

## Nebraska Regional Haze Progress Report Consultation

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**Date** Fri 02-May-25 9:01 AM

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 2 attachments (2 MB)

Attachment1\_NPS-NE-PR-Review.docx; Attachment2\_NPS-NE\_Workbooks2025.zip;

Hello Tracy,

Thank you for the opportunity for Federal Land Manager (FLM) regional haze consultation on Nebraska's Draft Progress Report for the Second Implementation Period. Staff from the National Park Service (NPS) held a consultation call with Nebraska Department of Environment and Energy (NDEE) staff on April 22, 2025. Staff from the other FLM agencies and the Environmental Protection Agency (EPA), Region 7, also attended. This email and the attached technical comments (attachment 1) and workbooks (attachment 2) document primary NPS conclusions and recommendations and serve as our formal regional haze consultation, as required by 40 CFR 51.308(i)(2).

We appreciate the opportunity to consult on this progress report and look forward to continuing to work with NDEE to improve and protect air quality and visibility in NPS Class I areas. If you have any questions or would like to talk through any regional haze topics, please feel free to reach out.

Best,

Melanie

p.s. Please forward this along to your colleagues who participated in the call.

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# Attachment 1: National Park Service (NPS) Technical Comments on Nebraska's Draft Regional Haze Progress Report for the Second Implementation Period (2018-2028)

May 2, 2025

## 1 Overview

The NPS recognizes the Nebraska Department of Environment and Energy (NDEE) for developing an organized progress report and providing it to the NPS for Federal Land Manager consultation as required by 40 CFR 51.308(i)(2). NDEE first and second round Regional Haze State Implementation Plans (SIPs) were submitted to EPA in July of 2012 and August of 2024, respectively. As NDEE summarizes, the initial SIP was partially approved and partially disapproved in 2012. On August 1, 2024, EPA proposed a Federal Implementation Plan (FIP) to address the long-term strategy, which relies on a sulfur dioxide (SO<sub>2</sub>) emission limit for Gerald Gentleman Station (GGS). However, a final rule has not been issued for the FIP and EPA has not yet proposed any action for the second implementation period SIP.

As the NPS has previously shared, emissions from GGS contribute to haze in six NPS-managed Class I areas in four different states, including Badlands, Wind Cave, Isle Royale, Voyageurs, Rocky Mountain, and Great Sand Dunes National Parks. In fact, GGS is by far the single most significant emission source affecting visibility at both Wind Cave and Badlands National Parks in South Dakota. The NPS provided consultation and public comments on NDEE's first and second implementation period SIPs. In addition, the NPS provided consultation feedback to EPA on their proposed 2024 SO<sub>2</sub> FIP for GGS. In each of these communications, the NPS identified emission reduction opportunities from Nebraska sources that would reduce regional haze and improve visibility in Class I areas.

The NPS continues to recommend that emission reductions are necessary for reasonable progress and shares updated cost estimates for SO<sub>2</sub> and nitrogen oxide (NO<sub>x</sub>) emission controls at GGS and Nebraska City Station (NCS). In addition, the NPS has generated new emission control cost estimates for the coal-fired emission units at North Omaha Station (NOS) that were previously scheduled to shut down. This attachment (Attachment 1) contains a brief discussion of new and updated NPS cost estimates and highlights several opportunities for improving the draft progress report document. Please see Attachment 2 for supporting calculation workbooks.

## 2 Updated Emission Control Cost Estimates

Cost estimates for emission controls recommended by the NPS for GGS and NCS have been updated to reflect:

- Current economic factors, namely:
  - “*Typical Gross Output*” values from Sargent & Lundy.<sup>1</sup>
  - Uncontrolled emission rates, gross heat rate, and capacity utilization consistent with CAMPD 2020–2024 annual averages.
  - The March 2025 7.5% prime interest rate.
  - Standard control equipment life consistent with the EPA Control Cost Manual and EPA’s Technical Support Document.<sup>2</sup>
  - The 2023 Chemical Engineering Plant Cost Index (CEPCI) of 797.9 to account for inflation.
- Newly proposed EPA guidance for Dry Sorbent Injection (DSI) sulfur dioxide (SO<sub>2</sub>) cost estimates.

NPS conclusions remain consistent with previous feedback.

Additionally, because the NOS schedule for retirement and/or conversion to natural gas burning has been extended, new cost-estimates for emission controls on Units 4 & 5 have been completed.

### 2.1 Gerald Gentleman Station (GGS)

#### 2.1.1 Review of Potential SO<sub>2</sub> Controls for GGS

NPS review of SO<sub>2</sub> controls for GGS Units 1 and 2 finds that:

- DSI could reduce over 16,000 tons/year of SO<sub>2</sub> from GGS at an annual cost of about \$42 million for an average cost-effectiveness of \$2,600/ton.
- Spray Dry Absorption (SDA) could reduce almost 18,000 tons/year of SO<sub>2</sub> from GGS at an annual cost of about \$93 million for an average cost-effectiveness of \$5,300/ton.
- Wet Flue Gas Desulfurization (WFGD) could reduce almost 19,000 tons/year of SO<sub>2</sub> from GGS at an annual cost of about \$104 million for an average cost-effectiveness of about \$5,600/ton.

These updated cost estimates are based on a 30-year remaining useful life, normal capacity utilization, and the proposed new DSI chapter of the CCM. Please see Attachment 2 for supporting calculation workbooks.

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<sup>1</sup> Sargent & Lundy November 2, 2020, “Technical Evaluations of Emission Control Costs” submitted to NDEE by NPPD on May 18, 2023.

<sup>2</sup> Appendix A, Technical Support Document, Cost of Controls Calculations for the Nebraska Public Power District Gerald Gentleman Regional Haze Federal Implementation Plan (Cost TSD)

Although the cost effectiveness of SDA and WFGD for reducing SO<sub>2</sub> are reasonable in the context of thresholds used by other states for the second regional haze implementation period, the NPS continues to recommend that NDEE require the more cost-effective DSI for Units 1 & 2 at GGS as a minimum level of SO<sub>2</sub> controls. The NPS supports EPA's August 1, 2024 proposal that, in consideration of water supply issues, GGS meet 0.06 lb SO<sub>2</sub>/mmBtu on a 30-day rolling average basis.

#### 2.1.2 Review of Potential Nitrogen Oxide (NO<sub>x</sub>) Controls for GGS

In addition to NO<sub>x</sub> control efficiency improvements, the NPS continues to recommend that NDEE thoroughly evaluate the potential for NO<sub>x</sub> emission reductions using SCR and SNCR controls by requiring full four-factor analyses.

NPS review of NO<sub>x</sub> controls for GGS Units 1 and 2 finds that:

- SNCR could reduce NO<sub>x</sub> emissions by 1,300 tons/year for about \$4,000/ton at standard useful life (20 years) and recent utilization levels.
- SCR could reduce over 5,000 tons/year of NO<sub>x</sub> at GGS for an annual cost of about \$51 million and an average cost-effectiveness of \$8,700/ton for Unit 1 and \$12,200/ton for Unit 2, based on a 30-year remaining useful life.
  - The cost-effectiveness value for Unit 1 is lower than the threshold used by Colorado, Nevada, and Oregon in this planning period (\$10,000/ton), while the cost-effectiveness for Unit 2 exceeds that threshold.

## 2.2 Nebraska City Station (NCS)

#### 2.2.1 Review of Potential SO<sub>2</sub> Controls for NCS

NPS updated cost-estimates for SO<sub>2</sub> controls for NCS Unit 1 find that:

- DSI with milled Trona could reduce SO<sub>2</sub> emissions by at least 80% (over 6,500 tons/year) for about \$3,700/ton.
- SDA could reduce SO<sub>2</sub> emissions by 88% (7,200 tons/year) for about \$6,100/ton.
- WFGD could reduce SO<sub>2</sub> emissions by 92% (7,500 tons/year) for about \$6,200/ton.

Each of these cost-estimates is reasonable in the context of cost thresholds used by other states in the second regional haze implementation period. The NPS continues to recommend that NDEE require DSI with milled trona as a minimum level of SO<sub>2</sub> control for NCS Unit 1.

For NCS Unit 2, the NPS recommends that NDEE evaluate upgrading the existing scrubber on Unit 2 to achieve (at least) 0.06 lb/mmBtu. This could reduce SO<sub>2</sub> emissions by an estimated 700 tons/year.

## 2.2.2 Review of Potential Nitrogen Oxide (NO<sub>x</sub>) Controls for NCS

NPS review of NO<sub>x</sub> controls for NCS Unit 1 finds that:

- SNCR could reduce NO<sub>x</sub> emissions by almost 700 tons/year for about \$3,700/ton.
- SCR could reduce NO<sub>x</sub> emissions by about 2,600 tons/year for about \$8,900/ton.

For NCS Unit 2, the NPS recommends that NDEE evaluate upgrading the existing SCR system on Unit 2 to achieve lower NO<sub>x</sub> emissions (by almost 400 tons/year).

## 2.3 North Omaha Station (NOS)

NCS is a significant source of haze-causing emissions affecting visibility in NPS-managed Class I areas. In the absence of a near-term federally-enforceable shut down or conversion to natural gas firing for Units 4 and 5 at the NOS, the NPS recommends that NDEE require full four-factor review of SO<sub>2</sub> and NO<sub>x</sub> emission reduction opportunities for Units 4 and 5 at NOS.

### 2.3.1 Review of Potential SO<sub>2</sub> Controls for NOS

With respect to potential NOS Unit 4 SO<sub>2</sub> controls, NPS review finds that:

- DSI with milled Trona is a very cost-effective way to reduce SO<sub>2</sub> emissions.
  - DSI could very cost-effectively reduce SO<sub>2</sub> emissions by at least 80% (almost 1,7000 tons/year) for about \$4,200/ton for NOS Unit 4.
  - The NPS recommends that NDEE require DSI for NOS Unit4 as a minimum level of SO<sub>2</sub> controls in this planning period.
  - Even if the remaining useful life were reduced to three years, the cost-effectiveness of DSI would still be reasonable at less than \$7,000/ton.
- SDA and WFGD are also cost-effective.
  - SDA could cost-effectively reduce SO<sub>2</sub> emissions by 89% (1,800 tons/year) for about \$8,100 /ton for NOS Unit 4.
  - WFGD could cost-effectively reduce SO<sub>2</sub> emissions by 93% (1,900 tons/year) for about \$9,400/ton for NOS Unit 4.
- These emission controls are all cost-effective. The NPS recommends that NDEE require SDA or WFGD as the most-stringent cost-effective emission reduction technologies evaluated for NOS Unit 4 in this planning period.

With respect to potential NOS Unit 5 SO<sub>2</sub> controls, NPS review finds that:

- DSI with milled Trona is a very cost-effective way to reduce SO<sub>2</sub> emissions.
  - DSI could very cost-effectively reduce SO<sub>2</sub> emissions by at least 80% (almost 2,300 tons/year) for about \$4,100/ton for NOS Unit 5.
  - The NPS recommends that NDEE require DSI for NOS Unit4 as a minimum level of SO<sub>2</sub> controls in this planning period.
  - Even if the remaining useful life were reduced to three years, the cost-effectiveness of DSI would still be reasonable at less than \$7,000/ton.
- SDA and WFGD are also cost effective.

- SDA could cost-effectively reduce SO<sub>2</sub> emissions by 89% (almost 2,500 tons/year) for about \$8,000 /ton for NOS Unit 5.
- WFGD could cost-effectively reduce SO<sub>2</sub> emissions by 93% (almost 2,600 tons/year) for about \$8,900/ton for NOS Unit 5.
- These emission controls are all cost-effective. The NPS recommends that NDEE require SDA or WFGD as the most-stringent cost-effective emission reduction technologies evaluated for NOS Unit 5 in this planning period.

### 2.3.2 Review of Potential NO<sub>x</sub> Controls for NOS

#### Unit 4 NO<sub>x</sub> controls:

- The NPS recommends NDEE fully evaluate the potential for NO<sub>x</sub> emission reductions using SCR and SNCR controls by requiring full four-factor analyses for NOS Unit 4.
  - SNCR could reduce NO<sub>x</sub> emissions at NOS Unit 4 in a cost-effective manner.
  - At standard useful life (20 years) and recent utilization levels, SNCR could reduce NO<sub>x</sub> emissions by 260 tons/year for about \$4,600/ton.
  - Even if the remaining useful life were reduced to nine years, the cost-effectiveness of SNCR would still be reasonable at less than \$7,000/ton.
  - The NPS recommends that NDEE require SNCR for NOS Unit 4 as a minimum level of NO<sub>x</sub> controls in this planning period.
- SCR could reduce NO<sub>x</sub> emissions at NOS:
  - At standard useful life (30 years) and recent utilization levels, SCR could reduce NO<sub>x</sub> emissions by almost 1,000 tons/year for about \$6,900/ton.
  - The NPS recommends that NDEE require SCR as the most stringent cost-effective emission reduction technology evaluated for NOS Unit 4 in this planning period.

#### Unit 5 NO<sub>x</sub> controls:

- The NPS recommends NDEE fully evaluate the potential for NO<sub>x</sub> emission reductions using SCR and SNCR controls by requiring full four-factor analyses for NOS Unit 5.
  - SNCR could reduce NO<sub>x</sub> emissions at NOS Unit 5 in a cost-effective manner.
  - At standard useful life (20 years) and recent utilization levels, SNCR could reduce NO<sub>x</sub> emissions by 345 tons/year for about \$4,300/ton,
  - Even if the remaining useful life were reduced to three years, the cost-effectiveness of SNCR would still be reasonable at less than \$7,000/ton.
  - The NPS recommends that NDEE require SNCR for NOS Unit 5 as a minimum level of NO<sub>x</sub> controls in this planning period.
- SCR could reduce NO<sub>x</sub> emissions at NOS:
  - At standard useful life (30 years) and recent utilization levels, SCR could reduce NO<sub>x</sub> emissions by almost 1,300 tons/year for about \$7,100/ton.
  - The NPS recommends that NDEE require SCR as the most stringent cost-effective emission reduction technology evaluated for NOS Unit 5 in this planning period.

### 3 Progress Report Questions & Feedback

#### 3.1 Section I.A

The first requirement for a progress report [40 CFR 51.308 (g)(1)] is to describe the status of all plan measures required to achieve reasonable progress goals. In response to this requirement, the progress report on page 3 says:

*“Measures described in Nebraska’s RH SIPs for both the first and second planning periods have been implemented and are described in the following pages.”*

The pages following this statement (pages 4-8) list the permit limits for Gerald Gentleman Station, Nebraska City Station, and North Omaha Station.

- Does this mean that the most recent Nebraska regional haze SIP includes these permit limits as required measures?
  - The NPS review team did not see these included as part of the FLM review draft for the second implementation period SIP but has not reviewed the final submission to EPA.
- If so, will these limits result in changes from recent actual emission levels from these facilities?

The NPS recommends that NDEE improve the clarity of the progress report by listing the specific SIP measures relied upon for reasonable progress and their anticipated results.

#### 3.2 Section I.B

40 CFR 51.308 (g)(2) requires progress reports to include a summary of the emissions reductions in the state due to the required plan measures. In response to this requirement, the progress report says:

*“Point source emission reductions of visibility-impairing pollutants achieved since the first planning period are largely attributed to implementation of emission reduction measures at key sources in the state.”*

The response includes Tables 1-4, which show total changes in point source NO<sub>x</sub>, SO<sub>2</sub>, and particulate matter (PM) emissions for several years between 2002 and 2023.

- What are the specific emissions reduction measures and key sources the statement is referring to?
- How much of the emissions changes shown in the tables are the result of required plan measures?

The NPS recommends that NDEE improve the clarity of the progress report by linking observed emissions reductions to specific reasonable progress measures. Further, it would be helpful to explain where the increasing emissions occur. For example: Table 2 highlights an increase in statewide SO<sub>2</sub> emissions of 3.5% since 2020 and Tables 6-8 show an increase in SO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub> emissions from GGS of 12.9%, 6.8%, and 32.7% respectively since 2020. Finally, there

may be a typographic error in Table 12 where the third column is labeled 2011 and should likely be 2010, and the percent change since 2010 is reported as a decrease of 31.6% when the table shows an increase of that amount.

### 3.3 Section I.E

40 CFR 51.308 (g)(5) requires an assessment of any significant changes in anthropogenic emissions in or outside the State and an explanation of whether these changes were anticipated in the report and whether these changes have limited progress in reducing emissions. In response, the progress report on page 15 says:

*“Point source anthropogenic emissions in Nebraska have not changed significantly since the period addressed in Nebraska’s RH SIP for the second period (2020). Individual sources, specifically the top seven emitting EGUs, have individually experienced changes in some pollutant emissions that appear to be associated with varying demands for electricity, weather-related events, or changes in operations.”*

- Are there data showing how changes in electricity demands, weather events, and changes in operations have resulted in changes in emissions at the state’s EGUs?
- If these are the causes of changes in emissions, how does this support the report’s earlier conclusion that *“Point source emission reductions of visibility-impairing pollutants achieved since the first planning period are largely attributed to implementation of emission reduction measures at key sources in the state”*?

The NPS recommends that NDEE improve the clarity of the progress report by including supporting information related to electricity demands and other factors that may account for fluctuating emissions from the EGU sector. Specifically, the NPS requests that NDEE explain what accounts for the increasing emissions from GGS shown in progress report Section I.B. In addition, it would be helpful to state clearly how the conclusion regarding changes in anthropogenic emissions in this section is consistent with the conclusion in Section 1.B.

### 3.4 Section I.F

40 CFR 51.308 (g)(6) requires that the progress report include an assessment of ambient data and emissions to determine if the current implementation plan elements and strategies are sufficient to meet all reasonable progress goals. In response, the progress report includes a discussion of visibility data at affected Class I areas in on pages 16-21. Figures 2 and 3, which present deciview trends at Badlands and Wind Cave National Parks, show that deciview values on the most impaired days increased over the period 2020-2023. However, on page 18, the progress report concludes that:

*“Based on this assessment, Nebraska determines that the current implementation plan elements and strategies are sufficient to enable South Dakota to meet its established RPGs for the second planning period at affected Class I areas in the state.”*

- Given that the most recent four-year period shows deciview increases on the most impaired days, why does the report conclude that current plan elements and strategies are sufficient to enable South Dakota to meet its reasonable progress goals?
- How will the current plan elements and strategies ensure that haze does not continue to increase on the most impaired days?

The NPS review of most impaired days (MID) visibility data from Badlands and Wind Cave National Parks in South Dakota confirms that visibility on these days has been deteriorating since 2020 and has not improved over the past 10 years (see figures below). Nebraska's GGS is the single largest contributor to haze-causing emissions affecting these Class I areas. The NDEE progress report shows increasing emissions from GGS at the same time visibility on MID is degrading at the parks. NDEE observes that "*...current visibility conditions (most impaired days, in deciviews) are better than the established RPGs for the second period.*" How will the NDEE plan address the worsening visibility conditions on MID for these parks and ensure that the South Dakota reasonable progress goals can be met?

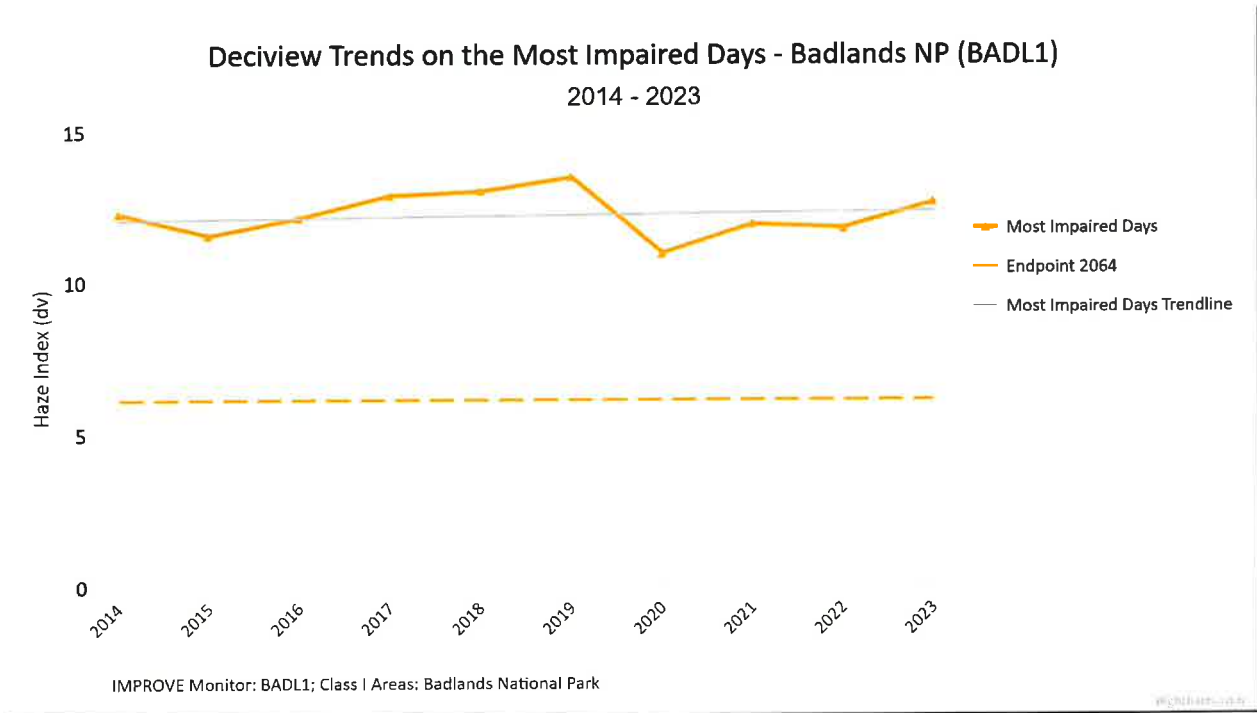


Figure 1. Haze Index on Most Impaired Days, Badlands National Park 2014–2023.  
<https://views.cira.colostate.edu/fed/Express/AqrvTools.aspx>

Table 1. Chart data: Haze Index on Most Impaired Days, Badlands National Park 2014–2023

Year	MID Haze Index (dv)
2014	12.24126
2015	11.52572
2016	12.0933
2017	12.82944
2018	12.96209
2019	13.43041
2020	10.93351
2021	11.8785
2022	11.76045
2023	12.59777
End Point	6.1

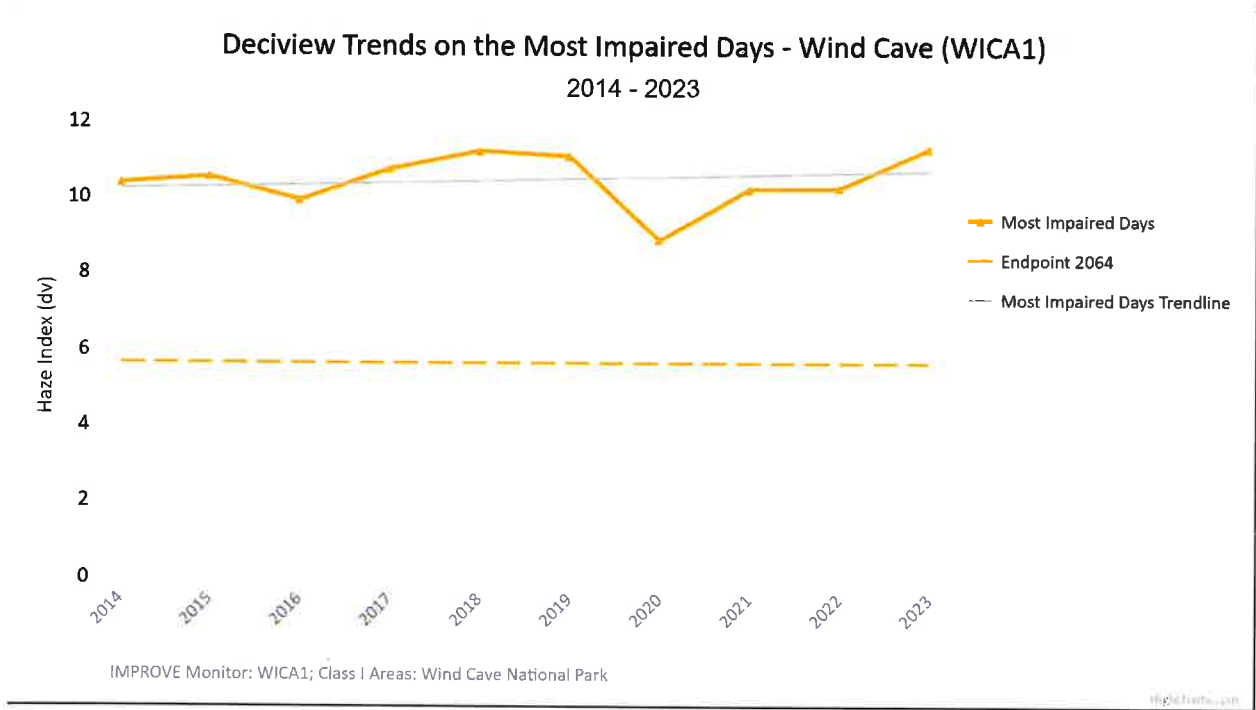


Figure 2. Haze Index on Most Impaired Days, Wind Cave National Park 2014–2023. (<https://views.cira.colostate.edu/fed/Express/AgvTools.aspx>).

Table 2. Chart data: Haze Index on Most Impaired Days, Wind Cave National Park 2014–2023

Year	MID Haze Index (dv)
2014	10.34131
2015	10.49866
2016	9.88913
2017	10.7131
2018	11.18702
2019	11.0547
2020	8.83488
2021	10.18794
2022	10.20721
2023	11.25762
End Point	5.6