



# Department of Environmental Quality



To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

January 9, 2008

Ms. Michelle Easley  
Bureau of Land Management  
Kemmerer Field Office  
312 Highway 189 North  
Kemmerer, Wyoming 83101

RE: Air Quality Comments on the Moxa Arch Area Infill DEIS

Dear Ms. Easley:

The Air Quality Division has reviewed and compiled comments on the Draft Environmental Impact Statement for the proposed Moxa Arch Infill Gas Development Project. These comments are enclosed and are also being sent by e-mail. Note that the highlighted comments point to critical deficiencies in the air quality analysis.

I have asked that my staff consider previous comments made on this project, and I am disappointed that we are raising many of the same comments and concerns today that were raised in previous stages of document development.

I believe adequate consideration of air impacts is of paramount concern and should be addressed more seriously.

My fundamental conclusion is that the air quality analysis is inadequate, and impacts to air quality should be reanalyzed prior to approval of any project activities. Further, I urge you to consult with the Air Quality Division regarding air quality analysis protocols prior to commencement of any new air quality modeling.

Regards,

David A. Finley  
Administrator  
Air Quality Division

Enclosure (1)

cc: John Corra  
Todd Parfitt  
Steve Furtney  
Paige Smith  
Kelly Bott  
Ken Rairigh  
Jane Darnell



**MOXA ARCH AREA INFILL GAS DEVELOPMENT PROJECT  
DEIS Comments**

**Reviewers:** Kelly Bott & Ken Rairigh    **Agency:** WDEQ - AQD    **Comments Due:** **January 10, 2008**

**Contact (phone/email):** 307-777-6088/6188 kbott@state.wy.us/krairi@state.wy.us

Committer	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	1	2.4	2-13	Top of page, 2nd bullet	This bulleted item mentions drilling multiple wells from a single pad. As noted below, air modeling did not analyze multiple wells being drilled from a single well pad, therefore the effects of utilizing this BMP have not been assessed.
WDEQ-AQD	2	2.4	2-15	6th bullet	This bulleted item mentions drilling multiple wells from a single pad. As noted below, air modeling did not analyze multiple wells being drilled from a single well pad, therefore the effects of utilizing this BMP have not been assessed.
WDEQ-AQD	3	3.1.1 and TSD 3.2	3-2 & 3-3 and TSD C-10 & C-11	2nd Paragraph in Section & Figure 3-1	Please justify the use of the Jonah windrose as opposed to a windrose from a closer location.
WDEQ-AQD	4	3.1.1	3-2	2nd Paragraph	The windrose shown is a plot of the annual wind directions and annual averaged wind speeds at the Jonah meteorological station, located in the Upper Green River Basin, approximately 92 kilometers NNE of the town of Granger (MAA centroid). The discussion regarding the mean annual wind speed and the windrose shown implies that the wind data in this plot were acquired in the MAA, which is not the case. The data in the windrose plot may be representative of the general wind patterns in the MAA, but it would be incorrect to make broad statements regarding the equivalency of these two locations without more information to make such comparisons.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	5	3.1.1	3-2	3rd Paragraph	This sentence discusses wind strength and wind direction frequency on the dispersion and transport of various airborne pollutants, and implies that the winds (wind rose plot) representative of the Jonah area are directly comparable to the winds in the MAA, forming the conclusion that the region's strong winds increase the potential for atmospheric dispersion of pollutants. As stated in the previous comment, it would be incorrect to make broad statements regarding the equivalency of the winds in the Jonah area and in the MAA without more information to make such comparisons. Further, the number of hours the winds are considered calm, as well as the persistence of calm conditions over extended periods at the Jonah meteorological station are likely to be different than in the MAA; this is an important distinction to evaluate in determining whether the meteorological data from the Jonah site is representative of the MAA, as the frequency of calm winds also affects pollutant dispersion and transport.
WDEQ-AQD	5	3.1.2.1	3-5	2nd Paragraph in Section, 5th sentence beginning "Also included in..."	Please change "Class II areas" to "Sensitive Class II areas" as all areas in the United States not designated as Class I areas are Class II areas.
WDEQ-AQD	6	3.1.2.1	3-6	Table 3-3	Please list the source of data collection for 24-hour National SO2 and Annual National SO2 as these data were not provided by WDEQ-AQD.
WDEQ-AQD	7	3.1.2.2	3-8	Last Paragraph, Last 2 sentences	Please change "Class II areas" to "Sensitive Class II areas" as all areas in the United States not designated as Class I areas are Class II areas.
WDEQ-AQD	8	3.1.2.2	3-8	Last Paragraph, 5th Sentence	Class I areas are not distinctly shown on Map 3-1 as stated in the text.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	9	3.1.2.2	3-10	Table 3-5	Please add Savage Run to the list of Class I areas. Savage Run Wilderness area is a State of Wyoming Class I area in the Snowy Range of southeastern Wyoming. It was established as a wilderness area in February 1978 prior to the date of January 25, 1979 in WAQSR Chapter 6, Section 4(c) that designated areas as Class I. The first sentence of Chapter 6, Section 4(c) states "All national parks, national wilderness areas, and national memorial parks in Wyoming as of January 25, 1979, shall be designated as Class I and may not be redesignated."; Rocky Mountain National Park and Rawah Wilderness Area are also within the study area and should be included as part of the analysis.
WDEQ-AQD	10	3.1.2.3	3-12	Table 3-7	Yellowstone National Park is not in the study area. Therefore data collected in YNP is not appropriate for this analysis and should not be included in this table.
WDEQ-AQD	11	Ch 4 General			Chapter 4 contains numerous references to "directional drilling" and "drilling multiple wells from a single well pad." However, air modeling analyses were based on a single vertical well being drilled from a single well pad. Therefore, air modeling has not been conducted to assess the impacts from directional drilling.
WDEQ-AQD	12	4.2.1	4-2	1st Paragraph in Section, Last sentence	Please add Savage Run to the list of Class I areas. Savage Run Wilderness area is a State of Wyoming Class I area in the Snowy Range of southeastern Wyoming. It was established as a wilderness area in February 1978 prior to the date of January 25, 1979 in WAQSR Chapter 6, Section 4(c) that designated areas as Class I. The first sentence of Chapter 6, Section 4(c) states "All national parks, national wilderness areas, and national memorial parks in Wyoming as of January 25, 1979, shall be designated as Class I and may not be redesignated."
WDEQ-AQD	13	4.2.1	4-2	2nd Paragraph in Section, 2nd Sentence, beginning "The Project source..."	We are not aware of a "WDEQ-AQD oil and gas inventory guidance" document. Please provide a more accurate and detailed explanation of the guidance followed.
WDEQ-AQD	14	4.2.1.1.1	4-3	2nd paragraph, 3rd Sentence	What is meant by "type of well constructed"?

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	15	4.2.1.1.2	4-4	2nd Paragraph, 1st Sentence	RFD Information should also include emissions for projects whose analysis is not yet final but whose emissions have been quantified.
WDEQ-AQD	16	4.2.1.2.2	4-5	1st Paragraph	More recent data is available from the EPA's Air Toxics Database. Please ensure the most current data available is used.
WDEQ-AQD	17	4.2.1.3	4-5	Bulleted list	Savage Run, Rawah Wilderness Area and Rocky Mountain National Park are Class I areas within the study area and should be included in this analysis.
WDEQ-AQD	18	4.2.1.3.2	4-6	1st Paragraph in Section, Last sentence	The background values presented in Table 3-3 include values beyond those supplied by Darla Potter on August 8, 2006. Please revise to maintain consistency.
WDEQ-AQD	19	4.2.2.1.1	4-9	Near-Field Criteria Pollutants	Near-field criteria pollutant impacts should also be considered significant if PSD Class II Increments are exceeded.
WDEQ-AQD	20	4.2.2.2.1	4-9	Far Field Criteria Pollutants	Far Field Criteria impacts should also be considered significant if any of the applicable WAAQS, NAAQS, CAAQS or UAAQS are exceeded.
WDEQ-AQD	21	4.2.2.3	4-10	Ozone	Ozone impacts should be considered significant if the WAAQS, NAAQS, CAAQS or UAAQS are exceeded for ozone in their respective areas. Threshold should either be described within this section or removed.
WDEQ-AQD	22	4.2.3.3	4-13	2nd Paragraph, 4th Sentence	The 75 ppb background is incorrectly characterized as "maximum background." The 75 ppb value represents a three-year average of the annual fourth highest daily maximum 8-hour average ozone value and should be characterized accordingly.
WDEQ-AQD	23	4.2.5	4-13	1st (and only) paragraph, 3rd and 4th Sentences	This section states that "All alternatives, including the No Action are well above the significance thresholds and implementation of mitigation in the MAA would do little to reverse this." This statement is in error. In addition, the last sentence only makes a token reference regarding mitigation in the form of "operators phasing in cleaner drilling rigs and equipment." Implementation of specific mitigation and monitoring measures must be discussed with the proponents and air stakeholders, as currently reported modeling results are indicating the real possibility of there being effects to ambient air standards and visibility resulting from additional drilling and production.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	24	5.2.1	5-2	Map 5-1	Jonah Infill, Continental Divide-Creston, Wind River and Riverton Dome should be included in the CIAA.
WDEQ-AQD	25	5.2...General	5-1 thru 5-7		After reviewing this section and the specific project descriptions, and in consideration of Map 5-1, it's unclear which projects have been included in the cumulative analysis. For example, Continental Divide-Creston is described in the text, but not included on the map and is a project whose components (i.e., emissions) have not yet been completely compiled. Therefore, we are unsure in what way this project has been considered. Please clarify.
WDEQ-AQD	26	TSD General			Please include a copy of the final Air Quality Impact Assessment Protocol in the Technical Support Document.
WDEQ-AQD	27	TSD 2.1	C-4	2nd Paragraph, 2nd Sentence.	The additional oil and gas production facility emission control and permitting requirements guidance document (July 28, 2004) applies to the Jonah and Pinedale Anticline gas fields only and does not include Moxa Arch. Further, this guidance was approved by the Air Quality Advisory Board and not the Air Quality Team. The sentence beginning "Additions to WDEQ-AQD Oil..." is confusing and unnecessary. Please remove this sentence and the following three sentences as this discussion is not applicable to Moxa Arch.
WDEQ-AQD	28	TSD 2.1.1	C-4	5th Paragraph	Fracing emissions also need to be included in the construction emissions for the project.
WDEQ-AQD	29	TSD 2.1.1	C-4	5th Paragraph	Emissions from drill rig engines should be discussed in this paragraph. Drill rig engines are usually a very large source of emissions and a more detailed account of those emissions should be contained within the text.
WDEQ-AQD	30	TSD 2.1.1	C-4	3rd Paragraph, last sentence	Please list the percentage of controlled and uncontrolled flaring emissions.
WDEQ-AQD	31	TSD		General Comment	For the fleet of combustion engines that burn diesel fuel, please identify the types of engines being used (Tier 0, 1, 2,) and what type of diesel fuel each engine is fired on.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	32	TSD 2.1.1	C-5	2nd Paragraph, 1st Sentence	It has been previously stated in the document that all wells are assumed to be drilled conventionally (i.e., straight). It is therefore confusing to introduce directionally drilled well emissions at this point in the document. Please remove reference to directionally drilled wells and ensure that the data applies to conventionally drilled wells only.
WDEQ-AQD	33	TSD 2.1.1	C-5	Table 2-1	This table seems to be incomplete in that it is lacking VOCs and HAPs. It should also use a consistent set of units for each pollutant. Drill rig emissions appear to be calculated based on approximately 223 hours per year in this table. However, Appendix A, Table F1.1.8 shows the Main Deck Drill Rig emissions being calculated based on 360 operational hours/year. Please confirm the operational hours per year for drill rig operations that were used in all modeling analyses for each applicable pollutant. Similarly, please confirm the correct number of operational hours that were modeled for the source category identified as "Roads (fugitive and exhausts)". Fracing emissions should also be included in this table.
WDEQ-AQD	34	TSD 2.1.2	C-5	Bulleted list	Pneumatics pumps should also be included in the analysis.
WDEQ-AQD	35	TSD 2.1.2	C-6	Table 2-2	The annual (TPY) emission rates representing traffic emissions and production emissions in this table do not appear to reflect the same number of operating hours per year for each respective pollutant. In one case (i.e., SO <sub>2</sub> emissions from traffic), the hours of operation associated with the annual emissions are greater than the number of hours in a year (8,760 hours/year). Please confirm that the correct number of hours per year for both traffic emissions and production emissions were used to calculate the expected annual emissions for each applicable pollutant, and revise any short-term (lb/hr) and annual (TPY) emission rates in this table to reflect the actual emission rates that were modeled. Footnote #2 provides the expected emission sources that comprise single-well production emissions, but does not account for flaring emissions.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	36	TSD 2.1.2	C-6	Last Paragraph in Section	The second sentence states that a conservative approach was used in assuming that one central compressor and one wellhead compressor could occur on the hypothetical well pad. Modeling these two sources together at the same location represents the combined effect of these two emission sources by themselves. Modeling these sources in combination with the project area emission sources related to production and compression (i.e. a cumulative near-field analysis) was not performed. Therefore, without analyzing the cumulative impacts from multiple expected maximum development emissions scenarios (including multiple central compressors) and well head compressors operating together, the word conservative may be misleading.
WDEQ-AQD	37	TSD 2.1.2	C-7	First Paragraph	The second sentence implies that both the maximum construction emissions and the maximum production emissions for a single year have been assumed to occur simultaneously. However, it isn't clear if this is the correct assumption. In addition, it is also unclear how these two maximum emission scenarios were treated in the modeling analyses with respect to 1) how the maximum impacts from these two components may coincide over the development life of this field and 2) how the spatial distribution of modeled concentrations from both maximum emission scenarios overlap each other. Please provide clarifying information in this section. It's important to understand how these two maximum emission scenarios were treated in the modeling analyses (underlying assumptions) in order to be able to review each of the modeling analyses presented within Appendix C.
WDEQ-AQD	38	TSD 2.2.1	C-8	1st (only) Paragraph	How are the emissions from partially completed NEPA projects being tracked and accounted for between 6/30/03 and 6/30/06 for all RFD and RFFA sources in the entire domain?
WDEQ-AQD	39	TSD 2.2.2	C-8	1st Paragraph - 2nd bullet	VOCs should be added to the pollutants considered in this bullet item.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	40	TSD 2.2.2	C-8 & Table of excluded sources	Last Paragraph in Section	The text indicates that oil and gas waivers were examined for exclusion based on a 3 tpy total emissions threshold. However, upon examination of the excluded sources, this does not seem to be the case. For example, waiver wv-3997, which was issued for a production site, was excluded even though it lists 6 tpy NOx, 5.7 tpy CO, 2.4 tpy VOC and 1.0 tpy HAPs. The text should accurately represent the emissions represented in the air quality analysis.
WDEQ-AQD	41	TSD 2.2.4	C-9	Figure 2-1	Jonah Infill, Continental Divide-Creston, Wind River and Riverton Dome should be included in the CIAA. Also, Figure 2-1 should be a representation of the data presented in Table B4.1.5 on page B-25.
WDEQ-AQD	42	TSD 3.1	C-10	2nd Paragraph	AERMOD (version 02222) was used for the near-field modeling analysis. AERMOD version 02222 was superseded by several updated versions, including version 04300 (released 10/26/04) and version 06341 (released 12/7/06). Why was the older version (02222) of AERMOD selected over the newer EPA approved versions of AERMOD?
WDEQ-AQD	43	TSD 3.1	C-10	2nd Paragraph	This comment relates to <a href="#">Comments #36 and 37</a> . The statement that "representative scenarios of construction and development were developed to maximize any potential impacts" does not contain sufficient information to explain what assumptions were employed in the representative scenarios to ensure that potential impacts were "maximized." The modeled impacts from construction activities and production activities typically overlap due to 1) the density of interacting emission sources in the area, 2) the release characteristics (height of source, exhaust flowrate, ...) of the sources being modeled, and 3) the extent of the receptor grid, if sufficient receptors have been used in the modeling simulations to predict concentrations between the sources. Considering the amount of development that will be occurring throughout this field over time based on the various alternatives proposed, the representative scenario evaluated does not appear to clearly demonstrate that potential impacts from interacting sources were "maximized".

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	44	TSD 3.2	C-10	1st Paragraph	<p>A single year of meteorological data was used to determine the modeled impacts from the representative scenario evaluated in the near-field (AERMOD) analysis. Up to five (5) years of meteorological data are often used in dispersion modeling analyses to ensure that the various meteorological conditions which can affect pollutant dispersion have been considered in the modeling simulations. If the outcome of the near-field screening analysis is to maximize potential impacts, then it is recommended that additional years of meteorological data be used in the modeling simulation. Five (5) years of AERMOD-ready meteorological data exist (1999-2003) and are available from the State of Wyoming DEQ - Air Quality Division.</p>
WDEQ-AQD	45	TSD 3.3	C-12	Table 3-1	<p>Please remove reference to 1-hour Averaging Time for Ozone. EPA published a final rule on August 3, 2005 identifying areas for which the 1-hour ozone standard was revoked. In that notice, the 1-hour ozone standard was revoked, effective June 15, 2005, for all areas of Wyoming. The WDEQ-AQD then completed the process to remove the 1-hour standard from Wyoming Air Quality Standards &amp; Regulations. That action was completed and the effective date for the removal from the regulations was January 30, 2006. As a result, there is no federal 1-hour ozone standard that applies to Wyoming and there is no state 1-hour ozone standard that applied to Wyoming.</p>

Committer	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	46	TSD 3.4	C-13	Table 3-2	Please remove reference to 1-hour Averaging Time for Ozone. EPA published a final rule on August 3, 2005 identifying areas for which the 1-hour ozone standard was revoked. In that notice, the 1-hour ozone standard was revoked, effective June 15, 2005, for all areas of Wyoming. The WDEQ-AQD then completed the process to remove the 1-hour standard from Wyoming Air Quality Standards & Regulations. That action was completed and the effective date for the removal from the regulations was January 30, 2006. As a result, there is no federal 1-hour ozone standard that applies to Wyoming and there is no state 1-hour ozone standard that applied to Wyoming.
WDEQ-AQD	47	TSD 3.4	C-13	Table 3-2	On December 18, 2006, revisions to the National Ambient Air Quality Standards for particulate matter took effect, including strengthening the 24-hour PM2.5 standard from 65 to 35 ug/m3 and revoking the annual PM10 standard of 50 ug/m3. The State of Wyoming will enter into rulemaking to revise the Wyoming Ambient Air Quality Standards. However, as that has not yet been done, the PM2.5 24-hour standard should be 65 ug/m3 for Wyoming and for annual PM10 should be 50 ug/m3.
WDEQ-AQD	48	TSD 3.4.1	C-13	1st Paragraph	How far away was the nearby central compressor located with respect to the representative well pad shown in Figure 3-2? Was flat terrain modeled in determining the maximum pollutant impacts from point sources, such as central compressor stations? Please include the rationale used as the basis for selecting 200 meters as the nearest distance from the edge of the well pad and road to begin placing receptors. What value was used as the threshold wind velocity at which wind erosion emissions would be modeled?

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	49	TSD 3.4.1	C-14	Figure 3-2	This drawing is somewhat confusing as it does not contain sufficient information to assist the reader in understanding the spatial relationships of the data being displayed. Please include a scale (including units of distance), a direction indicator, such as a "North pointing" arrow, axes labels, as well as identifying the emission sources represented in this analysis, including the central compressor, and also the resolution of the receptor grids). Concentration (Isopleth) plots of the modeled impacts for each pollutant and averaging period would also be helpful to the reader to understand the spatial distribution of the modeled concentrations from the sources analyzed.
WDEQ-AQD	50	TSD 3.4.1	C-14	Table 3-3	Wyoming has not yet entered into rulemaking to revise the PM2.5 24-hour standard. Therefore, please change the value in the table for the Wyoming Ambient Air Quality Standard for 24-hour PM2.5 from 35 ug/m3 to 65 ug/m3. Another column reflecting the NAAQS will then be needed as the Total Value should be compared to the more stringent standard. This table shows that the Class II SO <sub>2</sub> 3-hr increment of 512 ug/m <sup>3</sup> was exceeded (modeled SO <sub>2</sub> impact = 522 ug/m <sup>3</sup> ), but there is no mention of this in the document.
WDEQ-AQD	51	TSD 3.4.2	C-15	1st Paragraph, 2nd to last sentence	What is meant by "a water well disposal engine"?
WDEQ-AQD	52	TSD 3.4.2	C-15	3rd Paragraph, 2nd Sentence	Please provide the basis and assumptions used to determine 1) the location of the area sources within the representative square mile section, 2) the size (length x width) and release characteristics (release height, sigma y and sigma z values) of the representative area source, and 3) the distance between successive area sources.
WDEQ-AQD	53	TSD 3.4.2	C-15	3rd Paragraph, 2nd Sentence	Drill rig emissions should have been included in construction emissions rather than production emissions.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	54	TSD 3.4.2	C-15	4th Paragraph	Please provide a plot displaying all of the information in this paragraph including identifying the sources represented in the analysis and the receptor grids used, and provide plots which show the locations of the maximum modeled impacts. Also, provide the basis and assumptions used to determine 1) the location of the area sources within the representative square mile section, 2) the size (length x width) and release characteristics (release height, sigma y and sigma z values) of the representative area source, and 3) the distance between successive area sources.
WDEQ-AQD	55	TSD 3.4.2	C-15	5th Paragraph, first sentence	Please delete "for modeled" from the end of this sentence.
WDEQ-AQD	56	TSD 3.4.2	C-15	6th Paragraph, 2nd Sentence	The statement that "direct modeled pollutant concentrations from project sources are below the PSD Class II increment for all pollutants." is incorrect with respect to PM <sub>10</sub> (24-hr); the modeled PM <sub>10</sub> (24-hr) concentration was 100.8 ug/m <sup>3</sup> , and the Class II increment for PM <sub>10</sub> (24-hr) is 30 ug/m <sup>3</sup> .
WDEQ-AQD	57	TSD 3.4.2	C-16	Table 3-4	Wyoming has not yet entered into rulemaking to revise the PM <sub>2.5</sub> 24-hour standard. Therefore, please change the value in the table for the Wyoming Ambient Air Quality Standard for 24-hour PM <sub>2.5</sub> from 35 ug/m <sup>3</sup> to 65 ug/m <sup>3</sup> . Another column reflecting the NAAQS will then be needed as the Total Value should be compared to the more stringent standard.
WDEQ-AQD	58	TSD 3.4.2	C-16	Table 3-4	Please explain why modeled particulate concentrations (PM <sub>10</sub> and PM <sub>2.5</sub> ) are identical for each alternative. The modeled PM <sub>10</sub> and PM <sub>2.5</sub> concentrations due to the production emissions, as shown in this table, are nearly equal to the Wyoming Ambient Air Quality Standards (WAAQS) for these two criteria pollutants. Additionally, the modeled concentrations of PM <sub>2.5</sub> , due to the construction emissions, shown in Table 3-3 are also close to the WAAQS for PM <sub>2.5</sub> .
WDEQ-AQD	59	TSD 3.4.2	C-16	Table 3-4	It would be helpful to see isopleth plots of all criteria pollutant impacts for each proposed alternative, including the no action alternative.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	60	TSD 3.4.2	C-17-C-18	Figure 3-4 through Figure 3-6	The figures do not contain enough information to assist the reader in understanding the spatial relationships of the data being displayed. Please include a scale (including units of distance), a direction indicator; such as a "North pointing" arrow, axes labels, as well as identifying the emission sources represented in this analysis, including the central compressor, and also identify the resolution of the receptor grids). Concentration (Isopleth) plots of the impacts for each pollutant and averaging period would also be helpful to the reader to understand the spatial distribution of the modeled concentrations from the sources analyzed. {This comment generally applies to all plots in the document}.
WDEQ-AQD	61	TSD 3.5	C-18	1st Paragraph	There are multiple pathways in which Hazardous Air Pollutants (HAPS) can enter the human body, such as the risk of exposure due to inhalation of airborne HAPs. When discussing risk and risk assessment due to a single pathway, such as inhalation, the risk and corresponding risk analysis should be referred to as incremental risk, and an incremental risk assessment, respectively.
WDEQ-AQD	62	TSD 3.5	C-19	1st Paragraph	More recent data is available from the EPA's Air Toxics Database. Please ensure the most current data available is used.
WDEQ-AQD	63	TSD 3.5	C-20	2nd Paragraph	More recent data is available from the EPA's Air Toxics Database. Please ensure the most current data available is used.
WDEQ-AQD	64	TSD 4.1	C-23	1st Paragraph below bullets, last sentence	Please discuss what adaptations were made to the CALMET wind field that was developed for the WDEQ PSD Increment Consumption Study.
WDEQ-AQD	65	TSD 4.2	C-24-C-25	Figure 4-1 and Figure 4-2	Please include a scale (including units of distance), horizontal reference datum, a direction indicator; such as a "North pointing" arrow, axes labels, delineate the WY, CO, ID, UT state boundaries, and provide a listing of the station names and corresponding station IDs used in the CALMET simulations.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	66	TSD 4.3.1	C-26	1st (partial) Paragraph, last sentence	If the CALPUFF modeling analyses were to be revised, finer vertical resolution in the lowest layers of the CALMET wind field is recommended due to the expected plume rise and plume transport from low level releases used in the CALPUFF modeling simulations. An example of the finer vertical resolution recommended (units = meters above ground) using 11 vertical layers is provided in this comment for reference (i.e., 20, 40, 80, 160, 320, 560, 1000, 1500, 2250, 3200, 4000).
WDEQ-AQD	67	TSD 4.3.2	C-29	Table 4-1	The CALMET variable IAVET is listed in this table as being set to zero (0), whereas the EPA default setting for this CALMET variable is equal to one (1). Please provide the rationale used as the basis for the proposed setting rather than the EPA default setting.
WDEQ-AQD	68	TSD 4.4.4	C-35	Table 4-3	Change column header for first column to Stack Diameter.
WDEQ-AQD	69	TSD 4.4.4	C-35	Last Paragraph on page	In consideration of the large study area chosen for this project, extra care should be taken to adequately represent sources in Colorado and Utah.
WDEQ-AQD	70	TSD 4.4.4	C-36	Table 4-4	Change column header for first column to Stack Diameter.
WDEQ-AQD	71	TSD 4.4.4	C-38	Figure 4-6	This comment also relates to <b>Comment #49</b> (Figure 3-2). Based on Figure 4-6 (Alternative C), it does not appear that a "worst-case" representation of the overlapping impacts from construction and production emission sources in the near-field modeling would have been accounted for in the representative well pad scenario that was modeled to determine the maximum potential impacts. Please provide additional discussion about the assumptions that were employed to create the representative well pad scenario shown in Figure 3-2. Does the scenario modeled represent the ongoing construction and production emissions that would be expected to occur, as depicted in Figure 4-6?
WDEQ-AQD	72	TSD 4.4.4	C-40	1st Paragraph	Please list the four (4) sources and the criteria pollutant emissions that were modeled for these four (4) sources which had no location data.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	73	TSD 4.4.4	C-40	2nd Paragraph	Please provide a table that identifies the 353 sources that were removed from the original list of 1,254 state-permitted sources, and the corresponding criteria pollutant emissions from these 353 sources. Describe how the emissions were apportioned into area sources?
WDEQ-AQD	74	TSD 4.4.4	C-40	3rd Paragraph, 1st Sentence	Does the RFD emissions inventory contain point sources? If so, were the point sources modeled as point or area sources?
WDEQ-AQD	75	TSD 4.4.4	C-40	3rd Paragraph, 2nd Sentence	Please describe how the county-wide well sites were apportioned into area sources. Are the large polygons being modeled as large area sources to represent county well site emissions? Was a finer grid cell resolution used in the CALPUFF (far-field) modeling analyses to represent these emission sources?
WDEQ-AQD	76	TSD 4.5.1	C-40	1st Paragraph, 2nd Sentence	Please include Ozone (O <sub>3</sub> ) to the list of pollutants shown in brackets.
WDEQ-AQD	77	TSD 4.5.1	C-41	Figure 4-8	Inclusion of projects that are completely drilled out is confusing and unnecessary, and those projects should not be included in this representation. Please provide an updated map showing the NEPA project areas that represent the RFD emissions inventory that was included in the modeling analyses for the Moxa Arch Area (MAA).
WDEQ-AQD	78	TSD 4.5.2	C-43		A table containing the relative humidity factors for each method should be included.
WDEQ-AQD	79	TSD 4.5.2	C-43	4th Paragraph	Each site providing relative humidity data should be described within the document.
WDEQ-AQD	80	TSD 4.6.1.1	C-47	Table 4-10	On December 18, 2006, revisions to the National Ambient Air Quality Standards for particulate matter took effect, including strengthening the 24-hour PM <sub>2.5</sub> standard from 65 to 35 ug/m <sup>3</sup> and revoking the annual PM <sub>10</sub> standard of 50 ug/m <sup>3</sup> . Please revise this table accordingly. Also, please note that the State of Wyoming has not yet entered into rulemaking to revise the Wyoming Ambient Air Quality Standards. Therefore, the values presented in this table for WY (24-hour PM <sub>2.5</sub> standard of 65 ug/m <sup>3</sup> and annual PM <sub>10</sub> standard of 50 ug/m <sup>3</sup> ) are correct.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	81	TSD 4.6.1.1	General Comment	Table 4-11a through Table 4-31e	It would help to know how far away (distance and direction) the modeled impacts are occurring with respect to a common reference point, such as the centroid location of the sources in Moxa Arch Area (MAA). Please add a column at the end of each table providing the distance from centroid of the Moxa Arch Area (MAA) to the receptor location that corresponds to the modeled concentration shown in each row of the tables in this section.
WDEQ-AQD	82	TSD 4.6.1.1	C-50	Bullets listed below Table 4-11c	Several of the results provided in the bullets regarding the percentage of Class I increment that was consumed appear to be incorrect. Please review these values and provide revised values as needed.
WDEQ-AQD	83	TSD 4.6.1.1	C-54	Bullets listed above Table 4-13a	Several of the results provided in the bullets regarding the percentage of Class I increment that was consumed appear to be incorrect. Please review these values and provide revised values as needed.
WDEQ-AQD	84	TSD 4.6.1.1	C-57	Table 4-14	On December 18, 2006, revisions to the National Ambient Air Quality Standards for particulate matter took effect, including strengthening the 24-hour PM <sub>2.5</sub> standard from 65 to 35 ug/m <sup>3</sup> and revoking the annual PM <sub>10</sub> standard of 50 ug/m <sup>3</sup> . Please revise this table accordingly. Also, please note that the State of Wyoming has not yet entered into rulemaking to revise the Wyoming Ambient Air Quality Standards. Therefore, the values presented in this table for WY (24-hour PM <sub>2.5</sub> standard of 65 ug/m <sup>3</sup> and annual PM <sub>10</sub> standard of 50 ug/m <sup>3</sup> ) are correct .
WDEQ-AQD	85	TSD 4.6.1.1	C-57	Table 4-14	Please reverse the "Total" and "Incrmt" columns, such that the modeled result is provided first, the background concentration column provide after the modeled result, and then provide the third column showing the total additive concentration (source + background). An example calculation provided below the table would also be helpful.
WDEQ-AQD	86	TSD 4.6.1.2	C-58	Table 4-14	Several of the results provided in the bullets regarding the percentage of Class II increment that was consumed appear to be incorrect. Please review these values and provide revised values as needed.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	87	TSD 4.6.1.2	C-68	Table 4-18	On December 18, 2006, revisions to the National Ambient Air Quality Standards for particulate matter took effect, including strengthening the 24-hour PM <sub>2.5</sub> standard from 65 to 35 ug/m <sup>3</sup> and revoking the annual PM <sub>10</sub> standard of 50 ug/m <sup>3</sup> . Please revise this table accordingly. Also, please note that the State of Wyoming has not yet entered into rulemaking to revise the Wyoming Ambient Air Quality Standards. Therefore, the values presented in this table for WY (24-hour PM <sub>2.5</sub> standard of 65 ug/m <sup>3</sup> and annual PM <sub>10</sub> standard of 50 ug/m <sup>3</sup> ) are correct .
WDEQ-AQD	88	TSD 4.6.2	C-68	First Paragraph, 2nd Sentence	In calculating the deposition due to total N and total S, please provide a breakdown of the molecular components and molecular weight ratios that were considered in calculating deposition due to total N and total S (i.e., NO, NO <sub>2</sub> , NO <sub>3</sub> , HNO <sub>3</sub> , (NH <sub>4</sub> NO <sub>3</sub> ), SO <sub>2</sub> , SO <sub>4</sub> , (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> ).
WDEQ-AQD	89	TSD 4.6.4.5	C-108 & C-109	Tables 4-29c & 4-29d	Please include visibility results for "MOX" for each visibility assessment methodology for each alternative.
WDEQ-AQD	90	TSD 5.1	C-123	1st Paragraph, Sentence beginning "The Current NAAQS for ozone..."	Please delete the 85 ppb notation. The standard is described accurately as 0.08 ppm and adding the 85 ppb notation is misleading when describing impacts. Note that a search and replace should be conducted from this point forward to remove all instances of the 85 ppb notation.
WDEQ-AQD	91	TSD 5.2.3	C-125	1st (only) Paragraph	Change "Project and cumulative emissions in southeastern Wyoming and vicinity" to Project and cumulative emissions in southwestern Wyoming and vicinity. Additionally, provide an emissions table or reference an existing emissions table in the document that clearly defines the cumulative emissions inventory represented in all of the Ozone modeling analyses.
WDEQ-AQD	92	TSD 5.2.3.1	C-126	Figure 5-1	Please include a scale (including units of distance), a direction indicator, such as a "North pointing" arrow, axes labels, reference datum, as well as identifying the states represented in this plot.
WDEQ-AQD	93	TSD 5.2.3.1	C-127	Figure 5-2	Please include a scale (including units of distance) and axes labels on this plot.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	94	TSD 5.2.3.2	C-128	1st Full Paragraph and Figure 5-3	There are only six (6) CASTNet sites in the domain; the Thunder Basin monitoring site is not a CASTNet site. Please revise all references throughout the document and in Figure 5-3 to reflect the correct number of CASTNet sites.
WDEQ-AQD	95	TSD 5.2.3.2	C-129	3rd Paragraph, 1st Sentence	This sentence indicates that area source emissions were gridded to the 4 km grid and then modeled in CAMx as point sources. What was the rationale behind modeling area source emissions as point sources? How would this treatment of the area sources affect modeled ozone concentrations in general? Would this approach be representative in locations with a high density of area sources, such as the Jonah and Pinedale development areas, which have some of the highest monitored and modeled Ozone impacts in the analysis (4 km) domain?
WDEQ-AQD	96	TSD 5.2.3.2	C-129	4th Paragraph, 1st and 3rd Sentences	The low-level gridded emissions are referred to as Figure 5-4 (1st sentence) and Figure 5-4b (3rd sentence). However, the low-level emissions should be referenced as Figure 5-4a in both instances.
WDEQ-AQD	97	TSD 5.2.3.2	C-129	Figure 5-4a, 5-4b	This comment relates to <b>Comment #114</b> , whereby the 2002 Base Case NOx and VOC emissions for oil and gas sources in Sublette County are not shown in these two figures; why is this? Please provide additional discussion regarding the development of the emissions inventories and provide tables of the NOx and VOC emissions used in the Ozone modeling analyses.
WDEQ-AQD	98	TSD 5.3.1	C-133	1st (only) Paragraph, Last Sentence	Change "northeastern Wyoming" to northwestern Wyoming.
WDEQ-AQD	99	TSD 5.3.2	C-135	2nd Paragraph, 3rd Sentences, Fig 5-9 through 5-12	Based on the model performance data provided, the model appears to underestimate most of the peak observed Ozone concentrations from late June through September (approximately 15-35 ppb), and this underestimation tendency is evident through November. Please provide more discussion regarding why the model may be under predicting the observed Ozone concentrations in July and August.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	100	TSD 5.3.2	C-135	2nd Paragraph, 4th and 5th Sentences; Fig 5-9 and 5-10	The statement that "the reasons why the model begins an underestimation tendency in August is unclear" leaves this important question unanswered, and warrants further elaboration on this issue of why the model cannot replicate high Ozone values during the summer months. It is recommended that the discussion be revised to include a scientific basis or hypothesis discussing why this is occurring at both the Centennial and Pinedale monitors throughout the five months when the model under predicts the monitored values. Additionally, please include plots similar similar to Figure 5-9 and 5-10 for all seven (7) Ozone monitoring sites.
WDEQ-AQD	101	TSD 5.3.2	C-135	Figure 5-11	Please include similar plots for all seven (7) Ozone monitoring sites (only six (6) of which should be labeled as CASTNet sites, Thunder Basin is not a CASTNet site).
WDEQ-AQD	102	TSD 5.3.2	C-139	1st Paragraph, Last Sentence	The plots show a number of indicators that suggest the CAMx model performance (i.e. underestimation tendency) or the inputs to the CAMx model require additional evaluation as: 1) the model is greatly underpredicting Ozone concentrations throughout the entire months of July and August, 2) the model does not replicate the higher Ozone concentrations (i.e., 60-75 ppb) with respect to the observed values at the Pinedale and Centennial monitors, indicating model performance may be an issue in both the 12 km and 4 km domains, and 3) most importantly, the model significantly underestimates nearly all of the peak observed Ozone concentrations during several months of the year. Please provide more discussion regarding why the model may be underpredicting the observed Ozone concentrations in the 4 km and 12 km domains, and how this behavior may be related to source characterization and/or the apportionment of NOx and VOC emissions throughout the domain.
WDEQ-AQD	103	TSD 5.3.2	C-139	Table 5-3	Please provide similar data comparisons for the other five monitors used in the CAMx model performance evaluation.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	104	TSD 5.3.3	C-144	Entire Paragraph	On page C-137, it is stated that that model did not meet EPA's performance goal for the mean normalized bias (MNB) metric for January, February, August, September, and October. Additionally, based on the plots shown in Figures 5-9 through 5-12, the model does not reproduce the observed highest Ozone concentrations at the Pinedale and Centennial monitors, and the magnitude and frequency at which this underestimation bias occurs appears to be significant, and may warrant additional evaluation. The model performance evaluation conclusions appear to be based on several premises that are without sufficient merit based on the information provided. Please provide more information which discusses and documents how the performance of the model has been sufficiently demonstrated to meet all of the necessary performance goals for all months of the year, particularly, during the summer months. What sensitivity analyses would be needed to better support these conclusions?
WDEQ-AQD	105	TSD 5.3.3	C-144	Bottom Paragraph	Three (3) years of monitored Ozone data exist at the Jonah site, which began data collection in November 2004; these monitored Ozone data would be useful for any additional model performance evaluations to be conducted.
WDEQ-AQD	106	TSD 5.4.1		General Comment	Any significant deficits in the emissions inventory, particularly NOx, CO, and VOC emissions, could partially explain the model's tendency to under predict Ozone concentrations in areas such as the Upper Green River Basin (Pinedale monitor). Based on the various comments provided by the Air Quality Division that relate to underestimates of, or omissions of project, RFD, and RFFA emissions, in the modeling analyses, it is recommended that a thorough evaluation of the emissions inventories be conducted to ensure that adequate quality assurance exists in all components of the emissions inventories that were developed as inputs to the model. Some discussion of the verification process that was employed to ensure the data was quality assured would also be useful.

Commenter	Comment#	Section	Page	Paragraph / Line	Comment
WDEQ-AQD	107	TSD 5.4.1	C-145 thru C-151	Figure 5-16 thru 5-22	Please include a base map overlay showing the Moxa Arch Area (MAA) on all of these maps. Also, please label all pertinent Wyoming counties and adjacent states, as applicable, for additional clarity. Please include a scale (including units of distance), a direction indicator, such as a "North pointing" arrow, and axes units and labels, as applicable.
WDEQ-AQD	108	TSD 5.4.1.1	C-145	1st Paragraph, Last Sentence	Each alternative must be analyzed since a proposed alternative was not selected; the High Core scenario would need to be modeled explicitly to be considered as an alternative.
WDEQ-AQD	109	TSD 5.4.2.2	C-148	1st Paragraph, 1st Sentence	Change Figure 5-18 to Figure 5-20.
WDEQ-AQD	110	TSD 5.4.2.2	C-148	1st Paragraph, 3rd Sentence	The 2002 Base Case (4 km grid) being discussed relates to Figure 5-7, where the maximum Ozone predicted was 83.7 ppb, not Figure 5-8 as shown. Additionally, the maximum value which occurred in northeastern Utah was 108.6 ppb (12 km grid); please revise this sentence accordingly.
WDEQ-AQD	111	TSD 5.4.2.2	C-149	1st Paragraph, 1st Sentence	Change Figure 5-20 to Figure 5-21.
WDEQ-AQD	112	TSD 5.4.3...	C-150 thru C-153	Incremental Ozone Analysis	The Incremental Ozone sensitivity analysis is confusing and unnecessary and should be removed from the document. The 75 ppb background provided by AQD is not the "baseline," but the average of the fourth-highest daily maximum 8-hour ozone concentration. This number was provided because it is for comparison to the Ambient Air Quality Standard. Using this number in an additive manner is wholly inappropriate. Ozone is a secondary pollutant - based on chemical interactions of primarily VOC and NOx concentrations. While it may be scientifically sound to add primary pollutants such as NOx and VOCs, the adding of secondary pollutants has no scientific basis.
WDEQ-AQD	113	TSD Appendix A	A-11 & A-155	Tables F1.1.8 and F1.3.8	Please explain the inconsistency between these tables (i.e., drilling time).

<b>Committer</b>	<b>Comment#</b>	<b>Section</b>	<b>Page</b>	<b>Paragraph / Line</b>	<b>Comment</b>
WDEQ-AQD	114	Appendix B - Cumulative Emissions Inventory	B-25	Table B4.1.5	RFD List is inadequate. Emissions are grossly underestimated for the Pinedale Anticline Project, Atlantic Rim and others. Underestimating the RFD indicates that the cumulative impacts may also be underestimated.