Appendix 1

Hudson Group LLC
Scott #2
Federal Oil and Gas Lease WYW146470

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I. INTRODUCTION

Details of Additional Information, Modified Decision Record, Scott #2 Application for Permit to Drill (APD), Environmental Assessment (EA), WY-050-EA13-96

The information warranting the Bureau of Land Management's (BLM) Lander Field Office (LFO) completing the environmental record of review includes the return of jurisdiction via State Director Review (SDR) No. Wy-2012-020 (Part 2).

The following issues correspond to those identified in the SDR decision and address the issues with information and analysis. The issues are referenced to the SDR by identifying the page number of the SDR decision. This document includes a discussion on completion practices which incorporates a discussion on hydraulic fracturing. The one issue remanded to the LFO concerns disclosure of downhole operations (including drilling and completions), and any potential impacts to water resources.

II. COMPLETION PRACTICES

Chemical Disclosure and Hydraulic Fracturing Risk. The LFO properly excluded this issue from detailed NEPA analysis and is affirmed on this point. (SDR No. Wy-2012-020 (Part 2) Page 10)

The Wyoming BLM State Office affirmed the decision of the LFO to exclude this issue from analysis. As the BLM cannot reasonably foresee what may occur to complete the well for commercial production since it is an exploratory (wildcat) well, information concerning potential completion practices of similar Phosphoria and Tensleep Formation oil wells in the Wind River Basin is provided and is incorporated into the Scott #2 proposed action discussion.

A. Lander Field Office Reply and Rationale

As the Application for Permit to Drill (APD) shows, this is an exploratory well. Hudson has not proposed any completion methods pending the evaluation program of any potentially productive zones encountered during drilling. As a result, the LFO required through the application of a Condition of Approval (COA) that Hudson submit for prior approval the completion plans including which zones/formations will be tested, stimulation proposals, and the proposed production methods. Any operations involving plugging back, squeeze jobs (abandonment of perforations), or casing repair and remedial cementing operations require prior approval from the LFO, per regulations found in 43 CFR 3162.5.

Routine completion practices for testing geologic formations identified through well log interpretation as containing potential oil bearing porous zones include perforating the casing in the identified oil bearing zone while monitoring the fluid level within the well bore. Perforating of the well casing occurs once the drilling rig is dismantled and removed from the location and a service rig is brought in to equip the well, conduct tests, and completion operations. Oil and gas production metrics such as flow rates of crude oil and/or natural gas and water, the flowing and

shut-in tubing pressures, and the physical and chemical properties of the production stream will be of interest to the well operator and completion engineers. All of this falls under the heading of well testing. These tests determine whether the well would be equipped for production or permanently plugged and abandoned.

Completion techniques are expected to be similar in nature to wells drilled and produced in the Dubois Field, located approximately three (3) miles to the southeast of the proposed location. The Dubois Field was discovered in 1945 and developed the Phosphoria Formation. This field is considered a structural trap type on a faulted anticline resulting in repeat sections of the Phosphoria Formation with an overthrust section at approximately 2,000 feet deep and a subthrust section at approximately 6,500 feet deep. Historic completion practices in the Dubois Field included setting casing through the productive zone (overthrust Phosphoria Formation, average depth of 2,000') and selectively perforating and acidizing the dolomitic limestone. Acidizing is a type of stimulation treatment and would be performed below the reservoir fracture pressure in an effort to restore the natural permeability of the reservoir rock immediately around the well bore which can be damaged by the act of drilling. The acidizing operation consists of pumping anywhere from fifty to thousands of gallons of acid down the well. A common type of acid employed on wells to stimulate production is hydrochloric acid (HCL), which is useful in removing near well bore blockage in carbonate reservoirs, or limestones and dolomites. The acid travels down the tubing, enters the perforations, and contacts the formation. Continued pumping forces the acid into the formation matrix where it etches channels. The channels provide a way for the formation's oil or gas to enter the well through the perforations by improving the permeability of the near well bore rock. After an acid job is performed, the used acid and sediments removed from the reservoir are washed out of the well and the neutralized acid is disposed of by hauling the fluids off location through proper waste handling procedures. Acidizing stimulation is not proposed for the completion of the Scott #2 well but is discussed here as technique used in historic Phosphoria Formation development.

Acidizing the Phosphoria Formation oil zone to stimulate production would not require water volumes that are associated with the use of hydraulic fracturing as addressed in the referenced Attachment 1, Hydraulic Fracturing White Paper. The LFO required Hudson to submit for prior approval the completion plans including which zones/formations will be tested, stimulation proposals, and the proposed production methods through the application of a Condition of Approval (COA).

As discussed in the request for SDR for which this analysis is being completed, questions regarding the potential use of hydraulic fracturing were raised. Without a discrete development proposal, the use of hydraulic fracturing in the oil and gas development process cannot be predicted as is stated in the SDR No. Wy-2012-020 (Part 2), page 10. However, this modified Decision Record/Finding of No Significant Impact will incorporate by reference, in its entirety, a Hydraulic Fracturing White Paper included as Attachment 1, for informational purposes only. As stated above, this process is not expected to be used based on nearby similar oil and gas development projects. This document provides a general discussion of the hydraulic fracturing process and potential issues associated with its use as a specific completion technique.

Components of the referenced Hydraulic Fracturing White Paper, Attachment 1, are discussed below in more site specific detail and include Operational Issues, Potential Impacts to Usable Water Zones, Geologic Hazards (including seismic/landslides), Spill Response and Reporting, and Public Health and Safety.

1. Operational Issues

Oil and gas resources found in the Phosphoria and Tensleep Formations of the Permian and Pennsylvanian age in the Wind River Basin historically produce heavy asphalt crude oil. Based on historic production from the Phosphoria and Tensleep within the Wind River Basin, little to no natural gas is expected to be encountered. Natural gas venting or flaring could contribute additional emissions of volatile organic compounds (VOC) during flow back following any potential hydraulic fracturing (HF), should it be proposed and approved, or after well testing. As the project is associated with testing a structural oil play, it is expected that any oil column identified would also be exposed to an oil/water contact in the zone of interest. Any HF of the potential Tensleep or Phosphoria productive zones that would result in a fracture extending below the oil/water contact would result in formation water coning effect and render the well non-productive. Because water is denser and has a lower viscosity than oil, the water column in the formation would "cone" up into the oil column thereby bypassing the oil and leaving the oil remaining in the matrix of the rock. Calculation of relative permeability allows comparison of the different abilities of fluids to flow in the presence of each other, since the presence of more than one fluid generally inhibits flow. Therefore, it can be assumed that this type of oil play would not require HF. If HF is considered for this type of play, the engineering design for such a HF procedure is expected to be limited in size so as to not create a fracturing system extending into the formation water column of the productive oil zone. A HF design that would extend into the water column could result in the well becoming non-productive.

Hudson has proposed to obtain fresh water for use in drilling operations from the municipal water supply for the town of Dubois, Wyoming. Hudson has not proposed completion techniques in the APD. As such, BLM's ability to analyze impacts to the municipal water supply associated with water usage for completion and HF was limited. However, it is assumed that the volumes of water necessary are within the bounds of the permit governing the municipal water supply. If it is not, additional and/or other sources of water may be necessary. The BLM encourages the recycling and reuse of produced water in completion operations to minimize overall freshwater withdrawals.

To protect subsurface water resources at the drill site, operators are required by regulation to isolate all freshwater and usable water zones which is discussed further below.

2. Potential Impacts to Usable Water Zones

As addressed in Part 2 of this Appendix, the well casing design and cementing programs, as proposed and modified through the application of conditions of approval, are adequate to isolate all formations that may contain freshwater and protect all other formations that may contain oil, gas, and usable water as required by 43 C.F.R. 3162-5.2(d) and Onshore Order #2, Drilling Operations.

Within the Dubois Valley, groundwater generally flows south and south east from the Absaroka and Washakie Ranges and north and northeast from the Wind River Range towards the Wind River and into the center of the Wind River Basin. The proposed well location is not in an area that DEQ has identified as being a high or moderately high priority for monitoring, in an area where the aquifer is considered particularly sensitive to contamination, nor is it in a primary recharge area.

There are no identified Wyoming State Engineers Office adjudicated water wells or water developments within a one (1) mile radius of the well site location. Water well information within the following Townships/Ranges was collected from the Wyoming State Engineer's Office E-Permit website: T. 43 N., R. 107 W., T. 42 N., R. 107 W., T. 41 N., R. 107 W., T. 41 N., R. 106 W., and T. 42 N., R. 106 W., 6th P.M. Fremont County, WY (See Attachment 2). This is provided for informational purposes only and is not intended to establish the area of review under NEPA.

The Scott #2 well is proposed to be drilled to a total vertical depth of 7,400 feet below ground surface (bgs) to the Amsden formation. Production target zones are proposed in the Phosphoria and/or Tensleep formations between 6,620 feet and 7,300 feet deep.

There are four water supply wells located within 2.5 miles of the proposed action. These include two that appear to be sourced from two springs (1.2 and 1.5 miles down gradient of the proposed project, P135725.0W, P151806.0W) for domestic and stock purposes, and one that is permitted for miscellaneous use. Data available to BLM does not indicate the depth of these wells.

Additional wells are located approximately 10 miles south of the project and are associated with residents in and around the Town of Dubois, including the water supply wells for the town of Dubois. Available records for these water supply wells indicate that they are all less than 900 feet deep and are completed in the Chugwater and Wind River Formations. Shallower wells in the area of Dubois are generally less than 200 feet deep and are completed in the alluvial deposits associated with the Big Wind River and other perennial stream systems. Unconfined aquifers contained within alluvium are generally not associated with deeper groundwater supplies.

The deepest domestic water well within the study area is near the town of Dubois (Lamb #1 well, P102090.0W). This well is completed to 860 feet deep into the Chugwater Formation with a subsurface elevation of approximately 6,180 feet (assuming an approximate ground level elevation of 7,040 feet). This means that there is approximately 4,076 vertical feet between the target production zone of the Scott #2 well and the deepest domestic water well near the town of Dubois, as well as approximately 10 horizontal miles between these two wells.

As another example, the deepest Town of Dubois municipal well is completed to 84 feet deep, and the vast majority of the other wells completed within the Dubois valley are between 20 and 200 feet deep. Of these wells, the shallower wells are most likely completed within the Quaternary alluvium of the Wind River valley. The deeper wells within the Dubois valley area are likely completed in the Tertiary Wind River formation (or Wind River/Indian Meadow's

undifferentiated formation), Triassic Chugwater formation, or shallow formation aquifers between the Chugwater and Wind River formations.

It is highly likely that there is a hydraulic connection between the Big Wind River and the shallow aquifers of the unconsolidated quaternary alluvium found along the perennial stream systems in the Wind River Basin and in Wyoming in general. This surface water/groundwater connection may express itself as baseflow contribution and in recharging the larger groundwater system. However, there is no indication that a hydraulic connection exists between the proposed Scott #2 drilled formations or potential production formations and the shallow aquifers where the water wells in the Dubois area are completed because of the spatial separation, presence of confining layers, and structural geology of the area.

There is not enough information available to determine if local geologic structures or faulting provide connectivity between the deeper production aquifers and the usable water zones and/or domestic water supply wells. However, based on the inferred regional structure of the Dubois area, the aquifers within the proposed production zones for the Scott #2 well (Phosphoria and Tensleep Formations) would likely deepen to the south and southwest underneath the synclinal Wind River valley until hitting bedrock and remain within their respective formations due to the numerous confining layers which exist between usable water zones and the proposed production zones. Further, horizontal and vertical groundwater gradients are generally southward and downward. There is no data to indicate active mixing between the proposed production zone and any overlying usable water zones. The casing and cementing program is adequate for isolating usable water zones and to prevent mixing of incompatible waters.

There are multiple freshwater springs and ponds nearby the project area. These features likely only occur ephemerally within landslide or slump deposits that act as natural surface water impoundments. The slump deposits consist of unconfined and poorly consolidated sediments that could allow for rapid transmissivity of surface water into the subsurface sediments and provide recharge to underlying unconfined aquifers such as the Wind River aquifer. However, vertical gradients are undefined and the extent of any confining units that may impede vertical flow is not known. As such, river corridors and springs could likely reveal widespread impacts from surface spills from oil and gas development in a more timely fashion than groundwater quality impacts to deeper unconfined aquifers.

3. Geologic Hazards (including seismic/landslides)

As indicated by the map of historic earthquakes near the Scott #2 well, seismic activity and potential for activity in the vicinity of the project is very low. The nearest earthquake to the project area in the last 30 years was a magnitude 3 earthquake from 2004 approximately 4.5 miles to the southwest of the Scott #2 well (USGS, 2014). Also, according to the USGS, the Scott #2 well is situated between 9% and 10% *g* peak horizontal ground acceleration, where *g* is equal to the acceleration due to gravity, or 9.8 m/s2, with a 10% probability of exceedance in 50 years (USGS, 2008). There are no active or potentially active faults within 10 miles of the project area (Case and Green, 2000). Historic landslide and slumping activity in the vicinity of the well location happens to be very high, however the siting of the well location is positioned on solid stable ground as determined during onsite investigations (WSGS, 2004). There are no

active faulting systems or fracture zones identified that would impact this action. See the following illustrations.

4. Spill Response and Reporting

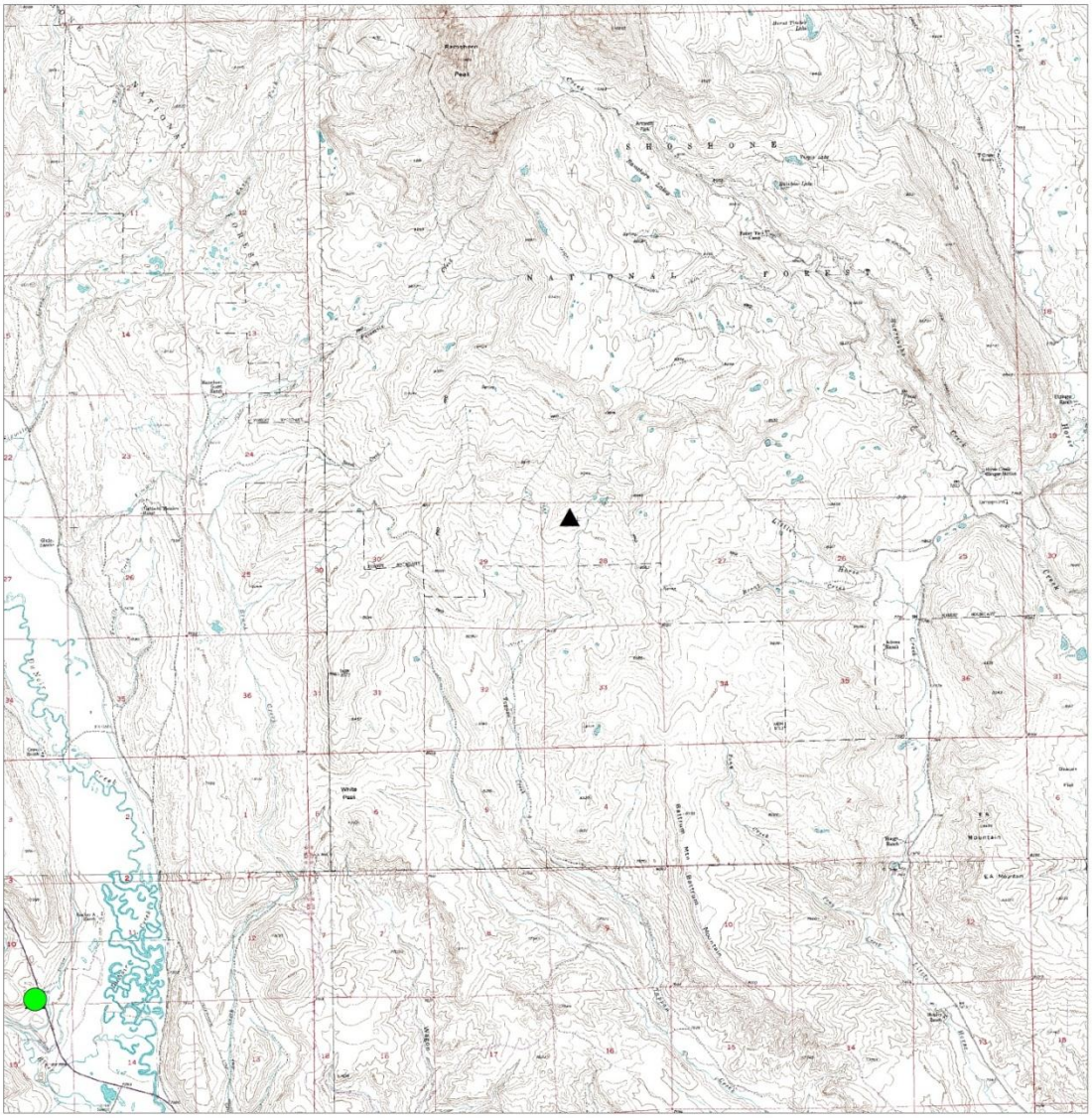
In the proposed action of the APD, Part 7 of the Surface Use Plan of Operations as well as the information provided in WY-050-EA10-101, the methods of handling waste materials are adequately addressed and so is not further discussed here.

5. Public Health and Safety

Potential impacts related to public health and safety relate to the proposed action's proximity to domestic and/or community water supplies. As addressed above under Part C of this section, there are no anticipated adverse impacts concerning public health and safety.

Potential for hydrogen sulfide (H2S) in the Phosphoria and Tensleep Formations exist. Appropriate public safety mitigation measures were implemented through the review and approval of the APD including a H2S Drilling Contingency Plan submitted in accordance with Onshore Oil and Gas Order Number 6, Hydrogen Sulfide Operations.

Historic Earthquakes Near Scott #2 Well



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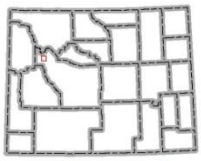
No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by BLM.

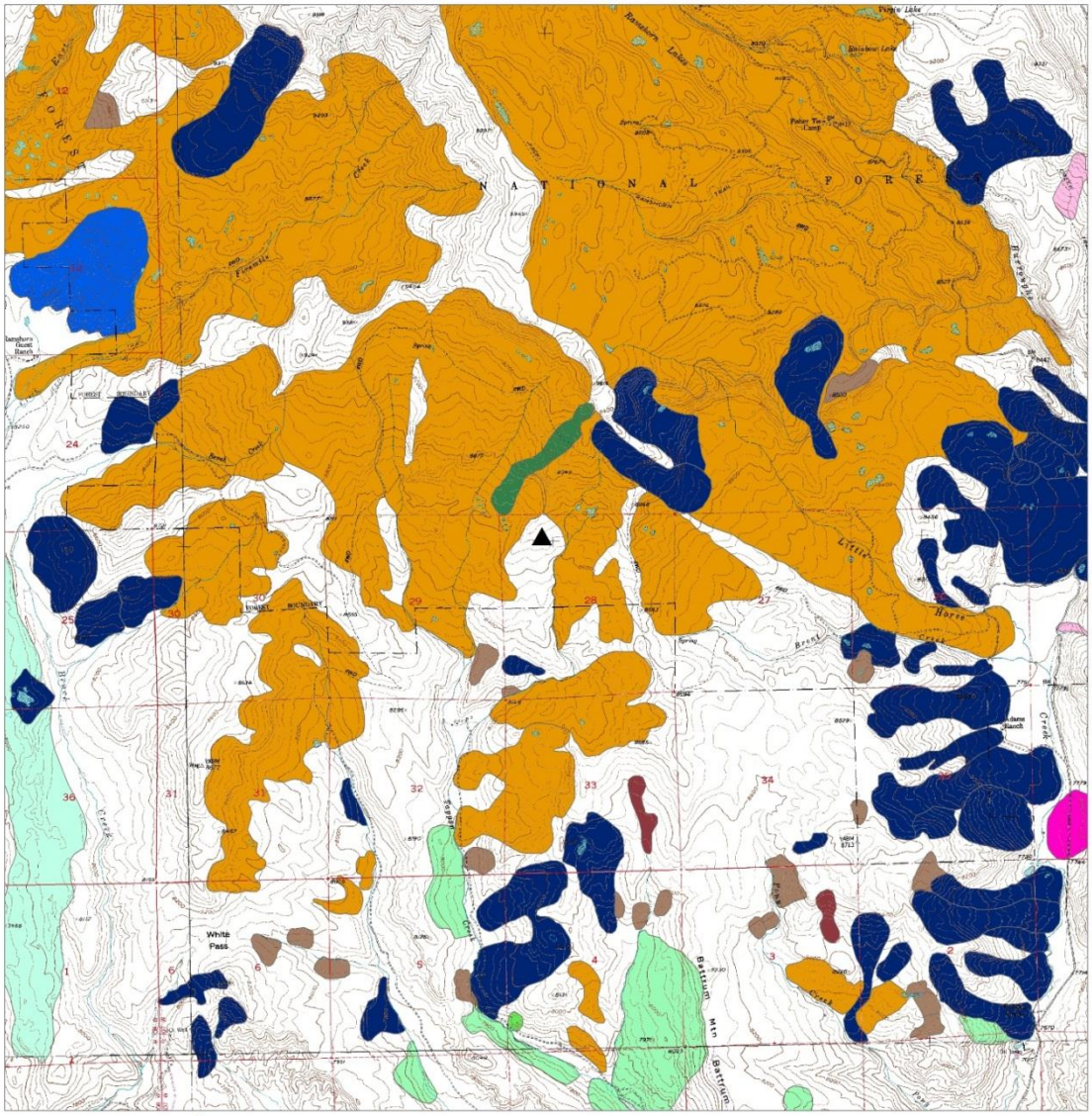
▲ Scott #2 Well Location

● Historic Earthquakes, 1975-2006



Date: 8/19/2013

Historic Landslides Near Scott #2 Well



▲ Scott #2 Well Location

Landslide Type

- Quaternary landslide and/or glacial deposits, undifferentiaed
- af/debris slump
- block slide (rock or earth)/multiple slump(bedrock, debris, or earth)/multiple flow (earth or debris-laden earth)
- block slide (rock or earth)
- flow
- possible flow
- multiple debris flow/slump/flow (earth or debris-laden earth)
- multiple flow (earth or debris-laden earth)
- multiple slump (bedrock, debris, or earth)
- multiple slump (bedrock, debris, or earth)/multiple flow (earth or debris-laden earth)
- slump
- slump/flow (earth or debris-laden earth)

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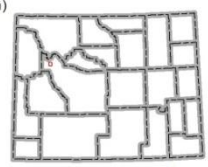
No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by BLM.



Date: 8/19/2013

III. DISCLOSURE OF DOWNHOLE OPERATIONS

The Wyoming State Office remands the decision to approve the Scott #2 Well to the LFO for additional analysis. The LFO is instructed to complete additional disclosure and analysis as necessary to ensure that information regarding downhole operations (including drilling and completions), and any potential impacts to water resources is disclosed in the NEPA record. (SDR No. Wy-2012-020 (Part 2) Page 11)

As a result of the need for additional information, the following response to the remanded decision includes the disclosure of geologic sections that will be penetrated by the proposed drilling process, a hydrologic impacts discussion, and complete well bore design which includes identification of the estimated depths of anticipated water, oil, gas, or mineral bearing formations and the protection of these resources.

A. Lander Field Office Reply and Rationale

This section provides a reasonable process for reviewing and designing downhole operations. Knowing the sequence of the geologic sedimentary strata provides a base line of how a well bore is designed to maximize well control and isolate mineral and potentially usable water zones. Hydrologic impacts are defined by projecting the occurrence, distribution, and potential properties of the geologic strata expected to be penetrated by the drilling of the well. Once these projections are defined, the well bore can then be designed.

1. Identification and Estimated Tops of Important Geologic Markers Including Hydrogeology

Formation	Top	Thickness	Potential For	Comment
Aycross	Surface	800’	No Data	900-ft of surface casing cemented to the land surface and through the Wind River should be sufficient to protect GW resources.
Wind River	800’	300’	Water	Abnormally high temperatures and pressures, H2S, or other geologic hazards are not anticipated.
Cenozoic and Upper Mesozoic	1,100’	1,800’	No Data	‘’
Chugwater	2,900’	1,020’	No Data	‘’
Fault	3,920’	0’	No Data	‘’
Dakota and Cloverly/Morrison	3,920’	500’	Oil/Gas	‘’
Sundance	4,420’	525’	No Data	‘’
Gypsum Springs	4,945’	100’	No Data	‘’
Nugget	5,045’	85’	Oil/Gas	‘’
Chugwater	5,130’	1,350’	No Data	‘’
Dinwoody	6,480’	140’	No Data	‘’
Phosphoria	6,620’	280’	Oil/Gas	H2S is known to occur within the Phosphoria. A H2S contingency plan has been developed to protect public health and safety.

Tensleep	6,900’	400’	Oil/Gas	‘’
Amsden	7,300’	100’	No Data	‘’
Total Depth	7,400’	------		BHP approximately=3700 psi at 0.5 psi/foot

The geologic information presented below comes from available geologic reports specific to the Dubois area. The hydrogeological information presented below was gathered from the most recent and complete compilation of available data pertaining to groundwater for the entire Wind River/Bighorn River basin and may or may not represent the local hydrogeological characteristics of the aquifers described therein. Information related to the local hydraulic gradients, groundwater flow regimes, and groundwater quality characteristics pertinent to the Scott #2 well is not available.

Aycross/Tepee Trail Fm (at surface to 800 feet):

The Upper Eocene aged Tepee Trail formation which may contain equivalents of the Aycross Formation consists of interbedded sandstone, conglomerates, shale, and volcanic tuff (Keefer, 1957).

The Tepee Trail and Aycross formations are considered part of the Aycross-Wagon Bed confining unit in the Wind River Basin. Both formations may yield small amounts of water to springs and shallow wells along outcrop areas, but water quality is not determinable (Taucher et al, 2012). No known domestic or stock wells are completed into the Aycross/Tepee trail formation or Aycross-Wagon Bed confining unit within the study area. The Aycross/Tepee trail formation is the surface formation within the project area and likely receives water through infiltration of soils, but there is no data to determine whether the Aycross/Tepee trails formation actually contains any water within the project area.

Wind River Fm (800 feet):

The Eocene aged Wind River formation unconformably underlies the Tepee Trail formation at approximately 800 ft bgs. The Wind River formation consists of sandstone, conglomerate, shale, siltstone, and claystone, in a variegated color sequence of red, purple, gray, and white. The strata are often highly tuffaceous and bentonitic in part, and thin carbonaceous shales with thin coal partings are present on occasion. In this area, the Wind River Formation is likely undifferentiated with the Indian Meadows formation (Keefer, 1957).

The Wind River Aquifer is considered a major aquifer throughout the Wind River Basin, and is used for many sources including public water supply in Riverton, WY. The principle use for the Wind River Aquifer throughout the Basin is for stock and domestic use due to relatively low yields and the need to treat water based on quality. In general, recharge to the Wind River Aquifer is from direct infiltration of precipitation, and discharge is from springs and seeps in perched

beds above lower permeable rocks. Groundwater flow in the Wind River formation aquifer is generally towards the Wind River and other perennial stream systems with

horizontal gradients trending with slope. Vertical gradients are not well established or documented in the Wind River formation. Water quality within the Wind River Aquifer fluctuates based on several characteristics with TDS ranging from 1,060 to 38,800 mg/L, with a median of 2,730 mg/L (Taucher et al, 2012). Many of the stock and domestic water wells drilled within the Dubois area are likely completed within the Wind River aquifer. These wells likely provide usable freshwater, but local water quality data is not available. These potential freshwater bearing zones will be isolated by running casing and cementing the zones covering all identified geologic sections containing possible freshwater within the Scott #2 well.

Cenozoics and Upper Mesozoics (1,100 feet):

The existing Cenozoic and Upper Mesozoic formations that would be encountered in the subsurface below the Scott # 2 well are speculative because of the inferred extent of the eastward plunging anticline visible at the surface to the east of the well location that is bounded by two thrust faults to the north and south, therefore, the Cenozoic and Mesozoic formations were grouped together for ease of reference. The Cenozoic (Paleocene aged) Fort Union formation is most likely not present in the subsurface of the Scott #2 well. The Upper Cretaceous aged Cody Shale and Frontier formation is most likely not present in the subsurface of the Scott #2 well. The Lower Cretaceous aged Mowry shale may be the first Mesozoic formation encountered in the Scott #2 well and generally consists of siliceous shale with thin beds of bentonite and sandstone (Keefer, 1957). The Lower Cretaceous aged Thermopolis Shale may be present and consists of the Muddy Sandstone member and fissile, black shale (Keefer, 1957). The Mowry shale and Thermopolis shale are typically considered confining units elsewhere in the Wind River Basin, according the Taucher et al (2012). Other formations that may be present and are described below include: Cloverly/Dakota and Morrison formations, Upper and Lower Sundance formation, Gypsum Springs formation, and Nugget Sandstone.

Chugwater Group (2,900 feet):

The Triassic aged Chugwater Group is divided into several formations in the Dubois area consisting of the Popo Agie Formation (shale and claystone), Crow Mountain sandstone (buff sandstone with sitly and shaly beds), and Red Peak Formation (massive shaly siltstones with one prominent sandstone bed) from youngest to oldest (Keefer, 1957).

The Chugwater Group contains the Chugwater aquifer which includes sub-aquifers and confining units based on the characteristics of the different lithostratigraphic units. General groundwater chemistry of the Chugwater aquifer indicates that the majority of the water is fresh and remaining waters are slightly saline based on TDS concentrations. TDS ranges from 1,010 to 72,100 mg/L with

a median of 5,330 mg/L (Taucher et. al, 2012). Some of the stock and domestic water wells drilled within the Dubois area are likely completed within the Chugwater aquifer. These wells likely provide usable water, but local water quality data is not available. No hydrogeologic information is available describing the Chugwater aquifer and or confining unit within the study area. These potential usable water zones will be isolated by running casing and cementing the zones covering all identified geologic sections within the Scott

#2 well.

Fault (3,920 feet):

A significant reverse fault has been correlated and inferred from previous drilling in the area to occur approximately 3,920 feet bgs where the Scott #2 well will be drilled. This fault is concealed by Tertiary sediments but is indicative of the intense faulting and folding evidenced in other places of the synclinal basin between the Wind River and Washakie Ranges. It is anticipated that movement of the overriding northern block of the fault is to the southwest with a displacement of approximately 2,230 feet. Formation tops below the fault are likely more speculative than overlying tops because of the unknown thickness of the fault zone and likely gradation of altered material surrounding the fault into underlying strata. Because information relative to the fault zone is not known no speculation as to the faults hydrogeological properties can be given. Generally, if a fault juxtaposes permeable strata with impermeable strata the fault can act to confine the groundwater in the permeable strata. Similarly, a fault can act to provide communication between otherwise incommunicable aquifers by juxtaposing them. The fault might juxtapose the overlying Chugwater group with the underlying Dakota and Cloverly/Morrison Formations at the well bore. The wellbore will indeed drill through this fault zone, and appropriate precautions will be taken to prevent hazardous drilling conditions while drilling through this fault zone.

Dakota and Cloverly/Morrison (3,920 feet):

The Dakota sandstone is often considered a separate formation in the subsurface between the Thermopolis shale and Cloverly Formation, or as a member of the Cloverly, and might be present within the well-bore below the reverse fault. The undifferentiated (at this location) Lower Cretaceous and Upper Jurassic aged Cloverly and Morrison Formations consist of two unique beds. The upper bed consists of reddish sandstone, siltstone, and shale, often referred to as the "rusty beds." The lower distinct bed consists of red, gray, blue, green, and purple claystones and white to gray medium to coarse-grained sandstone (Keefer, 1957).

Typically, the Cloverly is considered a confined aquifer by the overlying Mowry-Thermopolis confining unit and underlying Morrison confining unit. The Cloverly aquifer is generally only permeable where heavily fractured, and few water wells are completed into the Cloverly for that reason. The Morrison formation is considered a confining unit throughout the Wind River Basin, but thin sandstone beds may allow for small yields of groundwater. Because the Cloverly and Morrison are undifferentiated at this location and consist of various sandstones, siltstones, claystones, and shales, it is possible for thin sandstones to yield groundwater from various beds within the formation (Taucher et. al, 2012); however, there are no documented uses of groundwater from the Dakota and Cloverly/Morrison Formations within the study area.

Sundance (4,420 feet):

The Upper Jurassic aged Sundance Formation is likely split into the upper and lower members at this location. The Upper Sundance consists of highly glauconitic, fine to

coarse-grained, sandstone and conglomeratic, fossiliferous limestone. The Lower Sundance consists of fossiliferous, oolitic, bluish-gray limestone with interbeds of greenish-gray shale (Keefer, 1957). .

The Sundance Formation is considered a limited potential aquifer (often combined with the Nugget to make the Sundance-Nugget aquifer) due to small yields and formation extent within the Wind River Basin; however, where tested, the Sundance aquifer yields fresh water at discharge points (one location in the entire Wind River Basin) and saline water in the subsurface (TDS median of 14,500 mg/L) (Taucher et al, 2012).

Gypsum Springs (4,945 feet):

The Middle Jurassic aged Gypsum Springs Formation consists of limestone, dolomite, and soft red shale with a bed of brecciated limestone near the base (Keefer, 1957).

The Gypsum Springs Formation is considered a confining unit in the Wind River Basin. Springs in the Wind River Basin from the Gypsum Springs confining unit ranged in TDS from 287 to 1,360 mg/L (Taucher et. al, 2012). There are no springs generated from the Gypsum Springs Formation identified within proximity of the project area.

Nugget (5,045 feet):

The Lower Jurassic aged Nugget sandstone consists of fine to medium grained, white to red sandstone with thin to massive beds that are often crossbedded (Keefer, 1957).

The Nugget sandstone is often combined with the Sundance Formation as the Sundance-Nugget aquifer, and is considered to have limited potential development. Chemical composition of produced water from the Nugget ranges from 1,200 to 217,000 mg/L of TDS with a median of 6,520 mg/L (Taucher et. al, 2012).

Chugwater Group (5,130 feet):

Repeated section; previously described

Dinwoody: (6480 feet):

The Lower Triassic aged Dinwoody Formation consists of fine grained brown, pink, and yellowish sandstone with some siltstone layers (Keefer, 1957).

The Dinwoody Formation is typically considered a confining unit and is grouped as the Chugwater-Dinwoody aquifer and confining unit and may be considered a sequence of rocks that act as both confining and leaky-confining unit and aquifer. Produced water from the Dinwoody confining unit from oil and gas operations elsewhere in the Wind River Basin ranged in TDS concentration from 1,540 to 14,100 mg/L (Taucher et. al, 2012). There is no available data to determine whether groundwater from the Dinwoody aquifer is used or usable with the study area.

Phosphoria (6,620 feet):

The Permian aged Phosphoria Formation consists of interbedded dolomite, chert, limestone, siltstone, and sandstone, with potential thin beds of phosphate rock and minor

shales. The Phosphoria is a target formation in the Scott #2 well and has been a significant oil producing formation elsewhere in the Wind River Basin. Past production from the Phosphoria indicates high potential for hydrogen sulfide gas accumulation within formation (Keefer, 1957).

The Phosphoria Formation is a very complex hydrogeologic unit, and is referred to as the Goose Egg-Phosphoria aquifer and confining unit. Due to faults and fractures within the formation and intertonguing and interfingering of beds within the formation, the Phosphoria can act as both aquifer and confining or leaky-confining unit. The Goose Egg-Phosphoria aquifer is not commonly developed for water because of low yields and required drilling depths. Chemical characteristics of groundwater from the aquifer are highly variable. Produced water from the Goose Egg-Phosphoria aquifer ranges from 372 to 155,000 mg/L TDS, with a median of 5,810 mg/L (Taucher et. al, 2012).

Tensleep (6,900 feet):

The Upper-Pennsylvanian aged Tensleep sandstone consists of white, fine-grained, crossbedded sandstone that is also a target formation in the Scott #2 well and a known hydrocarbon producing formation elsewhere in the basin (Keefer, 1957).

The Tensleep Formation makes up the Tensleep aquifer which is a major aquifer in the Wind River Basin. Water from the Tensleep aquifer is used for a wide variety of uses, and it is considered by Taucher et. al, as one of the most prolific aquifers in the Wind River Basin. Wells located along the basin margin often flow from artesian pressure, and large volumes of water are produced in the aquifer from oilfields. In heavily structured areas, such as the project area, fracturing has increased permeability in the Tensleep aquifer. Produced water from the Tensleep aquifer ranges from 167 to 25,600 mg/L of TDS, and a median concentration of 2,930 mg/L (Taucher et. al, 2012). There is no available groundwater quality data or aquifer characteristic data to determine whether groundwater from the Tensleep aquifer is usable within the study area.

Amsden (7,300 feet):

The Pennsylvanian aged Amsden Formation consists of interbedded shale, dolomite, and sandstone (Keefer, 1957) and would be obtained as the TD formation for the Scott #2 well at 7,400ft.

The Tensleep aquifer is generally not confined from the Amsden aquifer where the Amsden Formation is permeable enough to allow groundwater flow and create an aquifer. The Amsden aquifer lacks available hydrologic data because virtually no water wells have been completed in the aquifer throughout the entire Wind River Basin. However, it is assumed that permeability of the Amsden aquifer might increase where fractured. One produced water sample from the aquifer from an oil/gas well elsewhere in the Wind River Basin indicated TDS concentrations of 6,100 mg/L (Taucher et. al, 2012). There is no information to indicate whether the Amsden Formation would be considered a usable water source within the study area.

2. Hydrologic Impacts Discussion

Impacts to surface water and groundwater are described in Chapter 4.1.4, Water, of the Proposed Lander Resource Management Plan/Final Environmental Impact Statement (LRMP/FEIS 2013) (p.648 - 653) and are specifically incorporated by reference here. The BLM discloses that the potential increase in the number of additional water and mineral production wells over the life of this plan would increase the chance of exposure to aquifer contamination and aquifer mixing (LRMP/FEIS (2013), p.650). As stated, groundwater could be affected by multiple factors, including industrial, domestic, or agricultural activities through withdrawal, injection (including chemical injection), or mixing of materials from different geologic layers or the surface. Withdrawal of groundwater could affect local groundwater flow patterns and create changes in the quality or quantity of the remaining groundwater (LRMP/FEIS (2013), p.650 - 651). The discussion of potential impacts to groundwater in the LRMP/FEIS (2013) is general and meant to be inclusive of the entire planning area.

Impacts to groundwater, should they occur, would likely be limited to a near well bore location due to inferred groundwater flow conditions. Impacts to near well groundwater could occur from poor casing and/or cementing practices and the use of potentially hazardous materials within those formations containing freshwater and/or usable water zones. The materials proposed for use in the drilling program within freshwater and/or usable water zones are water based and would be protective of these zones, both water quality and formation integrity.

The proposed action would not cause significant impacts to users of groundwater contained within alluvium nor is there any data to indicate that waters contained within the proposed production formation are hydraulically connected to usable water supplies; significant impacts are not expected to occur to usable water supplies from the drilling of the proposed well, or from any future completion activities. Should the well be identified for completion, the proposal will be evaluated to ensure that it is in compliance with Onshore Order #2, 43 CFR 3160 regulations, and would not result in a violation of a Federal and/or State law.

Leaks from spills could also impact both surface and groundwater resources. Due to the local geology, usable aquifers in the area of the proposed action are not considered to be susceptible to contamination from surface sources. Regardless, Hudson has provided adequate plans for responding to spill events should they occur. No significant impacts to groundwater are expected. Adequate engineering controls are in place to address any potential drilling issues should they arise.

3. Well Bore Drilling and Design

This section provides the engineering design of the well bore which includes the casing program, drilling mud program, well casing cement program, evaluation program, water use, and waste handling.

a. Casing Program

Once the drilling rig is mobilized and equipped at the drill site, the wellbore will be drilled, cased, and cemented. The casing program proposed and approved for the drilling of the well is summarized in the following table.

Hole Size	Casing Size	Wt./Ft.	Grade	Joint	Depth Set
17.500”	13.375”	54.0#	J-55	ST&C	0 – 900’
12.250”	9.625”	36.0#	J-55	ST&C	0 – 3000’
8.750”	7.000”	23.0#	J-55	LT&C	0 – 5500’
8.750”	7.000”	23.0#	N-80	LT&C	5500 – 6900’
6.500”	5.500”	17.0#	N-80	Flush	6300 – 7400’

Once the rig is ready, a 17.5-inch-diameter hole will be drilled to 900 feet, at which point a string of 13.375-inch-diameter surface casing would be set and cemented from 900’ to the surface. This design is to isolate any potential freshwater zones that may exist in the Wind River and Aycross Formations. The primary purpose for surface casing is to protect near surface water zones from possible contamination from drilling mud, oil/gas, and saltwater from deeper zones and provide optimum depth for maintaining pressure control of the wellbore. This is based on the rock competency at the surface casing setting depth. The basal Wind River Formation, made up of conglomerate rock, is not a competent zone to set surface casing and therefore a zone slightly above the base of the Wind River Formation is selected. As well, it is important to set the surface casing shoe in a competent (dense) formation in order to prevent erosive washing around the shoe by the drilling mud and to prevent underground blowouts. Resources that may be encountered below the surface casing setting depth of 900 feet will be isolated by the 9.625 inch intermediate casing string as discussed below.

The surface casing will have centralizers on the bottom three (3) joints with a stop ring utilized midway on the shoe joint with a centralizer every third joint thereafter for a total of 17 centralizers. A centralizer is a device fitted with a hinged collar and bow springs to keep the casing in the center of the wellbore to help ensure efficient placement of a cement sheath around the casing string. An efficient cement sheath will prevent inter-formational flow (protect freshwater/usable water from contamination) and retard casing corrosion.

After the surface casing is set in a competent rock formation, a blowout preventer (BOP) will be attached to the top of the surface casing. A blowout, or kick, is a release of subsurface fluids (oil, gas, water) into the wellbore when the pressure of the fluids in the formation rock overcomes the hydrostatic pressure of the well bore fluids or mud. Through a system of hydraulically activated valves and manifolds, the BOP is designed to shut the wellbore in and also allow fluid to be pumped into the hole and control any potential release of fluids (i.e., to kill the well). BOPs are required by state and federal rule, and conditions of the drilling permit approval specify the pressure rating of the BOP, which is designed based on potential subsurface conditions. State and federal rules also require testing of the BOP and related equipment prior to drilling out from the surface casing.

A 12.25 inch diameter hole will be drilled from below the 13.375 inch surface casing to 3000 feet and a string of 9.625 inch intermediate casing will be set from surface to 3000 feet providing hole stability and adequate protection of all formations to the overthrust Chugwater Formation. Cement will be circulated to surface to isolate all rock formations to 3000 feet. This casing string will provide isolation from 3000 feet to surface. Freshwater mud is proposed for use in this zone and is compatible with formation fluids and properties. Overlapping cement from 0 to 900' will provide an additional layer of protection and adequately isolates the potential usable water zones.

An 8.75 inch diameter hole will be drilled from below the 9.625 inch intermediate casing setting depth to 6900 feet and a string of 7.0 inch production casing will be set from surface to 6900 feet. Cement will be circulated resulting in the top of the cement column to be within the 9.625 inch casing string set at 3000 feet, providing isolation of all formations from 3000 feet to 6900 feet.

A 6.5 inch diameter hole will be then be drilled from below the 7.0 inch production casing setting depth at 6900 feet and a 5.5" casing string (production liner) will be set from 6300 feet to 7400 feet to isolate the proposed production zone, and proposed completion zone. Cementing operations will result in circulation of cement from 7400 feet to the top of the 5.5 inch casing liner at 6300 feet isolating all formations from 7400 feet to 6900 feet.

The production liner (5.5 inch casing string) will be overlapping into the 7.000 inch production casing by 600 feet which is adequate room to set a hanger and isolation packer. Standard practice is a minimum of 200 feet. It is important that casing liner design has adequate overlap in order to provide room for the tools used for hanging liners and adequate cement coverage is obtained to provide a hydraulic seal of the top of the casing liner.

Casing string(s) will be pressure tested to 0.22 psi/foot of casing string length or 1,500 psi, whichever is greater (not to exceed 70% of the internal yield strength of the casing), after cementing and prior to drilling out from under the casing shoe. On all exploratory wells, such as the proposed well, operators are required by regulation to conduct a pressure integrity test of each casing shoe. These tests ensure proper casing integrity has been obtained. The formation at the shoe will be tested to a minimum of the mud weight equivalent anticipated to control formation pressure to the next casing depth. This test will be performed before drilling more than twenty (20) feet of new hole below a newly set casing string. These tests provide information on maximum pressures that can be applied to the well bore.

Casing design is adequate and exceeds minimum API safety factor design criteria of 1.125 for collapse, 1.00 for burst, and 1.80 for tension. The 7.000" production casing and 5.500" production liner have been designed for service in a sour gas (H2S) environment.

The proposed and approved casing program is designed to provide pressure control and well bore integrity. All casing strings proposed will be cemented properly covering all exposed formations and is further discussed below where cementing operations are identified.

b. Mud Program

Among others, the primary function of the mud program is to cover the wall of the drilled hole with impermeable filter cake to prevent formation damage and protect fresh/usable waters from contamination.

The proposed drilling mud program includes the following.

Interval	Mud Type	Weight (ppg)	Viscosity	Fluid Loss
0 – 900’	Native Mud	8.4 – 8.9	30 – 36	No Control
900 – 3000’	Fresh Water/Gel	8.2 – 8.6	28 – 40	No Control
3000 – 7400’	LSND w/Polymer Sweeps	8.6 – 8.2	28 – 40	<10 cc/liter

Sufficient mud material to maintain mud properties, control lost circulation and contain a blowout will be available at the well site during drilling operations. Prior to entering the Phosphoria (500 feet above the top of the Phosphoria anticipated at 6620’) oxygen and H2S scavengers will be added to the mud system. As an added precaution, quantities of zinc carbonate and ironite sponge will be stored on location should an emergency arise.

Native mud is fresh water based mud containing bentonite clay that is flocculated with lime. In a large diameter surface hole, a flocculated clay based mud can remove large gravel cuttings encountered at shallow depths.

Fresh water/gel mud is a mud containing flocculated bentonite clay but will be thinned from the native mud so the viscosity is less in order to reduce pump pressures as the well is drilled deeper. Drill cuttings can still be lifted when reduction in viscosity occurs since the hole size is smaller, increasing the velocity of the mud in the wellbore, effectively cleaning the wellbore of cutting material.

Low solids non dispersed (LSND) muds contain less than 3–6% solids by volume and weigh less than 9.5 lbs/gal. Most muds of this type are water-based with varying quantities of bentonite and a polymer. LSND mud is a low-solids mud in which there is no clay deflocculant chemical. A thinning agent is used, in this case polymer sweeps, to reduce viscosity or prevent flocculation. Flocculation is a condition in which clays, polymers or other small charged particles become attached and form a fragile structure, a floc. In dispersed clay slurries, flocculation occurs after mechanical agitation ceases and the dispersed clay platelets spontaneously form flocs because of attractions between negative face charges and positive edge charges. Partially-hydrolyzed polyacrylamide (PHPA) as a functional additive is used either to control shales or to extend bentonite clay in a low-solids mud. Polyacrylamide is not toxic.

In LSND muds, viscosity can be obtained either entirely by polymers or by using a premium quality (nontreated) bentonite along with the appropriate extender polymer. Together, these give rheology comparable to that of a higher concentration of ordinary bentonite. Polyanionic cellulose (PAC) may be needed for fluid-loss control. Cross linked (XC) polymer can be effective for cuttings carrying. By combining premium bentonite and the right extender polymer, PAC and XC polymer, solids can be kept low, if solids control is required. This concept

applies best to low-density muds, below about 13 pounds per gallon (lb/gal), but has some validity in all muds.

Any additives that may be needed for the mud program during drilling will be designed based on actual well bore conditions experienced during drilling operations. Mud additives that may be in use are materials added to a drilling fluid to perform one or more specific functions, such as a weighting agent, viscosifier, or lubricant.

As proposed, the mud program does not contain any hazardous or toxic materials that are likely impact fresh/usable water zones. Impacts are not expected because the proposed mud program is compatible with the expected formation properties. Further, the operator has not proposed the use of oil based mud materials in the drilling of this well or in formations expected to contain usable waters.

c. Cementing Program

All casing strings will be cemented in place utilizing the following cementing program.

Casing	Cementing Program
Surface 0 – 900’	*Lead* with approximately 570 sx “Lite” cement + additives mixed at 13.10 ppg (yield 1.71 ft^3/sx) *Tail* with approximately 275 sx class “G” cement + additives mixed at 15.80 ppg (yield = 1.15 ft^3/sx), circulated back to surface with 100% excess.
Intermediate 0 – 3000’	*Lead* with approximately 580 sx “Lite” cement + additives mixed at 12.40 ppg (yield 2.04 ft^3/sx) *Tail* with approximately 220 sx class “G” cement + additives mixed at 15.80 ppg (yield = 1.16 ft^3/sx), circulated back to surface with 50% excess.
Production 0 – 6900’	*Lead* with approximately 150 sx 50/50 Poz-Mix cement + additives mixed at 14.15 ppg (yield 1.27 ft^3/sx) *Tail* with approximately 65 sx class “G” cement + additives mixed at 15.80 ppg (yield = 1.15 ft^3/sx), circulated with a planned top of cement (TOC) at 4,900’. <u>Conditions of Approval require the top of cement to be verified at above 3000’.</u>
Production Liner 6300 – 7400’	Set with approximately 50 sx Class “G” cement + additives mixed at 15.800 ppg (yield = 1.18 ft^3/sx). Top of cement at liner top.
sx = sacks of cement ppg = pounds per gallon ft^3/sx = cubic feet per sack	

The above cement volumes are approximate for planning purposes and are calculated under the assumption that a gauge hole will be achieved. Cement classes are standard oil field cement classifications as defined by the American Petroleum Institute (API). Class G and Lite cement are classified as premium Portland Cement. The differences between Class G and Lite cement is the water mix that results in providing different fluid weight in pounds per gallon. The Lite cement is mixed lighter to avoid applying excess hydrostatic pressure on the rock formations resulting in better isolation and reduced risk of lost circulation during cement placement.

Any additives identified will be designed based on actual well bore conditions experienced during actual drilling operations, such as high temperature and/or fluid loss into a formation. Actual cement volumes may vary due to variations in the actual hole size and will be determined by running a caliper log on the drilled hole. A caliper log is not expected to be run on the surface and intermediate casing sections of the hole since casing cementing operations will circulate

cement to surface and so can be verified through observation. As is customary practice for cementing surface casing, cement volumes are calculated using 100% excess of the hole volume and can be adequately verified by witnessing cement returns to the surface when the cement slurry is pumped.

All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling new hole beneath the previously cased and cemented hole. This is required to ensure the cement circulated on the set casing string is cured and can withhold any well bore pressures that may be experienced as drilling continues.

As proposed, through the approval of the Application for Permit to Drill the Scott #2 well, there is applied a Condition of Approval which requires; "All cementing operations on all casing strings below the surface casing shoe will result in a cement top of at least 100 feet into the previous casing shoe. The production liner will be cemented back into the liner hanger." This Condition of Approval means the entire wellbore will be cemented. All formations will be isolated and protected with cement.

As the casing, mud, and cementing program is designed and approved, no adverse impacts are expected to the mineral or water bearing zones or geologic formations. There are no other drilling hazards expected such as rock competency, high temperatures and pressures, or offset wells that have been previously plugged and abandoned. A review of other well drilling operations in the Dubois area do not indicate that drilling problems such as lost circulation or high pressures, will be encountered. An H2S contingency plan is in place should H2S be encountered during the drilling program including proper public and local law enforcement notifications to ensure protection of the public health and safety.

d. Evaluation Program

Prior to the determination whether the well is completed as a dry hole or as a producer, the well is evaluated through the use of well logs and potential drill stem testing.

Well logging is the practice of making a detailed record (a well log) of the geologic formations penetrated by a borehole. Well or wireline logging is performed by lowering a logging tool, or a string of one or more instruments, on the end of a wireline into a well (or borehole) and recording petrophysical properties using a variety of sensors. Logging tools developed over the years measure the natural gamma ray, electrical, acoustic, stimulated radioactive responses, electromagnetic, nuclear magnetic resonance, pressure and other properties of the rocks and their contained fluids.

As proposed, a flow test may be conducted during well drilling called a drill stem test (DST). A DST is a temporary completion of the well to test for oil and gas. A DST may be conducted when evidence of oil and gas or a porous zone(s) are encountered while drilling or indicated by down-hole logs. A DST can be highly diagnostic of producible oil and gas, particularly in frontier exploration areas where no well data exists to accurately assess the potential of a rock formation to produce oil and gas based solely on down-hole logs.

The DST not only allows formation fluids to temporaily flow, but also obtains samples of fluids and gas in sample chambers and records pressure data. Testing procedures commonly require one or two flow periods and one or two shut-in periods. The flow periods allow formation fluids to flow into the drill pipe and sample chambers, and the shut-in periods allow for measurement and calculation of accurate formation pressure. During a flow period (usually one to two hours in length), fluids consisting of varying combinations of oil, gas, water, and drilling mud may enter the drill pipe. Gas may come to the surface if it is present in sufficient pressure and quantities. The safest and most efficient way to handle gas during a DST is by flaring the gas during the short periods of fluid flow. Flaring would be done using a flare stack common to the industry if gas is encountered. Flaring would occur for short durations, 2-4 hours, with limited emissions. All other fluids that reach the surface will be collected in tanks and disposed of off-site. A DST can take up to 6 hours, not counting time to trip in and out of the hole with the tools. DST's are usually run in daylight hours for safety reasons, since potential spark sources such as electrical equipment and lights must be shut down because of the potential for the presence of gas.

One or more DST's may be required to estimate if potentially economic quantities of oil or gas are present in the event that favorable petroleum source and reservoir rocks are encountered during drilling. The decision to run DSTs and the number of DSTs required would be based on what formations are encountered during drilling, the results of mud logging data and the results of down-hole logs.

Fluids potentially generated from a DST would be oil and gas, formation water, and drilling mud. These materials would be recovered into surface tanks and/or flared as appropriate, and the materials disposed of offsite at approved third-party disposal facilities.

e. Water Use and Availability

Information contained within the LRMP/FEIS (pages 304 -315) describes current and projected water availability and use and is specifically incorporated by reference here. The proposed action is within the range of uses and impacts identified in this document.

Fresh water for use in drilling operations would be obtained from the municipal water supply for the town of Dubois, Wyoming. Based on an average water requirement of approximately 1.5 barrels of water per foot of hole for a semi-closed mud system, it is anticipated that approximately 11,100 barrels (466,200 gallons) of water would be needed for drilling operations. Extraction of water for drilling and/or completion supplies would not cause significant impacts. Temporary drawdown could occur during active pumping activities but are within what is already occurring. Drought conditions could impact the availability of water and depending upon the age of the water right, other sources could be necessary. A change of source would necessitate the filing of a Sundry Notice to the BLM for prior approval.

Water would be transported via tank truck from the load-out point in Dubois to the proposed Scott Well #2 location. No new construction would be required along the proposed water haul route. Access across any non-federal lands which may be crossed along the proposed water haul

route would be secured under separate authorizations to be issued by the responsible surface management agency.

Use of a permitted water source is acceptable and all impacts associated with that use are addressed in the Beneficial Use permit granted by the Wyoming State Engineers Office. If adequate use controls and maintenance of the water supply well does not occur (i.e. check valves, backflow preventers), inadvertent contamination of the water supply source could occur. All use of the water supply well would be overseen by the Town of Dubois.

f. Solid Waste and Hazardous Materials

Trash containers and portable toilets would be located on well sites during well pad construction, drilling operations, and site restoration. Toilet holding tanks would be pumped bi-weekly or as needed and their contents disposed of at a municipal sewage treatment facility in accordance with applicable rules and regulations regarding sewage treatment and disposal. Garbage, trash, and other non-hazardous waste material would be collected in a portable, self-contained, fully enclosed trash cage during operations. Trash would not be burned on location. The collected material would be hauled to an approved landfill.

According to a U.S. Environmental Protection Agency (EPA) rule (Resource Conservation and Recovery Act – RCRA), certain wastes intrinsic to the drilling and production of oil and gas are exempt from regulation as hazardous wastes (USEPA 1988). Although exempted from regulation as hazardous wastes, it is still required that these wastes be disposed of according to applicable rules and in an environmentally acceptable manner.

The drilling system would be an open system in which all excess fluids and drill cuttings are contained in the reserve pit. All produced water and any flowback fluids resulting from completion operations, should they occur, would be routed to tanks for storage. All storage tanks are required to be located within an area containing an impervious secondary containment system. These materials would be disposed of offsite at approved third-party disposal facilities. Additional information concerning waste handling is addressed in the approved SUPO and EA WY-050-EA10-101.

Hudson would maintain a file, according to 29 CFR 1910.1200 (g), containing Material Safety Data Sheets for all chemicals, compounds, and/or substances that would be used during drilling and completion operations. A variety of chemicals and materials, including petroleum fuels, lubricants, and additives, are used to drill and complete a well. Some of these chemicals and materials may be considered hazardous or contain constituents that are hazardous. The transportation, use, storage, and handling of hazardous materials would follow procedures specified by federal and state regulations. Transportation of the materials to the well locations would be regulated by the DOT under 49 CFR Parts 171–180. DOT regulations pertain to packaging, container handling, labeling, placards on vehicles, and other safety aspects.

A Spill Prevention and Counter Control (SPCC) plan would be developed for the drill site. A SPCC is site specific, describes how certain hazardous materials would be managed (oils and fuels), and provides information and procedures in case of a spill or release of those materials

occurs. SPCC plans would be developed when a drilling contractor is chosen, since the SPCC has to be specific to the equipment and storage that would be on-site. A SPCC plan must be reviewed and certified by a professional engineer. As part of their APD, Hudson has certified that they have a SPCC plan.

IV. CONSULTATION AND COORDINATION

Where federal minerals have been proposed to be developed underlying surface administered by the United States Forest Service, the Wind River Ranger District located in Dubois, Wyoming has been notified of this action taken by BLM. The BLM Lander Field Office also coordinated with the BLM Wyoming State Office as required in SDR No. WY 2012-020 Part 2 stating LFO will forward any new decision to the Wyoming DSD (920) for review and concurrence prior to approval (page 11). A BLM interdisciplinary team located in the Lander Field Office participated in development and review of this document.

V. REFERENCES, GLOSSARY

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