POSITION PAPER

TO: Review Team - Atlantic Rim Natural Gas Field Project Area

FROM: Atlantic Rim Big Game Working Group (WG)

SUBJECT: Final Recommendations for Mule Deer Migration Corridor and Crucial Winter Range Impact Thresholds in the Atlantic Rim Project Area

I. INTRODUCTION

The intent of this position paper is to provide specific recommendations for ***impact thresholds*** that would apply to mule deer migration corridors and crucial winter ranges within the Atlantic Rim (AR) natural gas field project area. It is important to note that the WG's impact threshold recommendations are not recommendations for limits on field development within the AR project area. The WG recognizes that the Atlantic Rim Natural Gas Field Record of Decision (ROD) specifically authorizes certain levels of field development that already meet or exceed the impact thresholds recommended in this position paper. The position of the WG is that field development actions which meet or exceed an impact threshold simply trigger the need to consider the development of feasible mitigation and adaptive management measures that can realistically be implemented.

The recommendations in this position paper supersede the recommendations presented in the WG's previous position paper (memorandum) dated March 2012. The recommendations in this paper specifically apply to mule deer migration corridors and crucial winter ranges only. The WG intends to prepare a separate position paper at a future date to address possible recommendations for impact thresholds relative to pronghorn antelope, the other principle big game species found within the AR project area.

II. DISCUSSION

A. Mule Deer Crucial Winter Ranges

Two distinct mule deer crucial winter ranges, known separately as the Dad Crucial Winter Range (**Map 1**) and the Wild Horse Basin Crucial Winter Range (**Map 2)** are located at least partially or wholly within the AR project area. Development of the natural gas field is encroaching on both crucial winter ranges.

Crucial winter ranges are vital to the survival of migratory populations of big game animals. The Wyoming Game and Fish Department's *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats (2010*) associates certain levels of oil and gas development on mule deer crucial winter ranges with moderate, high, and extreme levels of impact on dependent populations. The document describes levels of oil and gas development in terms of well-pad densities and surface disturbance. On mule deer crucial winter ranges, a moderate level of impact is cited as *one well-pad location **or** up to 20 acres of disturbance per square mile.* A high level of impact is described as *2-4 well locations per square mile **or** 20-60 acres of disturbance per square mile.* An extreme level of impact is described as *more than 4 well locations **or** more than 60 acres of disturbance per square mile* (WGFD 2010; pp. 18; 24-29). The document states that all 3 levels of impact – moderate, high, and extreme – result in a loss of habitat function. (Note: The loss of habitat function is generally proportional to the intensity of field development). At the extreme impact level, WGFD (2010) states: *The function and effectiveness of crucial winter habitat will be severely compromised. Long term consequences include continued fragmentation and disintegration of the*

winter range complex leading to decreased survival, productivity and ultimately, loss of carrying capacity for the herd . . . (WGFD 2010, p. 29).

The AR ROD limits development of the gas field to no more than 8 well pads per 640 acre section (ROD, p. 2). The analysis presented in the ROD and Final Environmental Impact Statement states that less than 8 wells per section would not allow for efficient or economical recovery of the field's natural gas reserves. The ROD projects an average level of surface disturbance at 6.5 acres per well, which includes associated roads and other infrastructure. At 8 wells per section and an average of 6.5 acres of surface disturbance per well, this would be equivalent to an ***extreme level of impact*** on mule deer crucial winter range, as described in WGFD (2010).

B. Mule Deer Migration Corridors/Routes

Mule deer migration routes, or travel corridors, between distant summer ranges and crucial winter ranges have been identified and mapped within the AR project area through GPS-collaring studies funded entirely by the Atlantic Rim natural gas company operators. These studies monitored the movements of migrating deer and documented that the animals spend a disproportionate amount of time foraging and resting along the travel routes within high-value/high-use stopover areas (**Maps 1 and 2**), while moving quickly along corridor zones which receive only moderate or low use (Sawyer 2007; Sawyer, et.al. 2009; Sawyer and Kauffman, 2008 and 2011; Sawyer and Nielson 2011; Sawyer et. al. 2013). The high-value stopover areas are characterized by more diverse communities of vegetation that provide important forage for building fat reserves to carry the animals through winter. Another important function of high-value foraging and stopover resting sites is the prevention of forage overutilization and loss of carrying capacity (i.e. the number of animals the habitat can support) on crucial winter ranges.

The mule deer migration route studies cited above indicate that expanding field development has affected mule deer utilization of high-value stopover sites and the speed of deer movements along the migration corridors. Within the northern travel corridors associated with the Dad crucial winter range **(Map 1)**, road densities during the study period increased by 344% from 0.90 miles/mile^2 to 3.1 miles/mile^2, and well densities increased by 366% from 1.24 wells/mile^2 to 4.54 wells/mile^2. The total area, or overall acreage, of travel corridors used by mule deer within and adjacent to this area of field development declined by 34% from 9.06 square miles to 5.98 square miles, while the overall time spent utilizing the high-value stopover sites along these corridors declined by a <u>statistically significant</u> 53%. In addition, the rate of mule deer movements through the development area nearly doubled from 0.66±0.16 mph to 1.20±0.11 mph.

By contrast, the study results associated with the Wild Horse Basin migration routes **(Map 2)** <u>did not</u> demonstrate a statistically significant change in migratory behavior or utilization of migration corridors, although actual mule deer use of the migration routes still declined by approximately 23%. The absence of a statistically significant response by migrating deer in the Wild Horse Basin development area may have been due to a number of factors, including the influence of topography, but Hall Sawyer (the principle research scientist) concluded that the smaller scale of development activity was the primary reason. In this area, road densities increased 182% during the study period, from 1.34 miles/mile^2 to 2.43 miles/mile^2, and well pad densities increased 286% from 1.05 well-pads/mile^2 to 3.0 well-pads/mile^2. The difference in the scale of development for both areas is apparent on **Maps 1 and 2**.

Sawyer et. al. (2013) describes the development and operation of natural gas fields as ***semi-permeable barriers*** to ungulate movements along migration corridors, and that mule deer migratory behavior varies with the intensity of development. As shown on **Map 1**, existing and proposed field

development (up to 8 well locations per square mile) now overlaps or will overlap most of the mapped migration corridors that pass through the Doty and Catalina development units. Similarly, as shown on **Map 2**, field development is encroaching on the main trunk of the migration corridor that accesses the Wild Horse Basin crucial winter range as well**.**

The WG believes the intensity of on-going natural gas field development is cause for concern that the functionality of mule deer migration routes within the project area is being compromised.

III. RECOMMENDATIONS

A. **Mule Deer Crucial Winter Range**

The Big Game Working Group recommends that an appropriate impact threshold for identified mule deer crucial winter ranges within the Atlantic Rim Project Area is ***one well-pad location or up to 20 acres of disturbance per square mile*****.** This recommended impact threshold is based on WGFD (2010), which identifies this level of development as a ***moderate level of impact*** on mule deer crucial winter ranges (WGFD 2010, p. 18).

The WG recognizes that development of up to eight wells per section has already occurred within several units of the Dad crucial winter range (as approved in the AR ROD), and that this density of authorized development is considered necessary for efficient and economic recovery of the field's energy reserves. Because this authorized level of development meets the definition of an ***extreme level of impact*** in WGFD (2010), the WG believes it is essential to begin immediate development and implementation of a mitigation or adaptive management program to help reduce or minimize the adverse effects of energy field's development on the functionality of mule deer crucial winter ranges in the project area.

B. Mule Deer Migration Routes

The Big Game Working Group recommends two distinct impact thresholds for mapped mule deer migration corridors within the Atlantic Rim Project Area:

(1) An impact threshold of ***three well-pad locations per square mile or 20 acres of surface disturbance*** within mapped areas of migration corridors that are categorized as zones of moderate and low levels of use. These areas are important travel corridors for migrating mule deer that provide access to crucial winter ranges and also provide connectivity and freedom of movement between zones of high use/high-value stopover sites.

(2) An impact threshold of ***one well-pad location or up to 20 acres of surface disturbance per square mile within mapped areas of migration routes that have been documented as high use-stopover sites.*** The functional importance of high-use stopover sites in prevent overutilization of crucial winter ranges and providing forage and resting cover for migrating mule deer cannot be over-emphasized. The WG considers the functional value of these sites to be on par with crucial winter range. The impact threshold described above is therefore recommended for the high-use stopover sites located along migration corridors.

The recommendation for 3 well pad locations or 20 acres of surface disturbance per square mile for the low and moderate use areas of the migration corridors is based on the analysis presented in Sawyer et al. (2013). Sawyer's study data indicates that an impact threshold was crossed at some level between 3.0 and 4.54 wells-pads per square mile (see discussion above in paragraphs II. B.). The WG considers the lower number to be the appropriate impact threshold level, particularly in light of the decision in the AR ROD that authorizes up to 8 well-pads per section to provide for the most efficient and economical extraction of the field's reserves. The surface disturbance threshold of 20

acres is based on the projected average of 6.5 acres of surface disturbance per well-pad, including access roads, as described in the AR ROD and FEIS (3 well-pads @ 6.5 acres per pad, equals 19.5 acres, rounded to 20).

Additional monitoring of mule deer movements using the same methods and analysis techniques used in the earlier studies is also critical to determine how current or future levels of development will change migration patterns or further disrupt mule deer use of high-value stopover sites along the corridor pathways.

IV. CONCLUSIONS

Based on the fact that the number of well-pads within most development units in the Atlantic Rim field typically approaches 8 well-pads per square mile, the WG acknowledges that our recommended impact thresholds have already been met or exceeded on substantial areas of mapped mule deer crucial winter ranges and migration corridors within the project area. The AR ROD and subsequent decisions for new and existing development units are expected to authorize future field development that would also meet or exceed these impact thresholds. The WG therefore recommends a shift in emphasis to consideration of mitigation or adaptive management actions to manage the effects of field development on mule deer crucial winter ranges and migration corridors. On-going monitoring studies will be required using analytical tools and GPS-collaring techniques similar to those employed by Hall Sawyer to map the area's migration corridors and measure mule deer response during the early phases of the field's development. These follow-up monitoring studies will be essential to determine how current and future levels of field development affect mule deer migration patterns and their use of crucial winter ranges, and finally, to assess the overall effectiveness of any mitigation and adaptive management actions that may be implemented.

Literature Cited

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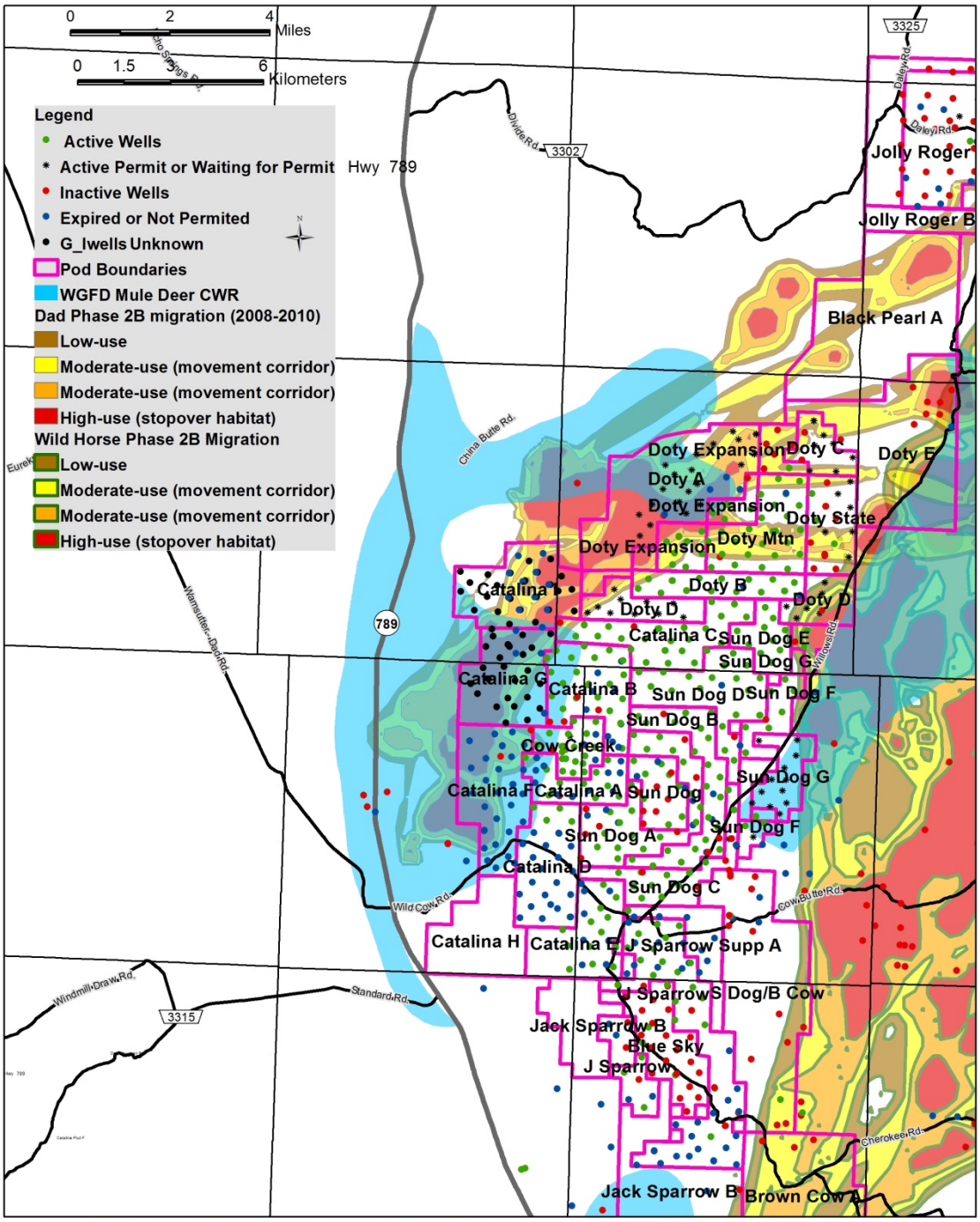
Map 1 – The Dad Mule Deer Crucial Winter Range and Associated Migration Corridors – The Dad mule deer crucial winter range, associated migration corridors and high-use stopover sites are shown in relation to existing and planned development units, existing coal-bed natural gas (CBNG) wells and approved future well sites. *(Note: Some wells may not be shown on this map because they have not yet been entered into the BLM GIS system.)* Road networks within the project area are not illustrated. The Sand Hills crucial winter range and the Wild Horse Basin crucial winter range are located in the center-right and bottom-center of the map, respectively.



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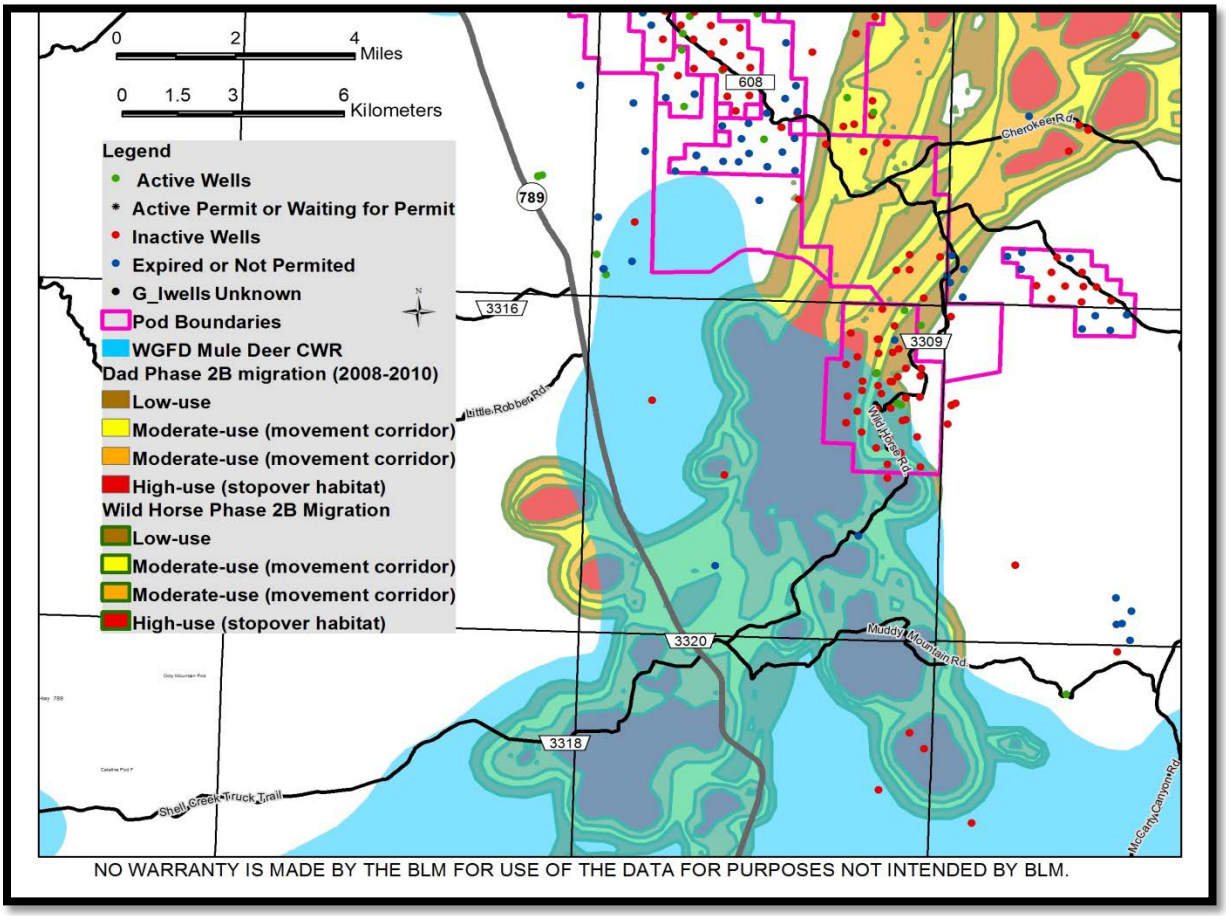
Map 2 – Wild Horse Basin Mule Deer Crucial Winter Range and Migration Corridors – The Wild Horse Basin Crucial Winter Range (light blue) is shown in relation to existing and planned development units, existing CBNG wells and approved future well sites. The road network within the project area is not illustrated. *(Note: Some wells may not be shown on this map because they have not yet been entered into the BLM GIS system.)*