]

I conducted cost effectiveness analyses for a dry FGD upgrade at George Neal South and at George Neal North. First, I used the dry FGD calculations of EPA's "Wet and Dry Scrubbers for Acid Gas Control Spreadsheet" (updated on 1/26/2023) which EPA has made available with its Control Cost Manual[175] to calculate the current annual average costs of operating the existing dry FGD. For these calculations, I assumed an average uncontrolled SO2 rate to each unit's dry FGD system of 0.46 lb/MMBtu for George Neal South and of 0.48 for George Neal North, which were based on the use of AP-42 emission factors subbituminous coal-fired boilers and which reflects a weighted average of the various coals shipped to the facilities during the baseline period of 2017-2019.[176] To determine average annual operational costs for the dry FGD systems at each unit during the 2017-2019 baseline period, I input a controlled SO2 emission rates of 0.292 lb/MMBtu for George Neal South and a controlled SO2 emissions rate of 0.357 lb/MMBtu for George Neal North which, as shown in Table 3 above, is the average of the actual annual SO2 rate from each unit over 2017-2019. In addition, I used operational data over the 2017-2019 baseline period to reflect actual annual MW-hours output as well as for heat rate at each unit. Based on these inputs, I calculated an annual average operating and maintenance cost of operating the existing dry FGD system at George Neal South of $8,096,502/year and an average annual operating and maintenance cost of $7,834,230 per year at George Neal North. [177]

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[172] *See* Ex. 33 with coal heat value and sulfur content of coals used at George Neal North over 2017-2019, from the Energy Information Administration's Coal Data Browser.
[173] *See* Weilert, Carl & Emily Meyer, Burns & McDonnell, Utility FGD Design Trends (attached as Ex. 4).
[174] *See* Ex. 6, which is a spreadsheet with the 30-boiler operating day average SO2 rates calculated for these EGUs.
[175] *See* https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.
[176] *See* Exs. 32 and 33 with coal heat value and sulfur content of coals used at George Neal South and George Neal North, from the Energy Information Administration's Coal Data Browser.
[177] *See* spreadsheet entitled "George Neal South current operational costs Dry FGD system_controlcostmanual spreadsheet_January 2023," at "SDA Cost Estimate" tab, cell C62. Attached as Ex. 34. *See also* spreadsheet entitled "George Neal North Current DFGD Operational Costs_controlcostmanual spreadsheet_January 2023," at "SDA Cost Estimate" tab, cell C62. Attached as Ex. 35.

Next, I used the EPA Wet and Dry Scrubber cost spreadsheet to calculate the increased annual operating and maintenance costs for a dry FGD upgrade at both units. For these spreadsheet calculations, I used the following input data:

a. **Retrofit Difficulty:** I used the default retrofit factor of "1."
b. **Unit Size:** 659.9 MW for George Neal South and 584.1 MW for George Neal North.
c. **Gross Heat Rate:** This was calculated from the Gross Load (MW-hours) and the heat input (MMBtu/hr) reported to EPA's Air Markets Program Database over 2017-2019 and averaged over the three-year period for each unit.
d. **SO2 Rate**: This input is used to calculate the rates for limestone (wet FGD)/lime (SDA), scrubber waste, auxiliary power, and makeup water, and also for base scrubber model and reagent handling capital costs. For this input, I used the weighted annual average uncontrolled SO2 emission rate based on EPA AP-42 emission factors and the coal shipped to each unit over 2017-2019, which was 0.46 lb/MMBtu for both the LGS facility[178] and for WSEC Unit 3.[179]
e. **Operating SO2 Removal**: This was calculated based on the percent removal from 0.46 lb/MMBtu annual uncontrolled SO2 at George Neal South and the 0.48 lb/MMBtu annual uncontrolled SO2 at George Neal North to achieve an annual SO2 rate of 0.05 lb/MMBtu.
f. **Costs of Limestone (for Wet FGD) and lime (for SDA FGD), Waste Disposal, Makeup Water, and Operating Labor**: The default values from the EPA cost spreadsheets for SDA FGD were used for these costs.
g. **Auxiliary Power Cost**: EPA's cost spreadsheet uses the average power plant operating expenses as reported to the Energy Information Administration for 2016 of $0.0361/kW-hr for auxiliary power cost calculations in its cost effectiveness spreadsheets provided with its Control Cost Manual.[180] I used the same 2016 EIA auxiliary power costs in all cost calculations including for the annual average costs of operating the dry FGD over the 2017-2019 baseline period. It must be noted that the most recent published final average cost of fossil-fueled steam electric plants from the EIA is slightly lower than the average 2016 average cost.[181] The most recent final EIA data for 2019, is $0.0367/kW-hr.[182] In all cases, I included auxiliary power costs in the variable operating and maintenance costs.
h. **Elevation:** 1093 feet above sea level[183]
i. **Interest rate:** For the reasons previously discussed, I used the current bank prime rate of 7.75%. However, no capital expenditures were assumed needed for this FGD upgrade, so the interest rate is not used in the calculations.

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[178] *See* Ex. 2 with coal heat value and sulfur content of coals used at Louisa Generating Station over 2017-2019, from the Energy Information Administration's Coal Data Browser.
[179] *See* Ex. 3 with coal heat value and sulfur content of coals used at Walter Scott Jr. Energy Center over 2017-2019, from the Energy Information Administration's Coal Data Browser.
[180] Available at https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution.
[181] *See* https://www.eia.gov/electricity/annual/html/epa_08_04.html.
[182] *See* EIA, October 2020, Electric Power Annual 2019, Table 8.4, available at https://www.eia.gov/electricity/data/eia923/.
[183] Elevation of Sergeant Bluff, Iowa where the units are located.

j. **Equipment lifetime**: A 30-year life was assumed in amortizing capital costs for dry FGD (although no capital costs were assumed to upgrade the dry FGD with an increased lime use, because the dry FGD already exists at these units).
k. **Baseline emissions**: 2017-2019 average emissions were used as baseline emissions and operational characteristics (heat input, heat rate, megawatt-hours generated). However, for calculating SO2 reductions that would result from a control evaluated (i.e., the denominator of the cost effectiveness calculation), emissions reductions were calculated from the 2017-2019 baseline SO2 emissions. To be clear, the operational expenses of the upgraded dry FGD systems are based on reductions from the uncontrolled emission rates at each unit (based on AP-42 emission factors and a weighted average uncontrolled SO2 rate based on the coal shipped to LGS and to WSEC over the baseline period of 2017-2019).
l. **Operation and Maintenance Costs**: As previously stated, the annual operation and maintenance costs were reduced by the annual average operation and maintenance costs currently being incurred at George Neal South and George Neal North with the existing dry FGD systems.
m. **Cost basis**: Costs were escalated from the 2016 cost basis of EPA's cost spreadsheet to 2021 dollars based on changes in the Chemical Engineering Plant Cost Indices for those years.

The following table summarize the cost effectiveness calculations for upgraded SO2 controls at George Neal South and George Neal North.

Table 14. Cost Effectiveness of SO2 Control Upgrades at George Neal South and at George Neal North, Based on 30-Year Life of Controls and the EPA Cost Spreadsheets (2021 $)[184]

	Annual SO2 Rate, lb/MMBtu	Capital Cost	Net Increase in O&M Costs	Total Annualized Costs	SO2 Reduced, tpy	Cost Effectiveness, $/ton
George Neal South						
Upgraded Dry FGD	0.05	$0	$1,003,650	$1,003,650	3,613	$278/ton
George Neal North						
Upgraded Dry FGD	0.05	$0	$930,347	$930,347	3,318	$280/ton

As the table above shows, upgraded dry FGD systems are as cost effective for George Neal South and George Neal South. Upgrading the dry FGD systems to achieve a 0.05 lb/MMBtu on an annual average basis would reduce SO2 by 3,300 to 3,600 tons per year below 2017-2019 emissions from these facilities

[184] *See* EPA Control Cost Manual cost spreadsheets for Dry FGD Scrubber Upgrade for George Neal South and for George Neal North, attached as Exs. 36 and 37.

at a cost effectiveness of about $280/ton. Not only are these costs well within the range of cost thresholds that other states have used in their regional haze plans, but these costs are in the range of costs that IDNR has proposed to find as reasonable for the same type of SO2 upgrades at Louisa Generating Station and Walter Scott Jr. Energy Center Unit 3. Since the units are already equipped with dry FGD systems, the energy and non-air environmental impacts of these upgrades should not be an impediment to implementing the control measure. In addition, these dry FGD upgrades should be able to be implemented relatively quickly, as MidAmerican Energy stated that similar improvements to the dry FGD systems at Louisa and at Walter Scott Jr. Energy Center Unit 3 could be achieved within six months of EPA's approval of the regional haze plan.[185] For all of these reasons, IDNR should adopt reasonable progress measures for the George Neal South and George Neal North power plants to reduce SO2 emissions based on the additional use of lime in the units' dry FGD systems.

[185] *See* February 2023 Draft Iowa Regional Haze Plan, Appendix D-1 at 11.

List of Exhibits

Exhibit Number	Description
1	EPA, Response to Technical Comments for Sections E. through H. of the Federal Register Notice for the Oklahoma Regional Haze and Visibility Transport Federal Implementation Plan, Docket No. EPA-R06-OAR-2010-0190
2	Energy Information Administration Coal Data Browser, Shipments to Louisa Generating Station
3	Energy Information Administration Coal Data Browser, Shipments to Walter Scott Jr. Energy Center
4	Weilert, Carl & Emily Meyer, Burns & McDonnell, Utility FGD Design Trends
5	Sargent & Lundy, IPM Model – Updates to Cost and Performance for APC Technologies, SDA FGD Cost Development Methodology, January 2017
6	Lowest Annual SO2 Rates in 2020 at Coal-Fired EGUs with Dry FGD Systems with 30-Boiler Operating Day Average Rates at or Below 0.06 lb/MMBtu
7	Lowest Annual SO2 Rates in 2020 at Coal-Fired EGUs with Wet FGD Systems with 30-Boiler Operating Day Average Rates at or Below 0.04 lb/MMBtu
8	Spreadsheet with Louisa Current Operational Costs with Dry FGD
9	Spreadsheet with WSEC U3 Current Operational Costs with Dry FGD
10	Control Cost Manual Cost Spreadsheet for Wet FGD scrubber Retrofit at LGS
11	Control Cost Manual Cost Spreadsheet for Wet FGD scrubber Retrofit at WSEC U3
12	Control Cost Manual Cost Spreadsheet for Dry FGD Upgrade at LGS
13	Control Cost Manual Cost Spreadsheet for Dry FGD Upgrade at WCEC U3
14	Spreadsheet with Louisa Daily 2017 to 2019 Annual SO2 Reduced under Different Types of SO2 Limits
15	Spreadsheet with Walter Scott Jr. Unit 3 2017 to 2019 Annual SO2 Reduced under Different Types of SO2 Limits
16	U.S. EPA, Complete Response to Comments for NM Regional Haze/Visibility Transport FIP, 8/5/11 (Docket EPA-R06-OAR-2010-0846
17	LG&E Energy, Selective Catalytic Reduction: From Planning to Operation, Competitive Power College, December 2005
18	M.J. Oliva and S.R. Khan, Performance Analysis of SCR Installations on Coal-Fired Boilers, Pittsburgh Coal Conference, September 2005
19	Haldor Topsoe, SCR Experience List, October 2009
20	Hitachi, NOx Removal Coal Plant Supply List, October 17, 2006
21	Argillon Experience List U.S. Coal Plants
22	Hitachi, SCR System and NOx Catalyst Experience, Coal, February 2010
23	Kurtides, T., Sargent and Lundy, Lessons Learned from SCR Reactor Retrofit, COAL-GEN, Columbus, OH, August 6-8, 2003
24	Institute of Clean Air Companies White Paper, SNCR for Controlling NOx Emissions, February 2008
25	Spreadsheet with Clean Air Markets Program Database Emissions Information for Jeffrey Energy Center Units 2 and 3 from 2007-2022
26	SCR Cost Manual Spreadsheet for LGS
27	SNCR Cost Manual Spreadsheet for LGS
28	SCR Cost Manual Spreadsheet for WSEC U3
29	SNCR Cost Manual Spreadsheet for WSEC U3

30	Spreadsheet with WSEC Unit 4 Current Operational Costs for Dry FGD
31	Control Cost Manual Spreadsheet for Dry FGD Scrubber Upgrade for WSEC Unit 4
32	Energy Information Administration Coal Data Browser, Shipments to George Neal South
33	Energy Information Administration Coal Data Browser, Shipments to George Neal North
34	Spreadsheet with George Neal South Current Operational Costs with Dry FGD
35	Spreadsheet with George Neal North Current Operational Costs with Dry FGD
36	Control Cost Manual Spreadsheet for Dry FGD Scrubber Upgrade for George Neal South
37	Control Cost Manual Spreadsheet for Dry FGD Scrubber Upgrade for George Neal North

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March 16, 2023

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RE: Comments on Draft Regional Haze Plan

Dear Mr. Johnson:

The Iowa Environmental Council (IEC) offers the following comments on the Iowa State Implementation Plan for Regional Haze Second Implementation Period (2019-2028). These comments represent the views of the Iowa Environmental Council, an alliance of more than 100 organizations, over 500 individual members, and an at-large board of farmers, business owners, and conservationists. IEC works to build a safe, healthy environment and sustainable future for Iowa. Our members care about air quality across the state, and they hike, recreate, and enjoy the outdoors in Iowa and beyond.

In reviewing the Iowa draft State Implementation Plan for the Regional Haze Second Implementation Period, IEC finds the 50% threshold to be arbitrary resulting in a draft SIP that fails to meaningfully reduce the contributions to visibility impairment. The 50% threshold is inconsistent with other states, and the SIP effectively ignored the comments from the National Park Service to include Neal South and Neal North. We encourage DNR to expand the SIP to include Neal South and Neal North not only to address significant contributions to regional haze in the Badlands National Park and Wind Cave Park, but to consider the ancillary benefits to the ambient air quality and addressing environmental justice issues.

I. DNR Relied on an Arbitrary Threshold for Consideration.

Congress declared a national goal of preventing and remedying "any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution."[1] This "cooperative-federalism approach to regulate air quality" requires that states create and adopt a state implementation plan (SIP) and that the EPA assures the state's SIP make

[1] 42 U.S.C § 7491(a)(1).

"reasonable progress toward meeting the national goal."[2] Therefore, Iowa DNR has the responsibility to adopt a SIP which will "provide for implementation, maintenance, and enforcement" of any primary or secondary air pollutant within the state under the Clean Air Act.[3] In doing so, EPA clarified in a July 8, 2021 memorandum, the expectation is for "states to undertake a rigorous reasonable progress analyses that identify further opportunities to advance the national visibility goal consistent with the statutory and regulatory requirements."[4] EPA further clarified that:

> "Source selection is a critical step in states' analytical processes. All subsequent determinations of what constitutes reasonable progress flow from states' initial decisions regarding the universe of pollutants and sources they will consider for the second planning period. States cannot reasonably determine that they are making reasonable progress if they have not adequately considered the contributors to visibility impairment. Thus, while states have discretion to reasonably select sources, this analysis should be designed and conducted to ensure that source selection results in a set of pollutants and sources the evaluation of which has the potential to *meaningfully reduce their contributions* to visibility impairment."[5](*emphasis added)*

DNR chose a 50% threshold for source selection by reasoning that because EPA's final guidance on August 20, 2019, did not contain a threshold recommendation, an Iowa source needs to be in the top 50% of all sources impacting a class I area to be considered for further review. EPA clarified in the July 8, 2021 memorandum:

> "While reviewing draft regional haze SIPs, EPA has found that some rely on source selection methodologies that result in selection of the largest regional contributors to visibility impairment across multiple states. While this approach may be permissible in some cases, it may not be reasonable for a particular state if it results in few or no sources in that state being selected. Under the RHR, each state has an obligation to submit a long-term strategy that addresses the regional haze visibility impairment resulting from emissions from within that state. This obligation is not discharged simply because another state's contributions to visibility impairment may be greater."

A state should "focus on the in-state contribution to visibility impairment" and should "not decline to select sources based on the fact that there are larger out-of-state contributors."[6] DNR is doing exactly that by pointing at nine facilities outside Iowa responsible "for the majority (top 50%) of the AOI Impacts" rather than considering the ability of Iowa sources to meaningfully reduce contributions to visibility impairment at Badlands National Park and Wind Cave.[7]

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[2] *See U.S. Magnesium, LLC v. EPA,* 690 F.3d 1157, 1159 (10th Cir. 2012); 42 U.S.C. § 7491(b)(2).

[3] 42 U.S.C. § 7410(a)(1)

[4] Peter Tsirigotis, U.S. EPA, "Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period (July 8, 2021) ("EPA Clarification").

[5] *Id.* at 3.

[6] *Id.*

[7] Iowa DNR SIP Round 2 Draft at 64 (DNR responses to comments).

Iowa DNR's 50% cumulative impact threshold percentage is arbitrary, by definition is not a majority, and undermines the purpose of the act. By choosing 50% as the threshold, DNR purposely excludes George Neal North (GNN) and George Neal South (GNS) from its four-factor analysis, despite the George Neal facilities ranking in the top 60% or above at Badlands National Park, Wind Cave and Isle Royale National Park, and 75% Voyageurs National Park.[8]

Although DNR's justification for choosing 50% as a threshold was because EPA's final guidance did not have any threshold recommendations, DNR acknowledged that EPA's previous proposed threshold was 80%.[9] DNR is aware that its 30% reduction from EPA's proposed threshold excluded identifying additional sources that impacted visibility but believes that its 50% threshold is reasonable and satisfies the requirements of the Regional Haze Rule (RHR).[10]

Just satisfying the requirements of RHR is not enough to meet the national goals of reducing visibility nor the purpose of this rule. DNR is determining the best available retrofit technology (BART) on the absolute mandatory minimum on powerplants generating capacity greater than 750 megawatts (MW) – Louisa Generating Station (LGS) (811.9 MW) and Walter Scott Energy Center (WSEC) (725.8 MW WSEC-3 and 922.5 MW for WSEC-4) - required under 42 U.S.C § 7491(b).[11] DNR's defense would be justified if § 7491 limited BART to only 750 MW powerplants like LGS and WSEC, but it does not. On the contrary, a "state plan must include BART determination for any plant that 'may reasonably be anticipated to cause or contribute to any impairment of visibility in such area.'"[12] However, by establishing the threshold at 50%, DNR ignores the George Neal facilities, whose generating capacity is below 750 MW but whose high SO2 emission rates contribute to impairment of visibility in Class I areas.[13]

a. *Uniform Rate of Progress goals do not justify ignoring cost-effective actions.*

Whether a particular visibility impact or change is "meaningful" should be assessed in the context of the individual state's contribution to visibility impairment, rather than total impairment at a Class I area. As stated in the RHR preamble: Regional haze is visibility impairment that is caused by the emission of air pollutants from numerous sources located over a wide geographic area. At any given Class I area, hundreds or even thousands of individual sources may contribute to regional haze. Thus, it would not be appropriate for a state to reject a control measure (or measures) because its effect on the RPG is subjectively assessed as not "meaningful."[14]

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[8] Iowa DNR SIP Round 2 Draft at 63 (NPS Comment 1).
[9] EPA final guidance dated Aug 20, 2019; 80% Threshold draft dated July 2016.
[10] Iowa DNR SIP Round 2 Draft at 64 (DNR responses to comments).
[11] 42 U.S.C § 7491(b) ("In the case of a fossil-fuel fired generating powerplant having a total generating capacity in excess of 750 megawatts, the emission limitations required under this paragraph shall be determined pursuant to guidelines").
[12] *Oklahoma v. U.S. E.P.A.*, 723 F.3d 1201, 1208 (10th Cir. 2013); 42 U.S.C § 7491(b)(2).
[13] Iowa DNR SIP Round 2 Draft, Appendix F, at 11.
[14] "Protection of Visibility: Amendments to Requirements for State Plans," 82 Fed. Reg. 3078, 3093 (Jan. 10, 2017).

DNR noted that LADCO's regional modeling results predict that the average visibility conditions on the 20% most impaired days in 2028 will be better than the uniform rate of progress (URP) in each of the five downwind Class I areas linked to Iowa. However, as EPA clarified in the July 8, 2021 memorandum, the "second planning period regional haze SIPs that conclude that additional controls, including potentially cost-effective and otherwise reasonable controls, are not needed because all of the Class I areas in the state (and those out-of-state areas affected by emissions from the state) are below their uniform rates of progress (URPs) cannot be used as a "safe harbor." The 2017 RHR preamble and the August 2019 Guidance clearly state that it is not appropriate to use the URP in this way. The URP is a planning metric used to gauge the amount of progress made thus far and the amount left to make. It is not based on consideration of the four statutory factors and, therefore, cannot answer the question of whether the amount of progress made in any particular implementation period is "reasonable progress."

b. Other states are using comprehensive and meaningful thresholds.

Iowa should follow the lead of other states by setting a threshold that screens additional sources and is consistent with EPA guidance. For example:

1. Michigan relied on emissions divided by distance (commonly known as a Q/d analysis) to identify sources in the state that were subject to review for possible 4-factor analysis. LADCO did the analysis for Michigan and the other LADCO states. Because of the large number of sources in the state, Michigan screened out those not significantly impacting the two monitors by only looking at sources with a Q/D value of 4 tons per year per kilometer (tpy/km) and greater. This cutoff represents approximately 80 percent of emissions from Michigan sources impacting Michigan's two Class 1 areas.[15]

2. Minnesota used a Q/d analysis to screen emission source impacts at Class I areas. The Q/d Analysis uses a facility's emissions (Q) in tons per year divided by the distance in kilometers (d) from the Class I areas. Ultimately, Minnesota selected sources that represent roughly the top 85% of visibility impacts via Q/d from Minnesota stationary sources that may impact visibility based on the screening analysis for Boundary Waters and Voyageurs. This top 85% threshold represented those facilities that had a Q/d value of roughly 4.6.[16]

3. The established Q/d threshold used by most WESTAR-WRAP states is a value of 10. South Dakota initially screened for all sources affecting its two Class I Areas, Wind Cave National Park and Badlands National Park, using a total Q/d threshold of 10 or greater. This analysis amounted to only one South Dakota source meeting the criteria. Therefore, South Dakota opted to

[15] Michigan Regional Haze draft SIP for Second Period, May 2021, available at https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Reports/AQD/state-implementation-plan/2021-05-sip-submittal-regional-haze.pdf.

[16] Minnesota's State Implementation Plan for Regional Haze, December 20, 2022, available at https://www.pca.state.mn.us/sites/default/files/aq-sip2-19.pdf.

consider a more stringent Q/d threshold of 2 for all its facilities. According to the analysis, with the "d" portion of the equation determined by measuring the distance from the location of the point source to the nearest boundary of any given Class I Area, the following percentages of Q/d values have been screened into the analysis at the Badlands: 91.74% of the total Q/d values, 89.66% of the NOx Q/d values, 97.57% of the SO2 Q/d values, and 79.09% of the PM10 Q/d values. Regarding the Wind Cave National Park, the following percentages of Q/d values have been screened into the analysis: 88.32% of the total Q/d values, 82.48% of the NOx Q/d values, 98.00% of the SO2 Q/d values, and 82.99% of the PM10 Q/d values.

South Dakota found that several states negatively affect visibility at Badlands National Park due to emissions of ammonium nitrate more than South Dakota's own sources, including Colorado, North Dakota, Wyoming, and the combined category of all non-WRAP states which includes South Dakota's other neighboring states of Iowa and Nebraska. These other states combined produce significantly more visibility impairment at Badlands National Park than South Dakota's own sources do. These include Washington, New Mexico, Colorado, Montana, Wyoming, North Dakota, and the combined category of all non-WRAP states which includes South Dakota's other neighboring states of Iowa and Nebraska. These other states combined produce significantly more visibility impairment at Badlands National Park than South Dakota's own sources do. **Specifically, South Dakota found that Neal South and Neal North contributed more to the visibility impairment at Badlands National Park than some in-state sources**.[17]

II. DNR's Decision to Exclude the Neal Units Is Inconsistent with the RHR.

DNR's approach for screening is inconsistent with other states as discussed above, and fails to evaluate additional Iowa sources for the four-factor analysis. It also fails to address the comments by the Federal Land Managers documenting the inadequacy of DNR's method.

a. Meaningful reduction requires including the Neal Units.

DNR concluded that only LGS and WSEC warranted selection for four-factor analysis. DNR used the linkages Iowa considered during the first implementation to inform the review of contribution data for the second implementation period. Based solely on this logic, DNR used the LADCO CAMx PSAT results showing Iowa's projected 2028 anthropogenic contributions to visibility impairment in the LADCO Class I areas (those in Minnesota and Michigan) ranges from 3.0% (Voyageurs) to 3.9% (Isle Royale). DNR then used consistency with the first implementation period and its SIP-approved conclusions as a basis to only look at sources where Iowa's contributions fall within or exceed that range. This method ignores significant sources,

[17] South Dakota Regional Haze Draft SIP (Mar. 19, 2022), at 112-113, available at https://danr.sd.gov/Environment/AirQuality/RegionalHaze/docs/SIP%20draft%20revised%20since%20sending%20to%20FLMs.pdf.

namely Neal North and Neal South.

As noted by DNR, "one potentially reasonable approach to select sources for four-factor analysis is to identify all sources with an individual impact greater than a given percentage contribution threshold, such as 1%". Had DNR evaluated sources based on a 1% contribution, the LADCO modeling shows that Neal South (1.97%) and Neal North (1.38%) meaningfully contribute to the visibility impairment at the Badlands National Park and should have been selected for the four-factor analysis. DNR must remedy its failure to even evaluate these facilities in the SIP.

b. DNR ignored the Federal Land Managers.

In developing any implementation plan (or plan revision) or progress report, the State must include a description of how it addressed any comments provided by the Federal Land Managers.[18] A state receiving a request to select a particular source(s) should either perform a four-factor analysis on the source(s) or provide a well-reasoned explanation as to why it is choosing not to do so.[19]

The National Park Service (NPS) clearly stated that their "review finds that the George Neal North and George Neal South facilities both have significant impacts on visibility in NPS Class I areas (see technical feedback for details). We recommend that you consider broadening the Iowa source selection criteria and conduct four-factor analysis of SO_2 and nitrogen oxide (NO_X) emission reduction opportunities for the George Neal North and George Neal South facilities."[20]

Although DNR met the statutory obligation of providing the Federal Land Manager with an opportunity for input, it appears that DNR did not use the information and recommendations provided by the Federal Land Manager to meaningfully inform the State's decisions on the long-term strategy. DNR clearly did not perform a four-factor analysis for Neal South and Neal North, and it is clear from the responsiveness summary that DNR chose to summarily dismiss the FLM comments, failing to provide a well-reasoned explanation of why it chose not to do a four-factor analysis. By relying on that the linkages back to the first implementation period and the arbitrary 50% threshold was sufficient to demonstrate meaningful progress, DNR inappropriately and arbitrarily concludes there is no compelling reason to expand the source selection process to include any other sources.

As discussed above in Section I, each state has an obligation to submit a long-term strategy that addresses the regional haze visibility impairment resulting from emissions from within that state. EPA has specified that this obligation is not discharged simply because another state's contributions to visibility impairment may be greater.[21] Yet that is exactly what DNR is doing in refusing to include Neal South and Neal North as a part of the State Implementation Plan for Regional Haze Second Implementation Period. Instead of providing a well-reasoned explanation for excluding Neal South and Neal North, DNR provided an explanation of flawed-reasoning.

[18] See 40 CFR 51.308(i)(3)
[19] See 40 CFR 51.308(f)(2)(ii), (i)(2)-(3)
[20] Iowa DNR SIP Round 2 Draft, Appendix F, at 6.
[21] EPA Clarification dated July 8, 2021.

In the DNR responsiveness summary, DNR states that "(u)nlike situations where visibility impairment is attributable to a relatively large number of sources (such as at ISLE), the AOI results indicate that visibility impacts at BADL and WICA are dominated by a small number of facilities, and none are in Iowa."[22] This is clearly contrary to the South Dakota Regional Haze SIP that concluded that emissions from Washington, New Mexico, Colorado, Montana, Wyoming, North Dakota and all non-WRAP states which includes the neighboring states of Iowa and Nebraska, produce significantly more visibility impairment at Badlands National Park than South Dakota's own sources do. **Specifically, South Dakota found that Neal South and Neal North contributed more to the visibility impairment at Badlands National Park than some in-state sources**.[23]

III. There Are Ancillary Air Quality And Environmental Justice Benefits Beyond Haze.

EPA noted in the July 8, 2021, memorandum that "(t)here exist many opportunities for states to leverage both ongoing and upcoming emission reductions under other CAA programs; however, we also expect states to undertake rigorous reasonable progress analyses that identify further opportunities to advance the national visibility goal consistent with the statutory and regulatory requirements." The converse is also true. Cost effective measures implemented as a part of addressing regional haze will improve ambient air quality. The NPS calculated that potential SO2 emissions reductions of 2,639 tons/year at George Neal North and 3,271 tons/year at George Neal South could cost effectively be removed at $280/ton. This would be in addition to the SO2 reductions at both LGS and WSEC-3 of 9,688 tons per year at a cost of less than $300/ton. The SO2 removal from the Neal plants would be a 61% increase in SO2 removal as compared to SO2 removed as a part of the draft Iowa Regional Haze SIP, and at a lower cost per ton. A more inclusive regional haze SIP has the ancillary benefit of improving ambient air quality. Additionally, it cost effectively undertakes emission reductions that may allow the state to remain in attainment as other ambient air standards are lowered, including PM 2.5.

Like several executive orders, EPA's July 8, 2021, memorandum encouraged states to be aware of where sources of visibility impairing air pollutants are located and impacts they may have on environmental justice communities. Using EPA's Environmental Justice Screening tool (as shown below), the census tract where Neal South and Neal North are located has potentially significant environmental justice issues. The census tract is at or above the 90th percentile in the state for ozone and traffic, as well as factors not directly related to air quality such as superfund proximity. Demographically, it is at the 95th percentile in the state for socioeconomic indicators, including at least the 90th percentile for people of color, limited English speaking households, and less than high school education. The surrounding community has similarly high environmental justice indicators. DNR should consider the environmental justice issues associated with Neal South and Neal North when evaluating whether to include the facilities in its screening.

[22] Iowa DNR SIP Round 2 Draft at 64.
[23] South Dakota Regional Haze Draft SIP (Mar. 19, 2022), at 112-113, available at https://danr.sd.gov/Environment/AirQuality/RegionalHaze/docs/SIP%20draft%20revised%20since%20sending%20to%20FLMs.pdf.

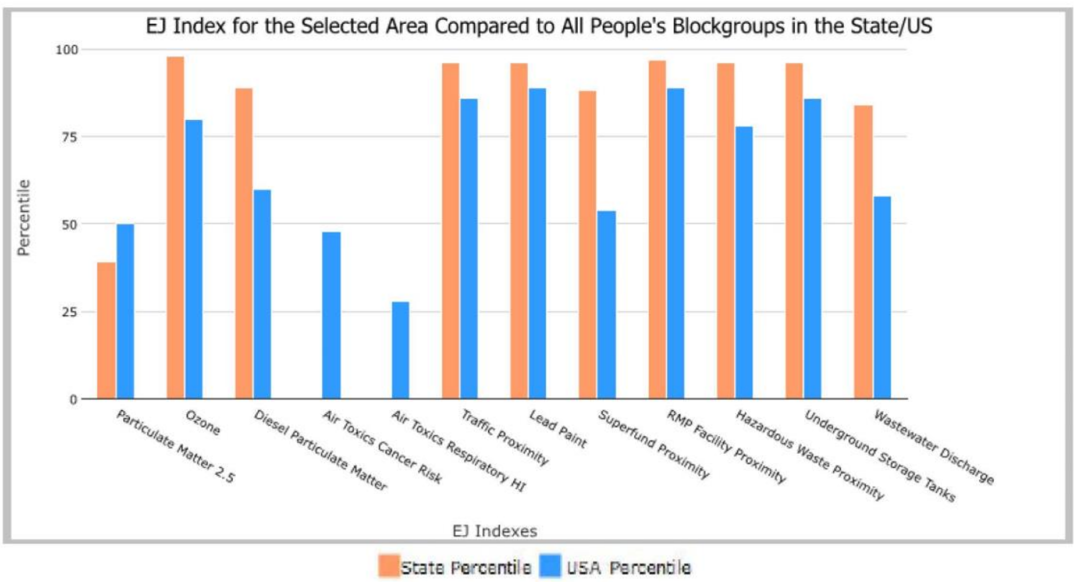
EJScreen Report (Version 2.1)

Tract: 19193003600, IOWA, EPA Region 7

Approximate Population: 3,145

Input Area (sq. miles): 14.52

Selected Variables	State Percentile	USA Percentile
Environmental Justice Indexes		
EJ Index for Particulate Matter 2.5	39	50
EJ Index for Ozone	98	80
EJ Index for Diesel Particulate Matter*	89	60
EJ Index for Air Toxics Cancer Risk*	0	48
EJ Index for Air Toxics Respiratory HI*	0	28
EJ Index for Traffic Proximity	96	86
EJ Index for Lead Paint	96	89
EJ Index for Superfund Proximity	88	54
EJ Index for RMP Facility Proximity	97	89
EJ Index for Hazardous Waste Proximity	96	78
EJ Index for Underground Storage Tanks	96	86
EJ Index for Wastewater Discharge	84	58



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJScreen Report (Version 2.1)

Tract: 19193003600, IOWA, EPA Region 7

Approximate Population: 3,145

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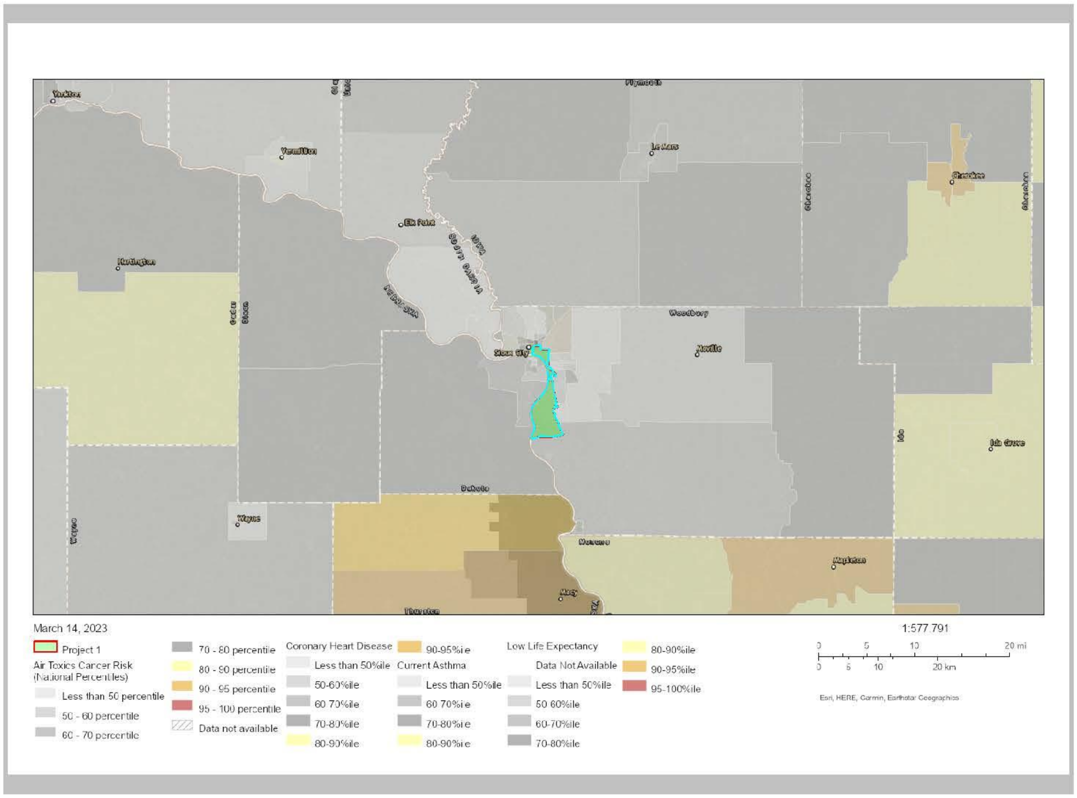

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	2

EJScreen Report (Version 2.1)

Tract: 19193003600, IOWA, EPA Region 7

Approximate Population: 3,145

Input Area (sq. miles): 14.52

Selected Variables	Value	State Avg.	%ile in State	USA Avg.	%ile in USA
Pollution and Sources					
Particulate Matter 2.5 (µg/m^3)	7.56	8.22	11	8.67	23
Ozone (ppb)	42.8	41.8	88	42.5	55
Diesel Particulate Matter* (µg/m^3)	0.164	0.165	59	0.294	<50th
Air Toxics Cancer Risk* (lifetime risk per million)	20	21	0	28	<50th
Air Toxics Respiratory HI*	0.2	0.24	0	0.36	<50th
Traffic Proximity (daily traffic count/distance to road)	1200	390	93	760	84
Lead Paint (% Pre-1960 Housing)	0.65	0.4	76	0.27	83
Superfund Proximity (site count/km distance)	0.026	0.094	46	0.13	24
RMP Facility Proximity (facility count/km distance)	2.8	1.2	89	0.77	94
Hazardous Waste Proximity (facility count/km distance)	1.3	0.45	90	2.2	60
Underground Storage Tanks (count/km^2)	8.7	1.9	95	3.9	87
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.00013	0.29	47	12	33
Socioeconomic Indicators					
Demographic Index	53%	22%	95	35%	77
People of Color	51%	15%	95	40%	68
Low Income	51%	28%	88	30%	81
Unemployment Rate	5%	4%	74	5%	62
Limited English Speaking Households	20%	2%	98	5%	93
Less Than High School Education	21%	8%	92	12%	82
Under Age 5	7%	6%	66	6%	68
Over Age 64	7%	17%	11	16%	17

*Diesel particular matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

For additional information, see: www.epa.gov/environmentaljustice

IV. Conclusion

We encourage Iowa DNR to expand the SIP to include analysis of Neal South and Neal North not only to address significant contributions to regional haze, but to consider the ancillary benefits to the ambient air quality and addressing environmental justice issues.

Thank you for the opportunity to comment. If you have questions or we can clarify these comments further, please feel free to contact us.

Sincerely,

/s/ Steve Guyer

Steve Guyer
Energy Program Manager
Iowa Environmental Council

/s/ Michael Schmidt

Michael Schmidt
Staff Attorney
Iowa Environmental Council

Cc: DeAndré Singletary, EPA Region 7 Air and Radiation Division
(Singletary.DeAndre@epa.gov)

3/15/2023

Dear IDNR,

I am concerned that the state is not taking adequate steps to control air pollution from the Louisa, Walter Scott Jr. 3 & 4, Neal North and Neal South coal plants. Under the Regional Haze rules, IDNR must require cost effective controls at these plants for both SO2 and NOx. By implementing cost effective upgrades to the controls at these plants, MidAmerican would reduce harmful air pollutants that worsen respiratory illnesses such as asthma and chronic bronchitis, while also degrading air quality and visibility.

I care about the impacts of these major sources of air pollution on national treasures like the Boundary Waters Area Wilderness, Isle Royale National Park, Badlands National Park, and Mammoth Cave National Park. I also am concerned about the impacts of these coal plants on the health of my family and my community.

I urge you to revise your draft regional haze plan to:

1. Require an evaluation of FGD upgrades to meet a 90% reduction level or an annual average emission rate of 0.05 lb/MMBtu at the Louisa Generating Station (LGS) and at WSEC Unit 3. Further, IDNR should impose an SO2 emission limit of 0.06 lb/MMBtu on a 30-day rolling average basis at these coal plants.

2. Require an evaluation of a wet FGD retrofit to achieve an annual average SO2 rate of 0.03 lb/MMBtu at LGS and at WSEC Unit 3.

3. Require MidAmerican to install selective catalytic reduction at WSEC 3 and at least selective non-catalytic reduction at Louisa.

4. Require dry FGD upgrades at WSEC 4.

5. Evaluate George Neal South and George Neal North for regional haze controls, including cost-effective upgrades to their FGD systems, which are currently not achieving the level of control that such systems are designed to control.

Mary Hacker
750 E. Foster Rd.
Iowa City, IA
52245
mary.hacker@gmail.com

3/15/2023

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Protect air for all life.

John Urbain
106 Amanda Dr
Epworth, IA
52045
jurbain@gmail.com

3/15/2023

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Karen Beine
P.O.Box 212
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50435
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Warren Allely
100 S 9th St, Iowa
Council Bluffs, IA
51501
warren.allely@gmail.com

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4. Require dry FGD upgrades at WSEC 4.

5. Evaluate George Neal South and George Neal North for regional haze controls, including cost-effective upgrades to their FGD systems, which are currently not achieving the level of control that such systems are designed to control.

With us facing more extreme weather due to the Climate Crisis, we must transition from coal to renewables asap!!

Carolyn Uhlenhake Walker
4111 Ingersoll Ave., #1110, #1110
Des Moines, IA
50312
carolynruw@gmail.com

3/15/2023

Dear IDNR,

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I care about the impacts of these major sources of air pollution on national treasures like the Boundary Waters Area Wilderness, Isle Royale National Park, Badlands National Park, and Mammoth Cave National Park. I also am concerned about the impacts of these coal plants on the health of my family and my community.

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Steven Herwig
9225 Cascade Avenue #2319
West Des Moines, IA
50266
srherwig@gmail.com

3/15/2023

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The state as a whole already does a terrible job maintaining clean environmental standards, doing what you can to cut air pollutants is the least we can do for our citizenry.

Nick Palmer
1126 Florida Ave, Apt 604
Ames, IA
50014
palmni01@gmail.com

3/15/2023

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Freedom Malik
1836 Hershey Ave
Muscatine, IA
52761
fmalik@dbq.edu

3/15/2023

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Elaine Donovan
1637 B Ave NW
Cedar Rapids, IA
52405
donovaneb2@gmail.com

3/15/2023

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Shawn Blaesing
816 Kellogg Ave
Ames, IA
50010
sblaesing@gmail.com

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Thomas Reardon
170 Bennett Ave
Council Bluffs, IA
51503
tom.reardon@cox.net

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Jane Clark
9871 Lincoln Ave
Clive, IA
50325
jrclark@radiks.net

3/15/2023

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Jim Trepka
242 Highland Dr
Iowa City, IA
52246
jim_trepka@msn.com

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Dan Meier
803 State St
Cedar Falls, IA
50613
lildan15@yahoo.com

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Ryan Strempke-Durgin
428 Gwendolyn Dr. NE
Cedar Rapids, IA
52402
rstrempkedurgin@outlook.com

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Cathy Patton
Box 304
New Sharon, IA
50207
cdpatton33@gmail.com

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Iowa needs to do its part to reduce air pollution, both for our neighbors and for ourselves. Our air, our health and our future depend on us.

Linda Long
3672 303rd Ave
Cresco, IA
52136
lslawng66@gmail.com

3/15/2023

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Ann Christenson
3 RUSSELL SLADE BLVD UNIT 448
Coralville, IA
52241
annfchris@gmail.com

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Donna Jennings
821 State St
Osage, IA
50461
donnajennings0904@gmail.com

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Victoria Laird
2440 Resolve Ave.
Oskaloosa, IA
52577
wishingstargoldens@gmail.com

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Jody Gibson
317 E Wall Ave
Des Moines, IA
50315
jodyg8@msn.com

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Judith Cooper
2701 Ashby Ave
Des Moines, IA
50310
judith.cooper17@icloud.com

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5. Evaluate George Neal South and George Neal North for regional haze controls, including cost-effective upgrades to their FGD systems, which are currently not achieving the level of control that such systems are designed to control.

Dana Good
23581 Great River Road
Leclaire, IA
52753
dana.good91@gmail.com

3/15/2023

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Donna Jenn
527 poplae st.
osage, IA
50461
donna@osage.net

3/15/2023

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Nikki Novak
2571 Highway 63
Toledo, IA
52342
novakx2@gmail.com

3/16/2023

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C Jean Boomershine
4210 Hickman Rd
Des Moines, IA
50310
cjeanboomershine@gmail.com

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Joy Avalos
4014 Forest rd
Davenport, IA
52807
joyavalos@msn.com

3/16/2023

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Michelle Benes
305 E Adams Ave
Fairfield, IA
52556
mbenes12@gmail.com

3/16/2023

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Richard Blandin
1151 Locke Ave
Waterloo, IA
50702
rblandin@mediacombb.net

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Patricia Slatin
2440 Raynond Ave
Council Bluffs, IA
51503
pkslatin@gmail.com

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Sue-ann Schuldt
2105 I Street
Iowa City, IA
52240
sue-ann@mysmall.net

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Nancy Thompson
2411 Lake Rd
Ottumwa, IA
52501
nthompson100@hotmail.com

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Mary Sand
245 Todd Circle
Ames, IA
50014
msand@isunet.net

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In our small town we are not allowed to burn outside unless it is a leisure, outdoor cooking event or similar sort. No trash or yard waste allowed because others have "allergies or sensitivities" the fumes or smoke from such fires. WHY DO LARGE CORPORATIONS HAVE PRIVILIEGES THE REST OF US ARE NOT ALLOWED?

Carol DeBell
1117 Buddy Holly
Clear Lake, IA
50428
dcdebell@cltel.net

3/15/2023

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Clean, healthy air for all should always be an option. Please do the right thing and follow through on these certifiable measures to hold these power plants accountable.

Tim Wagner
505 Franklin St
Decorah, IA
52101
tdwagner9604@gmail.com

3/15/2023

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Make the right choice.

David Bequeaith
4044 Flicker Lane
Hiawatha, IA
52233
dadofchen@yahoo.com

3/15/2023

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It is critical we take action to limit, and reduce emissions from coal plants. Iowa could lead the nation in wind generation of electricity if we chose to act boldly and lead the nation in renewable energy. Please act now.

Steve Drobot
2305 Cae Drive
Iowa City, IA
52246
sdrobot@exlautodetail.com

3/15/2023

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Emma Colman
3303 Lincoln Place Dr
Des Moines, IA
50312
emma.colman@sierraclub.org

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Thank you for all you do, and thank you for prioritizing a healthy future for Iowans.

Erin Miller
8411, Orchard Dr
Johnston, IA
50131
millererinalynn@gmail.com

3/15/2023

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Lilah Anderson
4120 8th Street
Des Moines, IA
50313
lilahesther@gmail.com

3/15/2023

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Erin Howell-Gritsch
700 North St
Williamsburg, IA
52361
erinhg52@gmail.com

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Iowa has so much potential to be a true leader in clean energy… Please consider your children and grandchildren and future generations!

Christine Curry
2801 EP True Parkway #303
West Des Moines, IA
50265
christineanncurry@gmail.com

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david murrin von Ebers
1022 Polk Boulevard
Des Moines, IA
50311
dave.murrin@gmail.com

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Julie Kamrath
2202 Fargo Ave
Spirit Lake, IA
51360
qnofevethng@yahoo.com

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Bob Fritzmeier
2933 Leech Ave.
Sioux City, IA
51106
bobfritzmeier@yahoo.com

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Dee Bosold
206 N 5th St apt C
Fairfield, IA
52556
donovanbosold@gmail.com

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4 Lincoln Place Dr
Des Moines, IA
50312
hayeshannah617@gmail.com

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2746 AURORA AVE
Des Moines, IA
50310
vicdesmoines2013@gmail.com

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Rebecca Skalsky
1990 SE 88th
Runnells, IA
50237
rskalsky39@gmail.com

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807 3rd Street
Camanche, IA
52730
divotqueen@gmail.com

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As a member of the NW IA Sierra Group in Sioux City, IA, I was happy to attend your zoom call today. It pains me to know that MidAmerican's 2 Port Neale Plants weren't in the final draft for the Regional Haze Draft Revision, mostly because Sioux City is not close enough to a Class 1 National Park. However, this is a start, including LGS & Walter Scott, #3. It is a start to reduce Small particulates & sulphur dioxide increasing haze. However, those 2 coal fired plants do affect the local health in our city and area surrounding, including the Loess Hills, of which there are only 2 locations - here in the west side of Iowa & in China.

I wish this hearing would have been done at a time when more people could have been in attendance with a little more prep time, since the announcement of this public commentary for you to consider. The Sierra Club of Iowa has almost 10,000 members, most of whom spend time hiking, kayaking in our state parks, whose air quality & health are affected.

Renee Weinberg
3905 COUNTRY CLUB BLVD
Sioux City, IA
51104
renee@weinberginvestments.net

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When I way young, my friends and I were thrilled with the EPA! Fast forward to now, breathing healthy air has become harder in so many states. I donated extra money to monthly utility bill to help build more wind generators in Iowa. I prefer that my grandkids have a better chance. Mid American can certainly step up.

Jeanne Bockholt
3514 Nebraska St, , Sioux City
Sioux City, IA
51104
justoneearth.0@gmail.com