

COLORADO DIVISION OF WILDLIFE'S ACTIONS TO MINIMIZE ADVERSE IMPACTS TO WILDLIFE RESOURCES	Noble Energy Inc.'s Current ACTIONS TO MINIMIZE ADVERSE IMPACTS TO WILDLIFE RESOURCES	Cross Reference Guide to BMP description or use in existing plans
October 27, 2008	December 5, 2008	
I. ELEMENTS OF AN IMPACT AVOIDANCE AND MINIMIZATION PLAN		
A. GENERAL WILDLIFE AND ENVIRONMENTAL PROTECTION MEASURES:		
1. Provide annual educational training for staff and contractors on specific wildlife issues of concern, (e.g., how to recognize lek sites, the location and importance of seasonal wildlife habitats and migratory patterns, how to locate mountain plover nests, the effects of winter range disturbance on wildlife, etc.,) and on the overall aspects of the landscape planning documents and any agreements with CDOW.	TBD	TBD
2. Establish policies to protect wildlife (e.g., no poaching, no firearms, no dogs on location, no feeding of wildlife, etc.).	All mentioned plus encouraged carpooling or bus to mancamps and drill sites, reduced vehicle speeds, locked trash	POD/ AMP, SWMP Safety Orientation – No Firearms
3. Promptly report spills that affect wildlife to the Water Quality Control Division of CDPHE and CDOW.	CDOW will be added as contact to SPCC equivalent to COGCC	SPCC Contact Sheet
4. Store and stage emergency spill response equipment at strategic locations along perennial	TBD: possibly along Battlement Creek, Dry Creek &	SPCC

water courses so that it is available to expedite effective spill response.	Cottonwood Creek	
5. Avoid locating staging, refueling, and storage areas within 300 feet of any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river.	Wherever possible	Engineered Survey DWGs and SWMP Plans
6. Install automated emergency response systems (e.g., high tank alarms, emergency shut-down systems, etc.).	Some Emergency Response Shut-Downs for separators, wells and drill rigs blow-downs	Engineered DWGs, SPCC
B. INFRASTRUCTURE LAYOUT WILDLIFE PROTECTION MEASURES (including production facilities, ancillary facilities, and roads):	Will inform all employees and contractors of these BMP preferences	
1. Avoid new surface disturbance and placing new facilities in key wildlife habitats in consultation with CDOW.	CDOW Field Mtg 10-28-08 CDOW Follow-Up 1-20-09 CDOW Follow-Up 2-25-09 CDOW Follow-Up 4-15-09 On-going	Engineered DWGs, SWMP and COAs
2. Phase and concentrate all development activities, so that large areas of undisturbed habitat for wildlife remain. Maintain undeveloped areas within development boundaries sufficient to allow wildlife to persist within development boundaries during all phases of construction, drilling, and production. Minimize the duration of development and avoid repeated or chronic disturbance of developed areas. Complete all anticipated drilling within a phased, concentrated, development area during a single, uninterrupted	South and East Flank of CDP Boundary is all Roadless NSO. Noble Private Surface gated and controlled. (On-going discussions with other landowners for controlled surface issues)	CDP Map, Stipulation Map,

time period.		
3. Develop a transportation plan to incorporate the following strategies:		
a. Minimize the number, length, and footprint of oil and gas development roads;	All multi-well pads for 10 acre spacing. using most direct routes following terrain	POD, COAs
b. Use existing routes where possible;	√	Engineered DWGs
c. Combine utility infrastructure (gas, electric, and water) planning with roadway planning to avoid separate utility corridors;	Always. Pipelines laid in or adjacent to roads where feasible and all water or utility lines buried with gas lines at the same time.	Engineered DWGs
d. Combine and share roads to minimize habitat fragmentation	Wherever possible	CDOW Wildlife Map
e. Place roads to avoid obstructions to migratory routes for wildlife, and to avoid displacement of wildlife from public to private lands.	Wherever possible	Some I-70 Viewshed COA's
f. Design roads with visual and auditory buffers or screens (e.g., topographic barriers, vegetation, and distance).	Wherever possible	Engineered DWGs
g. Surface roads to ensure that the anticipated volume of traffic and the	All roads engineered and designed with erosion	Engineered DWGs, COAs,

weight and speed of vehicles using the road do not cause environmental damage, including generation of fugitive dust and contribution of sediment to downstream areas.	control, wildlife mitigation and riparian avoidance. Dust mitigation is routinely applied using water or mag chloride.	POD
h. Locate roads as far from riparian areas and bottoms of drainages as possible and outside of riparian habitat.	Wherever possible	Engineered DWGs, COAs, POD
i. Avoid constructing any road segment in the channel of an intermittent or perennial stream.	Wherever possible	Engineered DWGs, COAs, POD
j. Avoid low water crossings. Structures for perennial or intermittent stream channel crossings should be engineered using bridges or appropriately sized culverts.	Wherever possible	Engineered DWGs, COAs, POD
k. Design road crossings of streams to allow fish passage at all flows and to minimize the generation of sediment.	Wherever possible	Engineered DWGs, COAs, POD
l. Design road crossings of streams at right angles to all riparian corridors and streams to minimize the area of disturbance.	Wherever possible	Engineered DWGs, COAs, SWMP, POD
m. Construct stream crossings “in the dry” to minimize sedimentation.	Wherever possible	Engineered DWGs, COAs, SWMP, POD
n. Protect culvert inlets from erosion and	Wherever possible	Engineered DWGs,

sedimentation and install energy dissipation structures at outfalls.		COAs, SWMP, POD
o. Implement fugitive dust control measures.	Routine application of water or mag chloride	COAs, SWMP, POD
p. Establish company guidelines to minimize wildlife mortality from vehicle collisions on roads.	Strict speed limits posted and incorporated into new visitor safety video	Safety Orientation
q. Coordinate employee transport, encourage carpooling or provide bus transport to work sites.	Staging areas and man camps for minimized traffic	COAs, POD
r. Prohibit or substantially limit the amount of traffic on lease roads in important wildlife habitats within 3 hours of sunrise and sunset.	Will try with education	
s. Install and use locked gates or other means to prevent unauthorized vehicular travel on roads and facility rights-of-way.	Locked gates at all Noble surface private roads to discourage public access.	
t. Limit parking to already disturbed areas.	Wherever possible	
u. Use man camps to reduce travel related disturbance when the benefits outweigh the disadvantages of developing human concentrations in wildlife habitats.	Based at all drill locations - but not a requirement for all drillers	POD
4. Develop and implement appropriate density caps or thresholds on wells sites, facilities and	COGCC pre-designated 10 acres spacing rule	COGCC

infrastructure (see the species-specific well site density recommendations in this document).		
5. Maximize the utility of surface facilities by developing multiple wells from a single pad (directional drilling), and by co-locating multipurpose facilities (for example, well pads and compressors) to avoid unnecessary habitat fragmentation and disturbance of additional geographic areas.	All multi-well pads and in most cases centralized facilities for a group of pads	Engineered DWGs, POD
6. Minimize the number, size and distribution of well pads and locate pads along existing roads where possible.	√	Engineered DWGs, POD
7. Cluster well pads in the least environmentally sensitive areas.	Wherever possible	CDOW WL Map, POD
8. Consolidate and centralize fluid collection and distribution facilities.	Underground piping to pending injection wells and/or water treatment facility	Engineered DWGs, POD
9. Share/consolidate corridors for pipeline ROW's to the maximum extent possible.	√	POD
10. Engineer pipelines to avoid field fitting and reduce excessive ROW widths and reclamation.	Wherever possible	Engineered DWGs, POD
11. Adequately size infrastructure and facilities to accommodate both current and future gas production. Economize gas transportation.	Wherever possible	Engineered DWGs, POD

C. DRILLING AND PRODUCTION OPERATIONS WILDLIFE PROTECTION MEASURES:		
1. Schedule construction, drilling, and completion activities to avoid particularly sensitive seasonal wildlife habitats in consultation with CDOW.	Whenever possible	
2. Schedule construction, drilling, and completion activities to avoid seasons and locations when public use of lands is at its highest (e.g., big game hunting seasons).	Whenever possible	
3. Reduce visits to well-sites through remote monitoring (i.e. SCADA) and the use of multi-function contractors.	SCADA being installed	
4. Use centralized hydraulic fracturing operations.	Wherever possible	Engineered DWGs, COAs, POD
5. Transport water through centralized pipeline systems rather than by trucking.	moving towards this	Engineered DWGs, COAs, POD
6. Where possible, locate pipeline systems under existing roadways, or roadways that are planned for development.	√	Engineered DWGs, COAs, POD
7. Maximize use of state-of-the-art drilling technology (e.g., high efficiency rigs, coiled-tubing unit rigs, closed-loop or pitless drilling, etc.) to minimize disturbance.	have incorporated Semi-closed loop mud system and high efficiency rigs	COAs, POD

8. Conduct well completions with drilling operations to limit the number of rig moves and traffic.	this is economically sound and preferred by all parties	COAs, POD
9. Employ state-of-the-art technology to protect existing vegetation (e.g., use mats if possible to preserve topsoil/vegetative root stock).	primarily BLM standard of stockpiling topsoil for Interim rec.	Engineered DWGs, BLM EA's, COAs, POD
10. Install exclusionary devices to prevent bird and other wildlife access to equipment stacks, vents and openings.	Screens installed on all vent stacks now	Engineered DWGs, COAs, POD
11. Ensure that surface discharged produced water meets minimum standards for Total Dissolved Solids (TDS) and Sodium Adsorption Ratio (SAR) to benefit wildlife.	No surface discharge allowed	COAs, POD Rullison SAP
12. Reduce noise by using effective sound dampening devices or techniques (e.g., hospital-grade mufflers, equipment housing, insulation, installation of sound barriers, earthen berms, vegetative buffers, etc.). Appropriate noise limits are included in the species-specific recommendations included in this document.	housing units, some earthen berms, mostly steel containment with bladders & vegetative buffers all SOP	Engineered DWGs, COAs, POD
13. Locate above-ground facilities to minimize the visual effect (e.g., low profile equipment, appropriate paint color, vegetation screening in wooded areas, etc.).	BLM color chart & I-70 visual mitigation standards contour profiling	Engineered DWGs, COAs, POD
14. During pipeline installations install trench plugs, earthen ramps, or other means as necessary to ensure that open pipeline trenches do not trap	Wherever possible	Engineered DWGs, COAs, POD

wildlife, and that pipe strings to not impair wildlife movements.		
D. FLUID PIT WILDLIFE PROTECTION MEASURES:		
1. Avoid locating fluid pits within 300 feet of the ordinary high water mark of any reservoir, lake, wetland, or natural perennial or seasonally flowing stream or river.	Wherever possible	Engineered DWGs, COAs, POD
2. Install and maintain adequate measures to exclude all types of wildlife (e.g., big game, birds, and small rodents) from all fluid pits (e.g., fencing, netting, and other appropriate exclusion measures).	Wherever possible	Engineered DWGs, COAs, POD
3. Construct fluid pit fences and nets that are capable of withstanding animal pressure and environmental conditions and that are appropriately sized for the wildlife encountered.	Wherever possible	Engineered DWGs, COAs, POD
4. Install impermeable barriers beneath fluid pits to protect groundwater, riparian areas and wetlands.	all pits are lined and surrounded by barbed wire fence	Engineered DWGs, COAs, POD
5. Skim and eliminate oil from produced water ponds and fluid pits at a rate sufficient to prevent oiling of birds or other wildlife that could gain access to the pit.	Whenever possible	Engineered DWGs, COAs, POD
6. Construct fluid pits with a 4:1 escape ramp to allow entrapped wildlife to escape.	Whenever possible - s are fenced & barbed wire surround	

<p>7. Treat waste water pits and/or any associated pit containing water with Bti (<i>B. thuringiensis v. israelensis</i>), commonly known as Mosquito Dunks, to control mosquito larvae that may spread West Nile Virus to wildlife or take other effective approaches to controlling mosquito larvae in ponds and pits.</p>	possibly	
<p>a. The appropriate application rate of Bti is 1 dunk/100 sq. ft. of standing water, applied each 30 day period during 1 June – 30 September.</p>		
E. INVASIVE/NON-NATIVE VEGETATION CONTROL:		
<p>1. Develop an aggressive, integrated, noxious and invasive weed management plan. Utilize an adaptive management strategy that permits effective responses to monitored findings and reflects local site and geologic conditions. Use of dedicated personnel with single responsibility for weed control is often the most effective approach.</p>	Being developed	BLM EA's, COAs, SWMP BLM-GSEO Weed Plan
<p>2. Map the occurrence of existing weed infestations prior to development to effectively monitor and target areas that will likely become issues after development.</p>	Wherever possible	BLM EA's, COAs, SWMP BLM-GSEO Weed Plan
<p>3. Establish a systematic and thorough noxious and invasive monitoring program for all disturbed</p>	Noble cannot agree to this extent of monitoring and record keeping	BLM EA's, COAs, SWMP BLM-GSEO Weed Plan

areas and maintain monitoring records.		
4. Continue control programs for the life of the well field.	Noble cannot agree to this extent of monitoring and record keeping	BLM EA's, COAs, SWMP BLM-GSEO Weed Plan
5. Use reclamation as a weed management tool. Plant competition provided by established reclamation is the most effective weed management tool.	Wherever possible	BLM EA's, COAs, SWMP BLM-GSEO Weed Plan
6. Thoroughly clean vehicles and other equipment to remove weed seeds before moving equipment to new sites.	Noble cannot agree to this beyond the normal and periodic washing of vehicles and equipment	
7. Educate employees and contractors about noxious and invasive weed issues.	√	BLM EA's, COAs, SWMP BLM-GSEO Weed Plan
F. RESTORATION, RECLAMATION AND ABANDONMENT:		
1. Soil		
a. Store topsoil in windrows no higher than 5 feet.	Wherever possible	BLM EA's, COAs, POD
b. Strip and segregate topsoil prior to construction. Appropriately configure topsoil piles and immediately seed to control erosion, prevent weed establishment and maintain soil microbial activity.	Wherever possible	BLM EA's, COAs, POD

c. Maintain separation between pit contents and soils.	√	BLM EA's, COAs, POD
d. Salvage topsoil from all road construction and other rights-of-way and re-apply during interim and final reclamation.	Wherever possible	BLM EA's, COAs, POD
e. Evaluate the utility of soil amendment application or consider importing topsoil to achieve effective reclamation.	When possible	BLM EA's, COAs, POD
2. Seed		
a. Use only certified weed-free native seed in seed mixes, unless use of non-native plant materials is recommended by CDOW.	When available	BLM EA's, COAs, POD BLM Seed Mixtures
b. Test seed rigorously and frequently for purity, germination/viability, and the presence of weeds.	When possible	BLM EA's, COAs, POD BLM Seed Mixtures
c. Use locally adapted seed whenever available, especially for species which have wide geographic ranges and much genetic variation (e.g., big sagebrush (<i>Artemesia tridentata</i>), antelope bitterbrush (<i>Purshia tridentata</i>), etc.).	Wherever possible	BLM EA's, COAs, POD BLM Seed Mixtures
d. Where more than one ecotype of a given species is available and potentially adapted to the site, include more than one ecotype per species in the seed mix.	When available	BLM EA's, COAs, POD BLM Seed Mixtures

e. Use appropriately diverse reclamation seed mixes that mirror an appropriate reference area for the site being reclaimed (see also species-specific recommendations).	Wherever possible	BLM EA's, COAs, POD BLM Seed Mixtures
f. Conduct seeding in a manner that ensures that seedbed preparation and planting techniques are targeted toward the varied needs of grasses, forbs and shrubs (e.g., seed forbs and shrubs separately from grasses, broadcast big sagebrush but drill grasses, etc.).	Wherever possible	BLM EA's, COAs, POD BLM Seed Mixtures
g. Emphasize bunchgrass over sod-forming grasses in seed mixes in order to provide more effective wildlife cover and to facilitate forb and shrub establishment.	Wherever possible	BLM EA's, COAs, POD BLM Seed Mixtures
h. Seed immediately after recontouring and spreading topsoil. Spread topsoil and conduct seeding during optimal periods for seed germination and establishment. Use of the same contractor for re-contouring land as used for seeding is often the most effective approach.	Wherever possible	BLM EA's, COAs, POD BLM Seed Mixtures
i. Do not include aggressive, non-native grasses (e.g., intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, smooth brome, etc.) in reclamation seed mixes. Site specific exceptions may be considered.	When possible	BLM EA's, COAs, POD BLM Seed Mixtures

j. Distribute quick germinating site adapted native seed or sterile non-native seed for interim reclamation on cut and fill slopes and topsoil piles.	When possible	BLM EA's, COAs, POD
k. Plan for reclamation failure and be prepared to repeat seeding as necessary to meet vegetation cover, composition, and diversity standards.	Wherever possible	BLM EA's, COAs, POD
l. Consider reclaiming with tubelings/plantings where seed failure is likely or has occurred.	Wherever possible	BLM EA's, COAs, POD
3. Vegetative Cover Standard		
a. Choose reference areas as goals for reclamation that have high wildlife value, with attributes such a diverse and productive understory of vegetation, productive and palatable shrubs, and a high prevalence of native species.	TBD	BLM EA's, COAs, POD BLM – Seed Mixtures
b. Establish vegetation with total perennial non-invasive plant cover of at least eighty (80) percent of pre-disturbance or reference area levels.	Wherever possible	BLM EA's, COAs, POD BLM – Seed Mixtures
c. Establish vegetation with plant diversity of non-invasive species which is at least half that of pre-disturbance or reference area levels. Quantify diversity of vegetation using a metric that considers only species with at least 3	Wherever possible	BLM EA's, COAs, POD BLM Seed Mixtures

percent relative plant cover.		
d. Establish permanent and monumented photo points and vegetation measurement plots or transects; monitor at least annually until plant cover, composition, and diversity standards have been met.	TBD	BLM EA's, COAs, POD BLM – Seed Mixtures
e. Observe and maintain a performance standard for reclamation success characterized by the establishment of a self-sustaining, vigorous, diverse, locally appropriate plant community on the site, with a density sufficient to control erosion and non-native plant invasion and diversity sufficient to allow for normal plant community development.	Wherever possible	BLM EA's, COAs, POD BLM – Seed Mixtures
4. Timing		
a. Use early and effective reclamation techniques, including interim reclamation to accelerate return of disturbed areas for use by wildlife.	Wherever possible	BLM EA's, COAs, POD
b. Remove all unnecessary infrastructure.	Wherever possible	BLM EA's, COAs, POD
c. Close and reclaim roads not necessary for development immediately, including removing all bridges and culverts and recontouring/reclaiming all stream crossings.	Wherever possible	BLM EA's, COAs, POD

d. Reclaim reserve pits as quickly as possible after drilling and ensure that pit contents do not contaminate soil.	Wherever possible	BLM EA's, COAs, POD
e. Remediate hydrocarbon spills on disturbed areas prior to reclamation.	Wherever possible	BLM EA's, COAs, POD
f. Reclaim sites during optimum seasons (e.g. late fall/early winter or early spring).	When possible	BLM EA's, COAs, POD
g. Complete final reclamation activities so that seeding occurs during the first optimal season following plugging and abandonment of oil and gas wells.	Wherever possible	BLM EA's, COAs, POD
5. Interim reclamation		
a. Use a variety of native grasses and forbs to establish effective, interim reclamation on all disturbed areas (e.g., road shoulders and borrow areas), including disturbed areas where additional future ground disturbance is expected to occur.	Wherever possible	BLM EA's, COAs, POD BLM – GSEO Weed Plan
b. Perform interim reclamation to final reclamation species composition and establishment standards.	Wherever possible	BLM EA's, COAs, POD
c. Perform “interim” reclamation on all disturbed areas not needed for active support of production operations.	Wherever possible	BLM EA's, COAs, POD

6. Riparian areas		
a. Replace all riparian vegetation removed during development at a rate of at least 3:1.	When possible	BLM EA's, COAs, POD
b. Restore both form and function of impacted wetlands and riparian areas and mitigate erosion.	Wherever possible	BLM EA's, COAs, POD
7. Disposal		
a. Remove well pad and road surface materials that are incompatible with post-production land use and re-vegetation requirements.	Wherever possible	BLM EA's, COAs, POD
b. Remove and properly dispose of degraded silt fencing and erosion control materials after their utility has expired.	Wherever possible	SWMP, BLM EA's, COAs, POD
c. Remove and properly dispose of pit contents where contamination of surface water, groundwater, or soil by pit contents cannot be effectively prevented.	Wherever possible	BLM EA's, COAs, POD
8. Establishing reclaimed areas		
a. Apply certified weed free mulch and crimp or tacify to remain in place to reclaim areas for seed preservation and moisture retention.	Where applicable	BLM – GSEO Weed Plan
b. Utilize staked soil retention blankets for erosion control and reclamation of large	Where applicable	

surface areas with 3:1 or steeper slopes. Avoid use of plastic blanket materials, known to cause mortality of snakes.		
c. Install cattle guards to regulate livestock pasture utilization;	Where applicable	POD, SUAs
d. Control weeds in areas surrounding reclamation areas in order to reduce weed competition.	Where applicable	
e. Educate employees and contractors about weed issues.	√	

SPECIES SPECIFIC RECOMMENDATIONS	
<i>These reasonable recommendations are derived from the best available science and represent preferred management actions to protect wildlife and wildlife habitats where oil and gas development is occurring.</i>	All personnel will be notified of the species in the CDP area and made
	Aware of these BMPs.