

EXHIBIT A



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Via Electronic Mail and U.S. Mail
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Re: Battlement Mesa Health Impact Assessment (2nd Draft)

Dear Dr. Witter:

Please find enclosed the comments of Antero Resources Piceance Corporation (“Antero”) on the Second Draft of the Battlement Mesa Health Impact Assessment that was released on March 1, 2011.

Attached to the main body of our general comments are a series of additional documents that provide more detail and support. These additional documents include an article from InsideEPA.com (Attachment A); a report prepared by ENVIRON International Corporation (Attachment B); a Response to Recommendations, which catalogs Antero’s specific responses to the recommendations made in the Second Draft HIA (Attachment C); a chart entitled “Recommendations – Regulations Comparison Chart,” which compares the recommendations with existing laws and regulations (Attachment D); a memorandum regarding existing protections for ambient air quality (Attachment E); a copy of a letter that Antero has provided the Garfield County Board of County Commissioners along with Antero’s comments (Attachment F); and, finally, a report prepared by S.S. Papadopolus & Associates that concludes that natural gas production in the Battlement Mesa and Gravel Trend areas has not impacted the quality of groundwater that serves as a potable water supply (Attachment G).

Hard copies of Antero’s comments and all attachments are being mailed to both you and the Garfield County Board of County Commissioners.

Very truly yours,

Kevin Kilstrom
Vice President—Production

**COMMENTS ON THE SECOND DRAFT OF THE
BATTLEMENT MESA HEALTH IMPACT ASSESSMENT**

Submitted by:

Antero Resources Piceance Corporation

April 27, 2011

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	ii
I. INTRODUCTION	1
II. BACKGROUND	3
A. Procedural	3
B. Objectives, Scope and Conclusions of HIA.....	4
III. COMMENTS.....	5
1. The HIA Lacks Site-Specific and Project-Specific Analysis	7
2. The HIA Inappropriately Assumes Maximum Exposure	7
3. The HIA Exaggerates Cancer Risk.....	8
4. The HIA Exaggerates Non-Cancer Risk.....	10
5. The HIA’s Baseline is Based on Inadequate Information	11
6. The HIA Fails To Consider the Likelihood of Adverse Impacts.....	12
7. The HIA’s Recommendations Are Devoid of Efficacy and Cost Considerations.....	14
8. The Recommendations Are Arbitrary and Inconsistent.....	15
9. The HIA Lacks Objectivity.....	17
10. The HIA Misstates Facts.....	19
11. The HIA’s Recommendations Fail to Consider COGCC and CDPHE Regulations and the Appropriate Role of the Board.....	22
12. The HIA’s Recommendations Fail To Adequately Consider Antero’s BMPs.....	25
IV. CONCLUSION.....	27

EXECUTIVE SUMMARY

Antero Resources Piceance Corporation (“Antero”) submits the following comments on the Second Draft of the Battlement Mesa Health Impact Assessment (the “Second Draft HIA”) prepared by the Colorado School of Public Health (“CSPH”). Antero believes that the Second Draft HIA is seriously flawed and does not present an adequate basis for evaluating the potential health impacts of Antero’s proposed gas operations in the Battlement Mesa PUD or the measures proposed to mitigate those impacts.

The HIA authors admit that there is not sufficient data to quantify potential health impacts but conclude nevertheless that chemical releases to ambient air, and to a lesser extent surface water, would present increased health risk to residents living near Antero well pads in Battlement Mesa. Based on this conclusion, and on generalized data regarding other potential community and societal impacts resulting from increased activity levels, the Second Draft HIA proposes seventy recommendations for the Board to implement in connection with its consideration of Antero’s special use permit in order to mitigate the presumed potential risk.

These conclusions are unfounded, both as to the potential health impacts and as to the appropriateness of the recommendations. They reflect a predetermined assumption on the part of the HIA authors that gas operations are harmful to human health, rather than a scientifically valid and objectively confirmed set of findings that Antero’s proposed operations will cause adverse health impacts to the residents of Battlement Mesa.

Antero's concerns are summarized as follows:

1. The Second Draft HIA fails to adequately consider readily available (a) site-specific information, such as local topography, local meteorological conditions, and characterization of the sources of emissions, which is essential in determining a reasonable range of exposure point concentrations for assessing impacts to human health, and (b) project-specific information, such as the effect of existing regulations governing Antero's operations and the Best Management Practices ("BMPs") that Antero has voluntarily proposed by Antero to mitigate potential impacts.
2. The Second Draft HIA uses scientifically invalid methodology to exaggerate both cancer risk and non-cancer risk from Antero's proposed operations.
3. The HIA authors rely on what they admit to be limited and inadequate baseline data to reach highly speculative and largely unfounded conclusions about likely impacts.
4. The HIA authors do not quantify or otherwise evaluate the actual likelihood of adverse impacts. Instead, they simply posit that, by reducing or eliminating the proposed activities, the potential impacts from those activities will necessarily be reduced.
5. The HIA authors recommend protective measures that either ignore, go beyond, or in some cases conflict with existing regulations in order to implement their vision of appropriate regulatory control, which they believe should be in most respects the responsibility of Garfield County to implement, a role for which the County does not have legal authority, expertise or resources.

6. The Second Draft HIA does not contain any analysis of whether the proposed recommendations are appropriate, necessary or sufficient to reduce the speculative impacts identified. There is no consideration of practicalities, cost, or technical feasibility of the recommendations.

7. The assessments of risk in the Second Draft HIA are arbitrary, inconsistent and lack transparency. Rather than evaluating the potential risk of the identified stressors based upon the information available, the authors rely on public perceptions of risk in arbitrarily assigning priorities for mitigation measures.

8. In their preparation of the HIA and their responses to comments, the authors reveal a predetermination that gas operations necessarily negatively impact public health, and have demonstrated resistance to comments that challenge this preconception.

9. The Second Draft HIA misstates critical facts that drive assumptions regarding potential impacts.

10. The Second Draft HIA fails to consider the mitigating effects of implementation of the voluntary BMPs proposed by Antero. At the same time, the document undermines the utility and effectiveness of the BMPs as flexible, adaptive, site-specific mechanisms by recommending that the Garfield County Board of County Commissioners (the “Board”) require all BMPs for all operations.

In all of this, the HIA authors betray a fundamental misunderstanding of the functioning of the natural gas industry and propose an overreaching, unrealistic and unnecessary role for the County to address hypothesized impacts having no objectively verifiable foundation. The Board should reject the HIA as a reliable basis for decision-making in connection with the permitting of Antero’s operations. Antero will continue to

work constructively with the Board and the citizens of Battlement Mesa to implement protective measures that address public concerns and insure that its operations are conducted safely and with minimum impact on the community.

I. INTRODUCTION

Antero submits the following comments on the Second Draft HIA that the CSPH released for public comment on March 1, 2011, along with its accompanying Human Health Risk Assessment (the “HHRA”).

Antero remains committed to working with Garfield County, the Colorado Oil & Gas Conservation Commission (“COGCC”), the Colorado Department of Public Health and Environment (“CDPHE”), and the citizens of Battlement Mesa and other communities within Garfield County to address concerns raised by its operations. Antero has actively participated throughout the HIA process and has actively engaged the community of Battlement Mesa. The participation has included attendance at more than twenty public meetings and the submission of environmental data, extensive proposed BMPs to address community concerns that go beyond legal requirements, and comments on the First Draft of the HIA (the “First Draft HIA”).

Antero remained optimistic that this process would yield a scientific, objective and valid assessment that would inform the stakeholders of the likely impacts and appropriate mitigation measures associated with Antero’s planned operations within and around the Battlement Mesa Planned Unit Development (“PUD”). Antero was disappointed to learn over the last several months, however, that the HIA authors would not seriously consider Antero’s or other comments on the Second Draft HIA and that, irrespective of their merit, such comments would not likely alter their findings, conclusions and recommendations. On March 17, 2011, the HIA authors submitted a written response to Antero’s request for an extension of the comment period for the Second Draft HIA, in which they stated:

- Any additional data provided by Antero or WSCOGA at this time is not likely to substantively change the recommendations of the HIA.
- The industry focus on the risk assessment is not likely to substantively change the recommendations. Differences [] regarding [the] risk assessment w[ere] addressed in the second draft.
- Any assumptions made by WSCOGA/Antero consultants with regard to alternate risk assessment methods and proposed mitigations are not substantiated. Although manipulation of assumptions may result in lower risk numbers, these alternate risk assessments will not substantively change our recommendations.

See CSPH Response to Second Public Comment Extension Request at 3. These statements reflect a pre-ordained and obdurate attitude on the part of the HIA authors that is both antithetical to sound policy and science and indicative of bias. In the face of the HIA authors' stated unwillingness to consider revision of the Second Draft HIA in a manner that would ensure its scientific integrity, Antero's latest round of comments focus less on the ways in which the Second Draft HIA can be improved, and more on the document's inadequacies and scientific shortcomings, so that anyone considering use of the document¹ has a correct and balanced view of the matters addressed and a complete picture of the document's deficiencies. Important public policy decisions and significant economic impacts to the community are at stake.

¹ Antero has also recently learned, in part from statements the HIA authors have made to the press, that the Battlement Mesa HIA could be used (1) as a model for the United States Environmental Protection Agency ("EPA") and other federal agencies in regulatory decision-making, (2) as a model for other researchers and activist groups contesting oil and gas operations across the United States, and (3) as a litigation tool by plaintiffs' lawyers bringing civil lawsuits against oil and gas companies. See Bridget DiCosmo, *Colorado Study Emerges as Model for Assessing Health Effects of Drilling*, Inside EPA.Com, April 14, 2011 (attached hereto as Attachment A). Any such use would be misguided considering the fundamental flaws of the HIA.

II. BACKGROUND

A. Procedural

In October 2009, the Battlement Mesa Concerned Citizens (“BMCC”), an organization affiliated with the Grand Valley Citizens Alliance, presented a petition to the Board, COGCC and CDPHE requesting them to “defer any permitting decision related to natural gas exploration and/or production within the Planned Unit Development (PUD) of Battlement Mesa until a thorough study of public health, safety and welfare concerns associated with urban natural gas development has been completed.” On November 6, 2009, the BMCC sent a letter to Ms. Meisner and Mr. Rada, both with the Garfield County Public Health Department, requesting that the County and State conduct a health impact assessment before a special use permit is approved for any drilling operations within the Battlement Mesa PUD.

In December 2009, the Board held a work session at which Mr. Rada presented information regarding the development of a health impact assessment and information regarding his preliminary discussions with the CSPH, with whom Mr. Rada was familiar. At the conclusion of the work session, the Board directed Mr. Rada to continue his conversations and obtain more information from CSPH regarding a potential health impact assessment. On February 16, 2010, after further conversations with CSPH and after a stakeholder meeting with interested participants, Mr. Rada and CSPH presented additional information regarding the proposed health impact assessment to the Board. At the February 16, 2010 hearing, the Board authorized initiation of and funds for the Battlement Mesa HIA to be completed by CSPH.

Throughout the spring and summer 2010, Antero met with the authors of the HIA; and the HIA authors communicated with other stakeholders to obtain information and

insight into the proposed gas activity in and around Battlement Mesa. In September 2010, the First Draft HIA was released for public and stakeholder comment. The authors presented the First Draft HIA to the Board in October 2010. The public comment period was extended to November 15, 2010. Antero provided comments to the First Draft HIA on November 15, 2010. In December 2010, based in part upon concerns expressed by Antero, CDPHE, the West Slope Colorado Oil and Gas Association (“WSCOGA”) and others, the Board requested that finalization of the HIA be postponed and that additional stakeholder meetings occur.

Throughout January and February 2011, the CSPH held additional meetings with the various stakeholders. The Second Draft HIA was released on March 1, 2011. On March 21, 2011, pursuant to a request by Antero (supported by WSCOGA), the Board extended the comment period until April 27, 2011.

B. Objectives, Scope and Conclusions of HIA

The Second Draft HIA describes the two primary objectives of the HIA as follows: (1) identify ways in which Antero’s proposed natural gas development project can affect the health of the Battlement Mesa residents; and (2) develop a priority list of recommendations to minimize the potential health impacts of Antero’s proposed project. Second Draft HIA, Executive Summary at ES-I. The Second Draft HIA identifies eight areas of concern: (1) air pollution; (2) water and soil contamination; (3) traffic from industry; (4) noise and light pollution; (5) community wellness; (6) economic impacts; (7) impact on the healthcare system; and (8) accidents and malfunctions. *Id.*, at ES-I.

The Second Draft HIA broadly concludes that natural gas development in Battlement Mesa could, *potentially*, affect each of the eight areas of concern and human health. *Id.* (emphasis added). According to the Second Draft HIA, the authors used

existing data to conduct quantitative and qualitative analyses in the eight areas of concern, as well as to describe the baseline conditions in Battlement Mesa. *Id.* According to the Second Draft HIA, this data included “Garfield County air monitoring data and related reports, resident statements of health effects related to the nearby natural gas activities, and health studies that explore the effects of chemical exposures.” *Id.*, at ES-II. The Second Draft HIA states that the baseline conditions are a one-time “snapshot” of Battlement Mesa resident health and environmental quality – and may be useful not only for the HIA, but as a comparison point for future studies. *Id.*, at ES-I.

The Second Draft HIA states that “[t]he principal findings of the HIA are that health of Battlement Mesa residents will most likely be affected by chemical exposures, accidents/emergencies resulting from industry operations, and stress-related community changes.” *Id.* The conclusion regarding chemical exposure is based largely on the HHRA, which concludes that chemical releases to ambient air, and to a lesser extent surface water, would present increased health risk to residents living near Antero well pads in Battlement Mesa. *Id.*, App. D, Human Health Risk Assessment at 64-65. The Second Draft HIA provides more than seventy specific recommendations to address these potential health impacts.

III. COMMENTS

We discuss below the general comments Antero has regarding the Second Draft HIA. We attach a series of additional documents that set forth Antero’s more detailed comments, which we incorporate by this reference. Attachment B is a report prepared by ENVIRON International Corporation, one of the nation’s leading environmental consulting firms with a specialty in risk assessment (the “ENVIRON Report”).

Attachment C catalogs Antero’s specific responses to each of the recommendations made in the Second Draft HIA (the “Response to Recommendations”). A chart entitled “Recommendations – Regulations Comparison Chart” is included as Attachment D and shows that virtually all of the recommendations in the Second Draft HIA are already addressed by existing CDPHE and COGCC regulations and other existing law.

Attachment E is a Memorandum regarding Existing Protections for Ambient Air Quality, which explains how the federal Clean Air Act, its Colorado equivalent and the regulations under both statutes are specifically designed to protect human health and how, under Colorado law, the Board is preempted from enacting, promulgating or enforcing limitations on hazardous air emissions. We include, as Attachment F, a letter that Antero has provided the Board related to the Second Draft HIA. And, finally, we include, as Attachment G, a report prepared by S.S. Papadopolus & Associates that concludes that the Thyne study, upon which the HIA authors rely upon for their conclusions regarding groundwater, is mistaken.

In summary, as currently drafted, the Second Draft HIA is fundamentally flawed, lacks the appropriate scientific basis, and proposes numerous overreaching and unfounded recommendations. The shortcomings of the Second Draft HIA are so extensive that it must be completely redrafted if it is to serve its intended purposes. If the Second Draft HIA cannot be redrafted, either due to the unwillingness of the authors, a lack of additional funds, or any other reason, the document should not be endorsed or used by the Board, any other Garfield County entity, COGCC, CDPHE, other regulatory agency, or any member of the public as a reliable indication of actual risk or appropriate

mitigation measures. It should in fact be disavowed by the Board as serving no effective public protection purpose.

1. The HIA Lacks Site-Specific and Project-Specific Analysis

One of the most glaring problems with the Second Draft HIA is its failure to adequately consider site-specific and project-specific information that was readily available. Site-specific information that was available but ignored includes local topography, local meteorological conditions, and characterization of the sources of emissions – information that is essential to determine a reasonable range of exposure point concentrations, which in turn are indispensable to any reliable conclusions about risk to human health and the need for mitigation measures. Project-specific information that was not sufficiently considered includes the many existing regulations that will govern Antero’s operations (see Part III, § 11 *infra*) and the many BMPs that Antero provided the HIA authors along with environmental monitoring data. These BMPs include such measures as increasing the minimum set-back distance between pads and residential areas from 350 feet to 500 feet, covering the ponds at the central water storage facility, use of a low emissions flow-back process and a host of traffic mitigation measures. (See Part III, § 12 *infra*.) The failure to adequately consider these specific site conditions and operational measures creates a major disconnect between the Second Draft HIA and reality, thereby vitiating any value the HIA and HHRA may have for making informed decisions.

2. The HIA Inappropriately Assumes Maximum Exposure

The HHRA or quantitative risk assessment includes a “maximum exposure” case, which relies on the maximum concentration ever measured in air in or near Battlement Mesa. In developing this scenario, the HHRA applies compound worst case assumptions resulting

in unrealistic exposure and risk estimates. The use of a “maximum case” is inconsistent with USEPA community risk assessment guidance and should be eliminated. *See* USEPA, Air Toxics Risk Assessment, Vol. I, Pt. I, Ch. 3, § 3.2.3 at 3-5 (April 2004), available at http://www.epa.gov/ttn/fera/risk_atra_main.html (“**Devise Realistic Exposure Scenarios.** Risk management decisions should be based on realistic exposure scenarios, rather than on the hypothetical **maximum exposed individual** (MEI)”) (emphasis in original). If the intent of the HHRA is to provide a range of risks, rather than using the maximum theoretical case, EPA recommends evaluation of the “central tendency” or reasonable average for the lower end of the range, and a “*plausible* worst case” for the high end of the range. *See* USEPA, Air Toxics Risk Assessment, Vol. 3, Pt. III, Ch. 8, § 8.2 at 8-6 (April 2006) (emphasis added). The estimate labeled “95% UCL” in the HHRA serves as the high-end case. However, by providing the 95 percent UCL and maximum case side-by-side in the result tables and graphs, the HHRA suggests that both are valid risk estimates even though the maximum case is unrealistic. *See* Second Draft HIA, App. D, Figure 7-2, Summary of Excess Lifetime Cancer Risk.

3. The HIA Exaggerates Cancer Risk

Even if one ignores the unrealistic maximum case, the HIA authors still conclude that there will be an increased risk of cancer to Battlement Mesa residents living “nearby” (arbitrarily defined as within one-half mile) Antero’s well pads due to breathing ambient air affected by emissions from the company’s operations. *See, e.g.*, Second Draft HIA, § 5.1.4 at 38. Notably, the HIA authors acknowledge that the increased cancer risk they calculate for nearby residents *is within the range that EPA finds acceptable* (1×10^{-4} to 1×10^{-6} excess lifetime cancer), and further that the cancer risk to persons who live farther

away is similar to the risk that would exist without Antero's operations. *See id.*, App. D, §§ 5.3.2 at 38 (first bullet), 45 and 7.2 at 66.

The manner in which the HIA authors calculate an increased cancer risk to nearby residents is flawed and unreliable for a number of reasons. First, the calculations were based on an inappropriate comparison of measurements taken near Silt, Colorado (in an area known as Bell-Melton Ranch) to levels measured by Antero and CDPHE in the Battlement Mesa area itself. The chemicals measured in the two sets of data do not match. Specifically, the two chemicals that drive the cancer risk estimate at the Bell Melton Ranch monitoring site (1, 4-dichlorobenzene and methylene chloride) have never been measured at the Battlement Mesa monitoring station. *Id.*, App. D § 7.2 at 66 (third bullet). As the HIA authors themselves openly acknowledged in the First Draft HIA, "it is not appropriate to directly compare" cancer risk where the list of chemicals measured were not the same in the data sets used to derive the risk estimates. First Draft HIA, App. D at 37. In order to make a fair comparison, one must use the same list of chemicals. Doing so in this case, as demonstrated in the comments of ENVIRON and admitted by the HIA authors in buried text of the Second Draft HIA, reveals that the estimates of risk to residents "not living near" pad sites is actually *less* than the risk that would exist in the absence of Antero's operations (i.e., baseline). *See* ENVIRON Report, § 2.2.1 at 9-10; Second Draft HIA, App. D, § 7.2 at 66 (third bullet). Further, if the appropriate comparison is made, there is virtually no difference in expected cancer rates between baseline and operating conditions (55 cancers per one million (baseline) vs. 56 cancers per one million (operating)). *See* ENVIRON Report, § 2.2.1 at 9. Accordingly, if the

HIA authors had assessed cancer risk properly, they would have concluded that there is no increased cancer risk associated with Antero's operations.

A second reason why the HIA authors are wrong in concluding that the air pathway presents an increased cancer risk is the inappropriate extrapolation of monitoring data collected at locations within a few hundred feet of the well pads to represent conditions up to one-half mile (2,640 feet) away. This is clearly unacceptable methodology and serves only to exaggerate the actual risk. It is an elementary principle of physics that air concentrations at ground level decrease as distance from the source increases, and that measurements taken 200 feet away from a source will be substantially higher than those taken at distances more than ten times away. The only way to reliably extrapolate data from measurements taken adjacent to the well pads to more remote distances is to perform air transport modeling, which could have been done relatively easily with readily available data. *See id.*, Executive Summary at 2-3, §§ 2.1.1 at 5, 2.2 at 8 and n.4, 3.2.1 at 24, 3.8.2 at 44. It is no excuse for the HIA authors to claim that they did not have enough time or budget to perform simple air transport modeling, when they have taken more than a year and spent hundreds of thousands of dollars in preparing the HIA drafts.

4. The HIA Exaggerates Non-Cancer Risk

The HIA and HHRA properly acknowledge that no *chronic* non-cancer adverse health effects are anticipated from the proposed Antero project. The conclusion that there may be adverse *acute* and *sub-chronic* non-cancer health impacts is contrary to the evidence and results from a combination of calculation errors, the inappropriate use of toxicity data, and the improper use of measurement data. *See id.*, Executive Summary at 4 and § 2.2.3 at 11-14. By way of illustration, the highest hazard index estimated in the

HHRA results from a child making contact with surface water. In reality, the calculated chemical concentrations in surface water are so low that all but one chemical is predicted to have concentrations less than the federal drinking water standard. The discrepancy arises because of an apparent 100-fold error in the exposure calculation.² In addition, the inappropriate use of acute toxicity values has led to the paradoxical conclusion that benzene can be inhaled for 20-months without ill effect, yet a short-term exposure to benzene at the same concentration will produce potential adverse health effects. *See id.*, § 2.2.4 at 16, n.8. The HIA authors have also arbitrarily selected measurement values that are acknowledged outliers (e.g., formaldehyde) to represent probable exposure concentrations for nearby residents, which produces sub-chronic risks that are demonstrably incorrect. *See id.*, § 2.2.3, Figure 2. Finally, as previously mentioned, the HIA authors have relied on maximum concentrations of chemicals detected from multiple sampling events that are disconnected in time and space and bear no relationship to actual exposure at any given time or location.

5. The HIA's Baseline is Based on Inadequate Information

An accurate understanding of baseline conditions is critical to any assessment of the likely impacts of Antero's operations on human health, yet the HIA authors repeatedly acknowledge that they do not have sufficient baseline information. *E.g.*, Second Draft HIA, Executive Summary at ES-IV to V,³ §§ 2.1 at 10-11, 5.1.3 at 36-37.

² In assessing the risk of acute exposure to chemicals in surface water, the HHRA assumes that a child completely immerses his hands, arms, feet and legs in a puddle continuously for two hours a day for seven straight days and that dermal permeability is constant over such period. Using the equations provided in the HHRA and review of the literature that the HHRA cites, the dermal intake estimates appear to be overstated by a factor of 100. *See* ENVIRON Report, § 3.8.3 at 50 (fourth bullet).

³ "Neither the health data nor the environmental data that were available to us were sufficient to make specific predictions about expected health impacts." Second Draft HIA, Executive Summary at ES-IV to V.

Rather than deferring any conclusions about probable impacts until adequate information is gathered, the HIA authors plow ahead and use limited data to reach highly speculative and largely unfounded conclusions about likely impacts. A prominent example arises in the discussion about the risk posed by chemicals in the air. The Second Draft HIA uses data collected from a single location (the Battlement Mesa Fire Station) and a period of only three months (September 2010 to November 2010) to represent conditions for the entire year at all potential receptor points. *See* ENVIRON Report, § 3.1.2 at 21. Another example is the failure to account for development that would occur in the absence of Antero's planned operations, such as that which may originate from other gas development in the area or from development in other sectors of the community or local economy. *See id.* at 22.

6. The HIA Fails To Consider the Likelihood of Adverse Impacts

The Second Draft HIA essentially fails to conduct a critical step of the HIA process – that of assessing the estimated likelihood of the potential impacts. The HIA is replete with speculative and generalized statements, unfounded assumptions and thin causal connections regarding potential impacts, the likelihood of the potential impacts and the recommendations proposed to reduce the risks from potential impacts. In one instance, the Second Draft HIA states:

[i]t is not known if current set back [sic] distances from a well pad to residences are sufficient to protect the public from chemical exposures that may result in short or long term health effects. Therefore, steps should be taken to decrease emissions from all sources and wherever feasible increase the distance between well pads and roads and residences to and schools.

Second Draft HIA, Executive Summary at ES – III-IV. Despite the acknowledgement that the authors lacked information regarding the sufficiency of current set-back

distances, the Second Draft HIA assumes (without evidence) that set-back distances from well pads are not sufficient to protect the public. Based on this assumption, the Second Draft HIA then recommends re-design and emission controls to mitigate the potential risk – despite acknowledging that there may not be a risk. The recommendation thus has no foundation other than a general, unscientific notion that, by reducing or eliminating an activity, the potential impacts from that activity will inherently be reduced. It was not necessary to incur the costs of the HIA drafts to come to such an obvious conclusion. The more relevant question is whether the demonstrated risks from the activity, and the demonstrated benefits from restricting the activity, outweigh the costs of the restrictions. No such analysis was undertaken.

In another part, the Second Draft HIA states that air pollution is a known hazard to public health. *Id.*, § 3.1 at 12. The Second Draft HIA then states that the natural gas industry produces large amounts of air pollutants. *Id.* Accordingly, the Second Draft HIA concludes that the Antero project has the potential to pollute the air and negatively impact the public health in Battlement Mesa. *Id.* The Second Draft HIA arrives at this conclusion even though it recognizes that “[c]urrently, there is not enough information to determine whether or not current federal, state, and COGCC regulations and rules are sufficient to protect public health from air pollution resulting from natural gas development and production in high population density areas such as the Battlement Mesa PUD.” *Id.* Notwithstanding this admission that the authors do not know whether the existing extensive regulatory framework at all levels of government is adequate to protect the public, the authors proceed to recommend protective measures that either ignore, go beyond or, in some cases, conflict with existing regulation in order to

implement their vision of appropriate regulatory control. It is as though the authors believe that natural gas activities are being encountered for the first time near a community and therefore a regulatory system must be developed to address a new phenomenon. In fact, as demonstrated in the Responses to Recommendations (Attachment C), the Recommendations - Regulations Comparison Chart (Attachment D), and the Memorandum Regarding Existing Protections for Ambient Air Quality (Attachment E), existing regulations at all levels of government are both comprehensive and sufficient to ensure protection of public health; and many of the Second Draft HIA's recommendations would be pre-empted or beyond the authority of the Board under well-established legal principles.

7. The HIA's Recommendations Are Devoid of Efficacy and Cost Considerations

As concerning as the methodology used to develop the recommendations in the Second Draft HIA is the fact that the Second Draft HIA does not demonstrate that the recommendations proposed are appropriate, necessary or sufficient to reduce any impacts from the anticipated gas operations. Prior to making project-specific recommendations, which if adopted would significantly drive-up costs and make some operations infeasible to conduct, the authors of the HIA should have analyzed the extent to which, if at all, recommendations would actually be effective in reducing the likelihood or scope of public health impacts. The HIA authors do not do so in the Second Draft HIA. Instead, the recommendations appear premised on the notion that assumed impacts should be mitigated to the greatest extent possible— without any regard to the actual level of additional protection needed or achieved, if any.

The Second Draft HIA also fails to consider the practicalities, cost, or technical feasibility of the recommendations. Although we understand that the HIA authors claim that they were instructed not to consider cost in undertaking their analysis, no serious analysis would omit a consideration of whether the costs incurred in implementing the recommendations are reasonable in light of the benefits to be obtained. *Cf.* Colo. Rev. Stat. §§ 24-4-105, -103, -103(2.5)(a)(I)-(V), -103(2.5)(b), -103 (4.5)(a)(IV) (Colorado Administrative Procedure Act provisions requiring agencies to consider costs in regulating parties and promulgating regulations). The Second Draft HIA fails to quantify even the benefits anticipated from the recommendations, much less the costs stemming from their implementation, and therefore provides no evaluation of the comparison. At a minimum, the Second Draft HIA should have made explicit, with each set of recommendations, the factors that were *not* considered in the recommendations such as cost and technical feasibility.

8. The Recommendations Are Arbitrary and Inconsistent

Many of the HIA's assessments are arbitrary, inconsistent and lack transparency. The evaluation of the stressors should focus on the assessment of potential risk based upon the information available. Instead, the characterization appears to emphasize public perceptions of risk or the apprehension of risk, even when those perceptions or apprehensions are not borne out by analysis. For example, with respect to accidents and malfunctions, the Second Draft HIA characterizes the duration of exposure as "short," the frequency of exposure as "infrequent," the likelihood of effects as "possible," and the magnitude of health effects as "low to high." Read together, these characterizations indicate that the likelihood of an impact or negative health effect from an accident or malfunction is not significant. However, the Second Draft HIA assigns accidents and

malfunctions a “high” priority rating because “of the possibility for severe injuries and death in the event of a catastrophic event.” Second Draft HIA, § 5.9.4 at 79. It is unclear why the authors of the HIA even characterize the frequency of exposure and the likelihood of effects if priority is going to be based solely on the potential for severe injury or death in a catastrophic event. More concerning is the fact that the Second Draft HIA does not evaluate the *likelihood* of such catastrophic events. As a result, the basis for prioritizing accidents and malfunctions as “high” is not informed by the analysis undertaken in the Second Draft HIA. One can agree that the consequences of a plane crash are catastrophic without determining to ban all air travel because the likelihood of a crash of any given flight is so remote.

Similarly, with respect to water and soil quality, the HIA authors characterize the frequency of exposure as “infrequent,” the likelihood of health effects as “unlikely,” and the magnitude of health effects as “low to high.”⁴ Despite the infrequent nature of exposure and the unlikelihood of health effects – and the extensive regulatory framework designed to prevent any deleterious impacts on water or soils – the Second Draft HIA characterizes the priority of addressing water and soil quality as “medium.” Again, it appears that this characterization is not informed by the analysis incorporated into the HIA, let alone the analysis not even undertaken.

The HIA authors also include recommendations for reducing impacts for all of the areas of concern – not merely those with a high or even medium ranking. Accordingly, the ranking appears to have no real meaning. The Second Draft HIA provides no logical

⁴ No basis is stated for the assumption that the magnitude of health effects is likely to be high. The Second Draft HIA’s assignment of a “high” health effect is arbitrary and inconsistent with the existing information and ongoing efforts by Antero. Water and soil quality are actively monitored pursuant to existing regulations and as part of Antero’s BMPs.

basis for evaluating recommendations or determining the weight that should be given to a particular stressor.

In conclusion, without significant revisions, the recommendations contained within the Second Draft HIA are arbitrary and unfounded and do not provide a usable platform for addressing the objectives originally expressed by the Board in commissioning the study.

9. The HIA Lacks Objectivity

The Preface of the HIA states that the “HIA is used to evaluate *objectively* the potential health effects of a project or policy before it is built or implemented.” Second Draft HIA, Preface at 1 (emphasis added). According to the Second Draft HIA itself, “HIAs are open processes that necessarily include stakeholder participation, review, and input as an essential part of the methods.” *Id.* at 1. As previously mentioned in these comments, the HIA authors have brought an inherent bias to this process. In their grant proposal to the Pew Charitable Trust (i.e., before the HIA authors began the HIA process), the authors of the HIA stated “[w]hile the connection between gas E&P hazards, exposures and health effects may appear obvious to those trained in public health, these connections are not immediately obvious to COGCC and GCBOCC.” Final Grant Application - Pew Charitable Trust, App ID. 109, available at [http://www.garfield-county.com/public-health/documents/Pew%20Grant%20Application-Final%20\[1\].10.10.pdf](http://www.garfield-county.com/public-health/documents/Pew%20Grant%20Application-Final%20[1].10.10.pdf). This statement evidences the HIA authors’ predetermination that natural gas operations necessarily negatively impact public health.

The bias and lack of objectivity of the HIA authors has not improved with time. Appendix F to the Second Draft HIA demonstrates a significant difference in the manner in which the HIA authors responded to concerned citizens in comparison to industry

representatives and even CDPHE. Specifically, the HIA authors expressed greater reluctance and hesitation to incorporate revisions or recommendations suggested by the industry. In contrast, revisions and recommendations suggested by citizens were frequently incorporated without additional analysis or assessment. Specifically, it appears that the HIA authors added at least the following recommendations upon the request of citizens without critical analysis:

- That the water storage facility and pipeline network be installed and fully functional prior to any drilling in the PUD
- That the Board assign a county inspector responsible for ensuring Antero complies with the special use permit and that the special use permit contain regulatory actions for non-compliance
- That actions be taken in the event of an odor event
- That the removal of mud from trucks occur before trucks leave the well pad site
- That the baseline quality of soil at each well pad be characterized prior to any activities and as part of closing the well pads
- That a separate haul route be built outside the PUD and that truck traffic be routed off Stone Quarry Road and other residential streets

The HIA authors further demonstrated their lack of objectivity by opposing Antero's request for an extension of the comment period. Third party contractors to government agencies (such as those preparing an Environmental Impact Statement for a federal agency) typically refrain from taking a position on procedural matters (like comment period extensions) before the agency or entity with which it contracts. Here, by

contrast, the authors vigorously opposed the extension, apparently because their minds were made up.

Giving lip service to the comment process is not enough. The authors of the HIA must be devoted to ensuring that the process is open and that the input from stakeholders is weighed evenly unless and until a more thorough analysis demonstrates the appropriate weight to be granted to the various inputs. The HIA was intended to be, and should be, a well-reasoned, peer-reviewed, scientific assessment to educate the Board and enhance its decision-making process. As conceived and drafted, the Second Draft HIA falls far short of that mark.

10. The HIA Misstates Facts

The HIA contains many overstated or misstated facts. These misstatements of facts affect the validity of the conclusions and recommendations in the Second Draft HIA. We provide several of the more egregious examples below:

- In Section 1.1, the Second Draft HIA states:

Whereas oil and gas development has historically taken place in locations that are geographically distant from human habitation (other than, perhaps, the housing for oil and gas worker themselves), it is increasingly common for drilling activities to occur in rural, suburban, and urban areas close to where people otherwise unaffiliated with the industry live, work and play.

Second Draft HIA, § 1.1 at 4. Contrary to the statement in the Second Draft HIA, oil and gas operations have historically taken place in areas of high density population in Texas, California, Oklahoma, Pennsylvania and even the Front Range of Colorado for decades, without the reported health effects feared by the authors. *See, e.g.,* Bill Toland, *Drilling in the City: Lessons from Texas, Part II*, *Pittsburg Post-Gazette* (March 2, 1011); Encana (Oil & Gas) USA, *Drilling*

Within City Limits, Solutions (Fall 2010) at 6; Branch, Melville C.(1972) “Oil Extraction, Urban Environment, and City Planning,” *Journal of the American Planning Association*, 38: 3, 140 — 154.

- In Section 3.1, the Second Draft HIA baldly asserts that “Antero’s recent well development activities on the Watson Ranch pad resulted in short term health impacts.” *Id.*, § 3.1 at 12. The Second Draft HIA cites no authority or evidence of such health impacts. Complaints about odors were made, but there has been no alleged or documented health impact from Antero’s activities at the Watson Ranch pad.
- The Second Draft HIA states that “the Mamm Creek Hydrological Study indicates some impacts to groundwater, such as increased levels of chloride and methane, from routine natural gas operations.” *Id.*, §§ 3.2 at 15, 5.3.2 at 41-42. This statement is based on a third-party characterization of the study, not on any findings in the study itself. Neither the Phase I nor Phase II Hydrogeologic Characterizations of the Mamm Creek Field Area (HIA References 19 and 20) indicate increased levels of chloride and methane from routine natural gas operations. In any event, the third-party summary of the Phase I and Phase II investigations (HIA Reference 18) was refuted in three presentations at the July 2009 COGCC Hearing. *See* Presentation by A. Gorody, *et al.*, for Bill Barrett Corp. and S. S. Papadopolus & Associates, Inc. (“SSPA”), available at http://cogcc.state.co.us/Library/Presentations/Glenwood_Sprs_HearingJuly_2009/GlenwoodMasterPage.html. In addition, SSPA, which was retained by the COGCC specifically to peer-review the Mamm Creek Hydrological Study,

refuted the claim in a Technical Memorandum SSPA submitted to COGCC in May 2010. Finally, and most importantly, SSPA has just recently completed a study designed to determine whether Antero's natural gas drilling and production activities have affected the quality of groundwater in the Battlement Mesa and Gravel Trend areas that is or may be used as a potable water supply. *See* Attachment G hereto. The conclusion of the report is that there has been no adverse impact from Antero's operations.

- In its discussion of Pavillion, Wyoming, the Second Draft HIA indicates that sampling of domestic water wells was conducted by EPA between 2009 and 2010. Second Draft HIA, § 5.3.2 at 42. The Second Draft HIA goes on to state, “[w]hile the groundwater contamination that occurred in Pavillion is not directly comparable to Battlement Mesa because of differences in the natural gas resource and state regulations, it does indicate that natural gas development and production can adversely impact groundwater quality.” *Id.* Contrary to the assumptions and statements in the Second Draft HIA, the presentation made by EPA to the citizens of Pavillion in August, 2010 states: “EPA has not made any conclusions about the sources of chemical compounds found in drinking water wells.”

<http://www.epa.gov/region8/superfund/wy/pavillion/PavillionPressRelease31Aug2010.pdf>.

- In Section 5.9.1, the Second Draft HIA states that, “[a]though the likelihood of an explosion involving a pipeline is small, persons in the community may be at risk for serious injury or death should such an incident occur.” *Id.*, § 5.9.1 at 77. The Second Draft HIA describes incidents in 2010 involving pipeline explosions in

Texas and California in which homes and lives were lost. The Second Draft HIA fails to acknowledge (or even identify) that the pipeline explosions that occurred in Texas and California involved high pressure natural gas transmission pipelines whose diameters were 30 to 36 inches. In comparison, Antero plans to construct much smaller natural gas gathering lines designed to operate at much lower pressure. The Second Draft HIA cites no examples of such lines exploding or causing significant injury or damage. The risks associated with these two distinct activities are not comparable, and conflating the two is misleading.

Each of these misstatements or overstatements of fact is relied upon, either directly or indirectly, in determining the potential for health impacts from natural gas operations in and around Battlement Mesa. These mistakes are significant and call into question the basic premises of the HIA and the experience of the HIA authors. Although we recognize that the Battlement Mesa HIA is the first HIA conducted by CSPH, there is no excuse for the absence of scientific rigor in creating their work-product.

11. The HIA's Recommendations Fail to Consider COGCC and CDPHE Regulations and the Appropriate Role of the Board

Even if one ignores the fundamental analytical flaws of the Second Draft HIA, the lack of consideration of the existing regulatory framework cannot be overlooked. The Second Draft HIA does not provide any analysis or meaningful discussion of the existing rules and regulations that govern the gas industry, which is one of the more highly regulated sectors of the economy in the United States, at all levels of government. Yet, in making recommendations, the Second Draft HIA does not hesitate to make recommendations that ignore, conflict with, or exceed existing regulatory requirements. The Second Draft HIA would make the Board the agency with primary responsibility for

overseeing the technical and operational aspects of natural gas development, a role for which the County does not have the legal authority, expertise, or resources.

For example, with respect to air quality, the Second Draft HIA states, without basis or explanation, that “we recommend the implementation of air pollution prevention measures some of which may be above and beyond those mandated in federal, state and COGCC regulations and rules as an integral part of Antero’s project” *Id.*, § 3.1 at 12. Similarly, with respect to water quality, the Second Draft HIA states, “we recommend the implementation of water and soil pollution prevention measures some of which may be above and beyond those mandated in federal, state and COGCC regulations and rules as an integral part of Antero’s project” *Id.*, § 3.2 at 15. These statements in the Second Draft HIA are puzzling given the fact that nowhere in the Second Draft HIA do the authors analyze existing federal, state and COGCC regulations or make any determination of whether they are insufficient to protect human health.

The HIA authors have noted in several forums that existing rules and regulations may not reflect the standards appropriate to protect human health. The HIA authors fail to consider, however, the extent to which existing regulations governing the natural gas industry were in fact developed to protect human health. The reality is that there is an extensive regulatory framework in place designed to protect public health, safety and welfare, and any serious analysis of the threats to public health has to take the extent of existing protection into account.

With respect to air quality, Congress, EPA, the Colorado General Assembly and CDPHE have put into place a comprehensive, complex framework related to criteria pollutants and hazardous air pollutants that is specifically designed to protect and reduce

the impacts on human health. *See* Attachment E. Similarly, the COGCC regulations were developed to protect public health. In 2007, the Colorado General Assembly passed legislation to “increase the Commission’s regulatory authority and oversight obligations to better address the potential adverse impacts that can accompany oil and gas development” and declared that it is “in the public’s interest to foster the responsible balanced development of Colorado’s oil and gas resources consistent with the protection of *public health*, safety, and welfare, including protection of the environment and wildlife resources.” *See* Statement of Basis and Purpose (“SBAP”), Specific Statutory Authority, and Purpose, New Rules and Amendments to Current Rules of the Colorado Oil and Gas Conservation Commission, 2 Colo. Code Reg. § 404-1 (emphasis added); *see also* Colo. Rev. Stat. § 34-60-102(1). In late 2008, COGCC adopted new rules, developed in consultation with CDPHE, to substantially enhance the protection of public health, safety, and welfare. *See* SBAP; *see also* Colo. Rev. Stat. § 34-60-106(11)(a)(II). The revised rules address areas of concern to public health, such as protection of drinking water supplies, reduction of odors, disclosure of chemicals and protection of groundwater, to name only a few, and require consultation with CDPHE on matters directly concerning public health. The HIA authors do not articulate a legitimate basis for not considering or relying upon the existing regulatory frameworks that have been established based on protection of human health.

But even if the authors were correct, and the regulations governing the natural gas operations were not designed to protect public health, counties and other local governments are not free to ignore those regulations and simply adopt their own. As demonstrated in Attachment F, local governments are pre-empted from implementing

measures that operationally conflict with those adopted by those agencies with the requisite statutory authority and expertise.

In general, the Second Draft HIA fails to account for the many human health-based regulations with which the natural gas industry must comply – both at COGCC and CDPHE. Attachment D summarizes the ways in which existing state and federal regulations and requirements already address most of the recommendations in the Second Draft HIA, certainly the majority of the recommendations addressing air and water quality. In addition, Attachment D describes the many Garfield County land use regulations that demonstrate the breadth of Garfield County’s existing standards that may be imposed upon oil and gas operations in Garfield County and that address many of the recommendations.⁵ There is no need – or legal basis – for the county to duplicate or make more stringent or attempt to enforce this existing regulatory regime.

We understand that the HIA authors may contend that an assessment or analysis of the existing regulatory framework was not within the scope of the analysis to be conducted. If the HIA is to be a useful tool for assessing the impacts of gas operations in the Battlement Mesa area, it must include an analysis of the existing regulations that address those impacts. Otherwise, the HIA is an entirely theoretical exercise offering no useful guidance to regulators or the public beyond that provided by existing regulations and operator proposed mitigation measures.

12. The HIA’s Recommendations Fail To Adequately Consider Antero’s BMPs

Antero understands that the residents of Battlement Mesa are concerned about the potential impacts of Antero’s operations on the community. Antero takes those concerns

⁵ The Battlement Mesa PUD contains specific standards or references to standards regarding the development of oil and gas operations within the Battlement Mesa PUD.

seriously, as evidenced by the over twenty public meetings that Antero has voluntarily held since 2009 to identify and address concerns of the Battlement Mesa community. As part of its efforts to address these citizen concerns, Antero has voluntarily agreed (even prior to initiation of the HIA) to implement significant steps in the form of BMPs that go beyond existing legal requirements to reduce the potential impacts from its natural gas operations. These BMPs will be incorporated on a site-specific basis as conditions of approval in permits issued by the COGCC and in the special use permit issued by the County, in accordance with each agency's respective areas of governance. The BMPs will allow both Antero and the governing agency the flexibility to address differing and changing circumstances over a variety of sites and over a period of time.

The HIA authors, however, misconceive the role of BMPs by recommending that the County simply require them to be implemented on a wholesale basis, without consideration of either the limits of County authority or expertise or the flexibility needed to apply them on a site-specific basis. The BMPs address many of the potential impacts raised by the Second Draft HIA, while providing Antero and the regulators greater flexibility to engage in adaptive management through the life of the gas operations. Attachment C contains numerous examples of how Antero's proposed BMPs – many based on Antero's experience in operating within communities in Garfield County and others based on public concerns - address the concerns reflected in the recommendations in the Second Draft HIA.

These BMPs will be considered as Antero proceeds through the permitting process before COGCC and the Board, and will provide technically feasible and economically effective mechanisms for mitigating potential impacts from Antero's gas

operations. Antero remains committed to updating those BMPs as new information becomes available, which will give the regulators and Antero a continuing basis for responding more effectively to demonstrated concerns.

IV. CONCLUSION

The Second Draft HIA and the HHRA upon which it is based were not prepared using scientifically sound methodology. Neither document presents a realistic assessment of likely impacts or risks associated with Antero's proposed project or the measures that should be taken to mitigate them. Accordingly, neither document should be relied upon by the Board or any other person or entity, including other decision-makers, in any assessment or regulation of Antero's natural gas operations.