

3.8 MINERALS AND ENERGY RESOURCES

3.8.1 Oil and Gas

Oil and gas development are major resource development activities within the Uintah Basin, and intense oil and gas exploration and development are expected on BLM-administered lands within the VPA over the 15-year planning period of the proposed RMP. At present, approximately 2,800 oil and gas wells are active within the VPA. The Geologic and Engineering Team in the BLM Vernal Field Office has estimated the relative potential for oil and gas resources, including coal bed methane (CBM), in six exploration and development areas within the VPA. These areas, from north to south, are: Manila-Clay Basin, Tabiona-Ashley Valley, Altamont-Bluebell, Monument Butte-Red Wash, West Tavaputs Plateau, and East Tavaputs Plateau (See Figure 19).

Seismic surveys, both three-dimensional (3D) and two-dimensional (2D), are expected to increase during the planning period, particularly in the East Tavaputs Plateau exploration and development area. Forty-five (45) to 75 Notices of Intent (NOIs) to perform surveys are anticipated, and the Geologic and Engineering Team has estimated that approximately 2,055 new oil wells, 4,345 new gas wells, and 130 new CBM wells would be drilled during the planning period. The majority of the oil and gas development activity is anticipated to occur in the Monument Butte-Red Wash exploration and development area. Most CBM activity is expected to occur in the East and West Tavaputs Plateau areas.

3.8.1.1 Oil and Gas Leasing, and Locatable and Saleable Minerals Categories

The exploration and development of oil and gas resources is accomplished in several stages of activity. The first stage (land categorization) involves determining which public domain lands should be leased and under what conditions. The second stage is leasing. The third stage includes exploration, development, and production operations.

The BLM has designated four categories that describe the conditions placed upon public domain lands in regard to their availability for fluid hydrocarbon leasing, and the entire VPA has been assigned one of the following leasing categories for oil and gas development:

- Standard Stipulations
- Timing and Controlled Surface Use
- No Surface Occupancy
- Closed to Leasing

Standard Stipulations – This lease category identifies areas, which are open to exploration and development, subject to the terms and conditions of the standard lease form.

Timing and Controlled Surface Use – This category identifies areas that are open to exploration and development, subject to relatively minor constraints such as seasonal restrictions. These areas possess other land uses and/or resource values such as critical big game wildlife range or special status plant and wildlife species, which might conflict with fluid hydrocarbon exploration and development and, therefore, moderately restrictive lease stipulations may be required to mitigate these impacts. The stipulations are utilized where there are resource values, which may require specific protection, but the conflicts with fluid hydrocarbon exploration and development would not be of sufficient magnitude so as to preclude surface occupancy.

No Surface Occupancy – This minerals lease category identifies areas that are open to exploration and development subject to highly restrictive lease stipulations, which includes no surface occupancy (NSO). These areas possess special resource values or land uses such as camping or picnic areas, scenic areas, Recreation and Public Purpose (R&PP) patents and leases, important historical and/or archaeological areas, and buffer zones along the boundaries of special use areas such as wild and scenic river corridors. This category is used for those areas where a number of seasonal or other minor constraints would severely restrict exploration and development.

Closed to Leasing – This lease category identifies areas that are closed to leasing either by discretionary or non-discretionary decisions. These areas have other land uses or resource values, which cannot be adequately protected, even with the most restrictive lease stipulations. Closing these areas to leasing is the only way to ensure their appropriate protection. Discretionary closures involve lands where the BLM has determined that energy and/or mineral leasing, entry, or disposal, even with the most restrictive stipulations or conditions, would not be in the public interest. Non-discretionary closures involve lands that are specifically closed to energy and/or mineral leasing, entry, or disposal by law, regulation, Secretarial Decision, or Executive Order.

Locatable and Saleable minerals areas are generally classified as either Open or Closed. Locatable minerals are usually the base and precious metal ores, ferrous metal ores, and certain classes of industrial minerals where acquisition is by staking a mining claim (location) over the deposit and then acquiring the necessary permits to explore or mine. Saleable minerals are defined as mineral commodities sold by sales contract from the federal government. Saleable minerals are generally common varieties of construction materials and aggregates, such as sand, gravel, cinders, roadbed, and ballast material.

3.8.1.1.1 EPCA

The Vernal Field Office Planning Area is located within the western portion of the Uinta/Piceance Basin area which covers a large amount of northeast Utah and northwest Colorado (approximately 18,945,000) acres and is known to have significant occurrences of oil and gas resources which have been depicted in a variety of studies. Most recently, in 2003, a multi-agency effort produced a “Scientific Inventory of Onshore Federal Lands’ Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development”. It is BLM policy to consider this information in its planning process. The information, commonly referred to as the EPCA data portrays two kinds of basic energy related information relevant to the Uinta/Piceance Basin, volumetric data and accessibility data. (EPCA 2003).

The volumetric data on oil reserve estimates for the entire basin is predicted between 61 -296 million barrels of oil with a mean estimate of 149 million barrels of oil (EPCA 2003).

Volumetric data on gas reserve estimates for the entire basin is predicted between 12-35 trillion cubic feet with a mean estimate of 22 trillion cubic feet. Most of the undiscovered natural gas is found widely dispersed in continuous deposits rather than distinct structural traps (EPCA 2003).

Among the five study areas that were subject to the EPCA study, the Uinta/Piceance Basin has the highest percentage of oil (85%) available under standard lease terms. (EPCA 2003).

Another kind of data illustrated by EPCA is that of accessibility by industry to the estimated reserves. Accessibility by industry was based on the actual depiction of existing land use plan

stipulations that presently occur in the Vernal Field Office Planning Area. Careful review of this information shows many major inaccuracies of oil and gas stipulations as they presently occur within the planning area. A more accurate portrayal of existing oil and gas stipulations which affect industry accessibility to oil and gas resources is shown in Chapter Two, Proposed Action and Alternatives and is located in the Alternative Matrix under Alternative D – No action which depicts current leasing stipulations.

In addition to the EPCA data, which is a very large-scale portrayal of energy information, BLM prepared more site-specific data based on 14 conventional and unconventional oil and gas play areas within the Vernal Field Office. Numerous data sources including USGS, UGS, academic research, UDOGM, industry and government sources, were queried in order to depict specific information that was relevant to the potential for occurrence of oil and gas resources within Duchesne, Uintah and Daggett Counties. This information was then used to compile the Mineral Potential Report for the Vernal Field Office. The mineral report also depicts the potential for reasonable foreseeable development for six different zones within the VPA. A brief summation of the six oil and gas producing zones is portrayed below.

3.8.1.2 Manila-Clay Basin Exploration and Development Area

Historically, exploration activity for and production of oil and gas in this region have been relatively low, particularly over the last 15 years. All producing wells in the area were drilled prior to 1980. Historic gas well data indicate that only three gas wells have been drilled since 1980, none of which are currently producing wells. New geologic data or an increase in the price of natural gas could create increased interest in this area. It is projected that a maximum of 45 additional gas wells would be drilled in this area over the next 15 years.

3.8.1.3 Tabiona-Ashley Valley Exploration and Development Area

Past exploration for oil and gas resources in this region has been unproductive. Data indicate that there have been no gas wells and only one oil well drilled in this region since 1980, and that the lone well is not producing. It is projected that no more than 30 oil wells would be drilled within this area over the next 15 years.

3.8.1.4 Altamont-Bluebell Exploration and Development Area

This area has had major oil exploration and production in the past, but due to a combination of low oil prices and the depletion of the oil reservoir the number of oil wells drilled annually in this area has decreased since the early 1990s. It is projected that no more than 175 oil wells would be drilled within this area over the next 15 years. Past exploration does not indicate a high potential for gas development, but the presence of deep gas reserves in the southern portion of this area could be explored over the next 15 years.

3.8.1.5 Monument Butte-Red Wash Exploration and Development Area

The Monument Butte-Red Wash exploration and development area has been an area of extensive oil and gas development and production in the past. It is projected that the oil and gas development within Monument Butte-Red Wash will continue to be extensive over the next 15 years, with 1,700 oil wells and 3,100 gas wells projected to be drilled in this area during the 15-year RMP planning period.

3.8.1.6 West Tavaputs Plateau Exploration and Development Area

This area has not been extensively developed for oil and gas resources in the past 15 years. However, based on BLM discussions with oil and gas producers, there is major interest in this area for oil and gas exploration and development. The greatest interest is in gas development on the eastern side of this area. As many as 75 oil wells, 350 gas wells, and 50 CBM wells could be drilled in the area over the next 15 years.

3.8.1.7 East Tavaputs Plateau Exploration and Development Area

This area has had slightly more oil and gas exploration and development than the West Tavaputs Plateau area, and it is anticipated that major development, particularly within natural gas fields, will occur over the next 15 years. Increased seismic exploration is expected in the area, and a potential land exchange with the State of Utah (subject to congressional approval) is expected to lead to increasing additional drilling in the first five years of the 15-year planning period. It is projected that 75 new oil wells, 600 new gas wells, and 80 new CBM wells could be drilled in this area over the next 15 years.

3.8.2 Tar Sand

Tar sand contains heavy hydrocarbon residues such as bitumen, tar, or degraded oils that have lost their volatile components. Hydrocarbons can be liberated from tar sands by heating and other processes. Tar sand deposits in the VPA are generally located along the margins of the Uintah Basin.

The bituminous substance in the sandstones of the Basin's geologic formations is tarry residuum of petroleum that fills the pore space in coarse sandstones or forms cement in loose unconsolidated sands (Pruitt 1961). The ore retrieved from tar sands is bitumen. Bitumen is a general name for various solid and semi-solid hydrocarbons that are fusible and are soluble in carbon bisulfide. Petroleum, asphalt, natural mineral wax, and asphaltite are all considered bitumen.

In the early 1980s, certain tar sand deposits in the Uintah Basin were divided into seven Special Tar Sand Areas (STSAs) designated by the U.S. Geological Survey (USGS) under direction from Congress pursuant to the Combined Hydrocarbon Leasing Act of 1981. These STSAs are Pariette, Sunnyside, Argyle Canyon - Willow Creek, Asphalt Ridge - Whiterocks, Hill Creek, P.R. Spring, and Raven Ridge - Rim Rock (BLM 2002). Table 3.8.1 quantifies the estimated amount of bitumen that could potentially be recovered from each of the STSAs in the VPA.

TABLE 3.8.1. ESTIMATED NUMBER OF BARRELS OF BITUMEN CONTAINED WITHIN EACH STSA		
STSA	Geologic Formations	Barrels of Bitumen
Pariette	Uinta Formation	12-15 million
Sunnyside	Wasatch Formation	3.5-4 billion
Argyle Canyon-Willow Creek	Green River Formation	60-90 million
Asphalt Ridge-Whiterocks	Duchesne River/Uinta, Navajo Sandstone, and Mesa Verde Formations	1.2-1.3 billion
Hill Creek	Green River Formation	1.6 billion
P.R. Spring	Green River Formation	4-4.5 billion
Raven Ridge-Rim Rock	Green River Formation	100-130 million
Source: (Blackett 1996)		

Other minor tar sand deposits have also been delineated within the VPA. These deposits include Chapita Wells (7.5 to 8 million barrels of bitumen), Cow Wash (1 to 1.2 million barrels of bitumen), Upper Kane Hollow (unestimated), Spring Branch (1.5 to 2 million barrels of bitumen), Tabiona (1.3 million barrels of bitumen), Lake Fork (6.5 to 10 million barrels of bitumen), Split Mountain (unestimated), Nine Mile Canyon (unestimated), Minnie Maude Creek (10 to 15 million barrels of bitumen), Little Water Hills (10 to 12 million barrels of bitumen), and Spring Hollow (unestimated; Blackett 1996).

Because tar sand development associated with a combined hydrocarbon lease could be more disruptive to environmental resources than oil and gas development, all combined hydrocarbon leases issued in STSAs are regulated by an amended leasing category system.

- Open to leasing, with standard stipulations
- Open to leasing, with standard and special stipulations
- Open to leasing, with no right of surface occupancy
- Closed to leasing

As of October 2001, there were four permitted tar sand surface mining operations in the VPA, all located in Uintah County. The potential for development of this resource, other than for asphalt paving, is anticipated to remain low over the next 15 years.

3.8.3 Gilsonite

Gilsonite is the purest solid bitumen found in nature. Gilsonite is the trade name for Uintaite, which is a black, pitch-like substance that occurs in pure form in vein-type deposits in the Tertiary sediments of the Uintah Basin of northeastern Utah. It is a petroleum substance of uniform composition and texture with a distinctive conchoidal fracture. In gilsonite, the surfaces exposed along fractures typically have a bright sheen and reflect bright light, in notable contrast to the jet-black color. A number of important uses for gilsonite have been found since its discovery in the late nineteenth century. These uses include high-grade varnishes, lacquers, paints, acid proofing, insulating plastics, inks, and mastic (Crawford 1960). For commercial purposes, it is graded and marketed by producers into “Selects” and “Standard.” There is also a very high-grade variety with high luster and deep black color known as “Jet Black” (Stern 1960).

Gilsonite is allocated by non-competitive and competitive leasing only. Leasing actions may be initiated by public interest or by the BLM. Allocation methods vary to suit different situations.

There is high to moderate potential for gilsonite occurrence within the VPA. It is likely that there will be continued exploration and development of this resource within the next 15 years.

3.8.4 Oil Shale

Oil shale is a popular term for sedimentary rock (e.g., marlstone) from the Tertiary Green River Formation that contains kerogen. Kerogen is a fossilized organic material that can be converted to conventional oil via retorting or destructive distillation processes (Cashion 1967) characterizes oil shale as a marlstone that, when distilled, will yield 15 gallons or more of oil per ton of rock.

Oil shale occurs within the lower part of the Parachute Creek Member of the Green River Formation. The Mahogany Oil Shale Zone of the Parachute Creek Member is the most notable kerogen-bearing unit of the Green River Formation (Trudell et al. 1983). It outcrops in the southern part of the VPA and dips north towards the synclinal axis of the Uintah Basin. The Mahogany Zone varies in thickness throughout the Uintah Basin, generally thickening and becoming less defined from east to west (Cashion 1967).

There is a high to moderate potential for occurrence of oil shale within the VPA. It is expected that a total of one or two small-scale projects may be active over the next 15 years.

3.8.5 Phosphate

Phosphate deposits exist in the Uintah Basin within the Meade Peak Member of the Permian Park City Formation. Phosphate ore is present in the form of P_2O_5 (Schillie 2002). Extensive, relatively high-grade deposits occur at or near the surface in the VPA, making phosphate mining in the VPA economical because the ore can be cheaply strip-mined. Deposits in the Flaming Gorge/Manila Field area are less economically attractive because of the area's more complex geologic setting.

There is high to moderate potential for the occurrence of phosphate deposits within the VPA. Phosphate mining on private land is expected to continue over the next 15 years. There is some potential for exploration on BLM lands over the next 15 years.

3.8.6 Mineral Materials

Other mineral materials include fine sand, gravel, and building stone. Fine sand deposits can be found on the northern edge of Ashley Valley, the portion of the Uintah Basin lying between Asphalt Ridge and the Utah-Colorado state line, Moon Lake Reservoir, and Yellowstone Reservoir. Moon Lake Reservoir and Yellowstone Reservoir are both on U.S. Forest Service (USFS) land in the Uinta Mountains.

Coarse sand and gravel deposits are found along the northern margin of the Uintah Basin, where it abuts the southern flank of the Uinta Mountains. More specifically, these deposits occur in the upper sandstone units of the Tertiary Duchesne River Formation, in the Uinta Piedmont, and in Quaternary terrace/alluvial deposits in streams draining the Uinta Mountains. Green River terrace deposits are a source of sand and gravel, and the Mississippian Madison Limestone that crops out along the south flank of the Uinta Mountains can be crushed and used as an aggregate.

Building stone resources exist in the Parachute Creek Member of the Tertiary Green River Formation. More specifically, the resource occurs as loose rock that has been eroded from outcrops along the south side of Duchesne County through southern Uintah County.

There is a high to moderate potential for the occurrence of mineral materials, including sand, gravel, and building stone in the VPA. It is likely that exploration and development of these resources will continue to occur over the next 15 years.

3.8.7 Locatable Materials

Minor deposits of locatable materials that are associated with hydrothermal alteration and secondary mineral precipitation (e.g., base metals, gold, gypsum, and uranium) are known to exist within the VPA (Johnson 1973). The Precambrian Red Creek Quartzite has yielded some lead, gold, copper, silver, iron, and barium between Mountain Home and the Owiuyukuts Plateau. The Mississippian carbonate rocks along the south flank of the Uinta Mountains contain some small iron deposits (Pruitt 1961). The terrace deposits of the Green River also contain some fine-grained placer gold (Pruitt 1961). Uranium is known to exist in some sections of the carboniferous units of the Mesa Verde and Uinta Formations (Chenoweth 1992). Gypsum is known to occur as an evaporative salt in the Jurassic Carmel and Triassic Moenkopi Formations. When mined for chemical-use purposes (e.g., for carbonate scrubber material), the Mississippian Madison Limestone that outcrops along the flanks of the Uinta Mountains may be subject to mining claim locatable mineral regulations, and may be removed pursuant to the Forest Service 36 CFR 228 (A) or the BLM 43 CFR 3809 mining regulations, as appropriate.

There is moderate potential for the occurrence of locatable minerals within the VPA. Very little development activity for locatable minerals is anticipated over the next 15 years.

3.8.8 Coal

Coal mining has not occurred on public lands in the VPA due to lack of demand and the poor quality of the deposits. However, coal of commercial value exists in the coal unit of the Cretaceous Frontier Sandstone and the Mesa Verde Group Formations (Pruitt 1961). The Frontier Sandstone is the most important coal-bearing unit in the VPA. The quality of these coal beds improves in an easterly direction (Doelling and Graham 1972).

There is a moderate potential for the occurrence of economically valuable coal deposits within the VPA, but it is unlikely that coal exploration or development will occur over the next 15 years because of the generally low-grade quality of the coal.

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