

Marys River Oil and Gas Exploration Project Master Surface Use Plan

Elko County, Nevada

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Presented to:

**Bureau of Land Management
Wells Field Office
3900 E. Idaho Street
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Introduction

The following Exhibits are attached to this Surface Use Plan of Operations (SUPO):

Exhibit "A"	Project Map
Exhibit "B"	List of Proposed Well Pads
Exhibit "C"	Transportation Plan
Exhibit "D"	Typical Drawings
Exhibit "E"	Fire Prevention Plan Measures
Exhibit "F"	Sage Grouse Best Management Practices
Exhibit "G"	Integrated Weed Management Plan
Exhibit "H"	Reclamation Plan
Exhibit "I"	Master Drilling Plan
Exhibit "J"	BLM Elko Recommended Operating Procedures
Exhibit "K"	Narrative of Completion and Hydraulic Fracturing

Noble Energy, Inc. (Noble) proposes to conduct an oil and gas exploratory drilling program in the Marys River project area which includes drilling, completion, and abandonment of a maximum of 20 wells on Bureau of Land Management (BLM) administered lands and private lands located approximately 4 miles northwest of the town of Wells in Elko County, Nevada. Livestock grazing is the primary existing surface use. Noble has identified 35 potential well pad locations; however, because this is an exploration program, no more than 20 of the well pads will be constructed over a two-year period or more. During the first year, Noble proposes to either construct two well pads with two test wells on each pad (one well will be used as a listening well for geophysical purposes), or to construct four well pads with one well on each pad. A total of four vertical wells will be drilled and completed under both scenarios during the first year. Sixteen well pads with 16 wells (one well per pad) may be developed during the following years. During the following years, up to four of the proposed 16 wells may be horizontal wells depending on the results of other well tests.

During the fall of 2012, Noble conducted a 3D Seismic program within the Marys River project area. Noble will use the results of the seismic program, previous 2D geothermal seismic programs, and previous well results from the project area to select locations that minimize the likelihood of encountering drilling hazards and faults which may act as a conduit for fluids in the reservoir. The seismic data will also be used to select locations which allow for separation of the hydrocarbon bearing zones from any potential water resources of the state.

Noble anticipates that each well could produce up to 250 barrels of oil per day. A small amount of natural gas may be produced with the oil which will run the production equipment. Excess natural gas will be flared in accordance with NTL-4A (Royalty or Compensation for Oil and Gas Lost). The lands include 20,622 acres (52 percent of the project area) administered by the BLM Elko District, Wells Field Office, 2,603 acres (7 percent) of private surface with BLM-administered subsurface mineral rights, and 16,220 acres (41 percent) of private lands and minerals, for a total of 39,445 acres. The proposed operations will comply with all applicable

federal Onshore Oil & Gas Orders. Noble is proposing several design features, plans and Best Management Practices (BMPs) to mitigate impacts to sensitive resources as provided in this Master Surface Use Plan of Operations and in addition, Noble will comply with the Recommended Operating Procedures for Notice Level Operations in the Elko District (Exhibit "J").

One drilling rig and one completion team will be required during the first year, and possibly two drilling rigs and possibly two completion teams may be required during the second year. A Master Drilling Plan is provided in Exhibit "I" and a Narrative of Completion and Stimulation is presented in Exhibit "K". Depending on the well pads selected for exploration, the proposal also includes possibly upgrading up to 28.1 miles of existing roads and possibly constructing up to 9.7 miles of new road to access the well pads.

Well Site Locations

The results of the Marys River Exploration Program will determine whether economic quantities of oil can be produced in the Marys River Area. The targeted formations will be the Humboldt, Indian Well, and Elko formations. The range in depths is variable given the basin shape, subsurface dip, and faults as determined via 3D Seismic imaging as well as the multiple formations under investigation. The target zone for the wells is a true vertical depth of between 7,000 and 14,000 feet. Targets for possible horizontal wells will be determined by the results of the vertical wells. Fewer wells may be drilled during exploration than are proposed due to well test results and geologic and market uncertainties. Well locations will be determined utilizing 3D Seismic data. Locations will be selected to minimize the likelihood of encountering faults and/or drilling hazards while still targeting suitably productive zones.

If drilling results in an unproductive well, the well will be plugged and abandoned as soon as practical after the conclusion of production testing. Productive wells may be shut-in temporarily for BLM authorization for production activities and facilities.

Surface Use Plan

1. Existing Roads

- A. The Marys River Area is accessed by existing Interstate-80, U.S. Highway 40, Nevada State Route (SR) 230 (Starr Valley Road), Elko County roads 753 (Deeth-O'Neill Road), and 754 (Metropolis Road), and unnamed BLM and private roads adjacent to and within the project area. A Transportation Plan identifying existing roads that will be used to access the project area is included as Exhibit "C."
- B. Existing roads will be maintained in as good or better condition as they existed prior to commencement of the exploration program. All equipment and vehicles will be confined to the routes shown on Map 1 in Exhibit "A". Maintenance of the access roads will continue until abandonment and reclamation of the well pads is completed.

2. New or Upgraded Access Roads

- A. The well pads selected for development will determine which existing roads will be upgraded and which new roads will be built. The Transportation Plan shows the locations of potential roads that will need to be upgraded or constructed to

access the well pads (see Exhibit “C”). Upgraded and new roads will generally require a 59-foot width for construction, and final road widths will be 29 feet with a 24 foot running surface for the road (see Figure 1 in Exhibit “D”). The roads will be crowned, ditched, and graveled and will meet the Gold Book Standards and BLM Road Manual 9113.

- B. After well completion, travel to each well site will include one pumper truck, one produced water truck, and two oil trucks per day. Additional traffic will include one maintenance truck visiting each well site approximately 10 days per year. Well service trips could be rescheduled or postponed during periods of wet weather when vehicle travel could cause rutting.
- C. All equipment and vehicles will be confined to the travel routes laid out on Map 1 in Exhibit “A” unless otherwise approved by the BLM and applied for by Noble.
- D. Dust will be controlled as necessary on the roads during construction and drilling through one or more of the following measures:
 - Watering of disturbed areas and dirt roads on a regular basis;
 - Pre-watering of areas to be disturbed;
 - Graveling of roadways, storage areas, and staging areas;
 - Following posted speed limits and where not posted, don’t exceed 20 miles per hour;
 - Application of water sprays on material storage piles on a regular basis;
 - Cessation of construction when high winds inhibit dust control;
 - Possible use of other dust suppressants such as DirtGlue, magnesium chloride, and tree sap; and
 - Re-vegetation of reclaimed areas.

3. Location of Proposed Wells

- A. All proposed wells will be on the proposed pads shown on Exhibit “A” and listed in Exhibit “B”.

4. Location of Proposed Production Facilities

- A. Initially, well pads will be up to 8 acres for drilling and completion (see Figures 2 and 3 in Exhibit “D”). After interim reclamation, production well pads will be up to 5 acres with an average of 3.5 acres. All areas will be reclaimed and reseeded after operations are completed (final reclamation).
- B. A typical production pad drawing showing the location of production facilities on a 5 acre well pad is shown on Figure 4 in Exhibit “D”.
- C. Equipment and facilities located on the production pad include the wellhead, pumping unit, vertical treater, re-circulating pump, one gas flare, 2-phase separator building, line heater, generator, gas sales meter and scada, pig launcher, eight 500-bbl oil tanks, two 500-bbl water tanks and a fuel tank per well. If two wells are located on a single well pad, production equipment will be shared to the greatest extent possible. All production equipment will be painted per BLM specifications.

- D. No off-pad ancillary facilities are planned during the exploration phase.
- E. All facilities or structures will be painted earth-tone colors such as “desert tan” that reduce the visual impacts of the built environment.
- F. Lighting during drilling and completions will follow “dark sky” lighting practices.
- G. Permanent lighting during operations will be manually operated by operations personnel which on location and will include lighting for the valve building, treater house, and load rack area (if 24 hour oil hauling is necessary).

5. Location and Types of Water Supply

Water for drilling, completion, and dust control may be supplied from one or more of the following sources: the City of Elko, Nevada, Spring Creek Utilities, Lamoille Water Users Association, and/or the temporary conversion/use of agricultural water rights in compliance with applicable federal and state law. Water will be transferred for use in drilling operations by tanker truck over existing roads. On-site water wells may be drilled on individual well pads to provide water for drilling and dust suppression. Water from on-site water supply wells will not be used for completions. On-site water wells will remain open on individual well pads until it is determined that no further wells will be drilled. The water supply wells on private land may be used by the landowner during Noble’s activities and turned over to the landowner for agricultural use once Noble’s activities conclude. BLM would also have the option to take over the water supply well on federal lands. All water uses will be permitted through the Nevada Division of Water Resources and/or Nevada Division of Environmental Protection, as appropriate.

Anticipated water usage for drilling includes approximately 10,000 barrels of water to drill one vertical well and approximately 20,000 barrels to drill one horizontal well. Well completion is expected to require approximately 50,000 barrels of water for a vertical well, and approximately 200,000 barrels for a horizontal well. Actual water volumes used during operations will depend on the depth of the well, length of horizontal sections, and the losses that might occur during the operation.

Traffic associated with water supply is described in the Transportation Plan (Exhibit “C”).

6. Construction Activities

- A. Construction, reclamation, and/or routine maintenance will not be conducted during periods when the soil conditions for construction could lead to impacts to the surrounding environment, or when watershed damage is likely to occur as a result of these activities.
- B. Gravel used during construction will be purchased from a certified weed free commercial facility per BLM requirements.
- C. Approximately 5 acres of the 10 acre drilling pad will be reclaimed and reseeded after drilling and completion operations.

7. Methods for Handling Waste

- A. **Cuttings.** Surface hole cuttings will be drilled with water-based mud and stacked on location during drilling for subsequent use in well pad reclamation. Production

hole cuttings will also be drilled with water-based mud and stacked on location for the duration of drilling and completion activities. Cuttings will be land-farmed onsite to treat any potential hydrocarbon impacts. Cuttings will then be sampled and buried onsite at depths greater than 3 feet to avoid potential impacts to plant root zones. Cutting that do not fit this waste profile will be disposed of at an approved facility (Clean Harbors) located between Wendover, Nevada and Salt Lake City, Utah during exploration.

- B. **Drilling fluids.** Salts and/or chemicals used in the mud system and other drilling fluids will be recycled and reused in the drilling mud system. Noble will utilize pitless or closed loop drilling systems and will not construct reserve pits (see Figures 9 through 12 in Exhibit "D"). Any non-recycled drilling fluids will be land-farmed with the drill cuttings or disposed of at an approved facility (Clean Harbors) located between Wendover, Nevada and Salt Lake City, Utah during exploration.
- C. **Produced Fluids.** Liquid hydrocarbons and other fluids produced during well completion operations will be placed in steel tanks on the well location. Any unintentional release of oil, gas, salt water, or other potentially hazardous substances will be cleaned immediately and removed to an approved disposal site (Clean Harbors) located between Wendover, Nevada and Salt Lake City, Utah during exploration. Noble may drill a disposal well on one of the 20 selected pads and if so, produced water from the exploration wells would be disposed of in this well. The injection well would be one of the 20 wells included in Noble's proposal. The disposal well will be permitted through the Nevada State Engineer's Office and the Nevada Division of Environmental Protection. Produced water, drilling fluids, and all waste associated with exploration and production of crude oil, natural gas or geothermal energy is exempted from RCRA and therefore, the standard RCRA evaluation is not required.
- D. **Sewage.** Portable, self-contained chemical toilets will be provided for human waste disposal. Upon completion of drilling and completion activities, or as required, the toilet holding tanks will be pumped and the contents thereof disposed of in an approved sewage disposal facility. Sewage disposal will be in strict accordance with the Nevada Department of Environmental Protection (NDEP) rules and regulations regarding sewage treatment and disposal.
- E. **Garbage and Other Waste Materials.** All garbage and non-flammable waste materials will be contained in a self-contained, portable dumpster or trash cage, especially to eliminate attracting ravens to the project site for sage grouse predator control as described in the Best Management Practices (BMPs) (Exhibit "F"). At the end of drilling and completion operations, or as needed, the accumulated trash will be hauled off-site to a NDEP approved sanitary landfill.
- F. **Debris.** Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash cage will be cleaned and removed from the well location. No potential adverse materials or substances will be left on location.

G. Hazardous Materials Management.

1. All drilling wastes identified as hazardous substances by the Comprehensive Environmental Response Compensation Liability Act (CERCLA) removed from the location and not reused at another drilling location will be disposed of at a hazardous waste facility approved by the U.S. Environmental Protection Agency (EPA).
2. Noble and its contractors will comply with all applicable Federal, State and local laws and regulations, existing or hereafter enacted or promulgated, with regard to any hazardous material, as defined in this paragraph, that will be used, produced, transported or stored on the oil and gas lease, "Hazardous material" means any substance, pollutant or contaminant that is listed as hazardous under the CERCLA of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulation. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the RCRA of 1976, as amended, 42 U.S.C. 6901 et seq., and its regulations. The term hazardous material also includes any nuclear or nuclear by-product material as defined by the *Atomic Energy Act of 1954*, as amended, 42 U.S.C. 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCLA Section 101 (14), 42 U.S.C. 9601 (14) nor does the term include natural gas.
3. No hazardous substances or wastes will be stored on the location after completion of the well.
4. Chemicals brought to location will be on the Toxic Substance Control Act (TSCA) approved inventory list.
5. All hazardous substances brought to the location will have a Material Safety Data Sheet (MSDS), and will be properly handled so as to not cause harm to the environment or to people.
6. All MSDSs will be kept on location until the hazardous material is properly disposed of in accordance with federal law.
7. Noble maintains a file, per 29 CFR 1910.1200 (g) containing current MSDSs for all chemicals, compounds, and/or substances which will be used during the course of construction, drilling, completion, and production operations for this project. Hazardous materials (substances) which may be found at the site may include drilling mud and cementing products which are primarily inhalation hazards, fuels (flammable and/or combustible), materials that may be necessary for well completion/stimulation activities such as flammable or combustible substances and acids/gels (corrosives). The opportunity for Superfund Amendments and Reauthorization Act (SARA) listed Extremely Hazardous Substances (EHS) at the site is generally limited to proprietary treating chemicals. All hazardous and Extremely Hazardous Substances

and commercial preparations will be handled in an appropriate manner to minimize the potential for leaks or spills to the environment.

8. All undesirable events (fires, accidents, blowouts, spills, discharges) as specified in Notice to Lessees (NTL) 3A will be reported to the BLM Wells Field Office. Major events will be reported verbally within 24 hours, followed by a written report within 15 days. "Other than Major Events" will be reported in writing within 15 days. "Minor Events" will be reported on the Monthly Report of Operations and Production (form 3160-6).

8. Well Site Layout

- A. A drawing of a typical drilling pad is shown in Figures 2 and 3 in Exhibit "D". A typical drilling pad will be 520 feet by 670 feet (up to 8 acres). The 8 acres will allow enough space for cuts and fills, topsoil storage, and stormwater control BMPs.

9. Plans for Surface Reclamation

- A. Rat and mouse holes will be backfilled and compacted from bottom to top immediately upon release of the completion rig from the location.
- B. Producing Operations:
 1. Backfilling, leveling, and re-contouring are planned as soon as possible after cessation of drilling and completion operations. Waste and spoil materials will be disposed of immediately upon cessation of drilling and completion operations.
 2. For production, the fill slopes will be reduced from a 1.5:1 slope to a 3:1 slope and the cut slopes will be reduced from a 2:1 slope to a 3:1 slope by pushing the fill material back up into the cut (see Figure 5 in Exhibit "D").
 3. Upon completion of backfilling, leveling, and re-contouring, all disturbed surfaces not needed for future operations will be scarified to a depth of one (1) foot and the stockpiled topsoil will be evenly distributed to a depth of six (6) inches over the reclaimed area (s).
 4. Prior to commencement of seeding operations, the seedbed will be prepared by disking on the contour to a depth of four (4) to six (6) inches, leaving no depressions that would trap water or form ponds.
 5. If conditions permit, the restored portions will be left rough and broadcast seeded. All disturbed surfaces (including the access road and the well pad areas) will be re-seeded using a seed mixture recommended by the BLM or surface owner.
 6. If the drilling method of seeding is utilized, it will be drilled on the contour with a seed drill equipped with a depth regulator in order to ensure even depths of planting. Seed will be planted between one-quarter (1/4) to one-

half (1/2) inches deep, with shrub seeds planted in rows separate from the grass seeds. In this case, the bins on the outside rows of the drill will be utilized for shrub seeds.

The broadcast method may be used instead of the drilling methods. If this is the case, the surface will be left in a rough condition and the seed mixtures will be doubled. The preferred method will be approved by the BLM at the time of reclamation.

7. Fall seeding will be completed after September 1 and prior to ground frost. If applicable, spring seeding will be completed after the frost has left the ground and prior to May 15. The seeding will be repeated until the BLM Authorized Officer (AO) determines that a satisfactory stand is achieved. The first evaluation of growth will be made following the completion of the first growing season. Re-seeding activities are considered best in the fall, unless requested otherwise by the BLM AO or surface owner.
8. Mulching may be required on soils with low reclamation potential; where mulching is deemed necessary a certified weed free straw or hay mulch will be crimped into the soil at an application rate of 2 to 4 tons per acre. Mulch may be applied by blowers, spreaders, or by hand. The mulch strand lengths would be long enough to be anchored by crimping. The mulch will be crimped to a depth of 2 to 3 inches. The mulch will be spread uniformly over the area so that 75 percent or more of the surface is covered.

C. Abandoned Well Locations

1. Upon final abandonment of the well location, gravel will be removed from the access road surface and well location (as directed by the BLM AO), water diversion installed as needed, and both the access road and well location will be restored to approximately the original ground contour(s) by pushing the fill material back into the cut and up over the backslope.
2. No depressions will be left that would trap water or form ponds. All disturbed surfaces (including the access road and well pad areas) will be re-seeded and re-vegetated sites will be monitored to ensure that desired species are thriving and invasive/noxious weeds are not present.

10. Surface Ownership

Within the Marys River project area, 52 percent of the surface is under the administrative jurisdiction of the BLM and 42 percent of the surface is under private ownership (see Map 1 in Exhibit "A").

11. Other Information

Surveying

- Well pad locations have been staked. A survey of the proposed access roads and well pad locations will be completed by a registered professional land surveyor. A preliminary center stake survey with access roads by a professional land surveyor has already been completed on federal lands only.

Cultural Resources

- A cultural resource inventory was conducted in accordance with applicable state and federal requirements on both lands administered by the BLM and on private lands where permission was obtained. A Class III Cultural Inventory Report was submitted to the BLM on December 12, 2012 with a recommendation of no historic properties affected for the Marys River Oil and Gas Exploration Project.
- If unknown cultural resources are found during operations, Noble will implement an Unanticipated Discovery Plan for Cultural Resources, which includes immediate stoppage of all work within thirty (30) meters of the discovery as directed by the BLM and immediate notification of the BLM AO.
- Prior to commencement of operations, Noble will inform all employees and contractors through job site safety orientations about compliance requirements associated with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, the Paleontological Resources Preservation Act, and the National Historic Preservation Act.
- Noble will suspend all operations that further disturb such materials and immediately contact the BLM AO. Operations will not resume until authorization to proceed is issued by the BLM AO.

Weed Control

- Noble will be responsible for weed control on disturbed areas within the exterior limits of the project area and will consult with the BLM AO and/or local authorities for acceptable weed control measures. Noble has prepared and will follow an Integrated Weed Management Plan for this project which includes measures for prevention, monitoring, and treatment of noxious weeds (Exhibit "G"). A weed control plan for individual well pads will be submitted with each APD.

Wildlife

- Sage-grouse lek surveys were conducted for the project area plus a 3-mile buffer around the entire project area. The results of these surveys were submitted to Nevada Department of Wildlife (NDOW) and the BLM Wells Field Office biologist assigned to the project. Two surveys for new or undocumented leks (aerial fixed-wing flights) were conducted as well as three ground surveys of each lek to confirm activity status and record lek attendance numbers. Lek attendance

numbers were used for monitoring trends and impacts, in accordance with standard BLM and NDOW survey protocols.

- Pygmy rabbit surveys were conducted on BLM-administered lands. Vegetation types, wetlands, large game species, raptors, and general wildlife observations were also recorded. The results of the biological survey were utilized to adjust proposed well pad locations to minimize effects to pygmy rabbits.
- The Wildlife Monitoring Report for Exploration Activity in the Marys River Project Area was submitted to the BLM for review and comment on November 1, 2012.
- Noble will inform employees and contractors through job site safety orientations that harassing or shooting of wildlife will not be permitted; dogs may not be brought to the project area; no firearms will be allowed on-site; and there will be no littering.

Soils and Revegetation

- No truck traffic will be operated during periods or in areas of saturated ground when surface rutting could occur.
- Noble has prepared and will implement a Reclamation Plan in consultation with the BLM for approval (see Exhibit "H"). Noble will also implement a baseline ecosite vegetation and weed survey for each well pad prior to construction to ensure proper seed mix design which is applicable to ecosites already existing at the location and to ensure protections from erosion due to cattle grazing during interim reclamation.

Water Quality

- Noble will prepare, implement, and follow a Spill Prevention Plan and a Stormwater Management Plan in accordance with state regulations and BLM approval.
- All tanks and processing equipment will be surrounded by secondary containment adequate to retain at least 100 percent of the volume of the largest vessel with sufficient freeboard/storage for precipitation in the containment area in the event of a release.
- Wellheads, above-ground flowlines, valves, fittings, vessels, and storage tanks will be inspected on a regular basis for any signs of potential failure. Noble maintains a flowline maintenance program for its flowlines.
- Containment areas will be maintained as dry as possible to reduce corrosion on tanks and to maintain maximum containment capacity.
- A system of earthen dikes with crushed rock will be used to control and contain oil spills to prevent escape before cleanup.
- Noble will drill and case wells with multiple stages of cement and steel pipe to protect groundwater resources in accordance with API (American Petroleum Institute) standards (see Figures 6 and 7 in Exhibit "D").

- Noble will clean up diesel, hydraulic fuel, or other spills, including contaminated soils. All spill-related material will be hauled to an approved disposal site.
- Wells will be cased and cemented to protect groundwater resources (see Figures 6 and 7 in Exhibit “D” and Exhibit I).
- Fueling will not occur within 300 feet of any riparian areas or standing or flowing surface water including streams, ponds, springs, seeps and stock reservoirs.

Fire Prevention Measures

- Fire prevention measures are included as Exhibit “E”.

Sage Grouse BMPs

- Sage Grouse BMPs are included as Exhibit “F”.

Workforce

- The peak construction workforce is estimated to be 159 workers assuming two drilling rigs and two completion teams are in operation. The peak workforce will occur during the second year as well pads and access roads are constructed and wells are drilled and completed. Noble will provide on-site (well pad) accommodations for drilling crews (see Figures 9 and 10 in Exhibit “D”). This will reduce traffic, minor source emissions, increase safety, reduce impacts on wildlife, and reduce dust. Once all wells are drilled and completed, the operational workforce will include one pumper, one maintenance worker, and up to 20 produced water truck drivers and 25 oil truck drivers (see Table 1). The actual number of truck drivers will depend on the location of oil well production, produced water disposal (either off-site or by an on-site injection well) and the amount of water produced per well.
- Noble estimates that drilling and completion crews will consist of non-local workers, and that approximately 15 percent of the construction workforce will be local. Nobel expects that, during operations, oil truck drivers would be non-local workers employed by crude oil transportation companies based outside of Elko County, and that the pumper, maintenance worker, and produced water truck drivers (approximately 50 percent of the operations workforce) would be local.

**Table 1
Estimated Peak Construction and Operations Workforces**

Workforce Category	Peak Number of Workers
Construction	
Well Pad and Road Construction	7
Drilling ¹	34
Completion ²	100
Water Truck Drivers ³	15
Dust Control ³	1
Interim Reclamation	2
Total Peak Construction Workforce	159
Operations	
Pumper	1
Maintenance Worker	1
Oil Truck Drivers ⁵	25
Produced Water Truck Drivers ⁶	20
Total Peak Operations Workforce	47
¹ Assumes two drilling rigs in operation with two seven-man drilling crews per rig. Additional drilling personnel include wellside consultants, mudloggers and mud engineers, solids control, directional driller, measurement while drilling (MWD), and active system aeration. Includes water delivery in 100 barrel trucks. ² Assumes two completion rigs in operation and 50 workers per rig during hydraulic fracturing. Includes water delivery in 100 barrel trucks. ³ Assumes 2.5 hours is required to complete a round-trip for trucks hauling water for drilling and completion. ⁴ Assumes 80 barrels of water per mile sprayed from 100 barrel capacity trucks. ⁵ Assumes oil production of 250 barrels per day per well transported in 200 barrel trucks. ⁶ Assumes one 100 barrel produced water truck per day per well, transporting produced water to Clean Harbors in Utah. As few as four drivers could be required if produced water is disposed of in an on-site injection well.	

BMPs for Erosions and Sediment Control

BMPs for sediment and erosion control will be accomplished through a combination of construction techniques, vegetation and re-vegetation, and structural features. Construction of a well pad requires the removal of vegetative cover and topsoil that increases peak flood flows, water velocity, and the volume of stormwater runoff. An increase in water runoff volume and velocity results in increased erosion. Erosion reduction and control will be accomplished by using the following erosion control methods. These methods include but are not limited to:

- Diversion and control of run-on water;
- Diversion and control of runoff water;
- Vegetation planting and maintenance;

- Application and maintenance of mulches, blankets, tackifiers, tracking and contouring; and
- Proper grading techniques.

Runoff control procedures that will be used to mitigate and reduce the erosive transport forces of stormwater during and after construction of a pad will include but will not be limited to the following:

- Check dams;
- Earth berms;
- Culvert protection;
- Diversion ditches;
- Slope drains;
- Rock lined ditch;
- Mulches, with or without a tackifier;
- Geotextiles; and
- Erosion Control Blanket/Turf Reinforcement Matting.

The control and reduction of sediment contained in stormwater runoff will be accomplished by the use of sediment containment systems. Sediment containment systems are hydraulic controls that allow the deposition of suspended particles by gravity. Sediment controls that will be used to mitigate and control sediments generated from the erosive transport forces of stormwater during and after construction of a pad will include but will not be limited to the following:

- Silt Fence;
- Straw Bale Dikes/Traps;
- Straw Wattles;
- Sediment Traps/Basins;
- Vehicle Tracking Pads;
- Continuous Berms;
- Continuous Berms with Rock Filter, and
- Slash Berm.

Hydraulic Fracturing

Noble will comply with BLM's proposed rule to regulate hydraulic fracturing on public and Indian land. The rule would provide disclosure to the public of chemicals used in hydraulic fracturing on public and Indian land, strengthen regulations related to well-bore integrity, and address issues related to flowback water. The rule is set forth to provide useful information to the public and to assure that hydraulic fracturing is conducted in a way that adequately protects the environment.

Noble will participate in FracFocus which is a national hydraulic fracturing chemical registry. It is managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission, two organizations whose missions both revolve around conservation and environmental protection. The primary purpose of the registry is to provide factual information concerning hydraulic fracturing and groundwater protection.

Drilling and Completion Fluid Additives

Drilling and completion fluids are custom-engineered to accomplish various objectives, including:

- Cooling of the bit;
- Suspension of rock cuttings so they can be circulated out of the boring as it is drilled;
- Maintaining fluid pressure on intercepted formations to control formation fluids;
- Pressuring the formation in open hole sections or through casing perforations to generate rock fractures, opening up the connection of formation to the well;
- Carrying “proppant” particulates, sand, ceramic or plastic, to prop fractures open when the pressure is released, and small rubber balls to block perforations and hold injected fluids outside the casing for a short time; and
- Carrying other chemicals to “break” the gel suspending the proppant, disinfect the hydraulically fractured zone and retard microbial growth which can sour the well, and flush general reidua.

Drilling is typically performed with a bentonite mud base, with various viscosity and density-adjusters (such as polymers and barite). Drilling mud will be entirely contained in (“pitless”) tanks at the surface, and fluid and cuttings will be segregated for re-use and disposal. Drilling mud will be displaced from the boring by each separate casing cementing.

Table 2 provides a tentative list of materials that may be used as completion fluid additives. Option 3 in the table may be used later in exploration if horizontal wells are drilled. Note that the list of materials does not contain diesel, common in fracturing fluids 10 years ago. The only constituent not fully disclosed is a proprietary amine polymer formulation (“KCl substitute”) added in small quantities to augment clay stabilization. All of these constituents are either consumed in the treatment (acid, pH buffers), inert (sand), or biodegradable. Biocide merely retards microbes which would otherwise grow rapidly in the guar starch, until such time as the fluid can be produced in “flowback” water or displaced and plugged off in a well that is abandoned.

Table 2
Tentative List of Materials for Nevada Stimulations

Material	Volume	Description	Purpose	Fate
Option #1: Cross-Linked Gel Sand Frac for Vertical Wells: 5 Stages of 150,000 lbs.				
Water	425,000 gal.	Fresh Water	Fluid basis	Flowback
Sand	35,000 lbs.	100 mesh	Very fine proppant	Inert
Sand	750,000 lbs.	Premium White Sand	Proppant	Inert
Labeled ceramic		Radioactive tracer	Ceramic proppant with trace radioactivity	Low radioactivity
LGC	5 gal/1000g	Liquid Gel Concentrate	Guar (legume) starch	Biodegradable
Breaker	2.5 gal/1000g	Gel Breaker	Encapsulated ammonium persulfate oxidizer	Chemically degradable
HCl	1000 gal.	15% Hydrochloric Acid	Muriatic acid, cleaner and breaker	Neutralized by rock
Corrosion inhibitor	0.5 gal/1000g	In acid solution only	Retards acid attack on steel	Adheres to steel
Citric Acid	50 lbs/1000g	In acid solution only	Sequesters dissolved iron and prevents rust coat	Biodegradable
Ball Sealers	1000 ea.	5/8" diam rubber balls	After frack, plug perfs and	Inert

Material	Volume	Description	Purpose	Fate
			hold well pressure	
KCl	2% in Water	Potassium Chloride	Formation clay stabilizer	Sorbed to borehole wall clay
"KCl Substitute"	1 gal/1000g	Proprietary polymer	Clay stabilizer	Biodegradable, and sorbed
Biocide	0.2 gal/1000g	Dibutyl normal propanamine	Disinfectant	Biodegradable
Cross Linker	2.25 gal/1000g	Borate X-linker with caustic	Forms gel in guar starch	Disperses at neutral pH
Buffer	0.5 gal/1000g	Formic Acid	Weak acid, pH regulator	Biodegradable
Non-emulsifier	1.0 gal/1000g		Soap	Flowback
Option #2: Large Acid Job for Vertical Wells: Single Stage with Diversion				
Water	13,000 gal.	Fresh Water		
HCl	100,000 gal.	15% Hydrochloric Acid		
Ball Sealers	1000 ea.	5/8" diam. RCN Ball Sealers		
Citric Acid	50 lbs/1000g	Iron Sequestrant		
Surfactant	2 gal/1000g	Friction Reducer		
Demulsifier	1.0 gal/1000g			
Biocide	0.2 gal/1000g	Dibutyl normal propanamine		
Corrosion inhibitor	0.5 gal/1000g			
KCl	2% in Water	Potassium Chloride		
Option #3*: Cross-Linked Gel Sand Frac for Horizontal Wells: 10 Stages of 150,000 lbs. (Double all volumes of Option #1) (Large Acid Job Option not recommended for Horizontal Wells) *May be used later in exploration.				

12. Lessee or Operator's Certification

Noble Energy, Inc. hereby certifies that said company is authorized to conduct operations on the above-described land under the terms and conditions of Federal Oil and Gas Leases _____. Bond coverage, as required by 43 CFR 3104 is provided by Noble Oil, Inc. The applicable bond number is NV-_____, a statewide oil and gas lease bond in the amount of \$_____.

I hereby certify that I, or persons under my direct supervision, have inspected the area and are familiar with the general area of the proposed drill site locations and access roads; that I am familiar with the conditions which presently exist; that the statements made in this plan are, to the best of my knowledge, true and correct and that the work associated with the operations proposed herein will be performed by Noble Oil, Inc., its agents, contractors, and subcontractors in conformity with the plan and the terms and conditions under which it is approved.

Noble Energy, Inc.

Name: _____
Jeff Schwarz, Rocky Mountain Business Unit Manager Date