
Appendix H

Oil and Gas

Reasonably Foreseeable Development Scenario

APPENDIX H

OIL AND GAS REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

This reasonably foreseeable development (RFD) scenario serves as a basis for analyzing environmental impacts resulting from future leasing and development of federal oil and gas resources within the decision area over the next 20 years. A variety of factors (e.g., economic, social, and political) are beyond the control of the BLM and Forest Service and will influence the demand for oil and gas resources. Therefore, the RFD scenario is a best professional estimate of what may occur if public lands are leased. It is not intended to be a “maximum-development” scenario; however, it is biased towards the higher end of expected development and shows where the potential development might occur. If future development eventually exceeds RFD predictions, then the BLM and Forest Service will assess the impacts to the resources under the context of the analysis provided in this Programmatic EIS or specific LUPs and determine if additional analysis is warranted.

The decision area produces approximately 367,000 barrels per day. Based on projects that have been or are expected to be approved, it is estimated that an additional 50,000 barrels per day will be produced by 2020. Based on production data within the planning area, production wells produce on average 5,169 barrels per day per well. Successful drilling of production wells can be estimated at 20 percent because of new completion technologies (Snow 2013; Davis 2011). If a total of 100 wells were to be drilled, 20 would be successful at production.

LOCATION OF DEVELOPMENT

Development would be distributed across the area shown by the oil and gas potential map. The majority of the resources are located within the Eastern portion of the decision area with high potential areas occurring within the Battle Mountain, Elko, and Ely BLM districts around Railroad and Pine Valleys.

Typical Phases in Oil and Gas Development

This RFD for oil and gas resource use involves four sequential phases: (1) exploration, (2) drilling, (3) utilization, and (4) reclamation and abandonment. The success or failure of each phase affects the implementation of subsequent phases, and, therefore, subsequent environmental impacts. The general assumptions outlined in the following four phases serve to establish RFD scenarios for analyzing future environmental impacts that may result from development following BLM issuance of leases for oil and gas resources within the identified area of oil and gas potential. It should be noted that the RFD scenario permits a general evaluation of the types of impacts that may occur but cannot accurately predict the magnitude and extent of these impacts. This is due in part to the uncertainty about the timing, location, distribution of the oil and gas resources, and the likely types of development.

Table H-1, Disturbance from Reasonably Foreseeable Development, provides the estimated acreages of land disturbance for each phase in oil and gas development for an oil and gas field. The actual area of disturbance varies greatly depending upon site conditions and the type and size of field being constructed; therefore, a range is provided. Acreages are not provided for the Reclamation and Abandonment phase since this phase involves the return of previously disturbed lands to their existing conditions.

Table H-1
Disturbance from Reasonably Foreseeable Development

Activity	Disturbance (acres)	Reclamation (acres)	Total Disturbance at the End of the RFD Period (acres)
Seismic Surveys	606	606	0
Roads	480	384	96
Drilling	160	128	32
Total	1246	1118	128

The total potential amount of area disturbed under the utilization phase includes development activities. Much of the land would be reclaimed after the initial exploration, drilling, and construction; therefore, the actual amount of land occupied during operation, would be less than the figure outlined in the development section. A typical development generally requires several leases or the use of private or other adjacent lands. The details of each phase of development are described below.

ASSUMPTIONS FOR REASONABLY FORESEEABLE DEVELOPMENT SCENARIO – OIL AND GAS

Assumptions for Exploration

1. Exploration and development will occur over 20 years.
2. There would be approximately 25 miles of seismic line at a width of 10 feet surveyed per year for an anticipated overall total of 606 acres of disturbance over the life of the RFD. Each year, 100 percent of the disturbance would be reclaimed. Other geophysical surveys would be completed; however, the surveys would be minimal with little to no surface disturbance.
3. The majority of the decision area is considered to be a high risk (wild cat) exploration region. This means that there is low to moderate potential for oil and gas discoveries.
4. Approximately 450 wells have been drilled within the decision area to date, and 71 of those wells are producing. This is a success rate of approximately 16 percent. On average two wells per year are drilled, which amounts to 40 wells over the life of the RFD. It is projected that the success rate would increase to 20 percent because of new completion technologies. Approximately eight out of the 40 wells drilled would be potentially viable for production.
5. An estimated 32 wells would be reclaimed over the 20 year timespan.
6. The majority of successful wells drilled are located in the high potential regions within the eastern portion of the planning area. From this we can assume the continued success of these locations.
7. The average size for a well pad is 4 acres. Forty new wells over the next 20 years would then amount to 160 acres of disturbance for new wells drilled. Since it is projected that eight wells would be producing, the amount remaining un-reclaimed would be 32 acres.
8. The average access road would be 20 feet wide and five miles long (average width accounting for turnouts) the total disturbance due to road construction would then be approximately:
 - 5 miles by 5,280 feet/mile by 20 feet = 528,000 square feet.
 - 528,000 feet by 1 acre/43560 feet = approximately 12 acres per successful well.
 - 12 acres by 8 (successful wells) = 96 acres remaining un-reclaimed over the course of 20 years. Over the 20 year period, the total amount of disturbed area due to access roads is expected to be no more than 480 acres, with 384 acres being reclaimed.

Based on the above assumptions, disturbance from geophysical surveys are estimated at 606 acres, access roads are estimated at 480 acres, well pads are estimated at 160 acres for a total surface disturbance of approximately 1,246 acres. The surface disturbance from oil and gas exploration well pads and access roads combined is estimated to be 640 acres, of which 512 acres for roads and well pads of unsuccessful wells would be reclaimed within the 20 year period, leaving a total of approximately 128 acres of surface disturbance.

Assumptions for Production

We have estimated that over the next 20 years 8 new producing wells will be discovered.

The following assumptions are based on estimated mineral potential, ground conditions within the decision area, road availability, and existing development for the decision area.

1. There would be 40 wells drilled within the RFD; 32 of those wells would be reclaimed, leaving a total of 8 successful production wells totaling 32 acres of disturbance due to well pads.
2. A tank battery would be placed on the existing drill pad of the producing well and no additional surface disturbance would be required.
3. The access roads to the unsuccessful wells total 384 acres. This acreage would be reclaimed.
4. Based on the above assumption, the total surface disturbance from the 8 production well pads is estimated at 32 acres, the surface disturbance from the construction of roads is estimated to be approximately 96 acres. Surface disturbance from oil and gas production over the 20 year period could total a maximum of approximately 128 acres after reclamation.

The above assumptions for both exploration and production are summarized below in **Table H-2**, Reasonably Foreseeable Disturbance from Exploration and Production.

Table H-2
Reasonably Foreseeable Disturbance from Exploration and Production

Activity	Disturbance (acres)	Reclamation (acres)	Total Disturbance at the end of the RFD period (acres)
Seismic Surveys	606	606	0
Roads	480	384	96
Drilling	160	128	32
Total	1246	1118	128

Assumptions for Reasonably Foreseeable Development Scenario (Noble – Elko)

1. Exploration and development will occur over 20 years.
2. The majority of the decision area is considered to be a high risk (wild cat) exploration region. This means that there is low to moderate potential for oil and gas discoveries.
3. Extensive seismic surveys have been completed within this portion of the planning area therefore additional seismic survey disturbance would be minimal.
4. Although no wells have been drilled within this portion of the decision area it is anticipated that Noble would drill 60 wells within the decision area and that 33 of those wells would be productive. This is a success rate of approximately 55 percent.
5. Multi-well directional and horizontal pads would be implemented; therefore four wells would be drilled on each pad. The average size of a well pad is four acres. This would result in a total of 15 pads being required to drill a total of 60 wells, amounting to 60 acres of disturbance.
6. Wells within this portion of the decision area would be drilled using new completion technologies. These technologies could include hydraulic fracturing and horizontal drilling.
7. The majority of successful wells drilled are located in the moderate potential regions within the northeastern portion (Elko District) of the decision area.
8. The average access road would be 20 feet wide and five miles long (average width accounting for turnouts) the total disturbance due to road construction would then be:
 - 5 miles by 5,280 feet/mile by 20 feet by 1 acre/43,560 square feet = approximately 12 acres.
 - 12 acres by 0.75 well pads per year = approximately 9 acres/year. Over the course of 20 years, this amounts to an expected maximum of approximately 180 acres.

The above assumptions for Noble – Elko are summarized below in **Table H-3**, Disturbance from Reasonably Foreseeable Development in Noble – Elko.

Table H-3
Disturbance from Reasonably Foreseeable
Development in Noble – Elko

Activity	Disturbance (acres)
Roads	180
Drilling	60
Total	240