

**EVIDENCE OF IMPAIRMENT OF AIR QUALITY RELATED VALUES IN THE  
BRIDGER WILDERNESS AREA, WYOMING**

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## INTRODUCTION

The 428,169-acre Bridger Wilderness Area is located in west-central Wyoming in the Wind River Mountains. It is part of the Bridger-Teton National Forest and is administered by the U.S. Forest Service. The Bridger Wilderness is a spectacular, rugged area filled with jagged peaks and glaciers, as well as thousands of alpine lakes and miles of trout-filled streams. It is enjoyed by thousands of visitors from throughout the country every year. In 1931 this part of the Wind River Mountains was designated a Primitive Area, and in 1964 it became one of America's first wilderness areas designated in the Wilderness Act.

The Upper Green River Valley lies just to the west of the Bridger Wilderness Area. The Town of Pinedale lies at the foot of the Wind River Mountains in close proximity to the Bridger Wilderness Area boundary, and there are several other small communities in the valley. Intensive oil and natural gas development is occurring in the Upper Green River Valley, especially in the Jonah and Pinedale Anticline fields, which are located just west of the Bridger Wilderness Area.

Air quality in Wilderness Areas is protected by provisions in the Clean Air Act and the Wilderness Act. The Clean Air Act designates many Wilderness Areas and National Parks as Class I areas. The Bridger Wilderness Area is one such area.<sup>1</sup> The goal for areas designated Class I is to prevent any future and remedy any existing impairment of visibility. A further purpose is to preserve, protect and enhance air quality in these special places. The Wilderness Act provides additional direction, requiring the Forest Service to administer Wilderness Areas so they are "unimpaired for future use and enjoyment as wilderness" and so as to "preserv[e] the wilderness character of the area."

Under the Clean Air Act, Federal Land Managers of Class I areas "shall have an affirmative responsibility to protect the air quality related values (including visibility)" of lands within a Class I area. To meet this affirmative protective responsibility, the Federal Land Manager can certify to the Wyoming Department of Environmental Quality that impairment of air quality related values is occurring in a Class I area, which requires the State to carefully consider the Federal Land Manager's concerns, and to take appropriate action. The Forest Service is the Federal Land Manager with affirmative responsibility for protecting air quality related values in the Bridger Wilderness Area.

There is increasing evidence that impairment of air quality related values, especially visibility, is occurring in the Bridger Wilderness Area. While all sources contributing to this impairment have not been definitively established, the massive oil and gas development occurring in very close proximity to the Bridger Wilderness Area is likely an important cause. Because the Forest Service has an affirmative responsibility to protect air quality in the Bridger Wilderness Area, because impairment of air quality values is occurring, and because more pollution from oil and gas production activities and other sources is on the horizon, the Forest Service should give careful consideration to certifying to the State of Wyoming and the Environmental Protection Agency that

impairment of air quality related values is occurring in the Bridger Wilderness Area. The weight of the evidence indicates that this is the case.

Evidence of impairment is provided by a number of sources, including: Forest Service reports, photographs taken by citizens living in the area, federal environmental impact statements, anecdotal accounts and observations, and other sources of information. Each of these lines of evidence will be discussed in turn below.

### **FOREST SERVICE REPORT PREPARED BY SCOTT COPELAND**

In December 2006, Mr. Scott Copeland, who is a contractor for the U.S. Forest Service and an expert on visibility issues, prepared a report on impairment of visibility in the Bridger Wilderness Area. This report is attached as Exhibit 1. Mr. Copeland reviewed more than 3,000 photographs taken at monitoring sites located in or near the Pinedale Anticline or Jonah natural gas fields located just west of the Bridger Wilderness Area. Photographs from the Daniel, Jonah and Boulder monitoring sites were reviewed.

Mr. Copeland found 54 photographs that showed unusual hazes, especially layered hazes, and evidence of local emissions. Three of those photographs are included in the report. In the report he states, “In some cases the photographs pretty clearly show a haze in the class I area . . . .”<sup>2</sup> While these hazes could not be definitively attributed to local oil and gas development, Mr. Copeland, again, determined that in some cases the photographs “pretty clearly show a haze in the class I area.” Consequently, there seems to be little doubt that impairment of visibility is occurring in the Bridger Wilderness Area, even if the precise source of the impairment could not be determined based on the photographs that were analyzed in this report. It should be noted, moreover, that in other communications Mr. Copeland has stated that the three camera stations (Jonah, Daniel, and Boulder) were not designed in a way that would allow for visibility impairment to be attributed to these gas fields. This limitation is reflected in his conclusions recommending additional camera sites and modifications to the existing sites.

### **CITIZEN PHOTOGRAPHS**

Citizens living in the vicinity of the Bridger Wilderness Area have taken a number of photographs documenting impairment of visibility in this area. Some of these photographs indicate that natural gas development is contributing to the problem, and that the haze problems are apparent from within the Bridger Wilderness Class I area.

Following are a sampling of photographs taken by several citizens. Most of these photographs were selected because they were taken in the late fall, winter or early spring when forest fires probably did not contribute to the haze. However, photographs taken by Ms. Leslie Rozier are also included even though they were taken during the summer because they document that haze in the Upper Green River Valley is apparent from within the Bridger Wilderness Area. It is recognized Ms. Rozier’s photographs were taken at times when forest fires may have contributed to the haze that is shown.

*Photograph Taken by Ms. Linda Baker, Pinedale, Wyoming*



Photograph taken January 21, 2007, 1656 hours. Photograph taken from 18 Moose Road, Pinedale, Wyoming looking southeast toward the Jonah field on the right, Wind River Mountains to the left. Camera: Panasonic DMC-FZ10, automatic exposure.

*Photographs Taken by Mr. Perry Walker, Daniel, Wyoming*



Photograph taken March 21, 2003, 0833 hours. Photograph taken from near Daniel, Wyoming, looking southeast toward the Wind River Mountains. Camera: Olympus C-2100 Digital, 10x zoom, f/1:2.8-3.5 lens, auto-speed aperture mode.



Photograph taken November 30, 2004, 0908 hours. Photograph taken from near Daniel, Wyoming, looking southeast toward the Wind River Mountains, which are obscured. Camera: Olympus C-2100 Digital, 10x zoom, f/1:2.8-3.5 lens, auto-speed aperture mode.



Photograph taken December 3, 2006, 0850 hours. Photograph taken from near Daniel, Wyoming, looking southeast toward the Wind River Mountains. Camera: Olympus C-2100 Digital, 10x zoom, f/1:2.8-3.5 lens, auto-speed aperture mode.



Photograph taken March 14, 2004, 0834 hours. Photograph taken from near Daniel, Wyoming, looking southeast toward the Wind River Mountains, which are obscured. Photograph is a composite of two photographs; differences in contrast between right and left half are due to automatic adjustments made by camera in auto-speed/aperture mode. Camera: Olympus C-2100 Digital, 10x zoom, f/1:2.8-3.5 lens, auto-speed aperture mode.

*Photograph Taken by Mr. Andy Blair, Lander, Wyoming*



Photograph taken July 10, 2006, 1400 hours. View from U.S. Highway 191 just north of junction with Wyoming Route 351 looking northwest toward the Pinedale Anticline field showing operating drill rigs. Camera: Fuji Finepix S3100, 4 megapixels, 6x optical zoom, auto setting.

*Photographs Taken by Mr. William Belveal, Pinedale, Wyoming*



Photograph taken February 13, 2004, 1234 hours. Photograph taken from 9508 U.S. Highway 191 looking southwest toward the Pinedale Anticline field showing well flaring. Camera: Olympus C2100 ISO 100.



Photograph taken April 19, 2006, 0704 hours. Photograph taken from 9508 U.S. Highway 191 looking northeast toward the Wind River Mountains. Camera: Olympus C2100 ISO 100.



Photograph taken December 7, 2005, 1739 hours. Photograph taken from Fremont Lake Road looking west over part of the Town of Pinedale, Wyoming to the northern part of the Pinedale Anticline field. Camera: Olympus C2100 ISO 100.

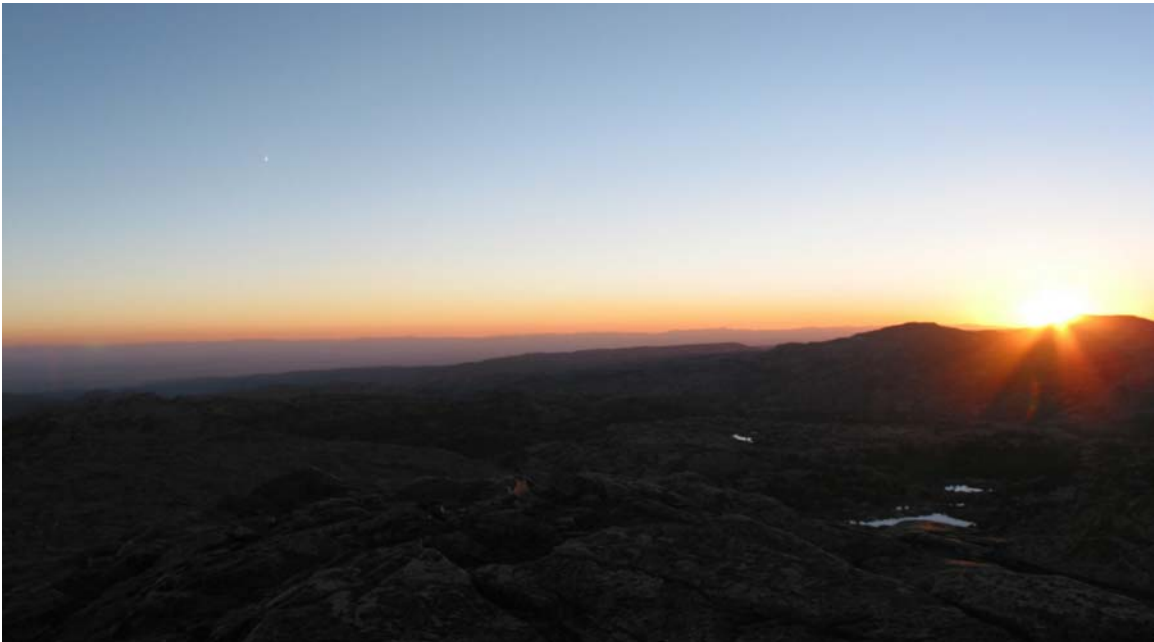


Photograph taken December 25, 2006, 0856 hours. Photograph taken from 9508 U.S. Highway 191 looking south toward Boulder Wyoming and the Jonah field, Wind River Mountains to the left. Camera: Samsung Techwin, ISO-50, exposure time 1/500 sec.



Photograph taken April 13, 2005 0824 hours. Photograph taken from 9508 U.S. Highway 191 looking northeast toward the Wind River Mountains. Camera: Olympus C2100UZ f/8 1/650sec ISO-100.

*Photographs Taken by Ms. Leslie Rozier, Pinedale, Wyoming*



Photograph taken August 20, 2005 at sunset. Photograph taken from the northwest flank of Mount Lester in the Bridger Wilderness Area looking west-northwest, pothole lakes above Little Seneca Lake in the foreground, Duran and Guitierrez peaks in the mid-ground, Upper Green River Valley in the background. Camera: Canon Power Shot G2, automatic setting.



Photograph taken September 15, 2005 in the early afternoon. Looking west from the pass between Raid Peak and Mount Bonneville in the Bridger Wilderness Area. Town of Pinedale is in the valley, Wyoming Range in background. Camera: Canon Power Shot G2, automatic setting.



Photograph taken August 10, 2004 in the late morning. Photograph taken from East Temple Peak in the Bridger Wilderness Area looking southwest to Temple Peak in the foreground and the Jonah field in the background. Camera: Canon Power Shot G2, automatic setting.



Photograph taken August 20, 2005 in the late afternoon. Photograph taken from Mount Lester in the Bridger Wilderness Area looking southwest onto Seneca Lake in the foreground and the Upper Green River Valley in the background. Camera: Canon Power Shot G2, automatic setting.

### *Discussion*

As noted, most of these photographs were taken at times when forest fires were unlikely to have contributed to the haze. Taken together, they make it clear that severe impairment of visibility is occurring in the Upper Green River Valley. The photographs taken by Leslie Rozier show that when haze fills the valley it is readily perceptible from within the Bridger Wilderness Area. Andy Blair's photograph documents haze in the vicinity of at least three drill rigs and one of William Belveal's photographs shows the effects of well flaring. As shown in a number of the environmental impact statements discussed in the next section, drill rigs and natural gas compressors, especially in the Jonah and Pinedale Anticline fields, emit substantial quantities of nitrous oxides in close proximity to the Bridger Wilderness Area and these emissions are important contributors to haze formation.<sup>3</sup>

## **OIL AND GAS PROJECT ENVIRONMENTAL IMPACT STATEMENTS**

The Bureau of Land Management (BLM) and in some cases the Forest Service have prepared environmental impact statements (EIS) for a number of oil and gas development projects in Wyoming. These EISs provide substantial evidence that oil and gas development and other regional pollution sources have or will significantly impair visibility in the Bridger Wilderness Area. While BLM and the Wyoming Department of Environmental Quality develop mitigation to reduce the impacts identified in these EISs, the impacts discussed below would occur even with mitigation in place.

Visibility impacts are measured in terms of changes in deciviews (dv). The deciview scale is a haziness index that estimates how apparent an impact would be to an observer. It is a measure of light extinction with a 1 dv change representing approximately a ten percent change in perceived visibility impairment. A 1 dv change is just perceptible to many observers. Very clear air has 0 dv of visibility impairment. The Forest Service considers impacts to visibility in excess of 0.5 dv due to the direct impacts of a project to be significant (the BLM considers project impacts significant if they exceed 1 dv). Cumulative impacts (impacts due to a project coupled with impacts from other emissions sources in the region) in excess of 1 dv are considered significant by the Forest Service.

A summary of impacts to visibility in the Bridger Wilderness Area that are predicted to result from some of the more significant BLM oil and gas projects in Wyoming appears below.

*BLM Jonah Infill Environmental Impact Statement (2006)*

The Jonah natural gas field is located in western Wyoming in Sublette County. Approximately 533 wells have already been drilled, and the BLM Jonah Infill EIS Record of Decision approved drilling 3,100 additional wells. The Jonah field is located approximately twenty miles southwest of the Bridger Wilderness Area boundary.

The Jonah Infill EIS shows the BLM anticipates there will be two days per year when impacts to visibility in the Bridger Wilderness Area will exceed 1 dv due to the direct impacts of further gas development in the Jonah field (1.50 dv maximum impact).<sup>4</sup> This impact occurs when emissions in the field itself reach their maximum, in about 2018. It is predicted there will be five days per year of cumulative impacts in excess of 1 dv at this time (2.29 dv maximum impact).<sup>5</sup> Cumulative impacts are the impacts of a project added to impacts from other emissions sources in the region, such as other oil and gas development projects. If the 0.5 dv level of significance is used, there will be nine days per year when visibility in the Bridger Wilderness Area is expected to be impaired due to direct project impacts, and on a cumulative basis there will be 19 days per year of impairment.<sup>6</sup>

Furthermore, the Jonah Infill EIS engaged in separate modeling of air quality impacts anticipated to occur at the “early project development stage” (in about 2006) when development is anticipated to also be occurring at other nearby gas fields. During the early project development stage, BLM predicts that impacts in the Bridger Wilderness Area from the Jonah Infill project and other regional sources will reach 94 days per year at the 1dv level and 147 days per year at the 0.5 dv significance level (13.51 dv maximum impact).<sup>7</sup>

*BLM Pinedale Anticline Draft Supplemental Environmental Impact Statement (2006)*

The Pinedale Anticline natural gas field is also located in Sublette County in western Wyoming. It is less than 15 miles west of the Bridger Wilderness Area boundary. Currently there are approximately 460 producing natural gas wells in the field, and nearly 4,400 additional wells are planned in this “infill” proposal.

As will be discussed in the next section, air quality impacts from this field were initially considered in the 2000 BLM Pinedale Anticline EIS. However, the BLM has released a Draft Supplemental EIS for this project that considers a 4,400-well infill that is now proposed for this field. The impacts to visibility in the Bridger Wilderness Area predicted in this Draft Supplemental EIS are what will be considered in this section.

The Pinedale Anticline Draft Supplemental EIS reveals that current impacts to the Bridger Wilderness Area from oil and gas development as shown by 2005 emissions data were 63 days per year of visibility impairment greater than 1 dv and 97 days of impairment greater than 0.5 dv (13.49 dv maximum impact).<sup>8</sup> When the direct impacts of the 4,400 additional-well infill were considered the following impacts were predicted. The direct impacts of the infill project under initial (“Phase I”) mitigation will lead to 63 days per year of visibility impairment greater than 1 dv and 94 days per year of impairment greater than 0.5 dv (14.03 dv maximum impact); with the additional mitigation that BLM may later implement (“Phase II Mitigation”) BLM reports that direct impacts are predicted to be 29 days per year with greater than 1 dv of impairment and 55 days per year of direct impacts greater than 0.5 dv (7.39 dv maximum impact).<sup>9</sup>

On a cumulative basis it is predicted, there will be 74 days per year of visibility impairment in the Bridger Wilderness Area that exceed 1.0 dv and 107 days per year that exceed 0.5 dv during “Phase I Mitigation” (15.59 dv maximum impact).<sup>10</sup> If BLM fully implements its “Phase II Mitigation,” cumulative impacts are predicted to be 53 days per year when visibility is impaired by more than 1.0 dv and 84 days per year when the impairment is greater than 0.5 dv (10.20 dv maximum impact).<sup>11</sup>

*BLM Pinedale Anticline Oil and Gas Project Environmental Impact Statement (2000)*

Until the Pinedale Anticline Supplemental EIS is approved, the 2000 Pinedale Anticline EIS continues to govern natural gas development in this field. As approved in the Record of Decision for this project, 700 producing wells and/or well pads were permitted with up to 900 initial well pad locations that could be drilled. As indicated above, approximately 460 wells have been drilled to date from approximately 322 well pads, and the operators are currently seeking approval to drill 4,400 additional wells.

In this earlier EIS, the BLM determined that the maximum change in visibility in the Bridger Wilderness Area due to the Pinedale Anticline project alone would be 0.46 dv.<sup>12</sup> However, cumulative impacts were greater, with five to nine days per year predicted to have visibility impacts of more than 0.5 dv in the Bridger Wilderness Area.<sup>13</sup> BLM stated that the Forest Service “has reviewed the days of modeled cumulative

impacts that are greater than 0.5 dv change and have determined that the cumulative impacts from the Pinedale Anticline Project, combined with other recently proposed projects in southwest Wyoming, are significant in increasing visibility impairment in the Bridger Wilderness Area.”<sup>14</sup> To alleviate this significant impact to air quality related values, an agreement was reached with Pacificorp, the operator of the Naughton Power Plant near Kemmerer, Wyoming, to install low nitrous oxides (NO<sub>x</sub>) burner technology on Unit 3 of the power plant, which was anticipated to reduce NO<sub>x</sub> emissions by 2,000 tons per year.<sup>15</sup> This emissions reduction was anticipated to reduce the number of days of significant visibility impacts by two days per year in the Bridger Wilderness Area.<sup>16</sup> Based on this emissions reduction at the power plant, the Forest Service considered impacts “to be within an acceptable range.”<sup>17</sup>

Events, however, have shown that the level of emissions reductions anticipated in the Pinedale Anticline EIS did not occur. The actual emissions of nitrous oxides from the Pinedale Anticline Project have outstripped predictions made in the Pinedale Anticline EIS. The Pinedale Anticline EIS’s conclusion that impacts to visibility in the Bridger Wilderness Area would be reduced to levels acceptable to the Forest Service due to the retrofit of the Naughton Power Plant was based on predictions that nitrous oxides emissions from the Pinedale Anticline Project itself would be 693.5 tons per year.<sup>18</sup> Emissions of nitrous oxides in 2005 due to activities in the Pinedale Anticline field were estimated at 3,512 tons per year.<sup>19</sup> The implications of this are that at least an additional 2,800 tons per year of nitrous oxides are being emitted beyond what was considered in the Pinedale Anticline EIS. Thus, the “potential benefit” of the Naughton Power Plant low NO<sub>x</sub> burner retrofit has been erased due to the greatly increased emissions levels in the Pinedale Anticline field itself. Accordingly, the Forest Service’s original conclusion that impacts to the Bridger Wilderness Area would be significant appears to have renewed validity, especially in light of the dramatically increased development that is proposed for this field.<sup>20</sup>

*BLM Seminoe Road Draft Environmental Impact Statement (2005) and Atlantic Rim Final Environmental Impact Statement (2006)*

The Atlantic Rim coalbed methane project area is located approximately 80 miles southeast of the Bridger Wilderness Area between Rawlins and Baggs, Wyoming, east of Wyoming Route 789. Two thousand coalbed methane wells would be drilled in this development.

The Seminoe Road coalbed methane project area is located approximately 85 miles southeast of the Bridger Wilderness Area, east of Rawlins, Wyoming, and north of Interstate 80, in the Seminoe Reservoir area. Under this development proposal 1,240 coalbed methane wells would be developed.

The air quality analysis for these two projects was done jointly. The maximum direct impacts of the Atlantic Rim project proposed action on visibility in the Bridger Wilderness Area are predicted to be 0.03 dv, however, the cumulative impacts are predicted to be eight days per year of visibility impairment greater than 0.5 dv and one

day per year with impairment greater than 1.0 dv (1.82 dv maximum impact).<sup>21</sup> The maximum direct impacts to visibility in the Bridger Wilderness Area from the Seminole Road project proposed action are predicted to be 0.01 dv, however, cumulative impacts, which again include the impacts of the project itself added to impacts from other emissions sources in the region, would be eight days per year of visibility impairment greater than 0.5 dv and 1 day per year with impairment greater than 1.0 dv (1.82 dv maximum impact).<sup>22</sup>

*BLM Desolation Flats Environmental Impact Statement (2004)*

The Desolation Flats natural gas development project is located approximately 90 miles southeast of the Bridger Wilderness Area in Carbon and Sweetwater Counties. It is located west of Wyoming Route 789 between Creston Junction and Baggs. Drilling approximately 385 natural gas wells was approved by BLM.

The Desolation Flats project is not predicted to directly cause visibility impacts to the Bridger Wilderness Area that exceed 0.5 or 1.0 dv (the maximum direct visibility impact would be 0.079 dv).<sup>23</sup> The cumulative impacts to the Bridger Wilderness Area associated with this project are predicted to cause five days per year of visibility impairment greater than 1 dv and nine days per year of impairment greater than 0.5 dv (2.32 dv maximum impact).<sup>24</sup>

*BLM Powder River Basin Oil and Gas Project Environmental Impact Statement (2003)*

This EIS was prepared to analyze environmental impacts from the massive coalbed methane development occurring in the Wyoming portion of the Powder River Basin. The EIS considered development occurring in Sheridan, Johnson, Campbell, and Converse Counties. Fifty-one thousand coalbed methane natural gas wells are anticipated to be drilled in this area. The Bridger Wilderness Area is more than 100 miles from this area.

The Powder River Basin EIS predicted that there would be four days per year of direct impacts to the Bridger Wilderness Area when visibility would be impaired by more than 1 dv by the Powder River Basin development.<sup>25</sup> Impacts from “other” sources would be seven to nine days per year of visibility impairment greater than 1 dv, and cumulative impacts would be ten to twelve days per year of visibility impairment greater than 1 dv in the Bridger Wilderness Area.<sup>26</sup>

*The Riley Ridge, Fontenelle, and Moxa Arch Environmental Impact Statements*

In the early 1980s and mid 1990s the BLM (and for the Riley Ridge EIS, the Forest Service) prepared the above-referenced EISs. The Moxa Arch and Fontenelle natural gas fields are located approximately 40-60 miles southwest of the Bridger Wilderness Area in Lincoln, Sweetwater, and Uinta Counties, and the Riley Ridge project is located approximately 50 miles west of the Bridger Wilderness Area in Sublette, Lincoln, and Sweetwater Counties.

The Fontenelle Natural Gas Infill Drilling Projects (1995-97) allowed for drilling 1,292 wells in addition to the existing 907 producing wells that were present. The Expanded Moxa Arch Area Natural Gas Development Project (1995-96) allowed for drilling 1,325 additional wells in an area where there were 957 existing active wells. (The BLM Kemmerer Field Office is currently preparing an EIS for additional infill in the Moxa Arch area. The operators in this area are proposing to drill an additional 1,860 wells in an area that now has approximately 1,400 producing wells.<sup>27</sup>) The Riley Ridge EIS Record of Decision (1984) allows for drilling 238 wells.

The BLM's Moxa Arch and Fontenelle EISs Air Quality Technical Support Document Cumulative Impact Analysis of Southwestern Wyoming Natural Gas Development Projects on Air Quality (1996) ("Air Quality TSD") report documented the likely impacts of these and other projects on visibility in the Bridger Wilderness Area in the mid-1990s. The modeled impacts of the Moxa Arch, Fontenelle, Stagecoach Draw, and Jonah natural gas projects were that there would be 26 days per year when visibility would be impaired by more than 1 dv in the Bridger Wilderness.<sup>28</sup> BLM recognized that when the 0.5 dv standard is used and the impacts of the projects were added to existing nitrous oxides emissions, "the Forest Service has estimated a perceptible change in visibility on 153 days."<sup>29</sup> And even when the BLM modified its analysis and adopted a "less conservative" emissions scenario, which allowed it to predict there would be no significant impacts to visibility in the Bridger Wilderness Area using the 1 dv standard, the Forest Service's analysis using the 0.5 dv standard still "found a perceptible visual range reduction of 18 days annually within the [Prevention of Significant Deterioration] Class I [Bridger] Wilderness Area."<sup>30</sup>

The Riley Ridge Final EIS provided an Air Quality Related Values Action Plan for the Bridger Wilderness Area signed by several Forest Service officials.<sup>31</sup> The Action Plan described the outstanding values of the Bridger Wilderness Area.<sup>32</sup> The Forest Service recognized that the Wind River Mountains "provide[ ] exceptional recreational opportunities and visual experiences that are almost unequaled any other place along the Rocky Mountain range."<sup>33</sup> The Forest Service determined categorically that "[d]evelopment of natural gas will alter the character of the National Forests and associated public and private lands."<sup>34</sup> Recently, the Forest Service has indicated that 500 new wells will be considered in a new EIS for the Riley Ridge and South Piney project areas.<sup>35</sup>

#### *BLM Hiawatha and Continental Divide-Creston Environmental Impact Statements*

BLM has initiated scoping for the Continental Divide-Creston natural gas development project. The project area lies north and south of Interstate 80, with the town of Wamsutter located roughly in the center of the project area. This project area is approximately 80 miles southeast of the Bridger Wilderness Area. This project would lead to the development of 8,950 natural gas wells.

BLM has also initiated scoping for the Hiawatha Regional Energy Development Project. This project lies south of Rock Springs on the Colorado-Wyoming border, with segments of the project located in both states. This project would lead to the development of 4,208 natural gas wells.

### *Discussion*

The above projects will lead to the drilling of more than 80,000 additional oil and gas wells in Wyoming. Approximately 31,000 of these wells will be drilled in southwest Wyoming, and nearly 10,000 wells will be drilled in the Upper Green River Valley in the next 10-20 years, in close proximity to the Bridger Wilderness Area. In 2000 there were approximately 4,345 oil and gas wells in southwestern Wyoming.<sup>36</sup> Clearly this level of oil and gas development, some of it in very close proximity to the Bridger Wilderness Area, can have significant impacts on air quality, including air quality related values in the Bridger Wilderness Class I area.

While impacts predicted by the modeling in the above EISs are not additive in most if not all cases, the EISs nevertheless repeatedly predict substantial direct and cumulative impacts to visibility in the Bridger Wilderness Area. They predict that direct impacts from oil and gas development projects in close proximity to the Bridger Wilderness in the Jonah and Pinedale Anticline fields will lead to as much as three months per year when visibility is impaired by more than 0.5 dv. Cumulatively, impacts of greater than 0.5 dv will occur as much as four to five months per year. Impacts are predicted to be as great as 14 to 15 dv. Taken together, these EISs make it clear that oil and gas development has or will directly lead to significant impairment of visibility in the Bridger Wilderness Area. And cumulatively in combination with other emissions sources, impacts to visibility in the Bridger Wilderness Class I area will be severe.

### **ANECDOTAL OBSERVATIONS—NEWSPAPER ACCOUNTS OF VISIBILITY IMPAIRMENT AND HAZE**

Residents of the Upper Green River Valley just to the west of the Wind River Mountains and the Bridger Wilderness Area have increasingly expressed concerns about the increasing air pollution and haze in this area that is resulting from oil and gas development. Following is a sampling of concerns and observations expressed by residents in this area in newspaper articles. These newspaper articles are attached as Exhibit 3.

- “It was this kind of light brown haze a lot like what I see when I am in Denver that fuzzed up the mountains. I just felt at that moment this tremendous sense of loss, like someone had bombed my church.” Judi Walker of Pinedale Wyoming, commenting on a September 2005 hike she took in the Wind River Mountains. Mark Clayton, *More Energy Security vs. Hazy Views in US Parks*, CHRISTIAN SCIENCE MONITOR, Oct. 11, 2005.
- “On some days it’s as if you could walk to [the Wind River Mountains] in 30 minutes, they seem so tantalizingly close and the air’s so clear. But with this

- haze, it's as if someone's slowly pulling them away." Linda Baker, 24-year Pinedale resident commenting on the Jonah Infill project. *Id.*
- “[Perry] Walker, 60, who lives on a bench in Daniel overlooking the Wind River Mountains, said the Winds were almost invisible on certain days in March because of haze.” Whitney Royster, *Change in the Skies, Some Say Air Quality Suffers with Gas Development*, CASPER STAR-TRIBUNE, Nov. 7, 2004.
  - “As the haze above Pinedale becomes increasingly apparent, even to people who have lived here only a short time, the [Wyoming Department of Environmental Quality] and the Governor are going to be hearing more and more from a disgruntled public.” Noah Brenner, *Haze in Pinedale*, PINEDALE ROUNDUP, Sept. 22, 2005.
  - “Local residents have repeatedly expressed concern about emissions coming from the [Pinedale Anticline field] creating a haze in the valley.” Noah Brenner, *Air Quality on the Anticline, NOx Emissions Almost Triple Predictions*, PINEDALE ROUNDUP, Dec. 16, 2004.
  - “We found dust-loaded ice and snow had lower reflectivity and higher melting rate than clean snow . . . so now we know what happens [when] the dust settles.” Jayne Thompson, Pinedale, Wyoming seventh grader commenting on the results of her science project. Jeff Gearino, *What Happens When the Dust Settles, Some Sublette County Residents Worry About Air Quality*, CASPER STAR-TRIBUNE, June 4, 2005 (noting that this science project “cut to the heart of the air quality issue: what is the effect going to be on air quality, visibility, and remote mountain lakes in the Wind River Range from increased oil and gas drilling?”).
  - “For the first time, public land officials acknowledged that increased natural gas drilling in Sublette County will possibly reduce visibility in Wyoming’s two national parks—as well as five wilderness areas and a roadless area. . . . That haze will affect Yellowstone and Grand Teton national parks, the Bridger, Popo Agie, Fitzpatrick, Teton, and Washakie wilderness areas, and the Wind River roadless area.” Whitney Royster, *BLM: Drilling Will Bring Haze*, JACKSON HOLE STAR-TRIBUNE, Aug. 11, 2005 (also quoting a local resident relative to haze impacts).

In addition to these articles, Exhibit 3 contains ten additional reports regarding air pollution and haze problems in the Upper Green River Valley and the resultant impacts to the Bridger Wilderness Area that are associated with oil and gas development. These reports have appeared in regional and national media such as the *Denver Post*, *Los Angeles Times*, and the *New York Times*, as well as industry trade journals.

### **BRIDGER WILDERNESS REAL TIME IMAGES, IMPROVE, AND WRAP WEBSITES**

The Forest Service and other entities maintain visibility monitoring sites related to the Bridger Wilderness Area. See <http://www.fsvisimages.com/brid2/brid2.html> (Forest Service “Real Time Images” website); <http://vista.cira.colostate.edu/improve/> (Interagency Monitoring of Protected Visual Environments (IMPROVE) website). These monitoring sites are located near Fremont Lake, outside of the Town of Pinedale, in the

northern part of the Wind River Mountains. Data at the IMPROVE site, which is part of a national network that monitors regional haze, have been collected since 1989. The Forest Service Real Time Images website has images available since October, 2006.

The IMPROVE site has not documented clear visibility trends; however, the Forest Service has recognized this site is not properly located to evaluate impacts that may be resulting from local oil and gas development because it is located north of the natural gas fields in the Upper Green River Valley, and the prevailing winds are from the west and northwest. As recognized in the recent report from the Pinedale Anticline Working Group (discussed in the next section), “the existing Bridger IMPROVE station is not, by itself, located to effectively capture potential impacts” of local development.<sup>37</sup> And as noted in the Bridger-Teton National Forest Air Quality Program report, “many locals have gone on record that they are seeing visibility impacts particularly on the southern end of the Bridger Wilderness area,” an area the IMPROVE site does not monitor.<sup>38</sup>

That oil and gas development to the south of the IMPROVE site is likely contributing to air quality problems in this area is supported by the Wyoming Department of Environmental Quality’s analysis of how much of the permissible “increment” of nitrogen dioxide pollution increase has been used up (“consumed”) in the Upper Green River Valley. Exhibit 5.<sup>39</sup> This report, especially the Figures in it, clearly shows that nitrogen dioxide levels and the amount of nitrogen dioxide increment consumed are greatest in the southern and western part of the Bridger Wilderness Area that is closest to the gas fields (the Jonah and Pinedale Anticline fields). “Nearly all of the maximum increment consumption within both the Class I and Class II areas has occurred as a result of growth in oil and gas sources since the [Prevention of Significant Deterioration] baseline year of 1987.”<sup>40</sup>

In addition to the IMPROVE and Real Time Images websites, the Western Regional Air Partnership (WRAP) recently established the Technical Support System (TSS) website, which will assist states in complying with the EPA regional haze rule. The TSS website can be found at <http://vista.cira.colostate.edu/tss/>. While many components of this site are still under development, the WRAP TSS website will be an increasingly important source of information regarding the impacts of regional haze on visibility in Class I areas. Among other things, the information presented in Exhibit 6 can be found on this website. These figures and data show that on the 20 percent of days with the best visibility conditions in the Bridger Wilderness Area, visibility is currently approximately 2.1 dv, and that visibility under natural conditions on the best 20 percent days would be approximately 0.6 dv. On the 20 percent of days with the worst visibility conditions, current (“baseline”) conditions are visibility of approximately 11 dv, but under natural conditions, which under the regional haze rule must be achieved by 2064, the level of impairment would be less than 7 dv.<sup>41</sup> This indicates that even at the IMPROVE site visibility is reduced compared to natural conditions, and that under EPA’s regional haze rule steps will have to be taken to achieve these natural visibility conditions by 2064.

## **PINEDALE ANTICLINE WORKING GROUP AIR QUALITY REPORT AND BRIDGER-TETON NATIONAL FOREST AIR QUALITY PROGRAM REPORT**

The Pinedale Anticline EIS Record of Decision established the Pinedale Anticline Working Group (PAWG). One subcommittee of the PAWG is an Air Quality Task Group, which released a 2005 Air Quality Monitoring Report. Sections of that report are discussed below and are attached as Exhibit 4.

In its report the PAWG determined that there was increasing evidence of acidification of alpine lakes in the Bridger Wilderness, as well as increased evidence of fertilization (eutrophication) due to deposition of air pollutants. There were “[i]ncreasing nitrates at all sampled inlets of lakes” which “indicate[d] that regional sources are probably contributing to local deposition.”<sup>42</sup> There was a decrease in acid neutralizing capacity (ANC) at Hobbs Lake, which was “of concern, because it is showing that acidification is starting to occur.”<sup>43</sup> And Black Joe Lake was “a major concern” because increases in nitrates and sulfates indicated that fertilization (nitrification) of the lake is occurring, and this “is a first step to eutrophication of the lake, and changes in the lake biota may be starting to occur.”<sup>44</sup> There were statistically significant trends in all of these attributes.<sup>45</sup>

The Forest Service confirmed the results of the PAWG report in its Bridger-Teton National Forest Air Quality Program report. Exhibit 2. The National Atmospheric Deposition Program (NADP), IMPROVE, Bulk Deposition Sampling, and Long-Term Lake Sampling analyses all showed increasing levels of nitrates and indications of lake fertilization and/or acidification.<sup>46</sup>

### **DISCUSSION AND CONCLUSION**

The weight of the evidence from the above studies and observations shows that visibility and perhaps other air quality related values have been impaired in the Upper Green River Valley and that this impairment extends into the Bridger Wilderness Class I area. Visibility impairment is not limited to the summer when forest fires may explain some of the impairment. While more definitive evidence would be desirable, it is apparent that oil and gas development, especially in the Jonah and Pinedale Anticline fields, is or soon will be a significant contributor to this impairment. As was poignantly observed by Dan Olson, former Wyoming Air Quality Division Administrator, “proximity counts” when considering the impacts of air pollution in the Upper Green River Valley.<sup>47</sup> There is no doubt that the Jonah and Pinedale Anticline fields are in very close proximity to the Bridger Wilderness Area and that they are undergoing massive levels of industrialization, with the attendant levels of air pollution emissions. Therefore, when the weight of the evidence presented here is considered there can be little doubt that these fields, especially when coupled with the extensive additional oil and gas development that is occurring in the state, are or soon will be significant contributors to the haze that is impairing visibility in the Bridger Wilderness Class I area.

Given the clear indications of impairment that are already present, and the modeling showing future impairment, the Forest Service should meet its “affirmative responsibility” to protect air quality related values in the Bridger Wilderness Area and certify that visibility, and perhaps other air quality related values, is impaired in this magnificent area so that the protections envisioned by the Clean Air Act and the Wilderness Act can be given effect. This is necessary to *prevent* any future impairment of visibility and to remedy any existing impairment, as required by the Clean Air Act, and so as to leave this area unimpaired and preserved for wilderness values, as required by the Wilderness Act.

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<sup>1</sup> Other Class I areas in Wyoming are Grand Teton National Park, Yellowstone National Park, Teton Wilderness Area, Fitzpatrick Wilderness Area, Washakie Wilderness Area, and North Absoraka Wilderness Area.

<sup>2</sup> Exhibit 1 at 1

<sup>3</sup> See Endnote number 47 (discussing how close proximity of nitrogen dioxide emissions sources in local gas fields is particularly important relative to impacts to local air quality). See also discussion on page 19 and Exhibit 5 (same).

<sup>4</sup> Final Air Quality Technical Support Document (“TSD”) for the Jonah Infill Drilling Project EIS (Vol. 1) at F-131 (Table F.10.17). BLM engaged in several modeling options for predicting visibility impacts. Here, impacts based on the Federal Land Managers Air Quality Related Values Working Group (FLAG) background data are presented because the Forest Service has endorsed FLAG methodology.

The Jonah Infill EIS is the most recent of several analyses of natural gas development in this field. Prior analyses include the McMurry Oil Co. Jonah Prospect Field Natural Gas Development Environmental Assessment (1994), the Jonah Field II Natural Gas Project EIS (1998), and the Modified Jonah Field II Natural Gas Project Environmental Assessment (2000).

<sup>5</sup> Final Air Quality TSD for the Jonah Infill Drilling Project EIS (Vol. 1) at F-133 (Table F.10.19).

<sup>6</sup> *Id.* at F-131 (Table F.10.17), F-133 (Table F.10.19).

<sup>7</sup> Final Air Quality TSD for the Jonah Infill Drilling Project EIS (Vol. 2) at G-E-163 (Table G-E.10.11).

<sup>8</sup> Pinedale Anticline Oil and Gas Exploration and Development Project Draft Supplemental EIS, Air Quality Impact Analysis TSD (Vol. 1) at E-109 (Table E.14.1) (“Supplemental TSD”). BLM engaged in five modeling options for predicting visibility impacts. Here, impacts based on the FLAG background data (MVISBK switch setting = 2) are presented because the Forest Service has endorsed FLAG methodology.

<sup>9</sup> Supplemental TSD at E-110 to -111 (Tables E.14.4, E.14.5). See also Pinedale Anticline Supplemental EIS at 4-69, 4-74 (describing the mitigation BLM may require and which was assumed for modeling purposes). While BLM does not state a preferred alternative in this Draft Supplemental EIS, it appears Alternative C will be the preferred alternative, so that modeling is reported here.

<sup>10</sup> Supplemental TSD at E-113 (Table E.14.9).

<sup>11</sup> *Id.* at E-113 (Table E.14.10).

<sup>12</sup> Pinedale Anticline Draft EIS at 4-75.

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<sup>13</sup> *Id.* at 5-18 (Table 5-6).

<sup>14</sup> *Id.* at 5-19.

<sup>15</sup> *Id.* at 5-20.

<sup>16</sup> *Id.* at 5-21 (Table 5-11). *See also id.* at 5-18 (Table 5-6), 5-20 (discussing these effects).

<sup>17</sup> *Id.* at 5-20.

<sup>18</sup> *Id.* at 4-72 (Table 4-27).

<sup>19</sup> Pinedale Anticline Draft Supplemental EIS at 3-62. *See also* Environmental Assessment for the Questar Year-Round Drilling Proposal at 3-21 (showing emissions of nitrous oxides in 2004 were 1,895 tons per year).

<sup>20</sup> It should be noted that these increased emissions from the Pinedale Anticline project in close proximity to the Class I area likely have a disproportionate impact on visibility in the Bridger Wilderness Area. *See* Endnote 47 (discussing the disproportionate impact of nitrogen dioxide emissions in close proximity to the Wilderness). *See also* discussion on page 19 and Exhibit 5 (same).

<sup>21</sup> Atlantic Rim Final EIS at Appendix F, Tables F1.8.1 and F1.8.3.

<sup>22</sup> *Id.* at Tables F2.8.1 and F2.8.4.

<sup>23</sup> Desolation Flats Final EIS at 2-45 (Table 4-18).

<sup>24</sup> *Id.* at 2-65 (Table 5-5).

<sup>25</sup> Powder River Basin Final EIS at Appendix F, pages F-19 (Table AQ-7) and F-23 (Table AQ-10). The BLM's preferred alternative in the Powder River Basin EIS was a combination of Alternatives 2A and 1. *Id.* at xxviii.

<sup>26</sup> *Id.* at Appendix F, pages F-19 (Table AQ-7) and F-23 (Table AQ-10). "Other" sources of impairment are the direct modeled impacts of "non-project" sources. *Id.*

<sup>27</sup> 70 Fed. Reg. 58,738-39.

<sup>28</sup> Air Quality TSD at ii, 6-8. *See also* Fontenelle Natural Gas Infill Drilling Project Final EIS at 2-7, Appendix A (page ii); Expanded Moxa Arch Area Natural Gas Development Project Final EIS at 1-4, Appendix A; Amended Record of Decision for Fontenelle Natural Gas Infill Drilling Projects EIS at 14; Moxa Arch and Fontenelle EISs Air Quality TSD at 6-8 (same). The modeling of the Jonah project included development in this field at an earlier and much lower level than was later analyzed in the Jonah Infill EIS, as discussed in the text above, and Endnote 4.

<sup>29</sup> Expanded Moxa Arch Area Natural Gas Development Project Final EIS at 1-4. *See also* Amended Record of Decision for Fontenelle Natural Gas Infill Drilling Projects Final EIS at 15 (158 days of impairment).

<sup>30</sup> Amended Record of Decision for the Fontenelle Natural Gas Infill Drilling Projects at 15. *See also id.* at Appendix E (presenting Forest Service letters documenting why it has adopted the 0.5 dv standard).

<sup>31</sup> Riley Ridge Final EIS at 5-7.

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<sup>32</sup> *Id.* at 5-11.

<sup>33</sup> *Id.*

<sup>34</sup> *Id.* at 5-12.

<sup>35</sup> Exhibit 2 at unnumbered page 5.

<sup>36</sup> Pinedale Anticline Draft EIS at 5-3 (Table 5-1).

<sup>37</sup> Exhibit 4 at iv.

<sup>38</sup> Exhibit 2 at unnumbered page 6.

<sup>39</sup> The full report is available at [http://deq.state.wy.us/aqd/Miscellaneous/SummaryReport\\_rev09152005.pdf](http://deq.state.wy.us/aqd/Miscellaneous/SummaryReport_rev09152005.pdf).

<sup>40</sup> *Id.* at SR-24.

<sup>41</sup> In addition to the websites discussed, the State of Wyoming maintains a visibility monitoring network (“visnet”) website, which can be found at <http://www.wyvisnet.com/>, and which contains information regarding the Bridger Wilderness Area.

<sup>42</sup> Exhibit 4 at ii.

<sup>43</sup> *Id.* at iii.

<sup>44</sup> *Id.*

<sup>45</sup> *Id.* at 21 (Table 3-6).

<sup>46</sup> Exhibit 2 at unnumbered pages 1-3, 6.

<sup>47</sup> Mr. Olson made this observation when commenting on the Wyoming Air Quality Division’s analysis of the amount of nitrogen dioxide “increment” that had been consumed in the Prevention of Significant Deterioration (PSD) Class I and Class II areas in the Upper Green River Valley (including the Bridger Wilderness Class I area). The Wyoming Department of Environmental Quality determined that 0.14  $\mu\text{g}/\text{m}^3$  of the permissible 2.5  $\mu\text{g}/\text{m}^3$  incremental increase in nitrogen dioxide concentration had been consumed in the Class I area, and moreover, that the vast majority of this increment consumption was attributable to local oil and gas development, not to more distant, much larger sources of nitrogen dioxide emissions (i.e., power plants). That is, “proximity counts.” *See* Exhibit 5. *See also* [http://deq.state.wy.us/aqd/Miscellaneous/SummaryReport\\_rev09152005.pdf](http://deq.state.wy.us/aqd/Miscellaneous/SummaryReport_rev09152005.pdf) (presenting the State of Wyoming’s increment consumption analysis and report); Exhibit 3, article entitled *Haze in Pinedale* (presenting Dan Olson’s remarks).