

Montana Board of Oil and Gas Conservation Environmental Assessment

Operator: Brigham Oil & Gas, L.P.
Well Name/Number: Shannon 2-35 #2H
Location: SW SE 2 T25N R59 E
County: Richland, MT; Field (or Wildcat) Wildcat

Air Quality

(possible concerns)

Long drilling time: No, 35-40 days drilling time.

Unusually deep drilling (high horsepower rig): Triple derrick rig 1000 HP to drill a 20,266' MD/10,339' TVD Bakken Formation single lateral horizontal well test.

Possible H₂S gas production: Slight chance of H₂S gas production, Mississippian Formations.

In/near Class I air quality area: No Class I air quality area, in the area of review.

Air quality permit for flaring/venting (if productive): Yes, DEQ air quality permit required under 75-2-211.

Mitigation:

- Air quality permit (AQB review)
- Gas plants/pipelines available for sour gas
- Special equipment/procedures requirements
- Other: _____

Comments: To drill a 20,266' MD/10,339' TVD Bakken Formation single lateral horizontal well test. If there are existing pipelines for natural gas in the area, associated gas can be gathered or if no gathering system nearby, associated gas can be flared under Board Rule 36.22.1220.

Water Quality

(possible concerns)

Salt/oil based mud: Yes to intermediate casing string hole, oil based invert drilling fluids. Horizontal lateral will be drilled with brine mud. Surface casing hole will be drilled with freshwater and freshwater drilling fluid system.

High water table: No high water table anticipated, in the area of review.

Surface drainage leads to live water: No, closest drainage is an unnamed ephemeral tributary drainage to the Missouri River, about 1/16 of a mile to the east from this location.

Water well contamination: None, closest water wells are about 3/8 of a mile to the west, about 3/8 of a mile to the southwest, about 5/8 of a mile to the east, about 7/8 of a mile to the east southeast and about 7/8 of a mile to the north from this location, all other water wells are further out than 1 mile. Depth of this water wells range from 40' to 1445'. This water well is shallower than the surface casing setting depth of 1800'. Surface casing hole will be drilled with freshwater and freshwater drilling fluids. Surface casing will be run to 1800' and cemented to surface to protect ground water.

Porous/permeable soils: No, sandy silty clay soils.

Class I stream drainage: Yes, Class I stream drainage is the Missouri River, in the area of review.

Mitigation:

- Lined reserve pit
- Adequate surface casing
- Berms/dykes, re-routed drainage
- Closed mud system
- Off-site disposal of **solids/liquids (in approved facility)**
- Other: Offsite disposal of cuttings at Clean Harbors (Sawyers Landfill) Sawyer, North Dakota. Completion fluids will be trucked to an authorized Class II SWD.

Comments: 1800' surface casing well below freshwater zones in adjacent water wells. Also, covering Fox Hills aquifer. Adequate amount of surface casing will be set and BOP (5,000psig annular,

pipe and blind rams) equipment (Rule 36.22.1014) to prevent problems.

Soils/Vegetation/Land Use

(possible concerns)

Steam crossings: None anticipated.

High erosion potential: No, location will require a moderate cut of up to 10.6' and small fill, up to 3.5', required.

Loss of soil productivity: None, location to be restored after drilling well, if nonproductive. If productive unused portion of wellsite will be reclaimed.

Unusually large wellsite: Yes, unusually large well site designed as a quad well pad, 700'X430' appears to be built to accommodate up to two (2) well location, Shannon 2-35 #2H and Shannon 2-35 #1H.

Damage to improvements: Slight, surface use is cultivated land.

Conflict with existing land use/values: Slight

Mitigation

Avoid improvements (topographic tolerance)

Exception location requested

Stockpile topsoil

Stream Crossing Permit (other agency review)

Reclaim unused part of wellsite if productive

Special construction methods to enhance reclamation

Other Requires DEQ General Permit for Storm Water Discharge Associated with Construction Activity, under ARM 17.30.1102(28)

Comments: Will use existing county roads, #355 and existing farm/ranch/lease road. About 0.08 of a mile of new access road will be built into this location off existing farm/ranch/lease road. Cuttings will be trucked to New Harbors (Sawyer Landfill) Sawyer, North Dakota for disposal. Oil base invert drilling fluids will be recycled. Completion fluids will be removed and hauled to commercial Class II Disposal. No concerns.

Health Hazards/Noise

(possible concerns)

Proximity to public facilities/residences: Closest residences are about ¼ of a mile to the southwest, about ½ of a mile to the east and about 7/8 of a mile to the east from this location. Town of Fairview, Montana is about 6 miles to the south from this location. Town of Dore, North Dakota is about 2 miles to the southeast from this location.

Possibility of H2S: Slight chance H2S, Mississippian Formations.

Size of rig/length of drilling time: Triple drilling rig 35 to 40 days drilling time.

Mitigation:

Proper BOP equipment

Topographic sound barriers

H2S contingency and/or evacuation plan

Special equipment/procedures requirements

Other _____

Comments: Adequate surface casing cemented to surface with working BOP stack should mitigate any problems. (BOP's 5,000 psig annular, pipe and blind rams) rule 36.22.1014. Sufficient distance between location and buildings, noise should not be a problem.

Wildlife/recreation

(possible concerns)

Proximity to sensitive wildlife areas (DFWP identified): None identified.

Proximity to recreation sites: None identified

Creation of new access to wildlife habitat: No

Conflict with game range/refuge management: No

Threatened or endangered Species: Species identified as threatened or endangered are the Pallid Sturgeon, Interior Least Tern, Whooping Crane and Piping Plover. Candidate species is the Sprague's Pipit. MTFWP Natural Heritage Tracker website indicates one (1) species of concern. That species is the Whooping Crane. MTFWP Natural Heritage Tracker website indicates one (1) potential species of concern: Hayden's Shrew.

Mitigation:

- Avoidance (topographic tolerance/exception)
- Other agency review (DFWP, federal agencies, DSL)
- Screening/fencing of pits, drillsite
- Other: _____

Comments: Private surface cultivated land. There may be species of concern that maybe impacted by this wellsite. We ask the operator to consult with the surface owner as to what he would like done, if a species of concern is discovered at this location. The Board of Oil & Gas has no jurisdiction over private surface lands.

Historical/Cultural/Paleontological

(possible concerns)

Proximity to known sites: None identified.

Mitigation

- avoidance (topographic tolerance, location exception)
- other agency review (SHPO, DSL, federal agencies)
- Other: _____

Comments: On private surface cultivated land. There may be possible historical/cultural/paleontological sites that maybe impacted by this wellsite. We ask the operator to consult with the surface owner as to his desires to preserve these sites or not, if they are found during construction of the wellsite. The Board of Oil & Gas has no jurisdiction over private surface lands.

Social/Economic

(possible concerns)

- Substantial effect on tax base
- Create demand for new governmental services
- Population increase or relocation

Comments: Wildcat Bakken Formation horizontal well. No concerns.

Remarks or Special Concerns for this site

This well is a 20,266' MD/10,339'TVD Bakken Formation single lateral horizontal well test. No concerns.

Summary: Evaluation of Impacts and Cumulative effects

Short term impacts expected, no long term impacts anticipated.

I conclude that the approval of the subject Notice of Intent to Drill (does/**does not**) constitute a major action of state government significantly affecting the quality of the human environment, and (does/**does not**) require the preparation of an environmental impact statement.

Prepared by (BOGC): /s/Steven Sasaki
(title:) Chief Field Inspector
Date: August 10, 2012

Other Persons Contacted:

Montana Bureau of Mines and Geology, Groundwater Information Center GWIC
website
(Name and Agency)
Richland County water wells
(subject discussed)
August 10, 2012
(date)

US Fish and Wildlife, Region 6 website
(Name and Agency)
ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES MONTANA
COUNTIES, Richland County
(subject discussed)
August 10, 2012
(date)

Montana Natural Heritage Program Website (FWP)
(Name and Agency)
Heritage State Rank= S1, S2, S3, T25N R59E
(subject discussed)
August 10, 2012
(date)

If location was inspected before permit approval:
Inspection date: _____
Inspector: _____
Others present during inspection: _____