

Dual Operator Proposal: Development of 25 Federal Natural Gas Wells and Associated Infrastructure on 5 Multi-well Pads Environmental Assessment (EA)

ERRATA Sheet No. 1

I. Technical clarification/edit:

The following Condition of Approval (COA) included in Appendix C of the Final EA did not completely restate the required measure identified in the analysis section 3.2.14.4 of the final EA. As described below, Appendix C will now reflect the updated COA (B) in place of the original version (A).

A. The original COA:

Hydrology (Ground Water)

Allen Location (12-90-7-1 APD)

1. Collection of baseline data prior to gas-well installation and time series collection of data after well installation is the best way to understand the geologic structure and existing contamination of groundwater (McManhon P.B., et al., 2013). Baseline samples should be collected to quantify the isotopic composition of methane (biogenic and/or thermogenic) which would aid in understanding the origin of the methane. Noble gases should also be sampled to age date groundwater and in combination with methane data can help distinguish between natural sources of methane or those induced from drilling activities. Sampling should be conducted at several sites on each of these creeks: West Muddy Creek, Williams Creek, and Pilot Creek.

B. The updated COA:

Hydrology (Ground Water)

All well pad locations:

1. Collection of baseline data prior to gas-well installation and time series collection of data after well installation is the best way to understand the geologic structure and existing contamination of groundwater (McManhon P.B., et al., 2013). Based on this finding, the following mitigations measures are required.

In addition to the State of Colorado baseline water monitoring requirements, the following will be added to or modify the existing baseline monitoring programs currently conducted by the operators.

- Sampling intervals will be conducted in accordance with COGCC requirements. Sampling will be conducted prior to drilling and intervals of 1 year, 3 years, and 6 years following completion.
- Sampling radius will include water wells 1 mile from well pad location.
- Include all surface water sources and spring sources within 1 mile from well pad location. Surface water and springs will be sampled two times a year, at high flow and at low flow to meet the baseline monitoring requirements. Water will be analyzed for major ions, trace metals, dissolved gases (including methane), BTEX, TPH, dissolved organic carbon (DOC), nutrients, and field properties including temperature, pH, specific conductance, dissolved oxygen, turbidity, and alkalinity. Quality assurance sampling will include one replicate and one blank during each sampling trip. The replicate and blank will be analyzed for the same constituents as the environmental sample.
- Surface water and groundwater baseline samples should include stable isotopes of methane (carbon and deuterium) to determine the origin of the methane (biogenic and/or thermogenic). Noble gases should also be sampled to age date groundwater and in combination with methane data can help distinguish between natural sources of methane or those induced from drilling activities.

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- Sample collection for surface water and groundwater should follow the National field manual for the collection of water-quality data¹. Instrument logs, well characteristics, and other QA/QC collection methods should be submitted to the BLM.
- Data should be summarized and provided to the BLM annually for review. BLM will determine if further analysis of data may be required by a third party such as the U.S. Geological Survey. Any additional expenses incurred for third party reviews as required by BLM, will be the responsibility of the operator.

II. Additional Technical clarification/edit:

The following Appendix C COA has also been updated changing the words “**result in**” to “**require**” for clarification purposes only the revised COA now reads:

Migratory Birds

1. For all new construction during the migratory bird nesting season preconstruction survey results for Neotropical migratory birds (including but not limited to species, nesting density) shall be submitted to BLM (to better inform future decisions). A positive finding will **require** avoidance of all disturbance activities by a minimum of 100 meters until fledging has occurred.

III. Additional Technical clarification/edit:

Spelling edits were necessary in the BLM Standard Native Seed Mix for Mountain Shrub Zone, Upper Elevations (7,500-9,000) feet. This table appeared in two places in the final EA (Table 3-13 in Chapter 3 and Appendix C, Conditions of Approval) both instances were updated. Revised table included below.

¹ U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9, available online at <http://pubs.water.usgs.gov/twri9A>.

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BLM Standard Native Seed Mix for Mountain Shrub Zone, Upper Elevations (7,500-9,000 feet)

Species	A	B	C	D	E
	Desired % of planting	Multiplier (A x 0.01)	PLS lbs for full stand	PLS lbs per acre needed for mix (B x C)	PLS lbs per acre for project (D x # acres)
Western Wheatgrass (<i>Pascopyrum smithii</i>) Variety Arriba	15	0.15	10	1.5	
Slender Wheatgrass (<i>Elymus trachycaulus</i>) Variety San Luis	15	0.15	7	1.05	
Bottlebrush squirreltail (<i>Elymus elymoides</i>)	15	0.15	8	1.2	
Mountain Brome (<i>Bromus marginatus</i>)	15	0.15	12	1.8	
Big Bluegrass (<i>Poa ampla</i>)	10	0.1	3	0.3	
Canada Wildrye (<i>Elymus canadensis</i>)	10	0.1	11	1.1	
American Vetch (<i>Vicia americana</i>)	3	0.03	25	0.75	
Rocky Mountain Penstemon (<i>Penstemon strictus</i>)	6	0.06	2	0.12	
Western Yarrow (<i>Achillea millefolium var. occidentalis</i>)	6	0.06	1	0.06	
Mountain Big Sagebrush (<i>Artemisia tridentata vaseyana</i>)	5	0.05	1	0.05	
Totals	100	1.0		7.93	