



BMC B Pad

Alternatives Analysis (Supplemental Information)

The following expanded rationale for siting the BMC B pad location is being provided per the COGCC request received on May 31, 2016. This document is intended to provide additional, supplemental information to the Alternatives Analysis that was previously submitted with the Form 2A application. The Form 2A for the BMC B pad (24 gas wells) was submitted to the COGCC on December 7, 2015 to develop natural gas within the Battlement Mesa Planned Unit Development (BMPUD). The location is on the western boundary of the BMPUD (please refer to plats attached to the Form 2A for additional location detail).

BACKGROUND

Battlement Mesa (Garfield County, CO) since the late 1970s, was planned as an energy community and initially built to support oil shale and oil and gas development. Following the slow-down of oil shale development in the 1980s, Battlement Mesa continued to be an oil and gas community for the development of the Piceance Basin. Since the 1980s, Battlement Mesa has also been promoted as a retirement community, however as of the 2010 census, the average age of a Battlement Mesa resident is 37.5 and a good portion of its residents support the oil and gas industry. The area surrounding the BMPUD has had historic (since 1949) and considerable oil and gas development, particularly within the past 10 years.

The BMPUD was established under the modified 1982 Garfield County Resolution No. 82-121. The resolution allowed for the “extraction and processing of natural resources” in all zoned districts of the BMPUD. This resolution meets the intent of the Governor’s Task Force and regulations passed for Large Urban Mitigation Areas (LUMA) in March 2016, subsequent to Ursa’s permit application filed in December 2015. The intent of LUMA is that local government has an expanded role in permitting oil and gas locations, and that an Operator and local government have an existing agreement regarding siting of the location and it is within the scope of the agreement. A copy of the resolution was previously submitted to the COGCC.

At the time of the county resolution, 14 well pads were proposed within the BMPUD. Under Ursa’s predecessor in interest, pre December of 2012, the number of pads and associated infrastructure was reduced to 10. Since that time, Ursa has reduced the number of proposed well pads within the BMPUD to five (5) as part of a comprehensive development plan to occur in two phases. Phase I includes two locations (the subject application and the BMC D). Phase II will be the remaining three well pads.

Of the 197 wells Ursa proposes in the vicinity of the BMPUD, only 94 are proposed to be drilled from the five (5) pads within the BMPUD, including the 24 gas wells to be drilled from the BMC B Pad.

All pad locations within the BMPUD are subject to an amended Surface Use Agreement (SUA, 2009) executed between Battlement Mesa Partners, LLC (BM Partners) and Ursa Operating Company LLC (formerly Antero Resources). Said SUA establishes not only the BMC D pad location, but all of the remaining pad locations for the overall development of the BMPUD. This also meets the intent of the Governor’s task Force and implementing LUMA regulations, as the oil and gas facility is proposed within an approved site specific development plan that establishes vesting property rights and which expressly governs the location of the wells and production facilities on the surface estate. It should be noted that in working closely with Battlement Mesa Partners over the past several years, the comprehensive development plan considered many complex factors, including long-term community development plans and complex operational considerations. A copy of the SUA has previously submitted to the COGCC.

SITING CRITERIA

Several considerations and criteria weigh significantly in selecting locations to minimize potential impacts to human health, safety, and the environment (including wildlife). Proposed Best Management Practices (BMPs), developed on a site-specific basis provide an additional level of mitigation, in addition to Federal, state, county and local regulations, land use codes and permit conditions of approval (COAs) issued by the local government (in this case Garfield County). Potential criteria may vary on a site-specific basis and include (but aren't limited to) those listed below: Only those criteria applicable to the proposed and alternative locations are addressed:

Rule 604.c.(2).E.i. Production Facility Siting Considerations

- Location of proximate residences
- Surrounding topology and surface features
- Mitigation of nuisance conditions

Geology and Bottomhole Considerations

- Number of Bottom holes and approximate depths
- Rationale for selecting this location from a mineral development perspective

Technical and Operational Capability Issues

- Topography and accessibility of locations
- The ability to reach and develop bottom holes in an economic and technically feasible manner using proven technologies
- Water availability, transportation and management options
- Seasonal and weather constraints along with timeframe to develop (construct, drill, complete, produce)

Existing Mineral Leasing, Surface Owner Contractual Considerations

- Mineral leasing agreement(s)
- Surface owner Surface Use Agreement (SUA) provisions and preferences (w/landowner conflicts)
- Potential local/regional conflicts with future development by a landowner
- Prior existing rights and encumbrances (both public and private)
- State and county land and easement cultural setback requirements (i.e. COGCC exception/buffer zones)

Community Health and Safety Concerns

- Traffic safety including transportation and haul routes
- Proximity to distance of the location from building units, schools, public buildings, etc.
- Community events that may affect scheduling (if known)
- Health studies and assessments

Regulatory Considerations Affecting Siting

- Existing Federal, state, county and local regulations and land use codes
- Minimizing the level of disturbance associated with pads, roads, pipelines, etc.
- Ongoing regulatory changes at the Federal and state level creates significant uncertainty affecting and Operator's ability for long-term development of comprehensive plans. Significant regulatory changes in Colorado since 2008 has made the state one of the most advanced in protecting public health, safety and the environment. (Recognized by Matt Sura)

Environmental Considerations

- Potential natural resource impacts to sensitive areas, public water supplies, wetlands, floodplains
- Potential for nuisances including traffic, odors, noise, air emissions, etc.
- Sensitive area, natural resource, environmental and wildlife concerns
- Potential environmental and wildlife concerns



SITING ANALYSIS

Rule 604.c.(2).E.i. Production Facility Siting Considerations

The location of the production facilities has been determined based on several criteria. First, the existing SUA as discussed above expressly governs the location of the production facilities on the surface owner's land. Second, placement of the production facilities along the western edge of the pad surface is the preferred location as the proposed production and injection tanks will be greater than 1000' from all proximate residences (except the Burke residence, which Ursa has obtained a waiver from) and all equipment is located as far as possible from the Colorado River 317B public water supply internal buffer area. Location of facilities in this area also provides both visual (line of sight) and sound mitigation based on the topology of the area and the location of the residences in the vicinity.

Shifting of the production facilities to the north edge of the pad would place the equipment closer to the Colorado River and internal buffer area of the 317B public water supply. Relocation of the production facilities to the eastern side of the pad would also place the equipment closer to the Colorado River and associated 317B internal buffer area. Additionally, placement on the east side of the pad would move equipment closer than 1000' to homes and toward the wetland area north of the pad location. Based on this information, the production and injection tanks already meet the requirement to be 1000' or more from the nearest residence. The location of the remaining production equipment (separators and combustor) are situated on the pad location as far as possible from residences in the vicinity while still maintaining proper safety setback as required per the 600-series rules. There are no feasible production facility locations within the abutting lands that would move the equipment further than the current distances from building units and allow maximum mitigation of nuisance conditions.

Ursa has invested significant capital in having a third-party sound study conducted and report generated for site-specific BMC B pad conditions. The sound study report is being included with this analysis as supplemental information to further support the proposed location of the BMC B pad production facilities. (Please note, Attachment A to the report is available as part of the approved Garfield County application materials and is not included here-in due to the size of the file at 100+ pages.)

Geology and Bottomhole Considerations

Consideration was given to the location most likely available to reach all bottomholes from a single well pad vs. multiple pads. The "drill radius" is the maximum radius that the furthest well bottomholes can be reached from the proposed location. In addition to the BMC B pad being the preferred location under the SUA, this location was best suited to reach all bottomholes, while maintaining maximum distances from building units and subdivisions. All wells except for one are being drilled in locations under the subdivisions to the east of the location. Situating the pad further east would conflict with the BMC D pad location that also will reach bottomholes under the BMPUD. In addition, an alternate location was not planned within the context of development of the BMPUD. The remaining criteria affecting the pad location are discussed in subsequent sections below. Please note that a potential injection well is proposed at this location in the future but is not within the scope of the current Form 2 permit applications.

Technical and Operational Feasibility

The location of the well pad and access road will have minor cuts and fills due to gradually sloping topography and would be the most suitable location in the vicinity in order to reach all bottomholes. Siting the location to the north was eliminated because it would require construction and operations closer to the Colorado River and a 317B public drinking water supply discussed below. The location can't be moved to the south, east or southeast due to an existing RV storage area and increasingly steep terrain, potential construction within a wetland and ephemeral drainage, and closer proximity to building units. Access to this location would only require a short unimproved road segment from an existing paved road as shown on the permit application construction drawings.



Based on the bottomhole locations in relationship to the location of the well pad, Ursa has determined that it is economically and technically feasible using proven technologies to drill all bottomholes. This is supported by drilling reach analysis information provided in both the Garfield County hearings and in the COGCC permit application for this location.

Existing Mineral Leasing, Surface Owner Contractual Considerations

Ursa has valid existing leases to reach bottomholes from the proposed location, with contractual obligations to develop the mineral interest. Communication with the surface owner regarding this location stems from several years of planning, which resulted in the SUA discussed above. Under the SUA, the surface owner (Battlement Mesa Partners) has set aside this location in the community development plan for natural gas extraction, so as not to affect future development; and to minimize conflicts with existing development. Based on land and title research, this location is not anticipated to affect any prior existing rights, easements or encumbrances.

One building unit is located within the 500 foot exception zone to the southeast of the proposed location as shown on Attachment D to the Form 2A, for which a waiver has been received. Other building units are located to the east at the outer perimeter of the 1000 foot buffer zone within a small radius. No residential building units are located within the 1000 foot buffer zone to the north, west or south.

Community Health, Safety and Nuisance Concerns

Some community residents have expressed concerns regarding development within the BMPUD. In response to a Health Impact Assessment (HIA) which was conducted under Garfield County by the Colorado School of Public Health. A final draft was completed in 2011, but was not adopted by Garfield County. At the request of Garfield County, Ursa provided responses and plans to address the concerns listed in the HIA, although this was not required by either state or county regulations. In addition, several community meetings were held, including six focused meetings since June 2015 to address the HIA concerns applicable to each phase of operations (construction, drilling, completions and production). Ursa held these focused meetings with Battlement Mesa citizens to balance citizen concerns with Ursa's rights and obligations to develop its mineral interests. Key concerns raised in the meetings to a great extent reflected the concerns raised in the HIA, which included traffic, noise, odors, air emissions, dust, and lighting. The location as planned would provide the greatest distance from homes. BMPs and COAs combined with Ursa's health, safety and environmental plans would minimize the potential for these types of relatively short-term nuisances. Many of Ursa's plans were provided to both the county and COGCC and part of the application submittals. This information is also supported in response to public comment.

Ursa's traffic and transportation (aka haul route) plans address both residential and public school traffic and potential safety concerns. The contemplated haul route was a part of the original BMPUD in 1982 and has been adopted/approved by Garfield County Road and Bridge. The proposed location doesn't present any traffic or safety concerns that would adversely affect this location, nor present any greater concerns than other locations in similar settings. In addition, Ursa coordinates its activities with the Community Counts Organization, the Garfield Energy Advisory Board, as well as holding periodic community meetings to address upcoming rig moves, construction and operations, etc. Haul routes were established by Garfield County to serve as primary routes for oil and gas development in the vicinity of this location. The existing haul routes are designed to serve the BMC B pad location. Traffic relative to this location is infrequent and is limited to River Bluff Road via Battlement Mesa Parkway.

Regulatory Considerations Affecting Siting

Although exempt from setback requirements per rule 604.b.(2) due to the location being addressed in a Surface Use Agreement prior to August (2013), Ursa has committed to unprecedented Best Management Practices (BMPs) and substantial conditions of approval (COAs) in accordance with permits approved by Garfield County in December 2015, most based on the HIA requested by local concerned citizens. The Garfield County permits and COAs have been previously provided to the COGCC.



As previously mentioned, Ursa has conducted numerous site reviews and surveys, onsites, and land assessments to ensure that the location would comply with existing Federal, state, county and local regulations and land use codes; including both cultural and environmental setbacks. No conflicts have been identified in the assessments and onsites conducted by Ursa, outside of those discussed within this document and required by regulations.

Environmental Considerations

Ursa and its third party consultants have conducted both site assessments and ecological surveys (including noxious weeds, wildlife, waters of the state, etc.) for the BMC B pad. The proposed location was evaluated for potential natural resource impacts including (but not limited to) sensitive areas, public water supplies, wetlands, floodplains and wildlife. The proposed location is not located within a 100-year floodplain. A small portion of the northwest corner of the located was originally located within the internal buffer zone. Based on site surveys and site visits with the COGCC and CDPHE, Ursa agreed to remove that portion of the northeast corner of the well pad to stay outside of the 317B internal buffer zone. Locating the pad to the north would place it entirely within the 317B internal buffer zone. Locating the pad to the east would place the location in close proximity to, or within, a designated wetland area, which the county specifically prohibits under current land use codes; which was addressed during the county permitting process. It would also fall within or close proximity to an ephemeral drainage. This location and other potential areas in the vicinity the BMPUD are all located within key wildlife habitats, for which a Wildlife Mitigation Plan exists. Placing the location to the west or southwest isn't feasible as it would impact a designated wildlife mitigation area under an agreement with the CPW and Battlement Mesa Partners. Otherwise no potential environmental conflicts were identified during the site reviews and onsite.

SUMMARY

Ursa has evaluated the proposed location and alternative locations to assess compliance with Federal, state and local regulations and land use codes; while still balancing complex potentially conflicting land uses and concerns. These included bottomhole accessibility, mineral lease obligations, existing and reasonably foreseeable land development uses, regulatory setbacks, community concerns, and potential impacts to natural resources, the environment, and wildlife.

As discussed in previous sections of this document, a key consideration in selecting this location under the SUA was to ensure the location was as far from residences and subdivision as possible. Moving the location to the east would place it closer to homes and more interior to the BMPUD, and present conflicts with designated wetlands and an ephemeral drainage. Moving it to the north would place the location within the 317B internal buffer zone area in closer proximity to the Colorado River. Moving the location to the west would conflict with existing development and a wildlife mitigation area.

Information has been provided to the COGCC by both Ursa and BM Partners to demonstrate the extent of thoughtful planning. BM Partners focused on minimizing potential conflicts and concerns within the community through 20+ years of planning, which resulted in this location being selected as the most feasible as documented in the SUA; which is precisely the intent of the Governor's Task Force Recommendations #17 and #20.

In addition, Ursa has committed to considerable BMPs and Conditions of Approval (COAs) under the Garfield County Special Use Permit and the COGCC applications, which go well above and beyond regulations, and are not typical for many oil and gas locations. The vast majority of the BMPs proposed by Ursa, and Garfield County COAs in the approved permits were based on recommendations in the "Battlement Mesa Health Impact Assessment" conducted by the Colorado School on Public Health. Citizens concerned with the location and their legal counsel have acknowledged that many of the issues raised in the HIA have been addressed through increased regulation over the past several years. A key component of the COAs was Ursa agreeing to complete construction, drilling and completions of all wells at the location within a 3-year period.

Had alternative locations existed for the BMC D pad location outside the BMPUD, Ursa would have been able to avoid three years of planning and over \$600,000 in planning and permitting costs, 3500 labor hours, all encompassed in Ursa holding: (1)



six focused community meetings, (2) holding numerous one-on-one discussions with concerned citizens, (3) hosting in excess of 10 onsites with the community, Garfield County and several agencies in attendance, (4) preparing for and testifying at five (5) Garfield County hearings over a one-year period; and (5) preparing unprecedented and substantial documentation to support the COGCC permit application over the past nine months, including extensive responses to public comment.

This location is clearly the most feasible location to address a myriad of complex and competing objectives in the vicinity of Battlement Mesa; hence the selection of this site as documented in the SUA. Placement of the well pad at any practicable alternative location able to reach the necessary bottomhole locations would be more intrusive to the community and/or the environment.



**Article 4-203.G.7
Sound Study**

**Ursa Operating Company
and Battlement Mesa Partners**

**Major Impact Review Application
Battlement Mesa PUD Phase I
BMC B**

OA Project No. 014-1829



October 16, 2014

Tara Mall
Ursa Operating Company, LLC
792 Buckhorn Drive
Rifle, CO 81650

**Subject: Review of Sound Data - URSA Drilling, Workover and Installation
Garfield County, Colorado**

Dear Ms. Mall,

At the request of Ursa Operating Company, LLC (URSA) Olsson Associates (Olsson) has conducted a review of sound data collected adjacent the Monument Ridge Production Pad facility from November 2013 to August of 2014 (the data collection period). The purpose of this review was to determine that the activities conducted at this location were in compliance with the noise limits set forth in the Colorado Oil and Gas Conservation Commission (COGCC) Rule 802 and Section 25-12-103 of the Colorado Revised Statutes (CRS). Additionally, the data was used to draw a correlation to expected sound pressure levels at the proposed BMC B and BMC D Production Pad facilities (proposed facilities).

Location

The Monument Ridge Production Pad facility (the location) is a natural gas production pad. During the data collection period, several gas wells were drilled, completed, and produced. Drilling and completion operations consisted of many different processes including conductor pipe setting, surface drilling, production drilling, hydraulic fracturing, flowback and several other operations. A noise mitigation sound wall was installed around the facility during the data collection period.

Sound Data

The sound data reviewed was collected and reported by Behrens and Associates Inc. (Behrens). The data was provided to Olsson for this review. The data was collected using two meters stationed adjacent to the location. One meter was installed 350 feet east and one installed 350 feet west of the center of the location. For meter installation location and sound level data, see the attached reports.

Compliance Point

The COGCC Rule 802 uses the property line or 350 feet from the noise generating equipment, whichever is greater, as the compliance point for oil and gas operations. Due to the nature of sound pressure, levels decrease over distance. Therefore using 350 feet as a compliance point is appropriate for this review.

Maximum Permissible Noise Levels

During the data collection period, numerous gas wells were drilled and completed. Production equipment was installed during the data collection period as well. As prescribed in COGCC Rule 802, “operations involving pipeline or gas facility installation or maintenance, the use of a drilling rig, completion rig, workover rig, or stimulation is subject to the maximum permissible noise levels for industrial zones”. The maximum permissible noise levels for Industrial zones are 80 dB(A) during daytime operations (7AM to 7PM) and 75 dB(A) during night time operations (7PM to 7AM).

Reported Sound Pressure Levels

All sound pressure levels reported in the attached reports indicate that all sound pressure levels, measured during the data collection period, are either within the maximum permissible noise levels or were not applicable due to wind generated overages.

Conclusion

The data presented for this review indicate that Ursa’s drilling, completions and installation operations at the location are within the maximum permissible noise levels set by the COGCC. As it is understood by Olsson, future drilling, completion and installation operations at the proposed facilities will utilize the same equipment and operations as those used for the Monument Ridge Production Pad facility. Therefore it is a valid assumption to assume that sound generated from those operations will produce similar sound pressure levels during future operations at the proposed facilities. Due to differences in topography and local surfaces, this review does not assure regulatory noise compliance with operations at the proposed facilities and sound pressure monitoring should be conducted if there is a concern, complaint or a major change in operations that could affect sound pressure levels.

Statement of Qualification

I am a multi-disciplinary Project Manager at Olsson Associates. I have coordinated many Noise Control Regulation Compliance Assessments over 5 years at existing and planned noise generating equipment installations in Colorado.

If you have any questions regarding this assessment, please contact me at 970-263-7800.

Sincerely,

Olsson Associates



Ken Kreie
Senior Scientist

Enclosures –

Attachment A – Web Base Meter Reports (Behrens and Associates, Inc.)

Cc: Project File