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An Assessment of In-Place Gas Resources in the Low-Permeability Basin-Centered Gas Accumulation of the Bighorn Basin, Wyoming and Montana.

by

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ABSTRACT

A basin-centered low-permeability gas accumulation has been identified in the central part of the Bighorn Basin of Wyoming and Montana using mudlogs and drillstem tests from the sparse drilling available, and a volumetric approach was used to assess in-place resources. A total of 334 tcf of mean in-place gas is estimated for the accumulation. Using probability theory, there is a 95% chance of at least 161 tcf of gas in place and a 5% chance that the accumulation has as much as 600 tcf of gas. The accumulation covers about 2,984 mi^2 in the Upper Cretaceous Frontier Formation, the oldest formation assessed, and about 1,444 mi^2 in the Upper Cretaceous Lance Formation, the youngest formation in which the accumulation occurs. Only about 94 tcf or 28% of the mean in-place gas occurs in overpressured rocks with the remainder occurring in normal to underpressured sequences. About one-half of the gas occurs at a depth of 12,500 ft or less. A detailed discussion of the probabilistic methodology used and a digital version of the tables on an Excel 7.0 Spread Sheet are included in Part B of this report (Open-File Report 00-xxxB)

INTRODUCTION

Extensive basin-centered gas accumulations have been identified in many Rocky Mountain basins that formed during the Laramide orogeny (Late Cretaceous through Eocene). Reservoirs within basin-centered gas accumulations typically have low permeabilities (in-situ permeability to gas of 0.1 millidarcy or less) and are commonly referred to as tight reservoirs (Spencer, 1989a). These accumulations differ from conventional hydrocarbon accumulations in that they: (1) cut across stratigraphic units, (2) commonly occur structurally down dip from more permeable water-filled reservoirs, (3) have no obvious structural and stratigraphic trapping mechanism, and (4) are almost always either overpressured or underpressured. The abnormal pressures of these reservoirs indicate that water in hydrodynamic equilibrium with outcrop is not the pressuring agent. Instead, hydrocarbons within the tight reservoirs are thought to provide the pressuring mechanism (Spencer, 1987).

Johnson and Finn (1998a) presented evidence for a basin-centered gas accumulation in Upper Cretaceous rocks of the Bighorn Basin of Wyoming and southern Montana (Figure 1), and an assessment of in-place gas in this accumulation is presented here. According to Johnson and Finn much of this accumulation appears to be underpressured, and only a small part is overpressured. The procedure used is essentially the same that was used to calculate in-place gas resources in the basin-centered accumulation in the Wind River Basin to the south (Johnson and others, 1996).

This report is part of a series of studies by the U.S. Geological Survey sponsored by the U.S. Department of Energy to evaluate gas resources in unconventional reservoirs in Rocky Mountain sedimentary basins.

METHODS

A volumetric approach is used here to generate an assessment of in-place gas. Structure contour and isopach maps used for the assessment were first generated by hand using all geologic information available, including drillhole information, published measured sections, and published geologic mapping. The maps were then digitized and manipulated in a Geographic Information System (GIS) using ARC/INFO software developed by the Environmental Systems Research Institute, Inc. The probabilistic methodology used is described in detail in OF-99 xxxB by Crovelli and others.

GEOLOGY OF BASIN-CENTERED HYDROCARBON ACCUMULATIONS

Basin centered gas accumulations in Rocky Mountain basins contain huge volumes of gas in place. Mean in-place estimates for these basins include 5,063 trillion cubic feet (tcf) for the Greater Green River Basin of Wyoming and Colorado (Figure 1) (Law and others 1989), 995 tcf for the Wind River Basin of Wyoming (Figure 1) (Johnson and others, 1996; 1998; Crovelli and others, 1998), and 420 tcf for the Piceance Basin of western Colorado (Johnson and others, 1987). In recent years, these accumulations have been extensively drilled and produced in the Greater Green River

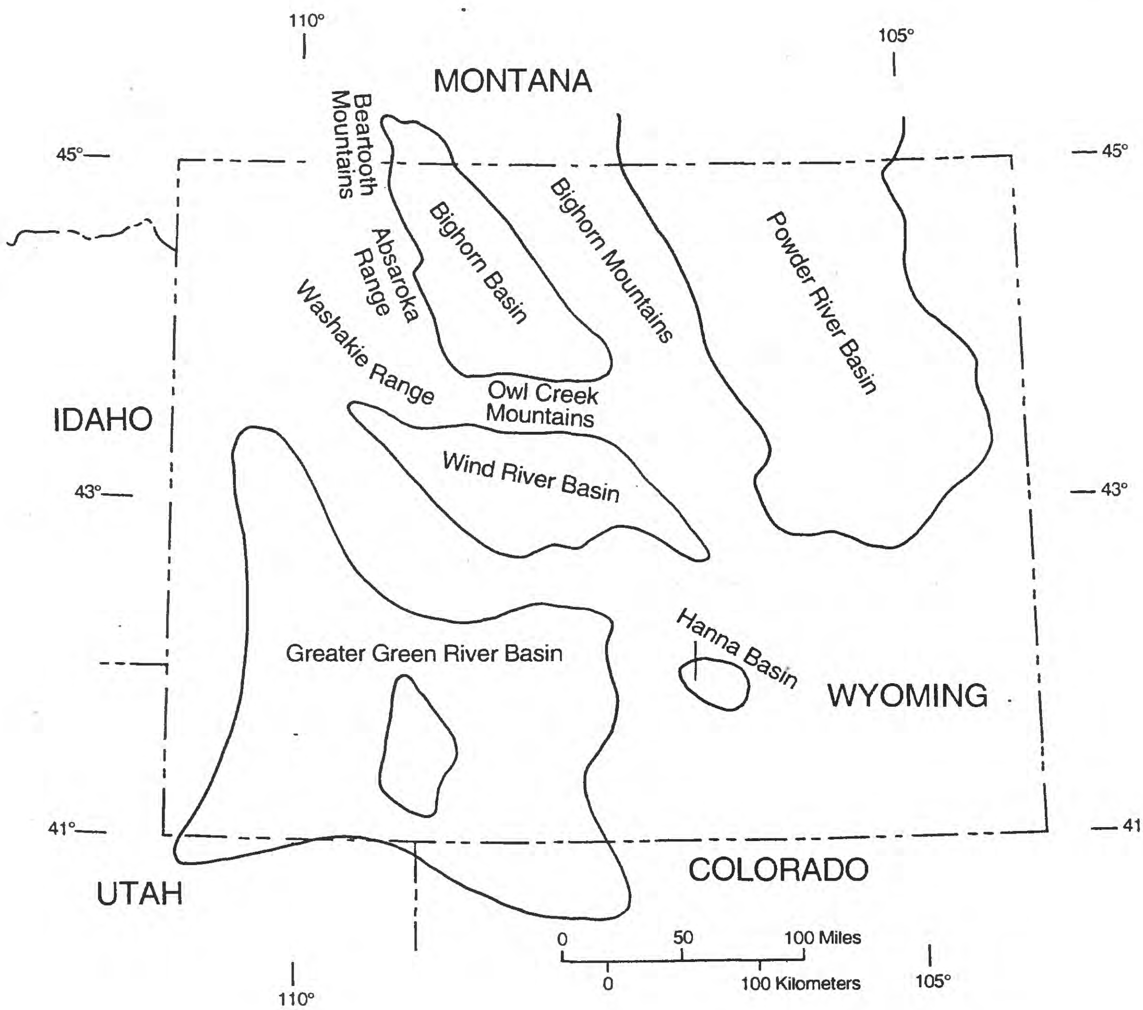

Figure 1. Map showing locations of major sedimentary basins in Wyoming and adjacent states.

Basin and Wind River Basin of Wyoming, the Piceance Basin of western Colorado, the San Juan Basin of New Mexico and Colorado, and the Uinta Basin of Utah and Colorado.

It is generally believed that only a few percent of the in-place gas in these accumulations will ever be produced (for example: see Johnson and others, 1987; Law and others, 1989). Hydraulic fracturing is almost always required in order to increase rates of production to economic levels in these low-permeability reservoirs. Fracturing procedures have been improving incrementally, and with each improvement, a greater percentage of this in-place resource becomes economic. The gas commonly occurs in isolated, lenticular sandstone reservoirs distributed through thousands of feet of strata. A well spacing of as little as 20 acres may be required to fully exploit the resource in some instances.

Masters (1979) was one of the first to study these unique accumulations, which occur downdip from more permeable, water-wet rocks. Masters (1979) proposed that gases generated in the deep, thermally mature areas of sedimentary basins with low-permeability rocks, are inhibited from migrating upwards and out of the basin by a capillary seal. Masters (1979) pointed out that low-permeability rocks (1 md), with 40% water saturation, are only three-tenths as permeable to gas as they are to water, and at 65% water saturation, the rock is almost completely impervious to the flow of gas. The concepts for the development of basin-centered gas accumulations in the Rocky Mountains have been further refined by a number of workers such as Jiao and Surdam (1993), Meissner (1980; 1981; 1984), McPeek (1981), Law, 1984; Law and others (1979; 1989), Law and Dickinson (1985), MacGowan and others (1993), Spencer and Law (1981), Spencer (1985), and Yin and Surdam (1993). In general, the conceptual models suggest that overpressuring, which is commonly encountered in these basin-centered accumulations, is the result of volumetric increases during hydrocarbon generation by the coals, carbonaceous shales, and marine shales that are interbedded with the sandstone reservoir rocks. Law (1984) suggested that migration distances from source rock to reservoir rock in the basin-centered gas accumulation of the Greater Green River Basin of Wyoming, Colorado, and Utah are generally less than a few hundred feet. Much of the water that originally filled the pore spaces in the potential reservoirs is driven out by hydrocarbons (Law and Dickinson, 1985). According to Law and Dickinson, the capillary seal is activated as gas replaces water in the pore space, and hence the basin-centered gas accumulations seal themselves as they form. These seals are so efficient that they may be able to maintain abnormally high pressures for tens of millions of years (MacGowan and others, 1993).

Many basin-centered gas accumulations in Rocky Mountain basins are partially to totally underpressured, and it is believed that all of these underpressured areas were overpressured at some time in the past (Meissner, 1978; Law and Dickinson, 1985). Moreover, it is believed that a previous period of overpressuring would have been necessary to drive much of the water out of the system. A change from overpressured to underpressured conditions can occur as a result of cooling related to uplift and erosion or to a decrease in thermal gradients (Meissner, 1978; Law and Dickinson, 1985). Most of the cooling in Rocky Mountain basins has occurred within the last 10 my as the onset of major regional uplift initiated a period of rapid downcutting throughout region. For a summary of the evidence for late Cenozoic uplift in the Rocky Mountain region see Keefer (1970) and Larson and others (1975). Overpressured areas became underpressured during cooling as gas contracts and the rate of gas generation decreases (Meissner, 1978; Law and Dickinson, 1985). Surface water enters the basin-centered accumulation through newly created permeability pathways created as pore throats and fractures dilate. According to Meissner (1978) this contraction may ultimately result in a "dead" basin where the basin-centered accumulation has been completely dissipated. Many Rocky Mountain basin-centered gas have underpressured zones surrounding an overpressured central core indicating that this process has only partially run to completion. The underpressured zone will grade outward into a predominantly water-bearing zone that is in pressure equilibrium with the local hydrodynamic regime. Any gas present in this water-bearing zone will be trapped in conventional reservoirs on anticlinal structures or in stratigraphic pinchouts.

GEOLOGIC SETTING OF THE BIGHORN BASIN

The Bighorn Basin is a Laramide (Late Cretaceous through Eocene) structural and sedimentary basin that covers about 7,500 square miles of north-central Wyoming and south-central Montana (Figure 1). The basin is elongate in a northwest direction and is surrounded, and is bounded by the Bighorn Mountains on the east, the Owl Creek Mountains on the south, and the Absaroka Range and Beartooth Range on the west. The narrow, northern end of the basin, in south-central Montana, is terminated by a low-lying west-northwest trending series of anticlines and en echelon faults along the Nye-Bowler lineament which separates the Bighorn Basin from the Crazy Mountains Basin to the north (Figure 2). Left-lateral movement along a buried fault apparently produced these anticlines and faults (Wilson, 1936; Roberts, 1972).

The Bighorn Basin is markedly asymmetric with a gently dipping east and south flanks. These flanks descend westward and northward into the deep basin trough just east of the Oregon Basin fault, an east-thrusting reverse fault. The Oregon Basin fault, with a vertical displacement of as much as 16,000 ft (Johnson and Finn, 1998b), forms the southwest margin of the deep trough of the basin. However, strata as young as the Upper Cretaceous Meeteetse Formation extend as much as 25 miles west of the fault to the east flank of the Absaroka Range where they are buried beneath Eocene volcaniclastic rocks. The Oregon Basin fault splits and dies out toward the north in the northern part of the basin. A subsidiary synclinal feature, sometimes referred to as the Clark's Fork sub-basin (for example, see Gingerich, 1983) occurs northwest of the northern part of the Oregon Basin fault (Figure 2). The west limb of the Clark's Fork subbasin is bounded by a series of west-dipping reverse faults along the east margin of the Beartooth Mountains.

A series of anticlines, which are breached to the Upper Cretaceous Cody Shale or older strata, occur along the east, south, and west margins of the basin. These anticlines have produced large amounts of oil from pre-Cody rocks. There are only a few minor closed anticlines basinward from these basin-margin structures. A prominent structural nose, the Five Mile trend, extends northwestward from the southeast corner of the basin and terminates in the northern part of the basin trough (Figure 2).

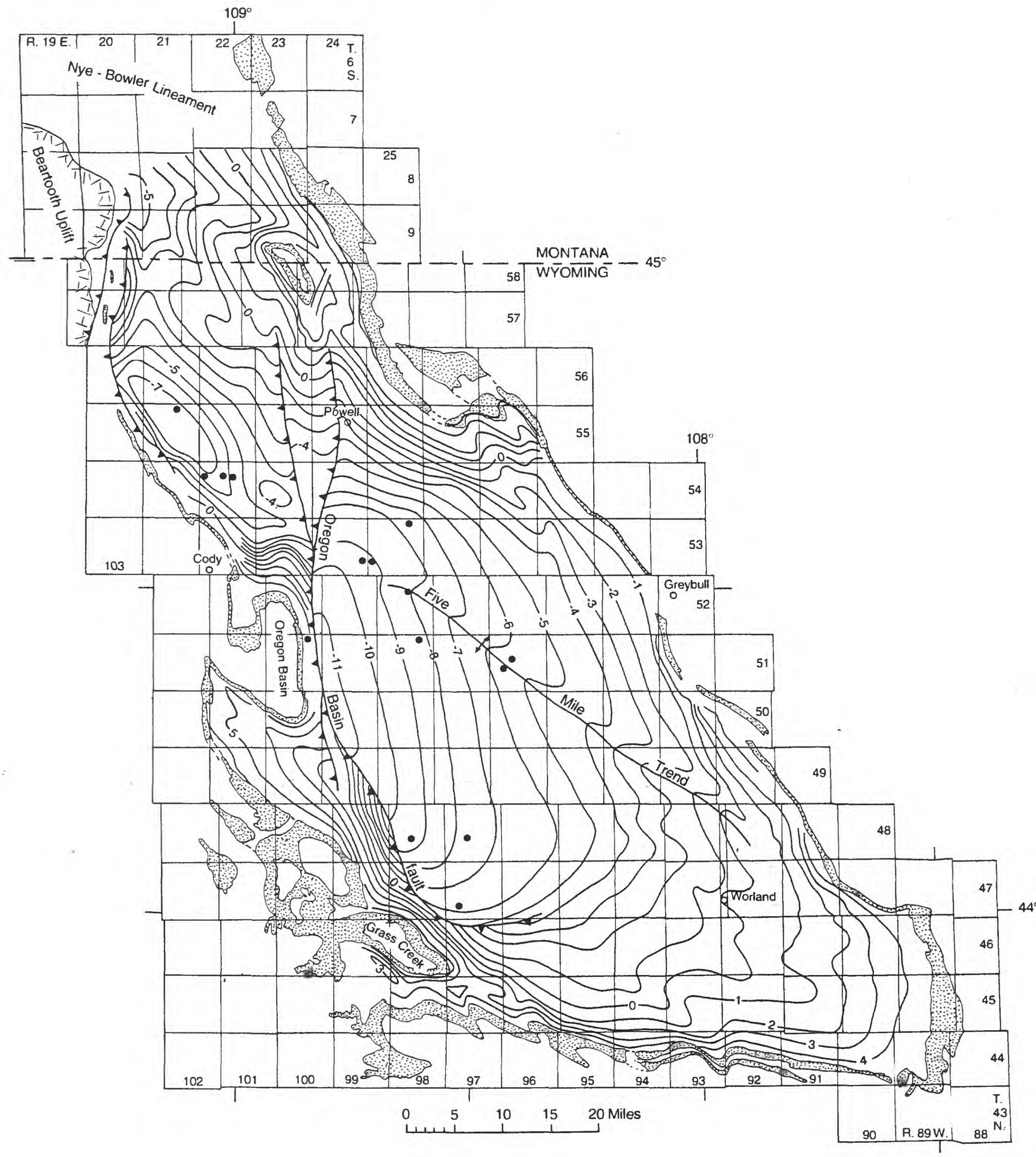

Figure 2. Structure contour map of the top of the Upper Cretaceous Mesaverde Formation, Bighorn Basin, Wyoming and Montana. From Johnson and Finn (1998b).

CRETACEOUS AND LOWER TERTIARY STRATA ASSESSED IN THE BIGHORN BASIN

Muddy Sandstone

The Lower Cretaceous Muddy Sandstone is the oldest unit that was assessed (Figure 3). It is a highly variable sandy unit that occurs above the Lower Cretaceous Thermopolis Shale and below the Upper Cretaceous Mowry Shale. The Muddy Sandstone in the Bighorn Basin was deposited during a period of maximum regression of the Cretaceous seaway, when the seaway had retreated to a comparatively small area in northern Wyoming, central Montana and Canada (Weimer, 1983; Dolson and others, 1991). Deltaic systems developed around the margins of the seaway. Further from the seaway, drainage systems incised into the underlying fine-grained marine sediments. According to the paleogeographic reconstruction of Dolson and others (1991) the area of the Bighorn Basin straddled the shoreline during the period of maximum regression of the Cretaceous seaway. This reconstruction suggests that the depositional setting of the Muddy Sandstone varied from deltaic in the northern part of the basin to valley fill in the southern. The Muddy Sandstone is absent from the northernmost part of the basin where the seaway was still present during Muddy deposition (Figure 4). Throughout the rest of the basin, total sandstone in the Muddy in beds 10 ft thick or greater varies in an irregular fashion to a maximum of 120 ft in the north-central part of the basin (Figure 4).

Frontier Formation

The Upper Cretaceous Frontier Formation was the next youngest stratigraphic unit assessed. It occurs above the Mowry Shale and is present throughout the basin (Figure 3). The Frontier Formation around the margins of the basin is composed of sandstone, conglomerate, siltstone, shale, bentonite and coal (Griggs, 1970; Merewether and others, 1975; Siemers, 1975; Merewether and others, 1998). The Frontier Formation was deposited in largely marine and marginal marine environments except in the west-central part of the Bighorn Basin where delta plain environments are present (Merewether and others, 1975). Coarsening upward regressive marine cycles occur in most of the drillholes examined in the basin. Individual sandstones in the Frontier are commonly laterally discontinuous. However, several sandy zones have been followed over large areas of the basin (Keefer, 1972; Rea and Barlow, 1975). Bentonitic marker beds have also been used to help subdivide the Frontier (Keefer, 1972). The Frontier Formation varies from less than 450 to more than 650 ft thick in the Bighorn Basin (Keefer and others, 1998). Total sandstone in Frontier Formation in beds 10 ft thick or greater varies irregularly from 32 ft to 196 ft (Figure 5).

Mesaverde Formation

The Upper Cretaceous Mesaverde Formation (Figure 3) is a variable sequence of sandstone mudstone and coal deposited in a variety of marginal marine and coastal plain settings along the west margin of the Cretaceous seaway. The Mesaverde can be subdivided into the lower member, an unnamed middle member, and the Teapot

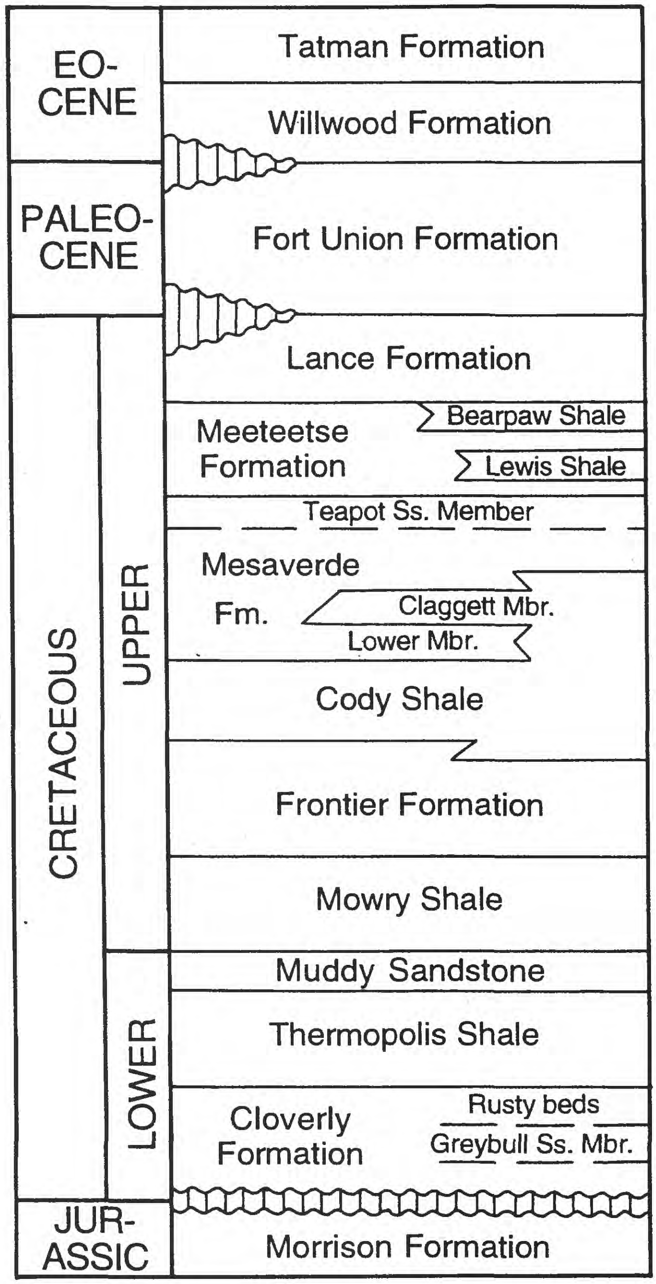

Figure 3. Generalized stratigraphic chart for Cretaceous and lower Tertiary rocks, Bighorn Basin, Wyoming and Montana.

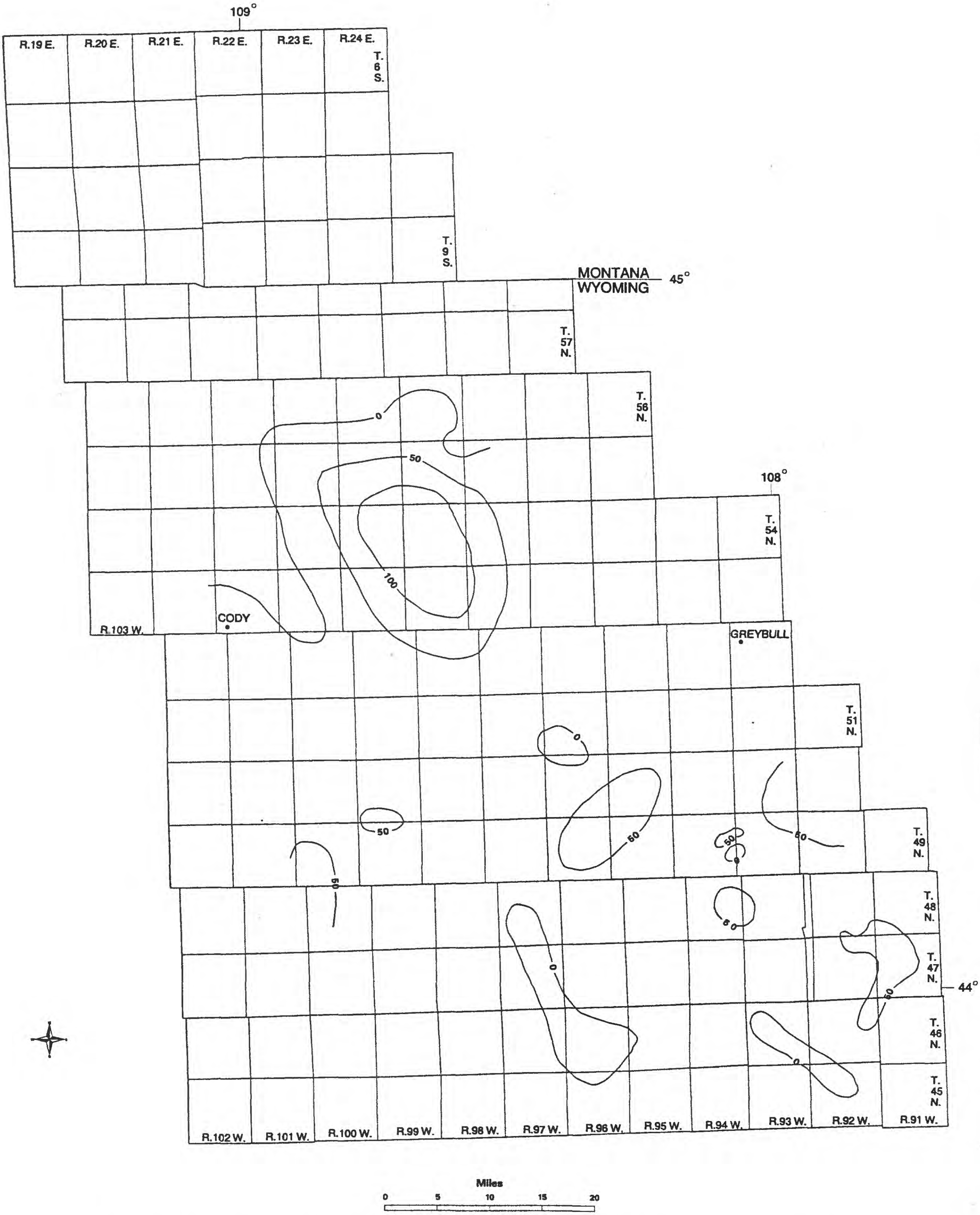

Figure 4. Isopach map showing total sandstone in beds 10 ft thick or greater in the Lower Cretaceous Muddy Sandstone. One hundred and fifty-six data points were used to construct this map. Contour interval: 50 ft.

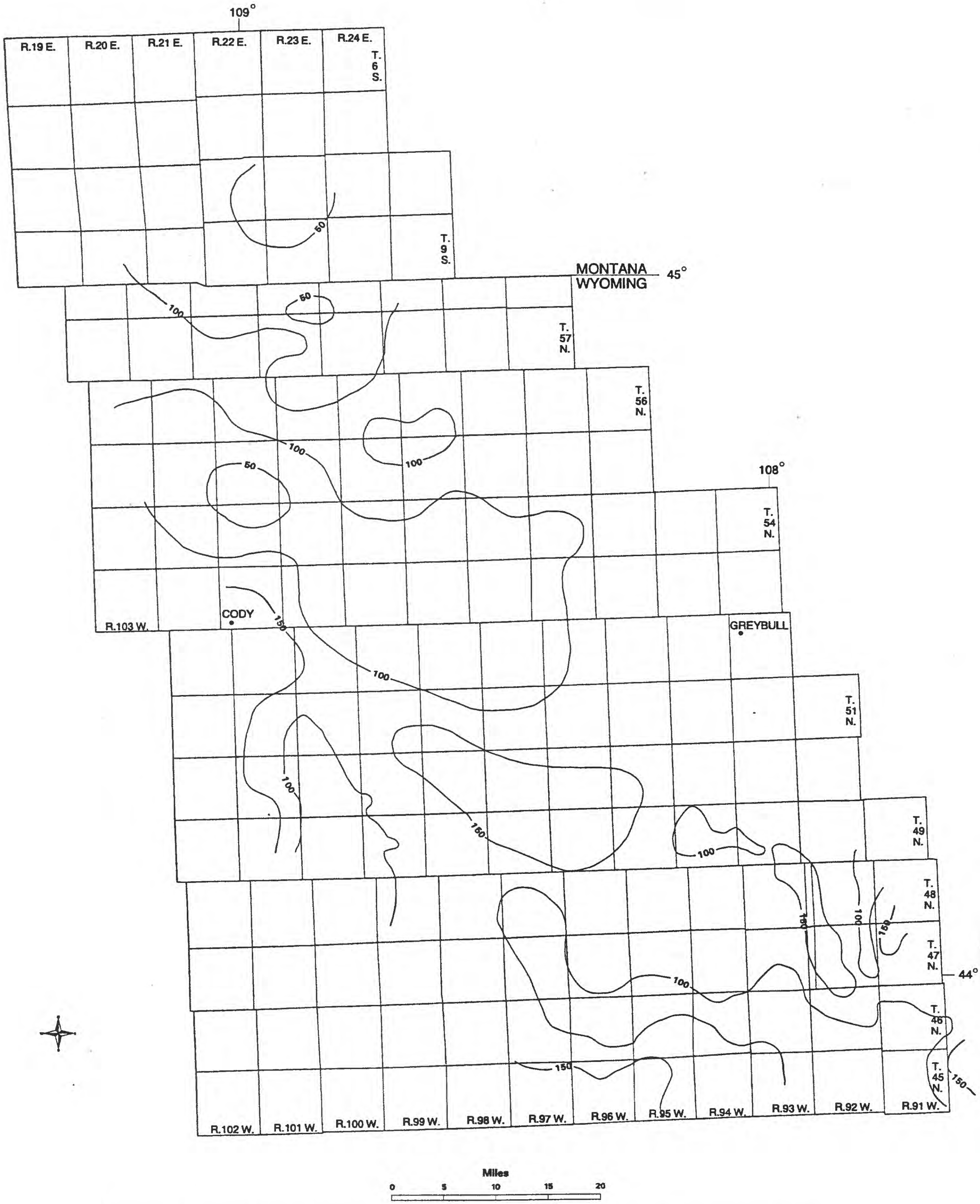

Figure 5. Isopach map showing total sandstone in beds 10 ft thick or greater in the Frontier Formation. One hundred and fifty-six data points were used to construct this map. Contour interval: 50 ft.

Sandstone Member (Keefer and others, 1998). Some workers such as Mackenzie (1975) have applied Montana nomenclature to the Mesaverde Formation in the Bighorn Basin. However, the usage of Montana names in Wyoming has never been formalized and wasrejected by Keefer and others (1998). Using Montana nomenclature, the lower member is equivalent to the Eagle Sandstone, and the unnamed middle part and the Teapot Sandstone are equivalent to the Judith River Formation.

The lower member of the Mesaverde Formation occurs throughout the eastern part of the basin (Figure 3). The Clagget Member of the Cody Shale separates it from the middle member of the Mesaverde Formation. Towards the east, the lower member grades into the upper part of the Cody Shale and is missing in the eastern and southeastern areas of the basin. Towards the west, the Clagget Member grades into nonmarine rocks and the lower member cannot be distinguished from the middle member. A lower unnamed tongue of Mesaverde Formation occurs in the Oregon Basin area near the western margin of the basin. Most of the coal in the Mesaverde Formation occurs in the lower member with as much as 27 ft of total coal in the Gebo coal field in the south-central part of the basin, near the western pinchout of the Clagget Shale (Johnson, 1998, Figure 4). Significant coal also occurs in strata equivalent to the lower member for many miles west of the pinchout of the Clagget.

The middle unnamed member of the Mesaverde Formation consists of sandstone, mudstone and coal deposited in marginal marine and coastal plain environments. Johnson and others (1998a) documented an increase in the number of marginal marine sandstones in the middle member toward the east. Trough cross beds suggest a general eastward flow direction for fluvial sandstones while a bidirectional north or south flow direction is indicated for marginal marine sandstones (Johnson and others, 1998a, Plate 1). According to Gill and Cobban (1969, Figure 4) the shoreline trend during deposition of the middle member was generally north-south in the area of the Bighorn Basin.

The Teapot Sandstone is the uppermost member of the Mesaverde Formation in the Bighorn Basin. The unit consists of sandstone with lesser amounts of gray mudstone. Barnett (1915) originally defined the member at Salt Creek oil field in the Powder River Basin, east of the Bighorn Basin. In the vicinity of the type section in the southern Powder River Basin, the Teapot is considered a deltaic complex which is both underlain and overlain by marine shales (Curry, 1976a; 1976b). Although Hewett (1926) noted the sandy nature of the upper part of the Mesaverde Formation while mapping in the southwest part of the Bighorn Basin, he did not apply the name Teapot Sandstone to the interval. Rich (1958) may have been the first to use the name Teapot Sandstone in the Bighorn Basin. Severn (1961), who applied Montana nomenclature to the Mesaverde Formation in the Bighorn Basin, recognized a 120 ft sandstone at the top of the Judith River Formation as a possible Teapot Sandstone equivalent in the eastern part of the Bighorn Basin. Gill and Cobban (1966a) identified the Teapot Sandstone in five sections measured along the south margin of the Bighorn Basin. Mackenzie (1975) traced the Teapot Sandstone on the surface and in the subsurface throughout the southern part of the basin and, like Severn, considered the Teapot a member of the Judith River Formation.

In the Bighorn Basin, the top of the Teapot Sandstone is generally well defined in outcrop and placed at the top of the highest resistant white sandstone in an overall predominantly sandstone interval. The overlying Meeteetse Formation is easily eroded and includes an abundance of gray mudstones, carbonaceous mudstones, and coal beds.

This contact can generally be traced in the subsurface because the Meeteetse is considerably less sandy than the Teapot. Sandstones in the Meeteetse, although less common and more easily eroded than sandstones in the Teapot, are none-the-less similar in grain size and color to sandstones in the latter. These similarities were first noted by Hewett (1926, p. 22-23). In addition sandstones in the lower part of the Meeteetse are also very similar petrographically to sandstones in the Teapot Member (Mackenzie, 1975; Keighin, 1998).

The Teapot in outcrop is, in most exposures, easily distinguished from the underlying middle part of the Mesaverde Formation by its sandy nature, white color, and coarser grain size. Although white and coarse-grained sandstones occur in the underlying middle unnamed member as well, they are generally interbedded with considerably more mudstone than found in the Teapot. An exception is the Oregon Basin area, along the west margin of the basin, where the middle member of the Mesaverde is very sandy and difficult to distinguish from the Teapot (Johnson and others, 1998). Gill and Cobban (1966b) believed that the base of the Teapot Sandstone marked a major hiatus throughout much of Wyoming, including the Bighorn Basin, based on the absence of marine fossil zones that occur in a more complete section of Upper Cretaceous strata in east-central Wyoming. Regionally, Gill and Cobban (1973) show an increase in the amount of truncation at the base of the Teapot from east to west across the Bighorn Basin. Direct evidence for an unconformity in the Bighorn Basin is, however, lacking because all the strata spanning the Teapot-middle member of the Mesaverde contact are nonmarine and have no diagnostic fossils. Johnson and others (1998a) traced bentonitic zones in the upper part of the underlying middle member across the northern part of the Bighorn Basin and found no evidence for an increase in truncation at the base of the Teapot towards the west as Gill and Cobban had suggested.

The Mesaverde Formation was not subdivided for the assessment but rather was assessed as a single unit. The thickness of the Mesaverde Formation varies from less than 700 ft in the southeast corner of the basin, where the lower member is absent, to more than 1,500 ft along the south-central margin of the basin (Keefer and others, 1998, Figure 10). Total sandstone in the Mesaverde Formation, in beds 10 ft thick or greater, varies from 855 ft in the south-central part of the basin to 160 ft in the southeast corner (Figure 6).

<u>Meeteetse Formation</u>

The Meeteetse Formation overlies the Mesaverde Formation throughout the basin (Figure 3). It was first studied by Hewett (1914; 1926) who named the formation for exposures near the town of Meeteetse along the west margin of the Bighorn Basin (Figure 2). The Meeteetse Formation is generally poorly exposed and has not been as extensively studied as other Cretaceous units in the basin. Thicknesses and general descriptions of the Meeteetse were published by Gill and Burkholder (1979) for the south margin of the basin and by Rogers and others (1948) and Pierce (1948) for the east margin. Keefer and others (1998) correlated the Meeteetse Formation in the subsurface throughout the basin and presented an isopach map of the formation. Johnson and others (1998a) presented six detailed sections of the Meeteetse Formation measured around the margins of the basin.

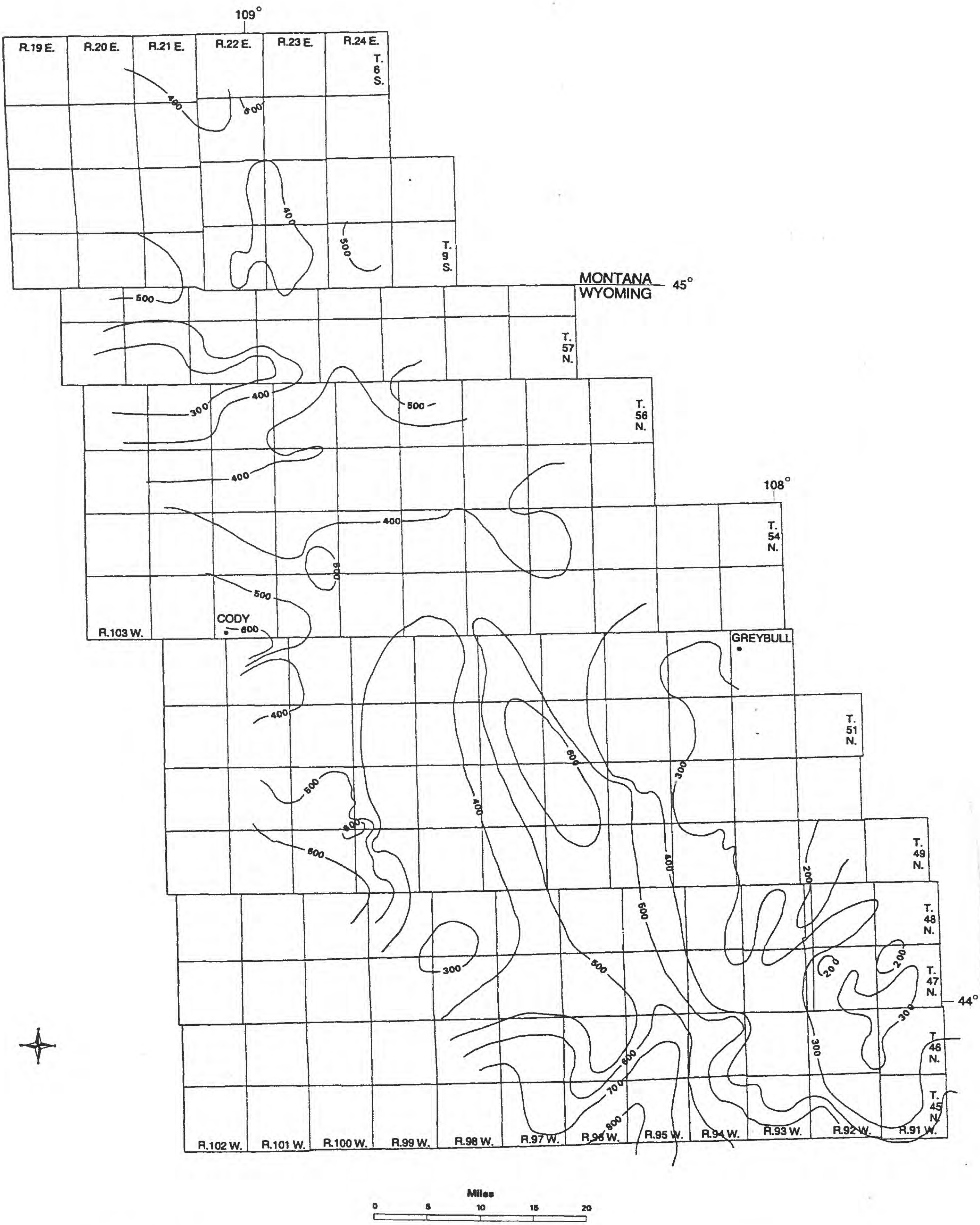

Figure 6. Isopach map showing total sandstone in beds 10 ft thick or greater in the Upper Cretaceous Mesaverde Formation. One hundred and eighty-two data points were used to develop this map. Contour interval: 100 ft.

The Meeteetse Formation was deposited in a coastal plain setting west of the Lewis seaway, and marine shale tongues occur in the Meeteetse in the eastern and northern parts of the basin (Keefer and others, 1998; Johnson and others, 1998a). Thickness of the Meeteetse Formation (including the Lewis Shale) ranges from more than 1,000 ft in the north-central and southwestern parts of the basin to a minimum of about 550 ft in the southeastern part (Keefer and others, 1998). The Meeteetse Formation is characterized by sandstone, shale, carbonaceous shale, and coal. Maximum total coal in the Meeteetse occurs in the southeast part of the basin where as much as 29 ft of coal in beds 2 ft thick or greater was reported (Johnson, 1998). The limited amount of paleocurrent data for sandstones in the Meeteetse Formation is highly variable (Johnson and others, 1998a, Plate II). Although sandstones in the Meeteetse are similar in composition to sandstones in the underlying Mesaverde Formation (Keighin, 1998) they are much less resistant to weathering in outcrop. These differences may be due to differences in the diagenetic histories of sandstones in the two formations. A thorough study of diagenesis, however, requires core samples, and there are none available for the Meeteetse and Mesaverde formations in the Bighorn Basin. Total sandstone in beds 2 ft thick or greater varies from 459 ft, measured in outcrop at Little Buffalo Basin in the southwest part of the basin, to less than 100 ft in areas in the eastern part of the basin (Figure 7).

Lance Formation

The name Lance Formation has been applied to rocks of latest Cretaceous age in many parts of Wyoming. In the Bighorn Basin the name Lance has been applied to a variable sequence of sandstone and shale above the Meeteetse Formation and below the Paleocene Fort Union Formation (Figure 3). The contact with the Meeteetse is thought to be everywhere conformable. The base of the Lance is generally marked by a shift from coaly and carbonaceous rocks of the upper part of the Meeteetse to thick sandstones in the lower part of the Lance. In the southwest part of the basin, Hewett (1926, p. 26) described the base of the Lance as "a rather persistent bed of massive buff to light-gray sandstone, which overlies the uppermost coal bed of the Meeteetse Formation."

Conglomerates, however, have also been reported from the Lance. Hewett (1926, p. 30) found rounded quartzite pebbles to as much as 2 in across in the Lance Formation in the southwest part of the basin. The limited fossil localities available in the Bighorn Basin suggest that this change in lithology may not correspond exactly to the Cretaceous-Tertiary boundary. Hewett (1926, p. 28, locality 6667, E. 1/2 sec. 29., T. 46N., R. 97W.) found Fort Union-age fossils in the Lance, 30 ft below the base of the Fort Union along the north rim of Grass Creek anticline.

The contact between the Lance Formation and the overlying Fort Union Formation is unconformable in the eastern and southeastern parts of the basin and along the western margin. In the eastern part of the basin, the unconformity has a noticeable angularity in outcrop on the west flank of Greybull anticline, just west of the town of Greybull. Here, the Lance dips at about 45° while the overlying Fort Union dips at only 22° (Keefer and others, 1998, Figure 18). A less angular, more regional truncation of the Lance beneath the Fort Union Formation occurs toward the southeast corner of the basin (Love and Chistiansen, 1983). In the western part of the basin, Hewett (1926, p. 36)

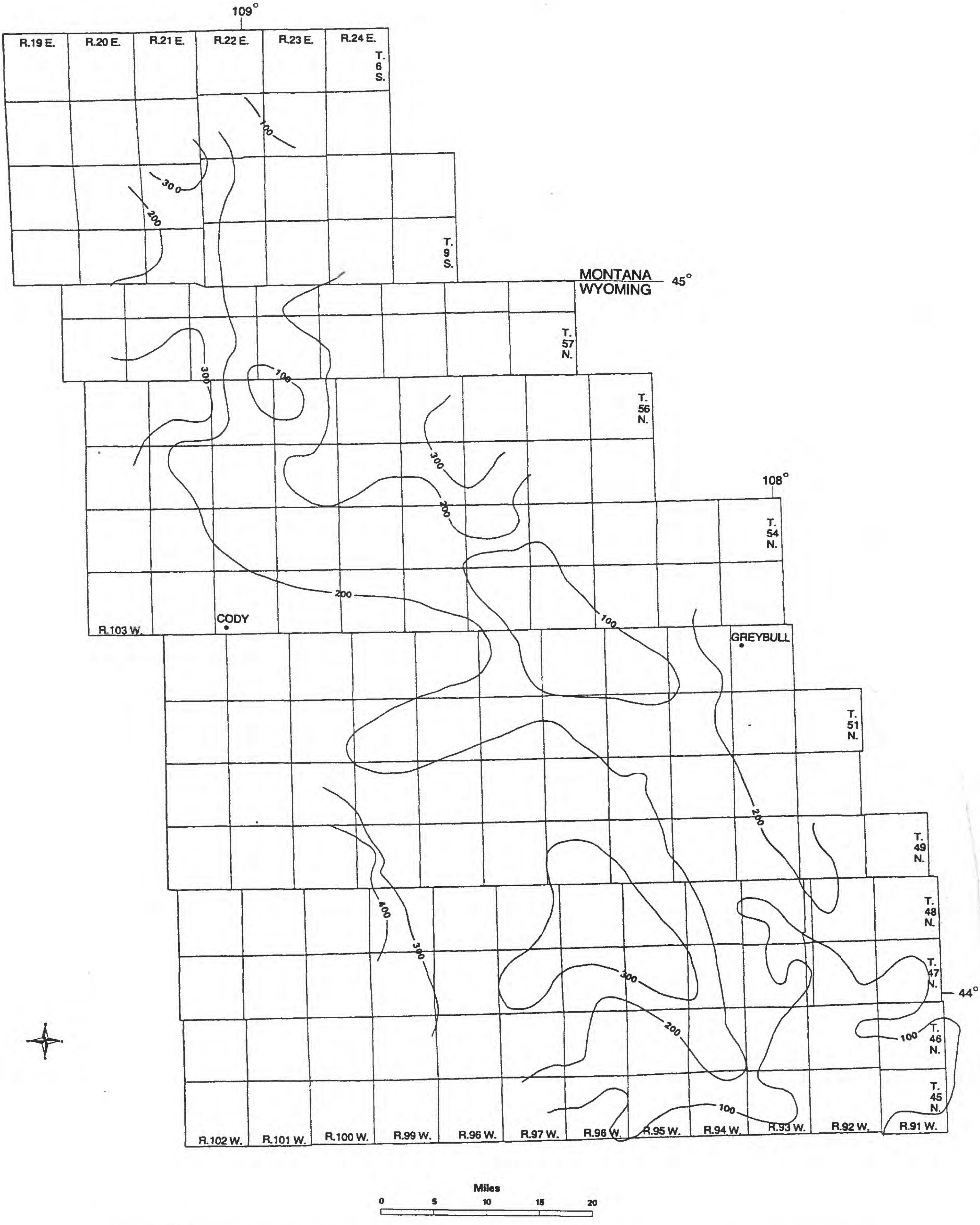

Figure 7. Isopach map showing total sandstone in beds 10 ft thick or greater in the Upper Cretaceous Meeteetse Formation. One-hundred and forty-eight data points were used to develop this map. Contour Interval: 100 ft.

documented the progressive truncation of as much as 1,800 ft of Lance and Meeteetse formations beneath this unconformity toward the north along the east flank of Oregon Basin anticline. Hewett believed that the Lance and Fort Union formations became conformable in outcrops south and east of Oregon Basin anticline. Here, the base of the Fort Union is generally placed at the base of a sandy, commonly conglomeratic sequence that occurs above the mud-dominated sequence that characterized the upper part of the Lance throughout much of this area.

In the subsurface, Keefer and others (1998, p. 22) could not identify any consistent lithologic or geophysical log characteristic to distinguish the Lance Formation from the Fort Union Formation. The distinctive basal sandstone of the Fort Union, identified in outcrop along the south margin of the basin, was not consistently present in the subsurface. In some wells, such as the Texas Pacific Oil no. 1 Red Point II well (Keefer and others, 1998, Plate II, well no. B-3) the contact is generally marked by a shift from thick sandstones in the upper Lance, which have a blocky signature on well logs, to thinner sandstone in the lower Fort Union, which produce a serrated log pattern. This shift is similar to the one noted between the upper part of the Lance and the lower part of the Fort Union in the subsurface of the Powder River Basin to the east (Conner, 1992). Unfortunately, this shift could only be recognized in a minority of the wells examined.

Recent work by Nichols (1998) and Roberts (1998) in the Bighorn Basin indicates that the Cretaceous-Paleocene contact occurs in the upper part of the Lance in many areas of the basin. Nichols (1998) identified early Paleocene pollen from a sample in the uppermost Lance at Greybull, below the angular unconformity between the Lance and Fort Union. Nichols identified Paleocene pollen, of indeterminate zonation, from about 40 ft below the top of the Lance in the Honeycombs area in the southeastern part of the basin. In addition Nichols identified Paleocene pollen from about 21 ft below the top of the Lance at Little Sand Draw along the southern margin of the basin, in an area where the Lance-Fort Union contact is thought to be conformable (Hewett, 1926). Total sandstone in beds 2 ft thick or greater varies from 88 ft in the northernmost part of the basin to about 1,450 ft at Little Buffalo Basin in the southwest part of the basin (Figure 8).

HYDROCARBON PRODUCTION FROM CONVENTIONAL RESERVOIRS AND POTENTIAL SOURCE ROCKS IN THE BIGHORN BASIN

The Bighorn Basin has produced large amounts of hydrocarbons from conventional structural and stratigraphic traps found mainly around the shallow margins of the basin. Two distinct classes of hydrocarbons are produced; 1) sour oil and gas from Paleozoic reservoirs; and 2) sweet oil and gas from Cretaceous and lower Tertiary-age reservoirs. Only minor hydrocarbon production occurs in Triassic and Jurassic rocks in the basin. The limited production from Triassic and Jurassic rocks is invariably sour gas and sour oil of probable Paleozoic origin. Crude oils from Paleozoic reservoirs are high-sulfur, high residuum, low-gasoline, asphaltic – based while Mesozoic and lower Tertiary crudes have a paraffin-naphthene base, low-sulfur, low-residuum, and high-gasoline content (Stone, 1967). With two possible very minor exceptions, which will be discussed later, these two petroleum systems appear to be almost completely isolated from each other. Paleozoic reservoirs are "conventional" with hydrocarbons trapped in anticlinal or

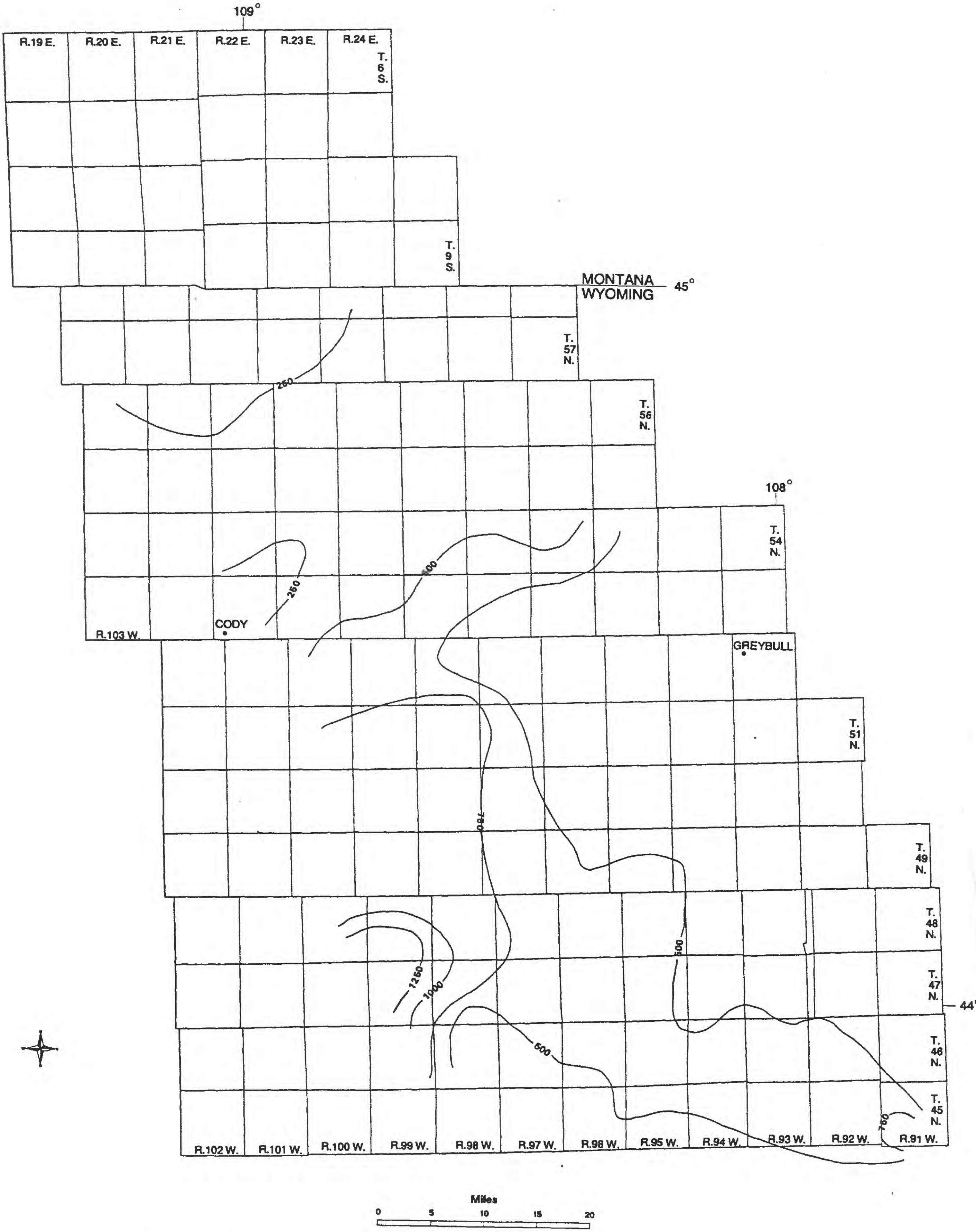

Figure 8. Isopach map showing total sandstone in beds 10 ft thick or greater in the Upper Cretaceous Lance Formation. One hundred and six data points were used to develop this map. Contour Interval: 250 ft.

stratigraphic traps. Hydrocarbons in Cretaceous and Tertiary strata, in contrast, occur in both "conventional" reservoirs in anticlinal traps, and in "unconventional" coal bed and low-permeability sandstone reservoirs. To date, only the conventional reservoirs on anticlines have been exploited to any extent in the basin.

Sour oil from Paleozoic reservoirs comprise the vast majority of the hydrocarbons produced thus far in the Bighorn Basin giving the basin the reputation as an "oily" basin. The Bighorn Basin has produced more oil from Paleozoic-age reservoirs than any other basin in Wyoming. Some of the first oil produced in the Rocky Mountain region was from Paleozoic reservoirs on anticlines in the Bighorn Basin. Considerably more has been written about Paleozoic oil in the basin than about the much less developed oil and gas resources in Cretaceous and lower Tertiary strata. This sour oil and gas, which occurs in units as old as Cambrian, has long been thought to be sourced by the Permian Phosphoria Formation based on regional geologic reconstructions and general similarities in chemistry (Stone, 1967; Sheldon, 1967). More recent geochemical studies have generally confirmed that the Phosphoria sourced these oils (Claypool and others, 1978; Seifert and Moldowan, 1981). This Phosphoria-based oil is thought to have underwent a two-stage migration process, first migrating into regional stratigraphic traps in the Phosphoria and underlying Pennsylvanian Tensleep Sandstone prior to the onset of the Laramide orogeny, and later migrating into Laramide anticlines (Lawson and Smith, 1966; Stone, 1967; Sheldon, 1967).

Phosphoria-based hydrocarbons do not appear to have migrated into Cretaceous and Lower Tertiary strata as there are no oil and gas fields in the Bighorn Basin that produce sour gas or sour oil from Cretaceous and lower Tertiary rocks (Wyoming Geological Association, 1989). According to Stone (1967, p. 2069): "The very effective cap rocks of the normal anticlinal Paleozoic fields in the Big Horn Basin include the calcareous shale, siltstone, and tight carbonate of the Dinwoody Formation, the red shale and evaporite of the Triassic Chugwater Formation, and, in the area of Permian redbeds, the Goose Egg Formation." In addition, faults do not appear to have acted as conduits for the migration of Phosphoria-sourced oil into Cretaceous and lower Tertiary rocks. Most of the anticlines in the basin are bounded on one side by faults that penetrate the Paleozoic through Cretaceous interval. At Grass Creek anticline, in the southwest part of the basin for example, the column of sour oil in the Paleozoic reservoirs is in contact with the fault plane that defines the southwest margin of the field (Stone, 1967, fig. 28). Yet the overlying Upper Cretaceous Frontier Formation produces only sweet oil and gas. This pattern of sour oil and gas from Paleozoic reservoirs and sweet oil and gas from Cretaceous reservoirs is repeated at anticlinal fields throughout the basin.

The Cretaceous Frontier Formation and Muddy Sandstone have produced most of the sweet oil and gas in the basin. Almost all of the oil and gas produced from these units is from structural closures, although the Frontier produces minor hydrocarbons from stratigraphic traps (Keefer, 1998). These hydrocarbons are thought to be sourced by dark organic-rich marine shales in the lower part of the Cretaceous interval (Stone, 1967). Hagen and Surdam (1984), in a study of Cretaceous marine source rocks, reported total organic carbon (TOC) values as high as 1.28 wt. % for the Lower Cretaceous Thermopolis Shale, 1.92% for the Lower Cretaceous Mowry Shale, 1.57% for the Upper Cretaceous Frontier Formation, and 5.86% for the Upper Cretaceous Cody Shale.

Hydrogen indices range from 150 to 300 suggesting Type II and Type III kerogen. According to Hagen and Surdam, production indices, elemental analysis, and extractable hydrocarbons indicate that source rocks in the Bighorn Basin are within the oil window starting at a depth of 2,000 to 3,000 ft and extending to a depth of 11,000 to 12,000 ft. At greater depths, liquid hydrocarbons would have broken down to gas.

The Upper Cretaceous marine Cody Shale overlies the Frontier Formation (Figure 3) and varies in thickness from less than 1,700 ft to over 3,900 ft in the basin. Hagen and Surdam (1984) reported TOC values for the Cody Shale ranging from 0.27 to 5.86% with hydrogen indicies ranging from 88 to 292. This suggests that there are good potential source rocks in the Cody. The Cody acts as a seal for Frontier Formation and Muddy Sandstone reservoirs where they are productive on structures in the basin.

Coal and carbonaceous shale, which occur in nonmarine rocks of the Upper Cretaceous Mesaverde and Meeteetse Formations and the Paleocene Fort Union Formation (Figure 3), is another possible source for hydrocarbons in the basin. Hydrocarbon gases, mainly methane, are generated from Type III organic matter in coal and carbonaceous shale, although only a minor portion of the total kerogen will react to form gas. The onset of gas generation by Type III organic matter is thought to occur at a vitrinite reflectance (Rm) of about 0.6 to 0.7% (Juntgen and Karweil, 1966). Much of the gas generated early in the maturation process, however, is thought to remain locked up in the organic matter in coal and carbonaceous shale and hence unavailable for migration into reservoir rocks (Juntgen and Karweil, 1966). Eocene rocks contain few, if any, potential source rocks. Nuccio and Finn (1998) determined levels of Rm in the basin and found them to be generally lower at comparable depths than thermal maturities in the Wind River Basin to the south.

DEFINING THE BASIN-CENTERED GAS ACCUMULATION IN THE BIGHORN BASIN

Johnson and Finn (1998a) defined an overpressured basin-centered gas accumulation covering a comparatively limited area of the deep trough of the Bighorn Basin using drillstem tests and mudweights. The onset of overpressuring occurs at about a depth of 14,000 ft in the lower part of the Upper Cretaceous Meeteetse Formation and extends stratigraphically downward to near the base of the Cretaceous interval. Maximum pressure gradients appear to be about 0.675 pounds per square inch per foot (psi/ft). These gradients are low when compared with the deeper parts of basin-centered gas accumulations in other Rocky Mountain basins such as the Wind River Basin, Greater Green River Basin, and Piceance Basin where fluid pressure gradients as high as 0.8 psi/ft are encountered (Bilyeu, 1979; Spencer, 1989). Pressures in the area of the basin-centered accumulation appear to drop to near normal below the Cretaceous strata. This drop to near-normal pressures at the base of the Cretaceous interval occurs in the Wind River Basin to the south as well (Bilyeu, 1978). Johnson and Finn (1998a) cite evidence that a much larger area of underpressuring may surround this overpressured area. This is opposite the basin-centered accumulation in the Wind River Basin to the south in which the overpressured part is much larger than the underpressured part.

Levels of thermal maturity define areas where potential source rocks have generated gas at some time in the past and are commonly used as an indirect method of defining the limits of a basin-centered gas accumulation. Masters (1984, p. 27, Fig. 25) in a study of the basin-centered gas accumulation in the Deep Basin of Alberta, indicated that a vitrinite reflectance (Rm) of 1.0% corresponds approximately to the limit of the accumulation. In the Piceance Basin of western Colorado, Johnson and others (1987) used a vitrinite reflectance (Rm) of 1.1% to define the limits of the basin-centered gas accumulation. Rm values of from 0.73 to 1.1% were used to define a transition zone containing both tight reservoirs and reservoirs with conventional permeabilities. Johnson and others (1996) used these same thermal maturity limits to help define the basin-centered gas accumulation and transition zone in the Wind River Basin, south of the Bighorn Basin, with some modifications to accommodate geologic characteristics unique to that basin. In the Greater Green River Basin of Wyoming, Colorado, and Utah, Law and others (1989) used an Rm of 0.80% to define the top of overpressuring in the basin-centered gas accumulation.

Profiles showing variations in Rm with depth for wells in the Bighorn Basin published by Nuccio and Finn (1998) generally show far more scatter than profiles published for other Rocky Mountain basins, and some of the possible reasons for this scatter are discussed by the authors. Despite the scatter, Nuccio and Finn (1998) generated maps showing approximate areas where the thermal maturity levels Rm 0.73, 0.80, and 1.1 % occur at the top and base of the Mesaverde Formation (Figure 9). In the northern part of the main basin trough, the Rm 1.1 % thermal maturity level more closely follows the areas of overpressuring in the Mesaverde in the northern part of the basin than in the southern part (Figure10). A thermal maturity of somewhat greater than Rm 1.1 % is required for overpressuring in the southern part.

A thermal maturity of Rm 0.73 % was used by Johnson and others (1987; 1996) to help define the limits of the transition zone surrounding the basin-centered gas accumulation in the Piceance Basin of Colorado and the Wind River Basin of Wyoming. The area of gas shows in the Mesaverde Formation closely follows the Rm 0.73% thermal maturity levels for that formation in the main part of the Bighorn Basin (Figure 10); however, in the Clark's Fork sub-basin, gas shows extend to areas were thermal maturities are significantly less than Rm 0.73%.

The rate that source rocks generate gas is directly related to temperature. Spencer (1989a) suggested that rates of gas generation need to exceed rates of gas loss in order to maintain abnormally high pressures in Rocky Mountain basin-centered gas accumulations, and that this balance generally occurs at present-day corrected formation temperatures of about 200^0 F or greater. Law and others (1989) agree that present-day temperatures can be used as a guide to predicting the onset of overpressuring but caution that they need to be used in conjunction with other data such as drillstem tests, mud weights, and gas analysis from mud logs. In the Wind River Basin, Johnson and others (1996) found that the 200° F isotherm fairly closely followed the top of overpressuring in the central part of the basin, while temperatures somewhat higher than 200° F are required for overpressuring in the western part of the basin and somewhat lower than 200°F in the eastern part. They (Johnson and others, 1996) did, however, find that the present-day 300° F isotherm fairly closely defined the limits of the highly overpressured central core of the basin-centered accumulation. Twelve-pound plus mud is typically used to drill through this highly overpressured zone. In the Bighorn Basin, Johnson and Finn (1998a) found that the onset of overpressuring at the top of the Mesaverde is fairly

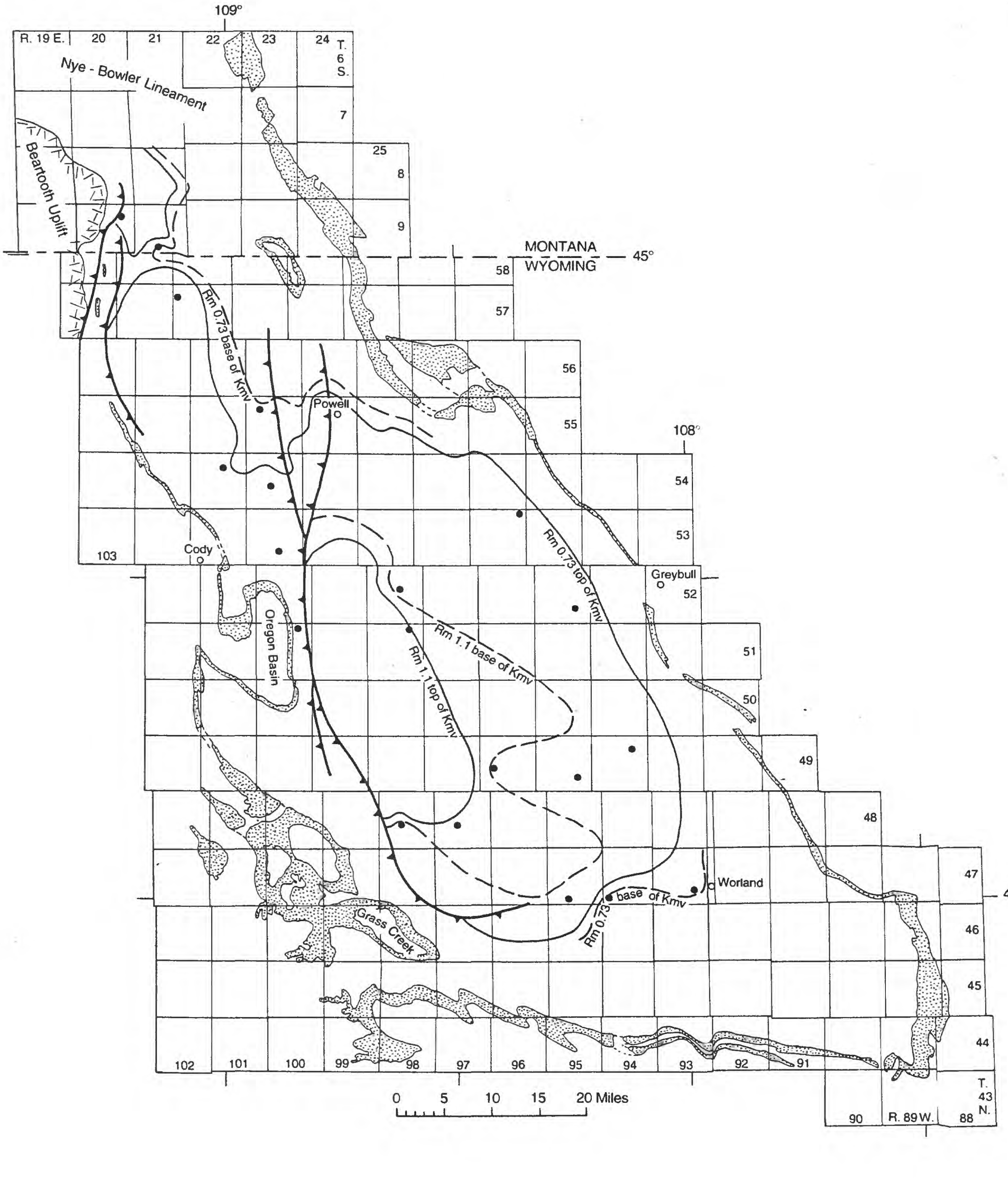

Figure 9. Map of Bighorn Basin showing variations in levels of thermal maturity using vitrinite reflectance at the top and base of the Mesaverde Formation. Areas where Mesaverde Formation crops out shown in stipple pattern. Abbreviations used: Kmv-Mesaverde Formation. Modified from Nuccio and Finn (1998).

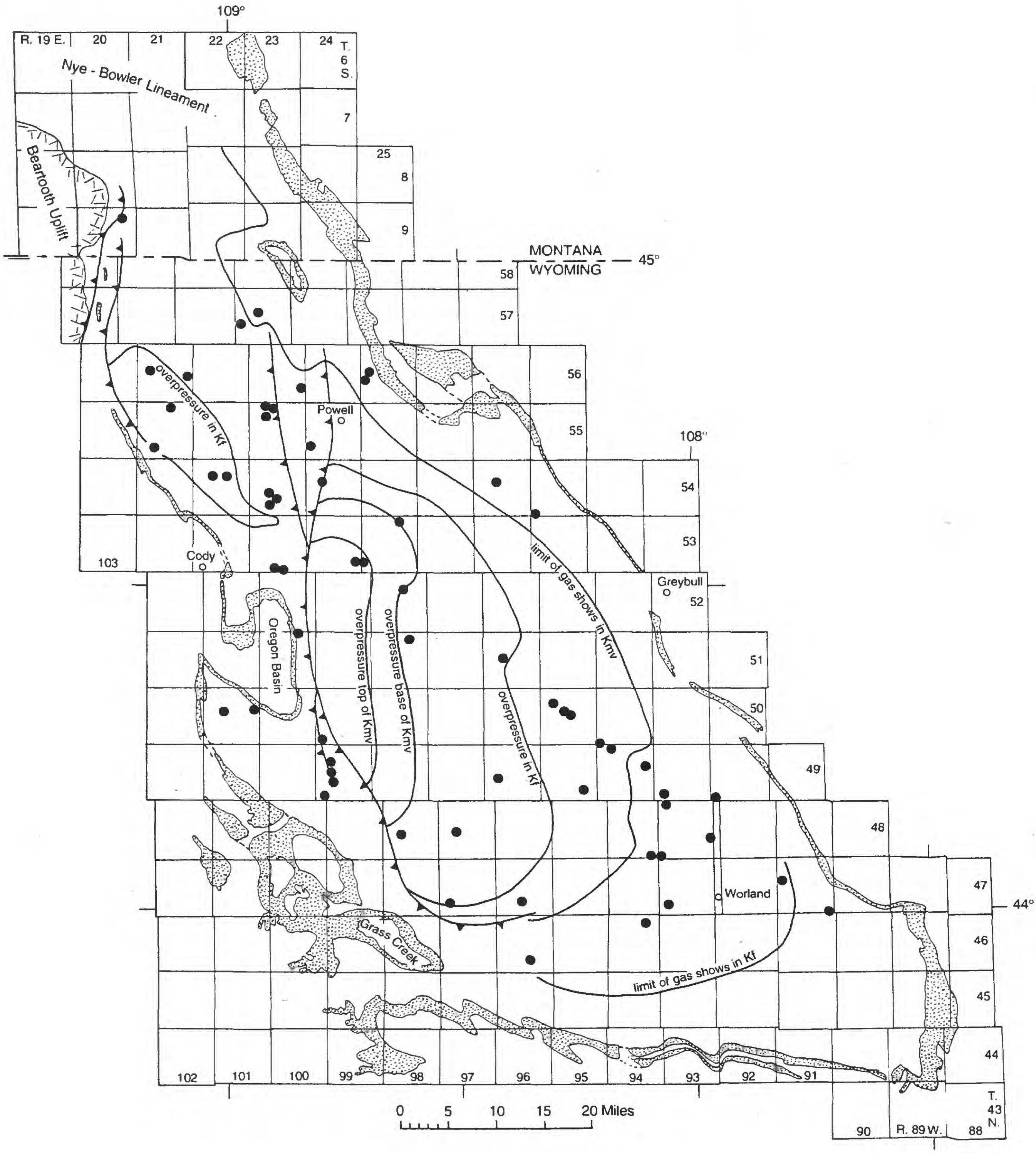

Figure 10. Map of the Bighorn Basin showing approximate areas where overpressuring occurs at three stratigraphic levels: 1) the top of the Upper Cretaceous Mesaverde Formation; 2) the base of the Mesaverde Formation; and 3) the top of the Upper Cretaceous Frontier Formation. Areas where gas shows in mudlogs occur in the Mesaverde and Frontier Formation also shown. Areas where Mesaverde Formation crops out shown in stipple pattern. Abbreviations used: Kmv-Mesaverde Formation, Kf-Frontier Formation. From Johnson and Finn (1998a).

close to the 225° F isotherm throughout the deep basin trough (Figure 11). The onset of overpressuring at the Frontier level occurs at a temperature between 200°F and 225°F (Figure 12).

PROBABILISTIC METHODOLOGY FOR GAS RESOURCE ASSESSMENT

Probabilistic methodology is developed for an assessment of the total in-place gas resources in the study area. The study area is subdivided into a set of geologic plays, and the plays are analyzed separately. Every play is partitioned geologically into parts, called sub-plays. Each sub-play is assessed individually, and then all of the sub-plays of a play are aggregated to make an assessment of the overall play. Finally, all of the plays are aggregated for an assessment of the total in-place gas resources in the study area.

Each sub-play is assessed individually using a reservoir engineering equation. The hydrocarbon-volume attributes (Table 1) are (1) area of sub-play, (2) thickness of reservoir rock, (3) effective porosity, (4) trap fill, (5) hydrocarbon saturation, and (6) depth to reservoir. The hydrocarbon-volume attributes jointly determine the volume of the hydrocarbon accumulation within the sub-play. The following reservoir engineering equation is used to calculate the in-place volume of gas in cubic feet:

$$\text{Gas in-place} = 1.5378 * 640 * A * H * P * F * S_h * P_e / (T * Z),$$

where

A = area of subplay (square miles)
H = reservoir thickness (feet)
P = effective porosity (percent)
F = trap fill (percent)
S_h = hydrocarbon saturation (percent)
P_e = original reservoir pressure (psi)
T = reservoir temperature (degrees Rankin)
Z = gas compressibility factor (no units)

The equation consists of a product of factors that are functions of the hydrocarbon-volume attributes. The geologic variables P_e, T, and Z are each taken to be linear functions of reservoir depth D (feet) in the form $a * D + b$.

To obtain a point estimate of the in-place gas of a sub-play, point estimates are made of the six attributes A, H, P, F, S_h, and D which may vary from sub-play to sub-play within a play. The parameters a and b for each of the variables P_e, T, and Z (i.e., three pairs of a and b) are estimated for a play, and the one set of parameter values is used in all sub-plays of the play. The point estimate of the in-place gas of a subplay is taken to be a mean estimate.

To obtain an interval estimate of the in-place gas of a sub-play, estimates are made of the ranges (range = F5–F95) of the six attributes A, H, P, F, S_h, and D. Like the parameters a and b, there is only one set of ranges for a play that is used in all sub-plays of the play. The attributes are treated as independent continuous random variables. The

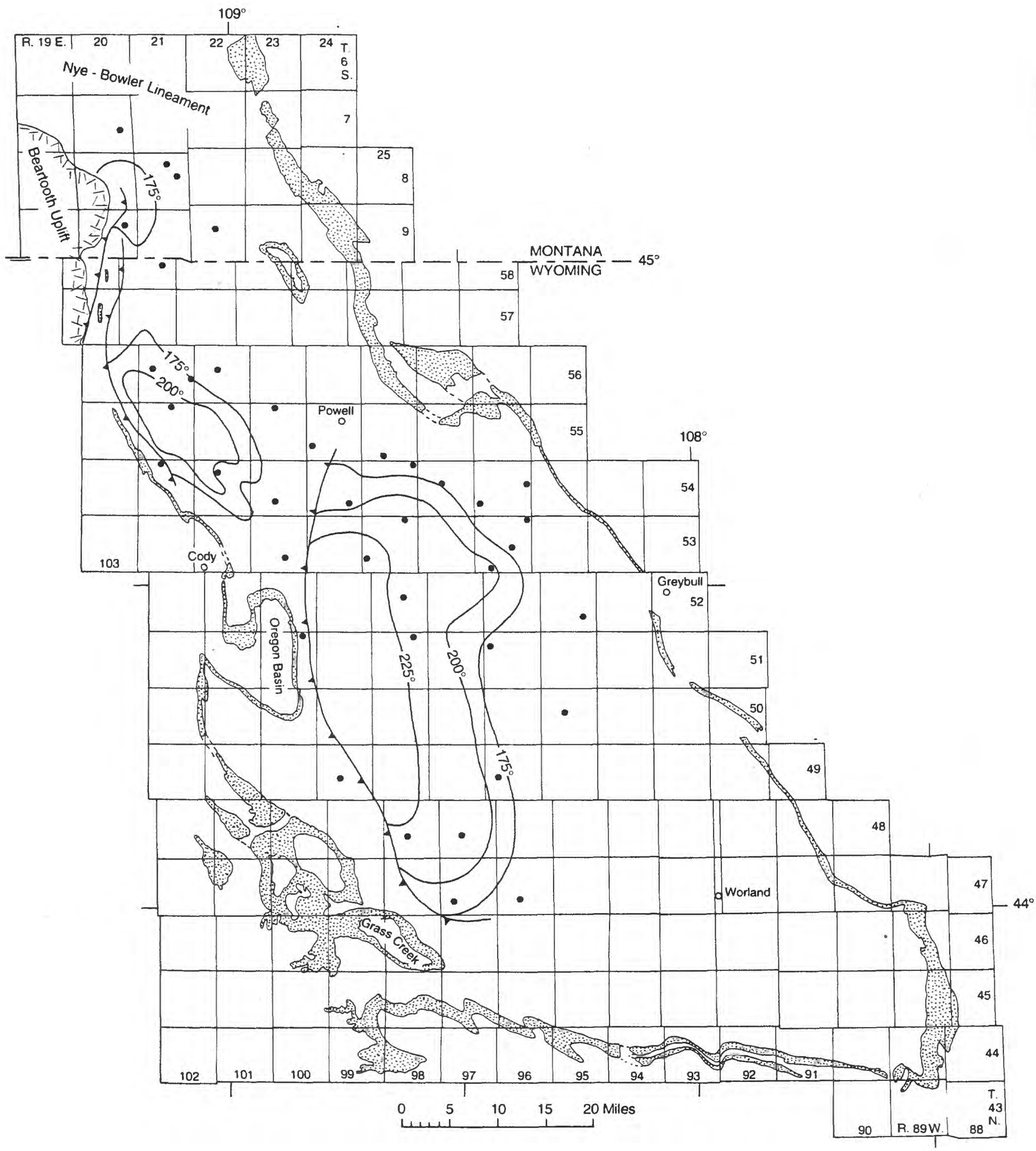

Figure 11. Present-day temperatures in °F at the top of the Upper Cretaceous Mesaverde Formation. Areas where Mesaverde Formation crops out shown in stipple pattern. From Johnson and Finn (1998a).

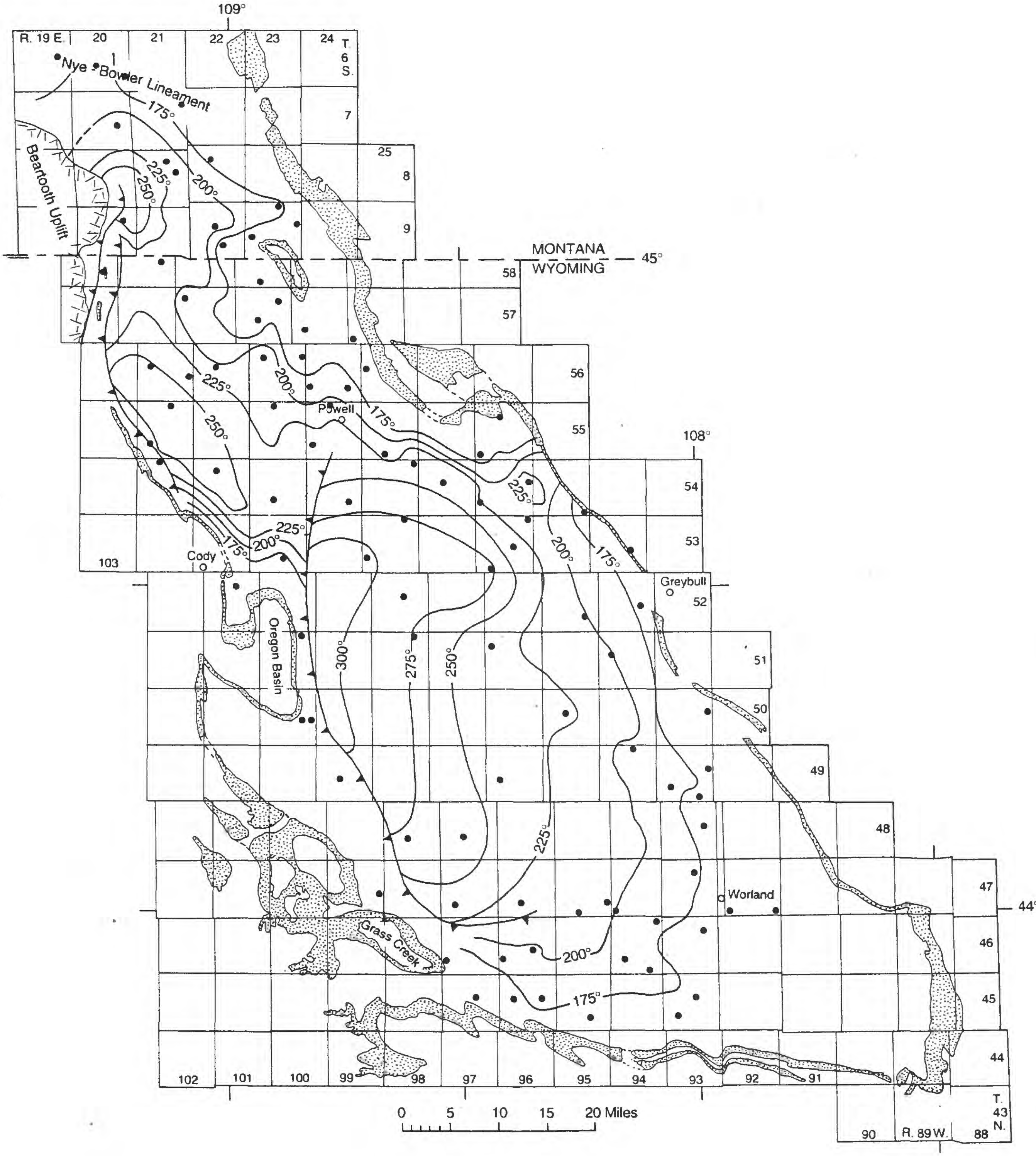

Figure 12. Present-day temperatures in °F at the top of the Upper Cretaceous Frontier Formation. Areas where Mesaverde Formation crops out shown in stipple pattern. From Johnson and Finn (1998a).

probabilistic methodology used to process the geologic data is an analytic method derived from probability theory. The analytic methodology is developed by the application of the laws of expectation and variance. The methodology systematically tracks through the geologic model and computes all of the means and variances of the appropriate random variables. An estimate of the standard deviation of the in-place gas of a sub-play is computed and varies from sub-play to sub-play. The log normal distribution is used as a probability model in order to generate probability fractiles for gas in-place.

All of the means, standard deviations, and fractiles of the sub-plays of a play are aggregated, assuming complete dependency or perfect positive correlation, to make an assessment of the play. Finally, all of the plays are aggregated, assuming complete dependency, by applying a separate methodology for an assessment of the total in-place gas resources in the study area. This probabilistic methodology for gas resource assessment lends itself as an ideal application for spreadsheet software. For a more detailed treatment of the probabilistic methodology see OF-xxxB by Crovelli and others.

DEFINITION OF GAS PLAYS IN THE BIGHORN BASIN

The basin-centered gas accumulation in the Bighorn Basin was divided into eight plays: 1) Muddy Sandstone overpressured play; 2) Muddy Sandstone transition play; 3) Frontier Formation overpressured play; 4) Frontier Formation transition play; 5) Mesaverde Formation overpressured play; 6) Mesaverde Formation transition play; 7) Meeteetse Formation transition play; and 8) Lance Formation transition play. The overpressured plays enclose all wells in which overpressuring is indicated from mud weights and/or drillstem tests. Structure contour maps were used to help define the boundaries of the plays between the widely spaced control points. The transition plays enclose all wells where near continuous gas shows occur on mud logs and/or underpressured gas is indicated from drillstem tests. Sub-thrust areas beneath the Oregon Basin reverse fault and the reverse faults along the Beartooth Mountains were not assessed. On the spreadsheets, the file names consist of a "G", representing the GRASS spreadsheet, followed by the play code. Highly overpressured conditions, such as those that occur in the deeper parts of the Wind River Basin to the south where present-day formation temperatures exceed 300° F, do not appear to exist in the basin-centered accumulation anywhere in the Bighorn Basin. This is consistent with present-day temperatures which do not appear to exceed 300° F in any of the formations assessed in this report except for possibly the Muddy Sandstone in the deepest part of the basin trough (Johnson and Finn, 1998a, Figs. 8-10).

The equation previously presented to calculate gas in place is constructed in such a way that only a single value can be applied to each of the volume attributes. If the entire basin-centered accumulation is considered one play, for instance, then only one set of values can be assigned to each of the volume attributes despite the fact that all of the volume attributes vary markedly across the accumulation. To more precisely calculate in-place gas each of the plays was subdivided into as many as 155 sub-play areas. Each sub-play area was assigned a unique set of volume attributes. The sub-plays were defined by overlaying isopach maps of total sandstone in beds 10 ft thick or greater on either the structure contour map on the top of the Mesaverde Formation or the structure contour map of the top of the Cloverly Formation. The crosscutting isopach lines and sandstone thickness lines create the sub-play areas. The play maps were digitized and a computer determined the areas of the sub-plays. The structure contour lines were used to estimate average depth of each sub-play by overlaying the play maps on a generalized topographic map of the basin. Average sandstone thicknesses were estimated for each sub-play from the sandstone isopach lines. An estimate of mean in-place gas for each of these sub-plays was calculated using the formula presented earlier, and the mean in-place gas for a play was estimated by summing the gas in each of the sub-plays within the play. Each sub-play is numbered and listed on the spreadsheets.

The probability program used here requires that the same temperature gradient and pressure gradient be assigned to all of the sub-plays within a play. Average pressure gradients used are 0.52 psi/ft of depth for the overpressured plays; and 0.35 psi/ft for the transition plays. Present-day thermal gradients in the basin vary from less than 1.2° F/100 ft to more than 1.6° F/100 ft (Johnson and Finn, 1998a, fig. 7). A thermal gradient of 1.4° F/100 ft was assumed for the entire basin.

CALCULATING Z FACTOR

Gases in nature seldom, if ever, obey the ideal gas equation and the gas compressibility factor or Z factor is a correction factor which was derived to quantify this deviation. The value of Z varies with pressure, temperature, and gas composition (Standing, 1977). Gas compositions for the basin-centered accumulation in the Bighorn Basin are unknown because of the almost total lack of gas production. Because of this, Z factors were calculated using gas compositions from the Wind River Basin to the south (Johnson and Rice, 1993). Johnson and others (1996) found that Z factor varied only slightly between the various sub-plays in the overpressured and transition plays, and only a very modest error in in-place gas for the sub-plays was introduced if a single value for Z was applied to all of the sub-plays. Johnson and others (1996) found that Z factor varied markedly between the shallower and deeper sub-plays in the highly overpressured plays, however, highly overpressured plays do not exist in the Bighorn Basin.

CALCULATION OF PROBABILITY DISTRIBUTIONS OF ESTIMATES FOR EACH PLAY

In order to calculate probability distributions, estimates were made of the range for each play attribute at the 95th and 5th percentile levels. For the Mesaverde overpressured play for instance, probability estimates for the play attributes at the 95th and 5th percentile levels are depth: 30%, closure: 30%, sandstone thickness: 50%, porosity: 30%, trap fill: 20%, and hydrocarbon saturation-40%. If, for instance, the mean thickness of sandstone in a sub-play is 100 ft then the thickness at the 95th and 5th percentile probabilities vary from this mean by 50% or 50 ft. Another way of expressing this variation would be 100 plus or minus 25 ft. The play attributes in each play were given different probability ranges based on geologic inference. However, because of limitations in the program used, the same ranges had to be applied to every sub-play within a play. The play attributes of porosity, trap fill, and hydrocarbon saturation were given large ranges in the relatively shallow transition plays where complex mixes of tight gas reservoirs, gas reservoirs with conventional permeabilities, and water-bearing reservoirs occur. These play attributes are considered less variable in the deeper, mostly gas saturated plays.

The attributes were treated as independent continuously random variables, and ranges of in-place gas for each sub-play were then calculated using probability theory. The sub-plays were aggregated assuming perfectly positive correlation to calculate the range of in-place gas for each play. Finally, all of the plays were aggregated assuming perfect positive correlation to assess the total in-place gas in all of the plays in the Bighorn Basin.

PLAYS ASSESSED

Muddy Sandstone overpressured play

The Muddy Sandstone overpressured play covers an area of 889.45 square miles in the basin. Depth to the Muddy Sandstone was estimated by overlaying the structure contour map of the top of the Lower Cretaceous Cloverly Formation on a generalized topographic map of the basin. The play was subdivided into 36 sub-play areas (Figure 13, Tables 1-3). The sub-play areas were defined by overlaying the isopach map of total sandstone 10 ft thick or greater in the Muddy on the structure contour map on the top of the Cloverly Formation. Small areas with zero sandstone occur within the play boundaries (Figure 12). Dividing the play into sub-play areas allowed volume attributes (i.e. closure, sandstone thickness, porosity, trap fill, hydrocarbon saturation, depth, pressure, and temperature) to vary throughout the play thus generating a more precise estimate of in-place gas. Each sub-play has a unique set of volume attributes (Table 1). A porosity of 7%, trap fill of 100%, and hydrocarbon saturation of 50% were assumed for all of the sub-plays (Table 1). The Muddy Sandstone is only about 200 ft above the top of the Cloverly Formation and the contours on the top of the Cloverly were converted directly to depth to the Muddy. Average depths for the sub-plays ranges from 15,000 ft to 22,000 ft (Table 1). Estimate of total mean in-place gas is 13.4 tcf (Table 3). Estimates of total in-place gas at the 95th and 5th percentile levels are 8.66 tcf and 19.6 tcf respectively (Table 3).

Muddy Sandstone transition play

The Muddy Sandstone transition play covers an area of 1356.84 square miles in the basin. The zero sandstone line from the sandstone isopach map (Figure 4) defines the northern limit of the play. Small areas of zero sandstone also occur within the play boundary, and these are shown as either black areas or blank areas on the play (Figure 4). The play was sub-divided into 79 sub-play areas (Figure 13, Tables 4-6). Average depth for the sub-plays varies from 8,500 ft to 14,000 ft. A porosity of 7% and a hydrocarbon saturation of 50% was assumed for all of the sub-play areas. Trap fill was varied from 50%, in the shallower areas of the play, to 70% in the deeper areas. The play was assumed to be moderately underpressured and a pressure gradient of 0.35 psi/ft was applied. Estimate of total mean in-place gas is 0.55 tcf (Table 6). Estimates of total in-place gas at the 95th and 5th percentile levels are 2.29 tcf and 10.5 tcf respectively (Table 6).

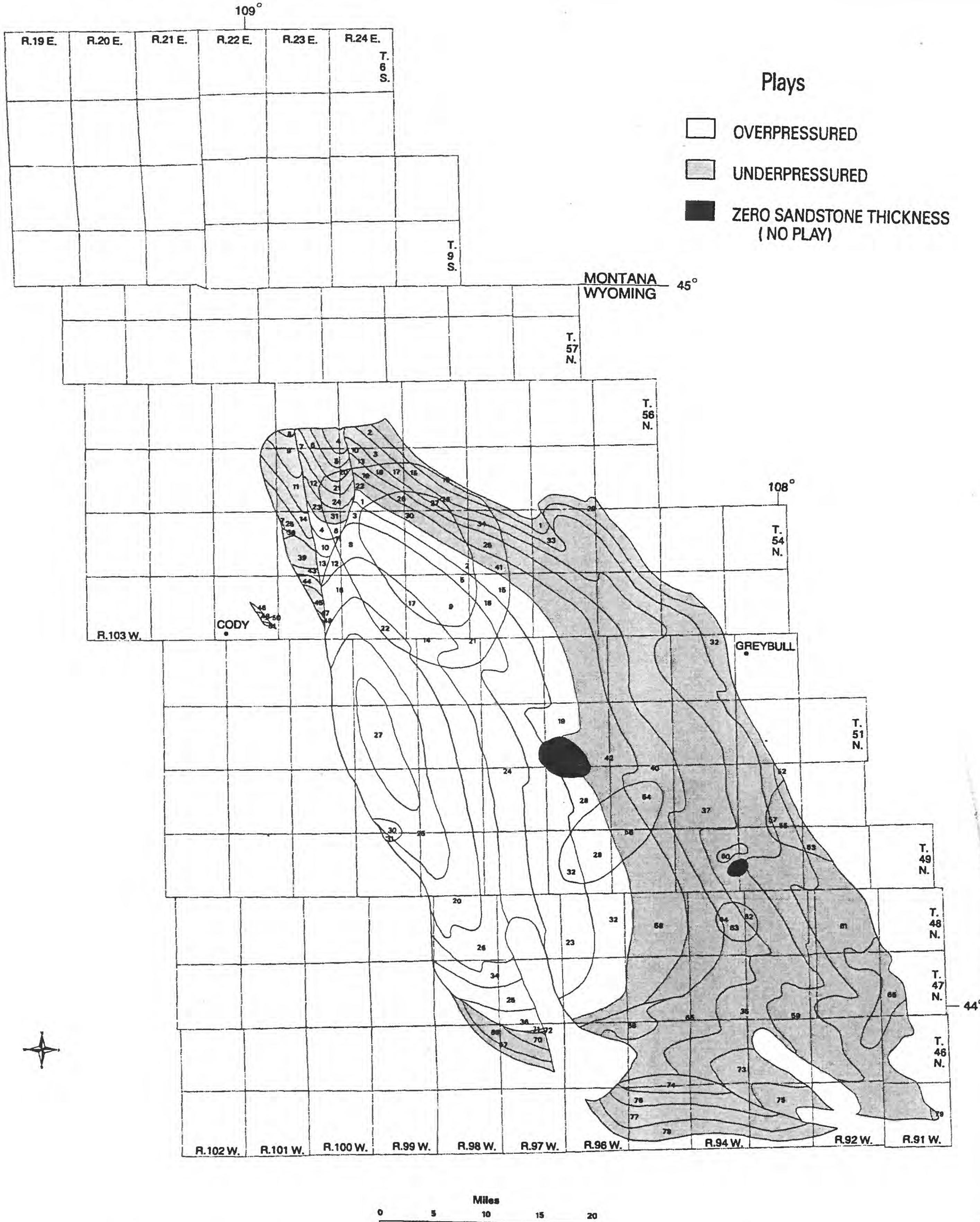

Figure 13. Detailed map showing sub-plays in the Lower Cretaceous Muddy Sandstone overpressured and transition plays. Sub-play identification numbers are keyed to Tables 1-6.

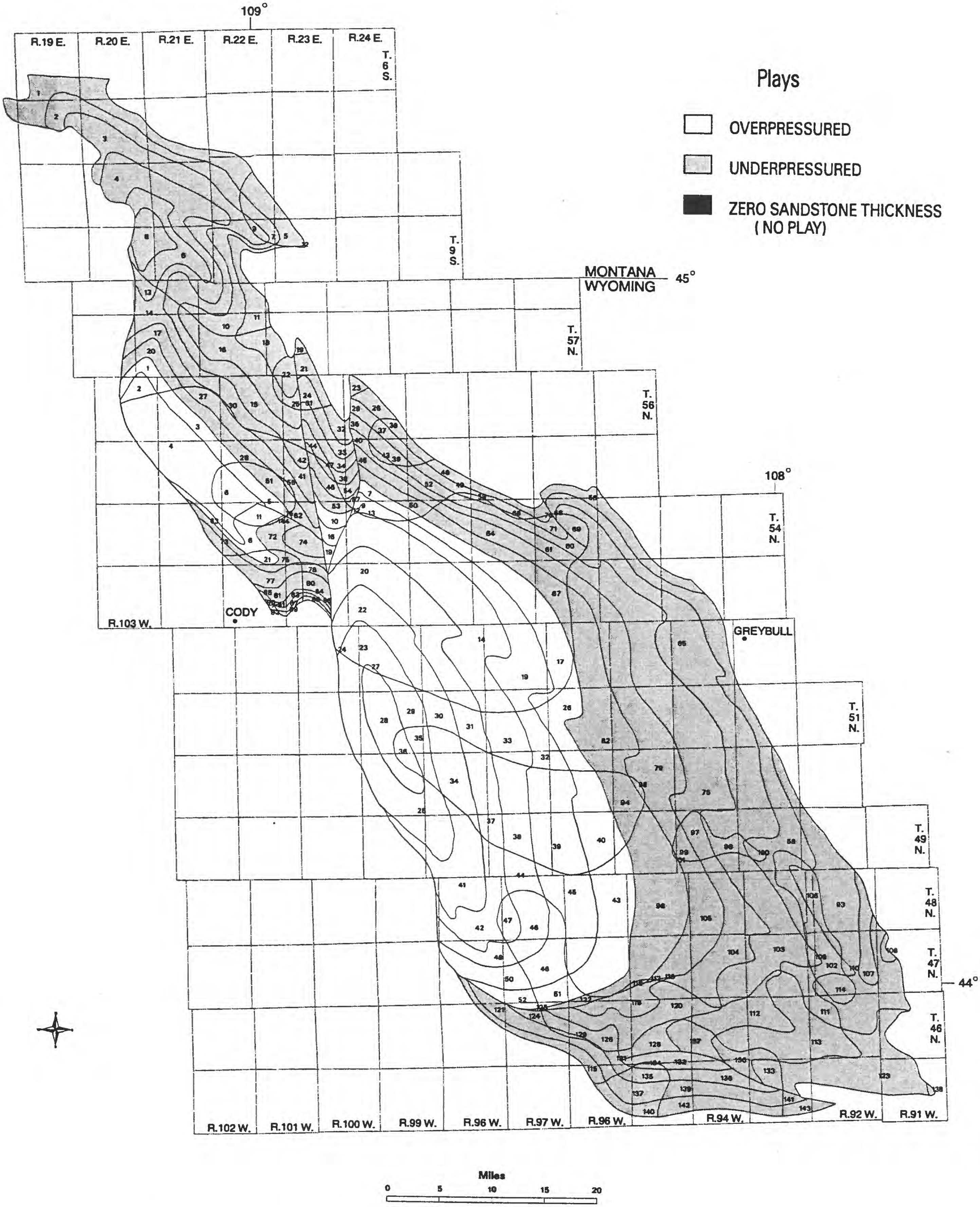

Figure 14. Detailed map showing sub-plays in the Upper Cretaceous Frontier Formation overpressured and transition plays. Sub-play identification numbers are keyed to Tables 7-12.

Frontier Formation overpressured play

The Frontier Formation overpressured play covers an area of 1046.85 square miles in the basin. The play was subdivided into 52 sub-play areas (Figure 14, Tables 7-9). Sub-play areas for both the Frontier Formation overpressured play and transition play were defined by overlaying the isopach map of total sandstone in the Frontier Formation in beds 10 ft thick or greater on the structure contour map on the top of the Cloverly Formation (unpublished map, T. .M. Finn, 1998). Average sandstone thickness in each sub-play was estimated from the sandstone isopach map. The base of the Frontier is about 700 ft above the top of the Cloverly in the basin, and the Frontier averages about 500 ft thick. The middle of the Frontier is therefore about 1,000 ft above the top of the Cloverly. Average depth for each sub-play was estimated by overlaying the play map on a generalized topographic map of the basin with a contour interval of 1,000 ft. Average depth for the sub-play areas ranges from 14,000 to 21,000 ft. A pressure gradient of 0.52 psi/ft, porosity of 7%, trap fill of 100% and hydrocarbon saturation of 50% was assumed for all of the sub-plays. Estimated total mean in-place gas is 41.9 tcf (Table 9). Estimates of total in-place gas at the 95th and 5th percentile levels are 27.0 tcf and 61.1 tcf respectively (Table 9).

Frontier Formation transition play

The Frontier Formation transition play covers an area of 1936.88 square miles in the basin. The play was subdivided into 144 sub-play areas (Figure 14, Tables 10-12). Average depth of the sub-plays varies from 7,500 ft to 14,000 ft (Table 7). A pressure gradient of 0.35psi/ft, porosity of 7% and hydrocarbon saturation of 50% was assumed for all of the sub-plays. A trap fill of 70% was assumed for sub-plays within 2,000 ft structurally of the overpressured play, and a trap fill of 50% was assumed for the remainder of the play. Estimated total mean in-place gas is 24.6 tcf (Table 12). Estimates of total in-place gas at the 95th and 5th percentile levels are 10.3 tcf and 47.4 tcf respectively (Table 12).

Mesaverde Formation overpressured play

The Mesaverde Formation overpressured play covers an area of 301.44 square miles along the deep basin trough (Figure 15). The overpressured play is defined as that area where overpressuring occurs anywhere in the Mesaverde Formation. Johnson and Finn (1998a, Figure 5) show that overpressuring at the base of the Mesaverde covers a larger area than overpressuring at the top. This is because the overpressured pocket cuts roughly horizontally across the dipping Mesaverde Formation and thus intersects the base of the formation further up dip than the top. Using the area where overpressuring occurs at the base of the Mesaverde overestimates the amount of overpressured sandstone in the Mesaverde somewhat. A conservative pressure gradient of 0.52 psi/ft is applied to the Mesaverde overpressured play in an attempt to compensate for this simplification.

The play was subdivided into 10 sub-play areas (Figure 15, Tables 13-15). The sub-play areas for both the overpressured Mesaverde play and underpressured Mesaverde play were defined by overlaying a structure contour map on the top of the Mesaverde Formation from Johnson and Finn (1998b) on the isopach map of total sandstone in the Mesaverde 10 ft thick or greater (Figure 6). Each polygon formed by this process is considered a sub-play area. Thickness of the Mesaverde Formation varies from about

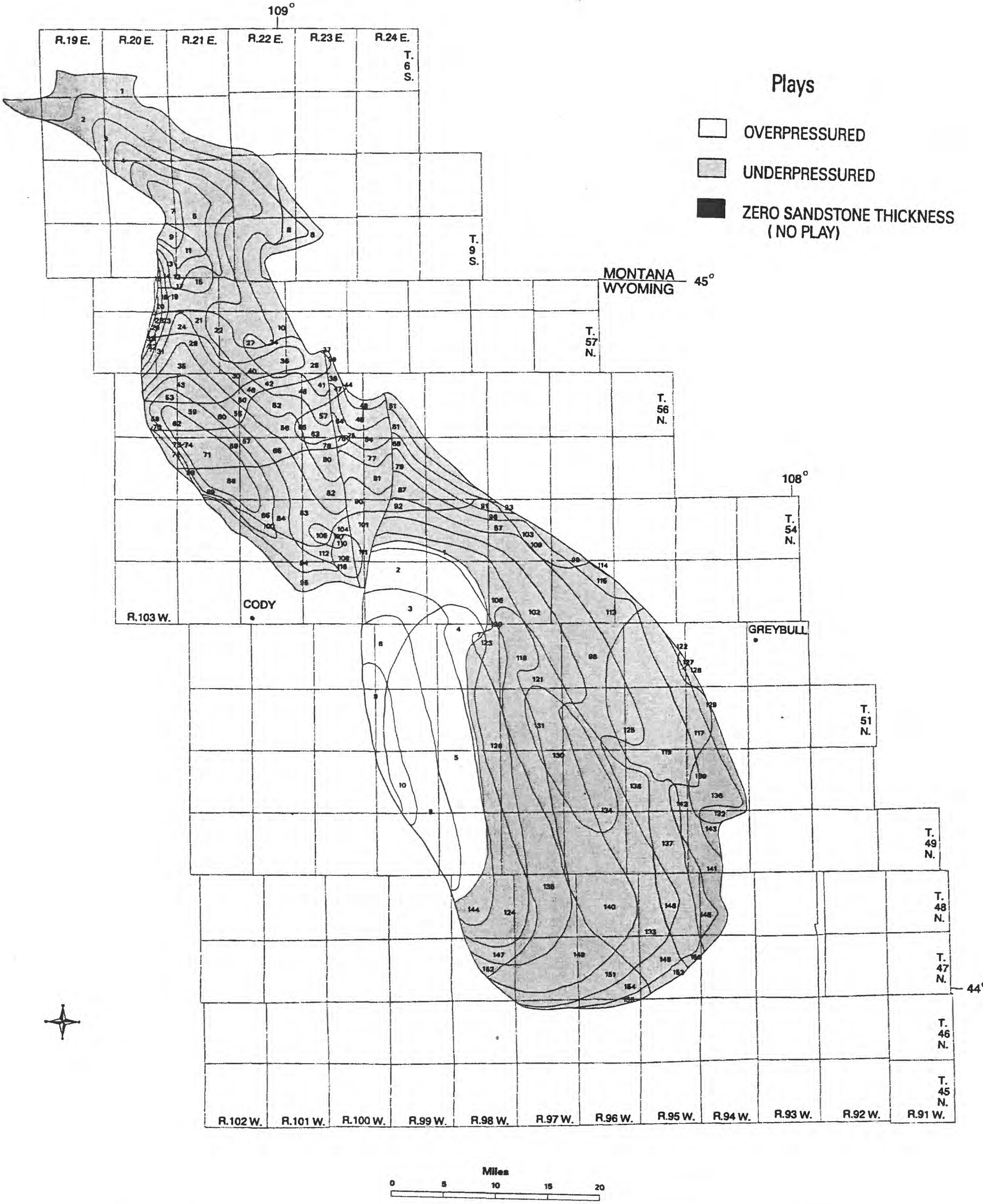

Figure 15. Detailed map showing sub-plays in the Upper Cretaceous Mesaverde Formation overpressured and transition plays. Sub-play identification numbers are keyed to Tables 13-18.

1,000 to 1,200 ft across the area of the overpressured play. For simplicity in calculating average elevation for each sub-play from the structure contour map, a thickness of 1,000 ft was assumed for the Mesaverde Formation for all of the sub-plays. Average depth for each sub-play was then estimated by overlaying a simplified topographic map, with a contour interval of 1,000 ft, on the sub-play map and subtracting the average elevation of the sub-play from average ground elevation. Average depth of the sub-plays varies from 13,000 to 17,500 ft (Table 13). The top of the play varies from a depth of about 14,500-ft at the south end of the play to 12,500 ft at the north. Porosity is assumed to be 7%, trap fill 100% and hydrocarbon saturation 50% for all of the sub-play areas. A pressure gradient of 0.52 psi/ft or moderate overpressuring is assumed. Estimated total mean in-place gas is 38.5 tcf (Table 12). Estimates of total in-place gas at the 95th and 5th percentile levels are 24.8 tcf and 56.2 tcf respectively (Table 15).

Mesaverde Formation transition play

The Mesaverde Formation transition play covers an area of 1780.78 square miles. The boundary of the play encloses all drillholes where significant gas shows occur in the Mesaverde. The structure contour map on the top of the Mesaverde (Johnson and Finn, 1998b) was used to help define the boundary in areas between the sparse drillhole data. The play was subdivided into 155 sub-play areas using the same maps as the overpressured Mesaverde previously described (Figure 15, Tables 16-18). Thickness of the Mesaverde varies from about 1,000 to 1,400 ft across the area of the play. A thickness of 1,000 ft was assumed for the entire play area in order to simplify depth calculations. The top of the underpressured Mesaverde play varies from a depth of 8,500-ft in the southern part of the play to about 4,500 ft in the northern part (Table 16). Average depth of the sub-play areas varies from 5,000 ft to 13,500 ft (Table 16). The play was assumed to be moderately underpressured and a pressure gradient of 0.35 psi/ft was applied. Porosity of 7% and a hydrocarbon saturation of 50% are assumed for all sub-plays.

Trap fills assumed for the sub-plays vary from 20% to 70% (Table 16). Trap fill was progressively decreased from 70% in the deep part of the basin, adjacent to the Mesaverde overpressured play and in the deepest part of the Clarks Fork sub-basin, to 20% to 30% in the shallowest parts of the play. The trap fill of only 20% was assumed for the shallow east margins of the play. This low trap fill was assumed because there is a high percentage of marginal marine sandstones in the Mesaverde Formation in this area. These marginal marine sandstones, which are typically laterally persistent parallel to paleo-shoreline (see Johnson and others, 1996, p. 40-41), crop out extensively along the east and southeast margins of the basin. It is assumed that they act as conduits for surface water moving into the Mesaverde Formation and gas moving out. Shoreline during deposition of the Mesaverde trended roughly north south (Gill and Cobban, 1969). A slightly higher trap fill of 30% is assumed for the shallow areas of the play in the northern part of the basin because of a lower percentage of marginal marine sandstones. When estimating trap fills, an attempt was made to accommodate the apparent shallowing of the basin-centered accumulation toward the north. For instance, the outline of the area where a trap fill of 70% was assumed follows the –7,000 ft structure contour in the main part of the basin and the –5,000 ft contour in the Clarks Fork sub-basin. Estimated total mean in-place gas is 75.8 tcf (Table 18). Estimates of total in-place gas at the 95th and 5th percentile levels are 31.8 tcf and 146 tcf respectively (Table 18).

Meeteetse Formation transition play

The outline of the Meeteetse transition play, used in the assessment, is the same as that used for the underlying Mesaverde Formation transition play. The play covers an area of 1804.67 square miles (Figure 16). Structural trends suggest that the Meeteetse may be overpressured along a small area of the deep trough of the basin. This area is nonetheless included in the underpressured play because there are no drillholes in this area and hence no proof of overpressuring. The play was subdivided into 133 sub-play areas (Figure 16, Tables 19-21). The sub-play areas are polygons defined by overlaying the isopach map of sandstones 10 thick or greater in the Meeteetse Formation on the structure contour map on the top of the underlying Mesaverde Formation. Total sandstone in the Meeteetse Formation within the basin-centered gas accumulation varies from over 300 ft in the central part of the Clarks Fork subbasin to less than 100 ft in the northeastern part of the main part of the basin.

Average depth was determined by overlaying a generalized topographic map on the play map (Figure 16). Thickness of the Meeteetse varies from less than 600 ft. to over 1,000 ft. across the basin (Keefer and others, 1998, fig. 13). The structure contour map on the top of the underlying Mesaverde Formation was converted to a structure contour map on the middle of the Meeteetse Formation by assuming a thickness of 1,000 ft for the Meeteetse Formation everywhere in the basin. Average depth for the sub-play areas varies from 5,000 ft to 16,000 ft (Table 19). The play was assumed to be moderately underpressured and a pressure gradient of 0.35 psi/ft was applied. A porosity of 7% and a hydrocarbon saturation of 50% were applied to all of the sub-plays. Trap fill was varied from 70% for the deeper areas of the play to 50% for the shallower areas (Table 19). The outline of the 70% trap fill area follows the -7000 ft. structure in the southern part of the play and the –5,000 ft. in the northern part in an attempt to adjust for the apparent shallowing the north character of the basin-centered accumulation. Estimated total mean in-place gas is 44.9 tcf (Table21). Estimates of total in-place gas at the 95th and 5th percentile levels are 18.38tcf and 86.5 tcf respectively (Table 21).

Lance Formation transition play

The Lance Formation transition play covers an area of 1443.84 square miles in the basin or somewhat smaller than the area of the underlying Meeteetse play (Figure 17). The play was subdivided into 67 sub-play areas (Figure 17, Tables 22-24). The outline of the play encloses all of the drillholes where significant gas shows occurred in the Lance. Average depth was determined by overlaying a generalized topographic map on the play map. The contours on the top of the Mesaverde were converted to contours on the middle of the Lance using the following assumptions. Average thickness for the Lance is about 1,000 ft in the Clarks Fork subbasin part of the play and about 1,500 ft in that part of the play in the main part of the basin (Keefer and others, 1998). Average thickness of the underlying Meeteetse Formation is about 1,000 ft throughout the play area. Using these thicknesses, the contours on the top of the Mesaverde Formation could be converted to contours on the middle of the Lance Formation by subtracting 1,500 ft of depth in the

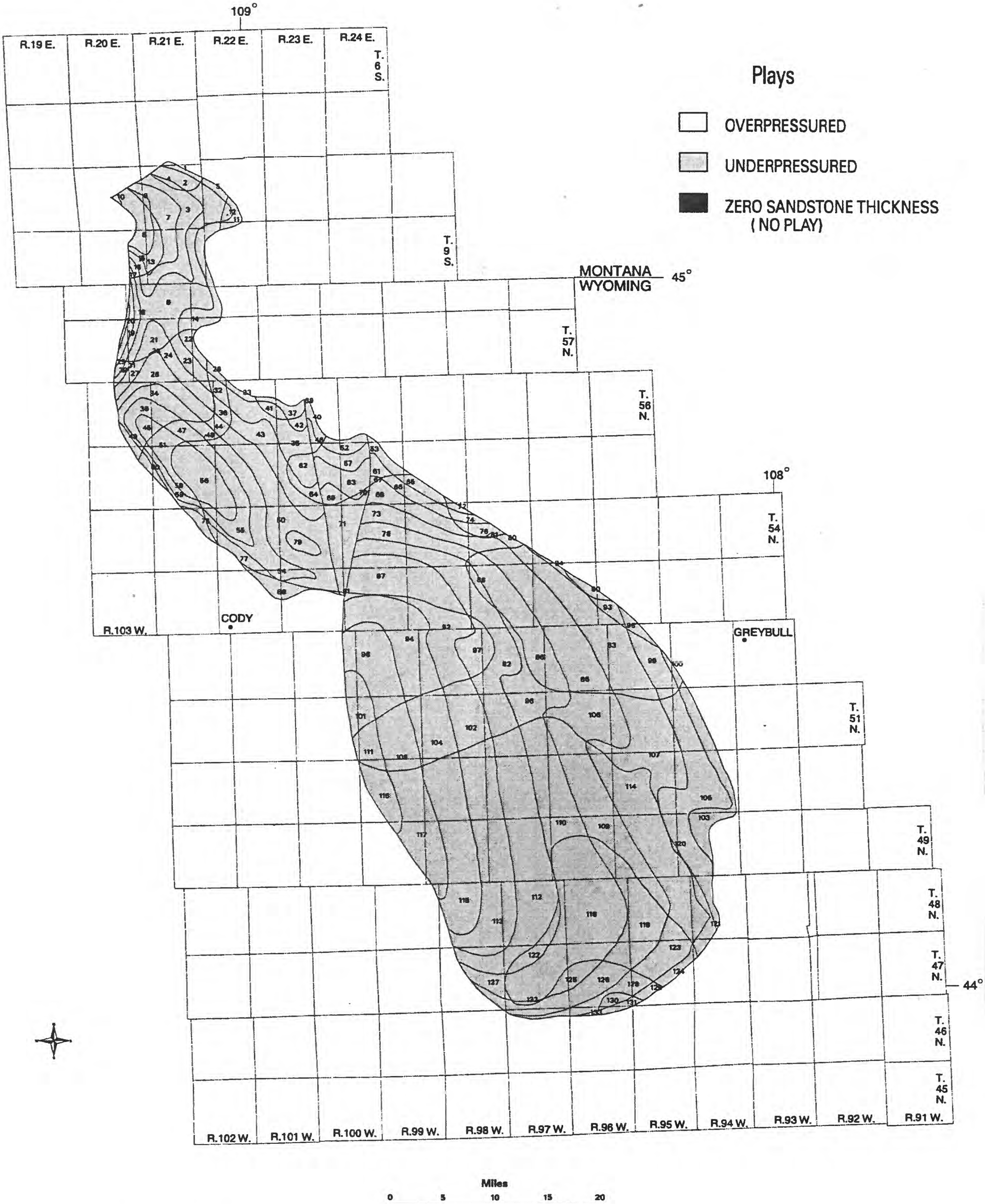

Figure 16. Detailed map showing sub-plays in the Upper Cretaceous Meeteetse transition play. Sub-play identification numbers are keyed to Tables 19-21.

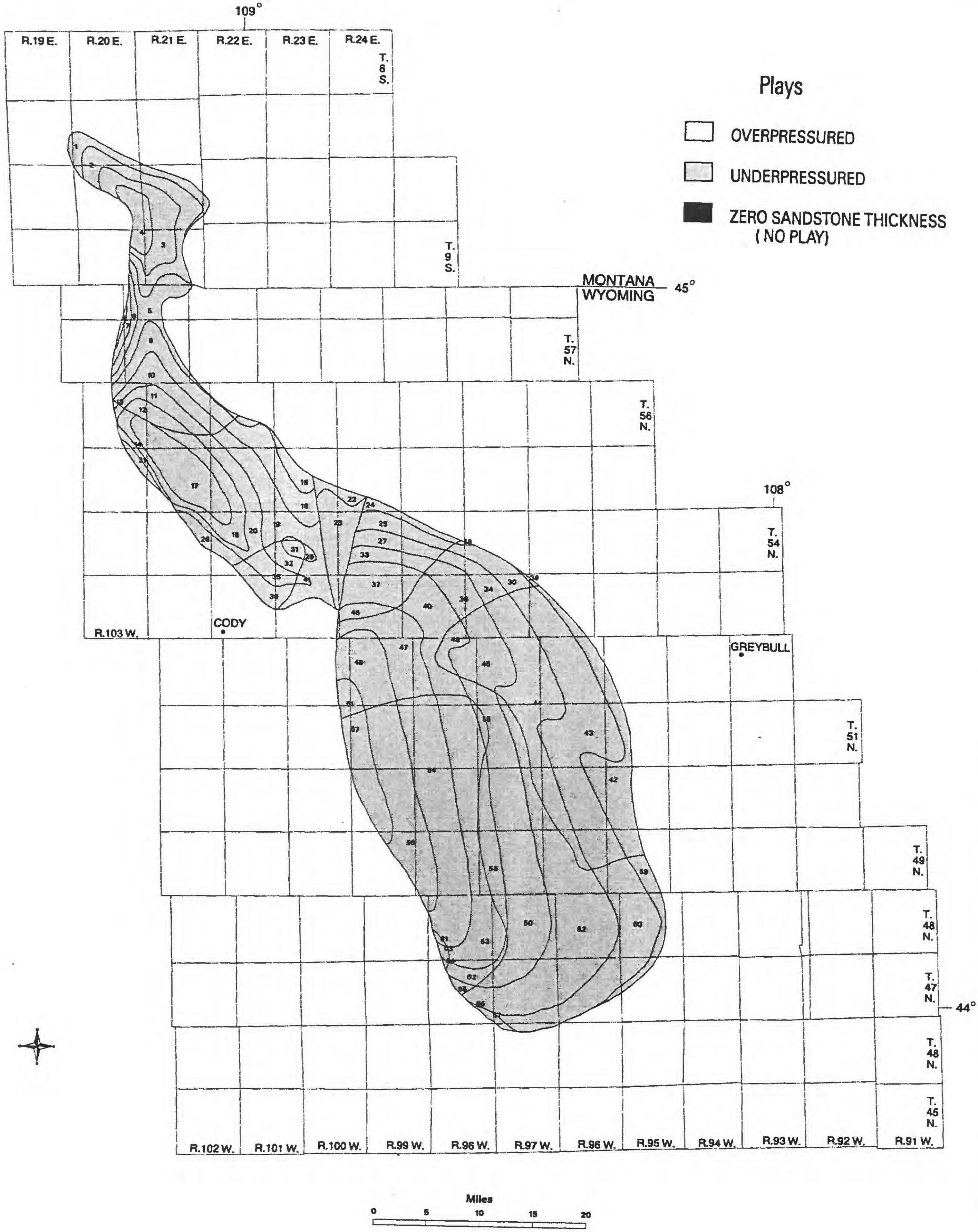

Figure 17. Detailed map showing sub-plays in the Upper Cretaceous Lance transition play. Sub-play identification numbers are keyed to Tables 22-24.

Clark's Fork subbasin and 1,750 ft of depth in the main part of the basin. The play was assumed to be moderately underpressured and a pressure gradient of 0.35 psi/ft was applied. A porosity of 7% and a hydrocarbon saturation of 50% were applied to all of the sub-plays. Trap fill was varied from 70% for the deeper areas of the play to 50% for the shallower areas (Table 22). Estimate of total mean in-place gas is 89.8 tcf (Table 24). Estimates of total in-place gas at the 95th and 5th percentile levels are 37.6 tcf and 173 tcf respectively (Table 24).

DISTRIBUTION OF GAS WITH DEPTH IN THE BIGHORN BASIN BASIN-CENTERED GAS ACCUMULATION

One of the most important factors in determining the economics of producing gas from basin-centered accumulations is drilling depth. Determining the distribution of gas with depth within a basin-centered accumulation can be used as the first step in determining what percentage of in-place gas within an accumulation can be economically produced. If, for instance, it is decided that at the present time it is uneconomical to produce tight gas at depths greater than 14,000 ft then all gas at depths greater that 14,000 ft can be subtracted from the total. In our assessment each sub-play area within the eight plays was assigned an average depth. It is therefore possible to reorganize the sub-play areas according to depth and sum the total mean in-place gas in the eight plays at each depth interval (Tables 26-33). Table 34 is a summary showing total gas in each of the eight plays in the Bighorn Basin at various depths and cumulative gas at each depth from shallow to deep. Figure 18 is a plot of the distribution of gas versus depth in the basin-centered accumulation in the Bighorn Basin. The distribution generally resembles a hyperbolic function.

As a comparison, Johnson and others (1996) use a nearly identical procedure to assess the basin-centered accumulation in the Wind River Basin to the south. However a depth analysis similar to the one presented here is only available for that part of the Wind River Basin that occurs within the Wind River Indian Reservation (Johnson, and others, 1998b). In the Wind River Indian Reservation (Johnson and others, 1998b) also found that the distribution of gas with depth resembled a hyperbolic function but were unsure why. The reasons why both distributions resemble hyperbolic functions are probably complex and may be different for the two basins. About half of the mean in-place gas occurs at depths of 12,500 ft or less in the Bighorn Basin. In the Wind River Indian Reservation, in contrast, less than 25% of the gas occurs at depths of less than 12,500 ft. The median depth for gas in the Wind River Indian Reservation is about 14,500 ft. About 80% of the gas occurs between 8,500 ft and 17,000 ft in the Bighorn Basin and between 10,000 ft and 19,000 ft in the Wind River Reservation part of the Wind River Basin.

These results are somewhat surprising since overall levels of thermal maturity are less in the Bighorn Basin when compared to the Wind River Basin (Nuccio and Finn, 1998), and the development of the basin-centered accumulations in both basins appears to be related to variations in thermal maturity. An Rm of 1.1%, for instance, approximately corresponds to the onset of overpressuring in both basins. Part of the answer is that levels of thermal maturity on the Wind River Indian Reservation are unusually low for the Wind River Basin as a whole. For example, the elevation of the Rm 1.1% maturity on the Reservation reach depths of more that –9,000 ft compared to less than -3,000 ft east of the Reservation (Nuccio and others, 1996, fig. 5). As a comparison the elevation

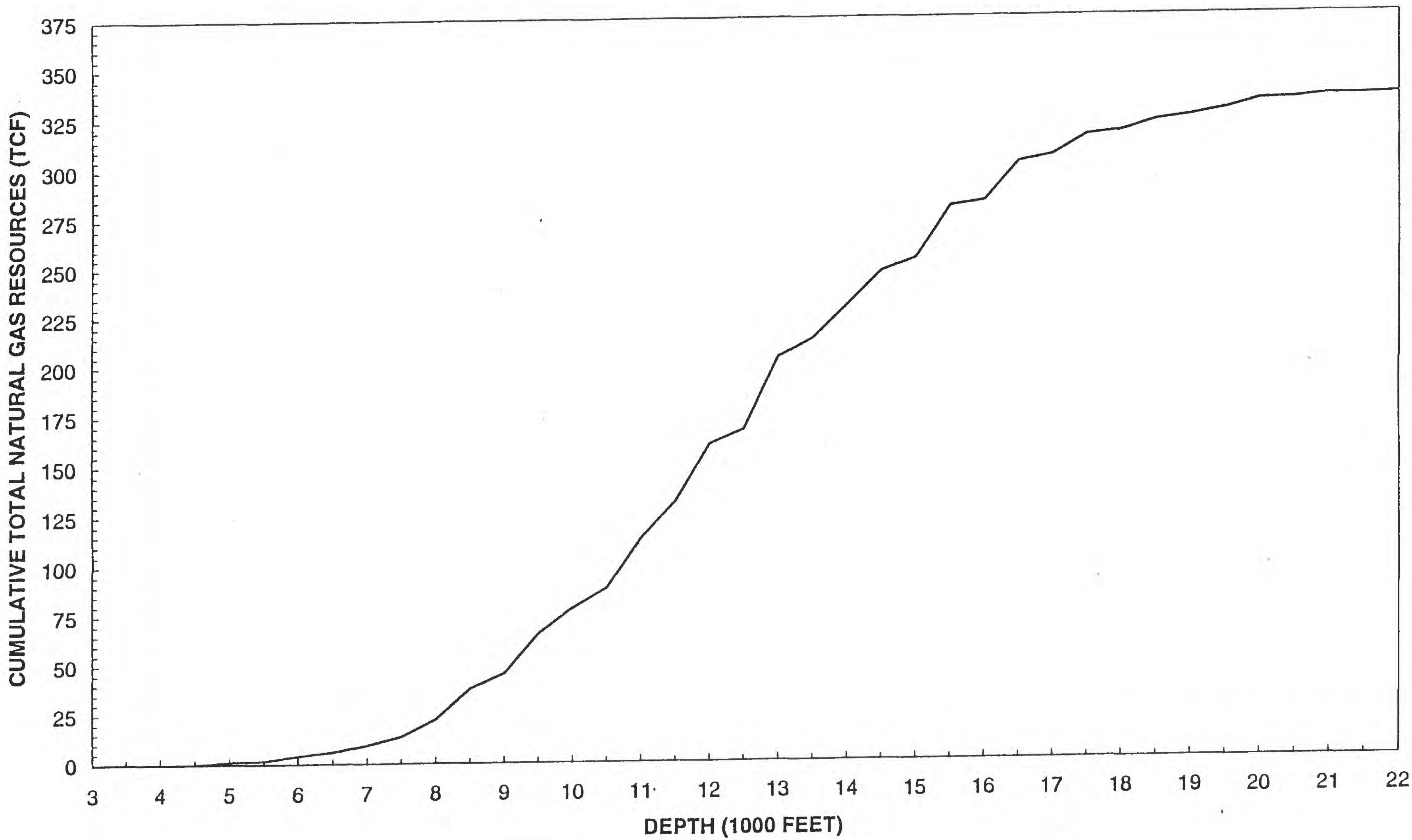

Figure 18. Graph showing cumulative mean gas by depth in trillions of cubic feet, Bighorn Basin. Data are from last column of Table 33.

of the Rm 1.1% thermal maturity along the trough of the Bighorn Basin varies from about –7,000 to –9,000 ft. (compare Johnson and Keighin, 1998, fig. 2 and Nuccio and Finn, 1998, fig. 4). Thus overall levels of thermal maturity in the Bighorn Basin and that part of the Wind River basin that lies within the Wind River Indian Reservation are probably similar.

DISCUSSION

A total of 334 tcf of mean in-place gas is estimated for the eight plays in the basin-centered gas accumulation in the Bighorn Basin. Using probability theory (Crovelli and others, 1999), there is a 95% chance that there is at least 161 tcf of gas in place and a 5% chance that there is as much as 600 tcf of gas in place. The 334 tcf estimate of mean in-place gas is about one-third of the 995 tcf mean in-place gas estimated by Johnson and others (1996b) for the Wind River Basin to the south, yet the two accumulations cover very similar sized areas. The accumulation in the Bighorn Basin covers an estimated area of 2,983.7 mi^2 at the Frontier level. This is very similar to the 3,056.7 mi^2 that the basin-centered accumulation covers in the Wind River Basin at the Frontier stratigraphic level (Johnson and others, 1996b). At the Mesaverde stratigraphic level, the accumulation in the Bighorn Basin covers an area of 2,082.2 mi^2. Again, this is very similar to the 2,137.3 mi^2 that the basin-centered accumulation in the Wind River Basin covers at the Mesaverde stratigraphic level. Most of the accumulation in the Wind River Basin, however, is overpressured, while the majority of the accumulation in the Bighorn Basin is underpressured. At the Frontier stratigraphic level, 91% of the area covered by the accumulation in the Wind River Basin is overpressured whereas, in the Bighorn Basin, only 35% is overpressured. At the Mesaverde stratigraphic level, 75% of the area covered by the accumulation is overpressured in the Wind River Basin whereas only 14% is overpressured in the Bighorn Basin. The contrast between the two accumulations is also reflected in the percent of the total mean in-place gas that occurs in overpressured rocks. Eighty one percent of the estimated mean in-place gas in the Wind River Basin occurs in overpressured rocks whereas only 28% of the gas occurs in overpressured rocks in the Bighorn Basin.

The differences between these two accumulations are probably related to the overall lower levels of thermal maturity in the Bighorn Basin when compared to the Wind River Basin (Nuccio and Finn, 1998). Most if not all of the basin-centered accumulation in the Bighorn Basin appears to be in the oil window. The deeper parts of the basin-centered accumulation in the Wind River Basin, in contrast, was heated to beyond the stability range of oil and produces only dry gas. The onset of overpressuring in the Bighorn Basin appears to occur at somewhat higher levels of thermal maturity and higher present-day temperatures than in other Rocky Mountain basins. This difference may be due in part to a lesser volume of source rocks in the Bighorn Basin when compared to other Rocky Mountain basins in the region such as the Powder River, Wind River, and Greater Green River basins (Johnson, 1998).

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Play Name :	Muddy Overpressured					a =	0.52	0.014	0	(Panel 1)
						b =	14.7	505	1.095	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	1.71	80	7	100	50	15,000	7814.7	715	1.095	4.70E+10
2	11.86	120	7	100	50	15,000	7814.7	715	1.095	4.89E+11
3	2.11	80	7	100	50	16,500	8594.7	736	1.095	6.20E+10
4	3.36	30	7	100	50	15,500	8074.7	722	1.095	3.55E+10
5	15.95	120	7	100	50	16,000	8334.7	729	1.095	6.88E+11
6	1.63	60	7	100	50	15,500	8074.7	722	1.095	3.44E+10
7	0.12	20	7	100	50	15,000	7814.7	715	1.095	8.25E+08
8	7.61	75	7	100	50	17,500	9114.7	750	1.095	2.18E+11
9	40.51	120	7	100	50	17,500	9114.7	750	1.095	1.86E+12
10	3.09	25	7	100	50	16,500	8594.7	736	1.095	2.84E+10
11	0.19	55	7	100	50	16,000	8334.7	729	1.095	3.76E+09
12	2.98	25	7	100	50	18,000	9374.7	757	1.095	2.90E+10
13	1.99	25	7	100	50	17,500	9114.7	750	1.095	1.90E+10
14	34.52	75	7	100	50	18,500	9634.7	764	1.095	1.03E+12
15	7.33	75	7	100	50	15,000	7814.7	715	1.095	1.89E+11
16	10.94	25	7	100	50	18,500	9634.7	764	1.095	1.09E+11
17	6.1	110	7	100	50	18,000	9374.7	757	1.095	2.61E+11
18	6.88	75	7	100	50	16,000	8334.7	729	1.095	1.86E+11
19	43.29	25	7	100	50	15,000	7814.7	715	1.095	3.72E+11
20	106.59	25	7	100	50	19,500	10154.7	778	1.095	1.09E+12
21	18.53	75	7	100	50	17,500	9114.7	750	1.095	5.31E+11
22	5.4	55	7	100	50	19,000	9894.7	771	1.095	1.20E+11
23	126.31	25	7	100	50	16,500	8594.7	736	1.095	1.16E+12
24	81.4	25	7	100	50	17,500	9114.7	750	1.095	7.78E+11
25	99.47	30	7	100	50	20,000	10414.7	785	1.095	1.25E+12
26	80.06	25	7	100	50	18,500	9634.7	764	1.095	7.94E+11
27	33.38	30	7	100	50	22,000	11454.7	813	1.095	4.44E+11
28	9.14	25	7	100	50	15,500	8074.7	722	1.095	8.04E+10
29	21.44	60	7	100	50	15,000	7814.7	715	1.095	4.42E+11
30	2.86	55	7	100	50	21,000	10934.7	799	1.095	6.77E+10
31	0.69	55	7	100	50	20,500	10674.7	792	1.095	1.61E+10
32	6.66	55	7	100	50	16,000	8334.7	729	1.095	1.32E+11
33	52.26	25	7	100	50	15,500	8074.7	722	1.095	4.60E+11
34	15.3	25	7	100	50	18,000	9374.7	757	1.095	1.49E+11
35	18.19	25	7	100	50	17,000	8854.7	743	1.095	1.70E+11
36	9.6	25	7	100	50	16,000	8334.7	729	1.095	8.63E+10
Total =	889.45								Total =	1.34E+13

Table 1. List of sub-plays in the Muddy overpressured play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Muddy Overpressured								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe* /*TZ*	
	Range (%) =	30		30	50	30	20	40		
Subplay No.	Expect *Pe* /*TZ*	F95 D. *Pe* /*TZ*	F5 D. *Pe* /*TZ*	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect (*Pe* /*TZ*)^2	Expect (Gas)^2
1	9.98	8.88	10.99	2.95	6547.8	49.41	10037.0	2536.95	100.04	2.35E+21
2	9.98	8.88	10.99	141.83	14732.6	49.41	10037.0	2536.95	100.04	2.55E+23
3	10.66	9.52	11.71	4.49	6547.8	49.41	10037.0	2536.95	114.18	4.09E+21
4	10.21	9.09	11.24	11.38	920.8	49.41	10037.0	2536.95	104.74	1.34E+21
5	10.44	9.31	11.48	256.52	14732.6	49.41	10037.0	2536.95	109.45	5.04E+23
6	10.21	9.09	11.24	2.68	3683.1	49.41	10037.0	2536.95	104.74	1.26E+21
7	9.98	8.88	10.99	0.01	409.2	49.41	10037.0	2536.95	100.04	7.24E+17
8	11.10	9.92	12.16	58.39	5754.9	49.41	10037.0	2536.95	123.64	5.06E+22
9	11.10	9.92	12.16	1654.71	14732.6	49.41	10037.0	2536.95	123.64	3.67E+24
10	10.66	9.52	11.71	9.63	639.4	49.41	10037.0	2536.95	114.18	8.57E+20
11	10.44	9.31	11.48	0.04	3094.9	49.41	10037.0	2536.95	109.45	1.50E+19
12	11.31	10.12	12.38	8.95	639.4	49.41	10037.0	2536.95	128.38	8.96E+20
13	11.10	9.92	12.16	3.99	639.4	49.41	10037.0	2536.95	123.64	3.85E+20
14	11.52	10.32	12.60	1201.54	5754.9	49.41	10037.0	2536.95	133.12	1.12E+24
15	9.98	8.88	10.99	54.18	5754.9	49.41	10037.0	2536.95	100.04	3.80E+22
16	11.52	10.32	12.60	120.68	639.4	49.41	10037.0	2536.95	133.12	1.25E+22
17	11.31	10.12	12.38	37.52	12379.5	49.41	10037.0	2536.95	128.38	7.27E+22
18	10.44	9.31	11.48	47.73	5754.9	49.41	10037.0	2536.95	109.45	3.66E+22
19	9.98	8.88	10.99	1889.61	639.4	49.41	10037.0	2536.95	100.04	1.47E+23
20	11.92	10.70	13.02	11455.90	639.4	49.41	10037.0	2536.95	142.58	1.27E+24
21	11.10	9.92	12.16	346.22	5754.9	49.41	10037.0	2536.95	123.64	3.00E+23
22	11.72	10.51	12.81	29.40	3094.9	49.41	10037.0	2536.95	137.85	1.53E+22
23	10.66	9.52	11.71	16086.87	639.4	49.41	10037.0	2536.95	114.18	1.43E+24
24	11.10	9.92	12.16	6681.05	639.4	49.41	10037.0	2536.95	123.64	6.44E+23
25	12.12	10.88	13.22	9976.55	920.8	49.41	10037.0	2536.95	147.31	1.65E+24
26	11.52	10.32	12.60	6462.90	639.4	49.41	10037.0	2536.95	133.12	6.70E+23
27	12.87	11.60	14.00	1123.49	920.8	49.41	10037.0	2536.95	166.09	2.09E+23
28	10.21	9.09	11.24	84.23	639.4	49.41	10037.0	2536.95	104.74	6.87E+21
29	9.98	8.88	10.99	463.50	3683.1	49.41	10037.0	2536.95	100.04	2.08E+23
30	12.50	11.25	13.62	8.25	3094.9	49.41	10037.0	2536.95	156.72	4.87E+21
31	12.31	11.07	13.42	0.48	3094.9	49.41	10037.0	2536.95	152.02	2.75E+20
32	10.44	9.31	11.48	44.72	3094.9	49.41	10037.0	2536.95	109.45	1.85E+22
33	10.21	9.09	11.24	2753.82	639.4	49.41	10037.0	2536.95	104.74	2.25E+23
34	11.31	10.12	12.38	236.04	639.4	49.41	10037.0	2536.95	128.38	2.36E+22
35	10.88	9.72	11.94	333.63	639.4	49.41	10037.0	2536.95	118.91	3.09E+22
36	10.44	9.31	11.48	92.93	639.4	49.41	10037.0	2536.95	109.45	7.93E+21

Table 2. List of sub-plays in the Muddy overpressured play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :	Muddy Overpressured									(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	4.70E+10	1.41E+20	1.19E+10	24.543	0.24878	3.03E+10	3.86E+10	4.56E+10	5.39E+10	6.87E+10
2	4.89E+11	1.53E+22	1.24E+11	26.885	0.24878	3.15E+11	4.01E+11	4.74E+11	5.61E+11	7.14E+11
3	6.20E+10	2.45E+20	1.56E+10	24.82	0.24832	4.00E+10	5.09E+10	6.01E+10	7.11E+10	9.05E+10
4	3.55E+10	8.02E+19	8.95E+09	24.261	0.24862	2.28E+10	2.91E+10	3.44E+10	4.07E+10	5.18E+10
5	6.88E+11	3.02E+22	1.74E+11	27.227	0.24847	4.44E+11	5.65E+11	6.67E+11	7.89E+11	1.00E+12
6	3.44E+10	7.55E+19	8.69E+09	24.231	0.24862	2.22E+10	2.82E+10	3.34E+10	3.94E+10	5.02E+10
7	8.25E+08	4.35E+16	2.09E+08	20.5	0.24878	5.31E+08	6.77E+08	8.00E+08	9.46E+08	1.20E+09
8	2.18E+11	3.02E+21	5.50E+10	26.078	0.24803	1.41E+11	1.79E+11	2.12E+11	2.50E+11	3.18E+11
9	1.86E+12	2.19E+23	4.68E+11	28.22	0.24803	1.20E+12	1.52E+12	1.80E+12	2.13E+12	2.71E+12
10	2.84E+10	5.12E+19	7.16E+09	24.038	0.24832	1.83E+10	2.33E+10	2.75E+10	3.25E+10	4.14E+10
11	3.76E+09	9.00E+17	9.48E+08	22.016	0.24847	2.42E+09	3.08E+09	3.64E+09	4.31E+09	5.48E+09
12	2.90E+10	5.34E+19	7.31E+09	24.061	0.24789	1.87E+10	2.38E+10	2.81E+10	3.33E+10	4.23E+10
13	1.90E+10	2.30E+19	4.79E+09	23.638	0.24803	1.23E+10	1.56E+10	1.84E+10	2.18E+10	2.77E+10
14	1.03E+12	6.68E+22	2.58E+11	27.627	0.24776	6.63E+11	8.43E+11	9.96E+11	1.18E+12	1.50E+12
15	1.89E+11	2.28E+21	4.78E+10	25.934	0.24878	1.22E+11	1.55E+11	1.83E+11	2.17E+11	2.76E+11
16	1.09E+11	7.45E+20	2.73E+10	25.379	0.24776	7.00E+10	8.90E+10	1.05E+11	1.24E+11	1.58E+11
17	2.61E+11	4.33E+21	6.58E+10	26.259	0.24789	1.69E+11	2.14E+11	2.53E+11	3.00E+11	3.81E+11
18	1.86E+11	2.19E+21	4.68E+10	25.916	0.24847	1.20E+11	1.52E+11	1.80E+11	2.13E+11	2.71E+11
19	3.72E+11	8.84E+21	9.40E+10	26.612	0.24878	2.40E+11	3.05E+11	3.61E+11	4.27E+11	5.43E+11
20	1.09E+12	7.56E+22	2.75E+11	27.69	0.2475	7.06E+11	8.98E+11	1.06E+12	1.25E+12	1.59E+12
21	5.31E+11	1.79E+22	1.34E+11	26.968	0.24803	3.43E+11	4.36E+11	5.15E+11	6.09E+11	7.75E+11
22	1.20E+11	9.09E+20	3.02E+10	25.479	0.24763	7.74E+10	9.84E+10	1.16E+11	1.37E+11	1.75E+11
23	1.16E+12	8.56E+22	2.93E+11	27.749	0.24832	7.48E+11	9.51E+11	1.12E+12	1.33E+12	1.69E+12
24	7.78E+11	3.84E+22	1.96E+11	27.349	0.24803	5.02E+11	6.38E+11	7.54E+11	8.92E+11	1.13E+12
25	1.25E+12	9.79E+22	3.13E+11	27.82	0.24738	8.04E+11	1.02E+12	1.21E+12	1.43E+12	1.81E+12
26	7.94E+11	3.99E+22	2.00E+11	27.37	0.24776	5.12E+11	6.52E+11	7.70E+11	9.10E+11	1.16E+12
27	4.44E+11	1.24E+22	1.11E+11	26.788	0.24692	2.87E+11	3.65E+11	4.31E+11	5.08E+11	6.46E+11
28	8.04E+10	4.12E+20	2.03E+10	25.079	0.24862	5.18E+10	6.59E+10	7.79E+10	9.22E+10	1.17E+11
29	4.42E+11	1.25E+22	1.12E+11	26.784	0.24878	2.85E+11	3.63E+11	4.29E+11	5.07E+11	6.46E+11
30	6.77E+10	2.89E+20	1.70E+10	24.908	0.24714	4.37E+10	5.56E+10	6.57E+10	7.76E+10	9.86E+10
31	1.61E+10	1.63E+19	4.04E+09	23.471	0.24726	1.04E+10	1.32E+10	1.56E+10	1.84E+10	2.34E+10
32	1.32E+11	1.11E+21	3.32E+10	25.573	0.24847	8.49E+10	1.08E+11	1.28E+11	1.51E+11	1.92E+11
33	4.60E+11	1.35E+22	1.16E+11	26.823	0.24862	2.96E+11	3.77E+11	4.46E+11	5.27E+11	6.71E+11
34	1.49E+11	1.41E+21	3.75E+10	25.697	0.24789	9.61E+10	1.22E+11	1.45E+11	1.71E+11	2.17E+11
35	1.70E+11	1.85E+21	4.30E+10	25.831	0.24817	1.10E+11	1.40E+11	1.65E+11	1.95E+11	2.49E+11
36	8.63E+10	4.74E+20	2.18E+10	25.15	0.24847	5.56E+10	7.08E+10	8.37E+10	9.90E+10	1.26E+11
P.P.C.	1.34E+13	1.14E+25	3.38E+12			8.66E+12	1.10E+13	1.30E+13	1.54E+13	1.96E+13

Table 3. List of sub-plays in the Muddy overpressured play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :	Muddy Transition					a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.9074	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	12.37	30	7	50	50	9,000	3164.7	631	0.9074	3.53E+10
2	5.39	20	7	50	50	10,000	3514.7	645	0.9074	1.11E+10
3	6.09	20	7	50	50	11,000	3864.7	659	0.9074	1.36E+10
4	4.04	40	7	50	50	9,500	3339.7	638	0.9074	1.61E+10
5	5	40	7	50	50	10,500	3689.7	652	0.9074	2.15E+10
6	5.63	40	7	50	50	11,500	4039.7	666	0.9074	2.59E+10
7	4.34	40	7	50	50	12,500	4389.7	680	0.9074	2.13E+10
8	0.84	20	7	50	50	11,000	3864.7	659	0.9074	1.87E+09
9	7.68	20	7	50	50	11,500	4039.7	666	0.9074	1.77E+10
10	3.23	25	7	50	50	12,500	4389.7	680	0.9074	9.89E+09
11	9.3	20	7	50	50	12,500	4389.7	680	0.9074	2.28E+10
12	3.23	20	7	70	50	13,500	4739.7	694	0.9074	1.17E+10
13	1.11	20	7	70	50	13,000	4564.7	687	0.9074	3.92E+09
14	8.35	20	7	70	50	13,500	4739.7	694	0.9074	3.03E+10
15	8.43	75	7	50	50	10,000	3514.7	645	0.9074	6.54E+10
16	4.58	60	7	50	50	9,000	3164.7	631	0.9074	2.62E+10
17	9.83	75	7	50	50	11,000	3864.7	659	0.9074	8.21E+10
18	3.55	75	7	50	50	12,000	4214.7	673	0.9074	3.16E+10
19	4.42	75	7	70	50	13,000	4564.7	687	0.9074	5.85E+10
20	1.35	55	7	50	50	11,500	4039.7	666	0.9074	8.55E+09
21	3.62	60	7	50	50	12,000	4214.7	673	0.9074	2.58E+10
22	3.36	75	7	70	50	14,000	4914.7	701	0.9074	4.69E+10
23	3.41	20	7	70	50	14,500	5089.7	708	0.9074	1.30E+10
24	4.84	60	7	70	50	13,000	4564.7	687	0.9074	5.13E+10
25	6.79	20	7	70	50	14,000	4914.7	701	0.9074	2.53E+10
26	6.66	120	7	70	50	13,000	4564.7	687	0.9074	1.41E+11
27	3.08	110	7	50	50	12,000	4214.7	673	0.9074	4.03E+10
28	1.62	110	7	50	50	11,500	4039.7	666	0.9074	2.05E+10
29	19.38	20	7	50	50	14,000	4914.7	701	0.9074	5.16E+10
30	11.76	120	7	70	50	14,000	4914.7	701	0.9074	2.63E+11
31	3.8	60	7	70	50	14,500	5089.7	708	0.9074	4.36E+10
32	45.58	20	7	50	50	9,500	3339.7	638	0.9074	9.06E+10
33	6.32	30	7	50	50	10,000	3514.7	645	0.9074	1.96E+10
34	3.76	75	7	50	50	12,000	4214.7	673	0.9074	3.35E+10
35	214.08	25	7	50	50	11,000	3864.7	659	0.9074	5.96E+11
36	6.82	75	7	70	50	13,000	4564.7	687	0.9074	9.03E+10
37	124.66	25	7	50	50	12,000	4214.7	673	0.9074	3.70E+11
38	0.55	20	7	70	50	14,000	4914.7	701	0.9074	2.05E+09
39	6.75	20	7	70	50	14,000	4914.7	701	0.9074	2.52E+10
40	115.06	25	7	70	50	13,000	4564.7	687	0.9074	5.08E+11
41	5.22	75	7	70	50	14,000	4914.7	701	0.9074	7.29E+10
42	73.01	25	7	70	50	14,000	4914.7	701	0.9074	3.40E+11
43	1.83	20	7	70	50	14,000	4914.7	701	0.9074	6.82E+09
44	2.03	20	7	70	50	13,500	4739.7	694	0.9074	7.37E+09
45	2.52	20	7	50	50	12,500	4389.7	680	0.9074	6.18E+09
46	0.38	20	7	50	50	12,000	4214.7	673	0.9074	9.03E+08
47	0.28	20	7	50	50	12,000	4214.7	673	0.9074	6.66E+08

48	0.27	20	7	50	50	11,500	4039.7	666	0.9074	6.22E+08
49	0.07	20	7	50	50	11,000	3864.7	659	0.9074	1.56E+08
50	0.28	20	7	50	50	10,500	3689.7	652	0.9074	6.02E+08
51	0.29	20	7	50	50	9,500	3339.7	638	0.9074	5.76E+08
52	1.03	50	7	50	50	9,000	3164.7	631	0.9074	4.90E+09
53	8.06	70	7	50	50	8,500	2989.7	624	0.9074	5.13E+10
54	10.05	60	7	70	50	13,000	4564.7	687	0.9074	1.06E+11
55	8.89	60	7	50	50	9,500	3339.7	638	0.9074	5.30E+10
56	17.31	60	7	70	50	14,000	4914.7	701	0.9074	1.93E+11
57	1.37	50	7	50	50	10,000	3514.7	645	0.9074	7.08E+09
58	70.32	30	7	70	50	14,000	4914.7	701	0.9074	3.93E+11
59	82.75	25	7	50	50	9,500	3339.7	638	0.9074	2.06E+11
60	2.76	55	7	50	50	10,500	3689.7	652	0.9074	1.63E+10
61	114.42	25	7	50	50	9,000	3164.7	631	0.9074	2.72E+11
62	2.51	55	7	50	50	11,500	4039.7	666	0.9074	1.59E+10
63	7.98	55	7	50	50	12,000	4214.7	673	0.9074	5.22E+10
64	0.7	55	7	50	50	12,500	4389.7	680	0.9074	4.72E+09
65	58.98	20	7	50	50	12,000	4214.7	673	0.9074	1.40E+11
66	22.57	55	7	50	50	9,000	3164.7	631	0.9074	1.18E+11
67	6.76	35	7	50	50	10,000	3514.7	645	0.9074	2.45E+10
68	13.37	20	7	70	50	13,500	4739.7	694	0.9074	4.85E+10
69	11.14	35	7	50	50	11,000	3864.7	659	0.9074	4.34E+10
70	3.59	35	7	50	50	12,000	4214.7	673	0.9074	1.49E+10
71	0.43	35	7	50	50	12,500	4389.7	680	0.9074	1.84E+09
72	0.06	35	7	50	50	12,500	4389.7	680	0.9074	2.57E+08
73	22.2	20	7	50	50	10,000	3514.7	645	0.9074	4.59E+10
74	13.68	25	7	50	50	12,500	4389.7	680	0.9074	4.19E+10
75	14.33	20	7	50	50	9,000	3164.7	631	0.9074	2.73E+10
76	17.76	20	7	50	50	11,500	4039.7	666	0.9074	4.09E+10
77	28.65	20	7	50	50	10,500	3689.7	652	0.9074	6.15E+10
78	27.77	20	7	50	50	9,500	3339.7	638	0.9074	5.52E+10
79	0.56	40	7	50	50	8,500	2989.7	624	0.9074	2.04E+09
Total =	1356.84								Total =	5.45E+12

Table 4. List of sub-plays in the Muddy transition play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Muddy Transition								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe/TZ*	
	Range (%) =	30		30	50	60	100	80		
Subplay No.	Expect *Pe/TZ*	F95 D. *Pe/TZ*	F5 D. *Pe/TZ*	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect (*Pe/TZ*)^2	Expect (Gas)^2
1	5.53	4.85	6.17	154.29	920.8	50.63	2731.0	2647.82	30.71	1.55E+21
2	6.01	5.28	6.68	29.29	409.2	50.63	2731.0	2647.82	36.25	1.54E+20
3	6.46	5.70	7.18	37.40	409.2	50.63	2731.0	2647.82	41.97	2.28E+20
4	5.77	5.07	6.43	16.46	1637.0	50.63	2731.0	2647.82	33.45	3.20E+20
5	6.24	5.49	6.93	25.21	1637.0	50.63	2731.0	2647.82	39.09	5.72E+20
6	6.68	5.90	7.41	31.96	1637.0	50.63	2731.0	2647.82	44.90	8.33E+20
7	7.11	6.29	7.87	18.99	1637.0	50.63	2731.0	2647.82	50.84	5.61E+20
8	6.46	5.70	7.18	0.71	409.2	50.63	2731.0	2647.82	41.97	4.33E+18
9	6.68	5.90	7.41	59.47	409.2	50.63	2731.0	2647.82	44.90	3.88E+20
10	7.11	6.29	7.87	10.52	639.4	50.63	2731.0	2647.82	50.84	1.21E+20
11	7.11	6.29	7.87	87.21	409.2	50.63	2731.0	2647.82	50.84	6.43E+20
12	7.53	6.67	8.31	10.52	409.2	50.63	5352.7	2647.82	56.90	1.70E+20
13	7.32	6.49	8.10	1.24	409.2	50.63	5352.7	2647.82	53.86	1.90E+19
14	7.53	6.67	8.31	70.30	409.2	50.63	5352.7	2647.82	56.90	1.14E+21
15	6.01	5.28	6.68	71.66	5754.9	50.63	2731.0	2647.82	36.25	5.30E+21
16	5.53	4.85	6.17	21.15	3683.1	50.63	2731.0	2647.82	30.71	8.48E+20
17	6.46	5.70	7.18	97.43	5754.9	50.63	2731.0	2647.82	41.97	8.35E+21
18	6.90	6.10	7.65	12.71	5754.9	50.63	2731.0	2647.82	47.85	1.24E+21
19	7.32	6.49	8.10	19.70	5754.9	50.63	5352.7	2647.82	53.86	4.24E+21
20	6.68	5.90	7.41	1.84	3094.9	50.63	2731.0	2647.82	44.90	9.05E+19
21	6.90	6.10	7.65	13.21	3683.1	50.63	2731.0	2647.82	47.85	8.26E+20
22	7.73	6.86	8.52	11.38	5754.9	50.63	5352.7	2647.82	59.95	2.73E+21
23	7.92	7.04	8.73	11.72	409.2	50.63	5352.7	2647.82	63.03	2.10E+20
24	7.32	6.49	8.10	23.62	3683.1	50.63	5352.7	2647.82	53.86	3.26E+21
25	7.73	6.86	8.52	46.49	409.2	50.63	5352.7	2647.82	59.95	7.93E+20
26	7.32	6.49	8.10	44.72	14732.6	50.63	5352.7	2647.82	53.86	2.47E+22
27	6.90	6.10	7.65	9.57	12379.5	50.63	2731.0	2647.82	47.85	2.01E+21
28	6.68	5.90	7.41	2.65	12379.5	50.63	2731.0	2647.82	44.90	5.22E+20
29	7.73	6.86	8.52	378.71	409.2	50.63	2731.0	2647.82	59.95	3.30E+21
30	7.73	6.86	8.52	139.45	14732.6	50.63	5352.7	2647.82	59.95	8.56E+22
31	7.92	7.04	8.73	14.56	3683.1	50.63	5352.7	2647.82	63.03	2.35E+21
32	5.77	5.07	6.43	2094.81	409.2	50.63	2731.0	2647.82	33.45	1.02E+22
33	6.01	5.28	6.68	40.27	920.8	50.63	2731.0	2647.82	36.25	4.77E+20
34	6.90	6.10	7.65	14.26	5754.9	50.63	2731.0	2647.82	47.85	1.39E+21
35	6.46	5.70	7.18	46211.31	639.4	50.63	2731.0	2647.82	41.97	4.40E+23
36	7.32	6.49	8.10	46.90	5754.9	50.63	5352.7	2647.82	53.86	1.01E+22
37	6.90	6.10	7.65	15669.33	639.4	50.63	2731.0	2647.82	47.85	1.70E+23
38	7.73	6.86	8.52	0.31	409.2	50.63	5352.7	2647.82	59.95	5.20E+18
39	7.73	6.86	8.52	45.94	409.2	50.63	5352.7	2647.82	59.95	7.83E+20
40	7.32	6.49	8.10	13348.88	639.4	50.63	5352.7	2647.82	53.86	3.20E+23
41	7.73	6.86	8.52	27.47	5754.9	50.63	5352.7	2647.82	59.95	6.59E+21
42	7.73	6.86	8.52	5374.78	639.4	50.63	5352.7	2647.82	59.95	1.43E+23
43	7.73	6.86	8.52	3.38	409.2	50.63	5352.7	2647.82	59.95	5.76E+19
44	7.53	6.67	8.31	4.16	409.2	50.63	5352.7	2647.82	56.90	6.72E+19
45	7.11	6.29	7.87	6.40	409.2	50.63	2731.0	2647.82	50.84	4.72E+19
46	6.90	6.10	7.65	0.15	409.2	50.63	2731.0	2647.82	47.85	1.01E+18
47	6.90	6.10	7.65	0.08	409.2	50.63	2731.0	2647.82	47.85	5.49E+17

48	6.68	5.90	7.41	0.07	409.2	50.63	2731.0	2647.82	44.90	4.79E+17
49	6.46	5.70	7.18	0.00	409.2	50.63	2731.0	2647.82	41.97	3.01E+16
50	6.24	5.49	6.93	0.08	409.2	50.63	2731.0	2647.82	39.09	4.48E+17
51	5.77	5.07	6.43	0.08	409.2	50.63	2731.0	2647.82	33.45	4.12E+17
52	5.53	4.85	6.17	1.07	2557.7	50.63	2731.0	2647.82	30.71	2.98E+19
53	5.28	4.62	5.90	65.50	5013.2	50.63	2731.0	2647.82	28.03	3.26E+21
54	7.32	6.49	8.10	101.84	3683.1	50.63	5352.7	2647.82	53.86	1.40E+22
55	5.77	5.07	6.43	79.69	3683.1	50.63	2731.0	2647.82	33.45	3.48E+21
56	7.73	6.86	8.52	302.13	3683.1	50.63	5352.7	2647.82	59.95	4.64E+22
57	6.01	5.28	6.68	1.89	2557.7	50.63	2731.0	2647.82	36.25	6.22E+19
58	7.73	6.86	8.52	4986.02	920.8	50.63	5352.7	2647.82	59.95	1.91E+23
59	5.77	5.07	6.43	6904.50	639.4	50.63	2731.0	2647.82	33.45	5.24E+22
60	6.24	5.49	6.93	7.68	3094.9	50.63	2731.0	2647.82	39.09	3.30E+20
61	5.53	4.85	6.17	13200.79	639.4	50.63	2731.0	2647.82	30.71	9.19E+22
62	6.68	5.90	7.41	6.35	3094.9	50.63	2731.0	2647.82	44.90	3.13E+20
63	6.90	6.10	7.65	64.21	3094.9	50.63	2731.0	2647.82	47.85	3.37E+21
64	7.11	6.29	7.87	0.49	3094.9	50.63	2731.0	2647.82	50.84	2.76E+19
65	6.90	6.10	7.65	3507.56	409.2	50.63	2731.0	2647.82	47.85	2.44E+22
66	5.53	4.85	6.17	513.64	3094.9	50.63	2731.0	2647.82	30.71	1.73E+22
67	6.01	5.28	6.68	46.08	1253.3	50.63	2731.0	2647.82	36.25	7.42E+20
68	7.53	6.67	8.31	180.24	409.2	50.63	5352.7	2647.82	56.90	2.92E+21
69	6.46	5.70	7.18	125.13	1253.3	50.63	2731.0	2647.82	41.97	2.33E+21
70	6.90	6.10	7.65	13.00	1253.3	50.63	2731.0	2647.82	47.85	2.76E+20
71	7.11	6.29	7.87	0.19	1253.3	50.63	2731.0	2647.82	50.84	4.21E+18
72	7.11	6.29	7.87	0.00	1253.3	50.63	2731.0	2647.82	50.84	8.20E+16
73	6.01	5.28	6.68	496.94	409.2	50.63	2731.0	2647.82	36.25	2.61E+21
74	7.11	6.29	7.87	188.70	639.4	50.63	2731.0	2647.82	50.84	2.18E+21
75	5.53	4.85	6.17	207.06	409.2	50.63	2731.0	2647.82	30.71	9.23E+20
76	6.68	5.90	7.41	318.04	409.2	50.63	2731.0	2647.82	44.90	2.07E+21
77	6.24	5.49	6.93	827.65	409.2	50.63	2731.0	2647.82	39.09	4.69E+21
78	5.77	5.07	6.43	777.59	409.2	50.63	2731.0	2647.82	33.45	3.77E+21
79	5.28	4.62	5.90	0.32	1637.0	50.63	2731.0	2647.82	28.03	5.15E+18

Table 5. List of sub-plays in the Muddy transition play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :	Muddy Transition									(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	3.53E+10	2.99E+20	1.73E+10	24.18	0.46358	1.48E+10	2.32E+10	3.17E+10	4.34E+10	6.80E+10
2	1.11E+10	2.98E+19	5.46E+09	23.027	0.46334	4.67E+09	7.33E+09	1.00E+10	1.37E+10	2.15E+10
3	1.36E+10	4.40E+19	6.63E+09	23.223	0.46312	5.69E+09	8.91E+09	1.22E+10	1.66E+10	2.61E+10
4	1.61E+10	6.18E+19	7.86E+09	23.392	0.46346	6.73E+09	1.06E+10	1.44E+10	1.97E+10	3.09E+10
5	2.15E+10	1.10E+20	1.05E+10	23.683	0.46323	9.01E+09	1.41E+10	1.93E+10	2.64E+10	4.13E+10
6	2.59E+10	1.61E+20	1.27E+10	23.871	0.46301	1.09E+10	1.70E+10	2.33E+10	3.18E+10	4.99E+10
7	2.13E+10	1.08E+20	1.04E+10	23.674	0.46281	8.93E+09	1.40E+10	1.91E+10	2.61E+10	4.09E+10
8	1.87E+09	8.37E+17	9.15E+08	21.242	0.46312	7.84E+08	1.23E+09	1.68E+09	2.30E+09	3.60E+09
9	1.77E+10	7.48E+19	8.65E+09	23.489	0.46301	7.42E+09	1.16E+10	1.59E+10	2.17E+10	3.40E+10
10	9.89E+09	2.34E+19	4.84E+09	22.908	0.46281	4.15E+09	6.51E+09	8.89E+09	1.21E+10	1.90E+10
11	2.28E+10	1.24E+20	1.11E+10	23.743	0.46281	9.56E+09	1.50E+10	2.05E+10	2.80E+10	4.38E+10
12	1.17E+10	3.28E+19	5.73E+09	23.078	0.46261	4.92E+09	7.71E+09	1.05E+10	1.44E+10	2.25E+10
13	3.92E+09	3.67E+18	1.92E+09	21.982	0.46271	1.65E+09	2.58E+09	3.52E+09	4.81E+09	7.54E+09
14	3.03E+10	2.19E+20	1.48E+10	24.028	0.46261	1.27E+10	1.99E+10	2.72E+10	3.72E+10	5.83E+10
15	6.54E+10	1.02E+21	3.20E+10	24.796	0.46334	2.74E+10	4.30E+10	5.87E+10	8.03E+10	1.26E+11
16	2.62E+10	1.64E+20	1.28E+10	23.88	0.46358	1.10E+10	1.72E+10	2.35E+10	3.21E+10	5.04E+10
17	8.21E+10	1.61E+21	4.01E+10	25.024	0.46312	3.44E+10	5.40E+10	7.37E+10	1.01E+11	1.58E+11
18	3.16E+10	2.39E+20	1.55E+10	24.071	0.46291	1.33E+10	2.08E+10	2.84E+10	3.88E+10	6.09E+10
19	5.85E+10	8.18E+20	2.86E+10	24.686	0.46271	2.46E+10	3.85E+10	5.26E+10	7.18E+10	1.13E+11
20	8.55E+09	1.75E+19	4.18E+09	22.762	0.46301	3.59E+09	5.62E+09	7.68E+09	1.05E+10	1.64E+10
21	2.58E+10	1.59E+20	1.26E+10	23.867	0.46291	1.08E+10	1.70E+10	2.32E+10	3.17E+10	4.97E+10
22	4.69E+10	5.26E+20	2.29E+10	24.465	0.46252	1.97E+10	3.09E+10	4.22E+10	5.76E+10	9.03E+10
23	1.30E+10	4.05E+19	6.36E+09	23.183	0.46243	5.47E+09	8.57E+09	1.17E+10	1.60E+10	2.51E+10
24	5.13E+10	6.28E+20	2.51E+10	24.553	0.46271	2.15E+10	3.37E+10	4.61E+10	6.29E+10	9.86E+10
25	2.53E+10	1.53E+20	1.24E+10	23.847	0.46252	1.06E+10	1.66E+10	2.27E+10	3.10E+10	4.87E+10
26	1.41E+11	4.75E+21	6.89E+10	25.566	0.46271	5.92E+10	9.28E+10	1.27E+11	1.73E+11	2.71E+11
27	4.03E+10	3.88E+20	1.97E+10	24.312	0.46291	1.69E+10	2.65E+10	3.62E+10	4.94E+10	7.75E+10
28	2.05E+10	1.01E+20	1.00E+10	23.637	0.46301	8.61E+09	1.35E+10	1.84E+10	2.52E+10	3.95E+10
29	5.16E+10	6.35E+20	2.52E+10	24.559	0.46252	2.17E+10	3.39E+10	4.63E+10	6.33E+10	9.92E+10
30	2.63E+11	1.65E+22	1.28E+11	26.188	0.46252	1.10E+11	1.73E+11	2.36E+11	3.23E+11	5.06E+11
31	4.36E+10	4.52E+20	2.13E+10	24.39	0.46243	1.83E+10	2.87E+10	3.91E+10	5.35E+10	8.37E+10
32	9.06E+10	1.97E+21	4.43E+10	25.122	0.46346	3.80E+10	5.95E+10	8.14E+10	1.11E+11	1.74E+11
33	1.96E+10	9.21E+19	9.60E+09	23.592	0.46334	8.22E+09	1.29E+10	1.76E+10	2.41E+10	3.77E+10
34	3.35E+10	2.69E+20	1.64E+10	24.128	0.46291	1.41E+10	2.20E+10	3.01E+10	4.11E+10	6.45E+10
35	5.96E+11	8.49E+22	2.91E+11	27.006	0.46312	2.50E+11	3.92E+11	5.35E+11	7.31E+11	1.15E+12
36	9.03E+10	1.95E+21	4.41E+10	25.119	0.46271	3.79E+10	5.94E+10	8.11E+10	1.11E+11	1.74E+11
37	3.70E+11	3.28E+22	1.81E+11	26.531	0.46291	1.55E+11	2.44E+11	3.33E+11	4.55E+11	7.13E+11
38	2.05E+09	1.00E+18	1.00E+09	21.334	0.46252	8.60E+08	1.35E+09	1.84E+09	2.52E+09	3.94E+09
39	2.52E+10	1.51E+20	1.23E+10	23.841	0.46252	1.06E+10	1.65E+10	2.26E+10	3.09E+10	4.84E+10
40	5.08E+11	6.16E+22	2.48E+11	26.846	0.46271	2.13E+11	3.34E+11	4.56E+11	6.23E+11	9.77E+11
41	7.29E+10	1.27E+21	3.56E+10	24.906	0.46252	3.06E+10	4.80E+10	6.55E+10	8.95E+10	1.40E+11
42	3.40E+11	2.76E+22	1.66E+11	26.445	0.46252	1.43E+11	2.24E+11	3.06E+11	4.17E+11	6.54E+11
43	6.82E+09	1.11E+19	3.33E+09	22.536	0.46252	2.86E+09	4.49E+09	6.13E+09	8.37E+09	1.31E+10
44	7.37E+09	1.30E+19	3.60E+09	22.613	0.46261	3.09E+09	4.85E+09	6.62E+09	9.04E+09	1.42E+10
45	6.18E+09	9.11E+18	3.02E+09	22.437	0.46281	2.59E+09	4.06E+09	5.55E+09	7.58E+09	1.19E+10
46	9.03E+08	1.95E+17	4.42E+08	20.515	0.46291	3.79E+08	5.94E+08	8.12E+08	1.11E+09	1.74E+09
47	6.66E+08	1.06E+17	3.25E+08	20.209	0.46291	2.79E+08	4.38E+08	5.98E+08	8.17E+08	1.28E+09

48	6.22E+08	9.24E+16	3.04E+08	20.141	0.46301	2.61E+08	4.09E+08	5.59E+08	7.63E+08	1.20E+09
49	1.56E+08	5.81E+15	7.62E+07	18.757	0.46312	6.54E+07	1.02E+08	1.40E+08	1.91E+08	3.00E+08
50	6.02E+08	8.66E+16	2.94E+08	20.108	0.46323	2.52E+08	3.95E+08	5.40E+08	7.38E+08	1.16E+09
51	5.76E+08	7.96E+16	2.82E+08	20.065	0.46346	2.41E+08	3.79E+08	5.18E+08	7.07E+08	1.11E+09
52	4.90E+09	5.76E+18	2.40E+09	22.206	0.46358	2.05E+09	3.22E+09	4.40E+09	6.02E+09	9.44E+09
53	5.13E+10	6.32E+20	2.51E+10	24.554	0.4637	2.15E+10	3.37E+10	4.61E+10	6.30E+10	9.88E+10
54	1.06E+11	2.71E+21	5.20E+10	25.284	0.46271	4.47E+10	7.00E+10	9.57E+10	1.31E+11	2.05E+11
55	5.30E+10	6.73E+20	2.59E+10	24.586	0.46346	2.22E+10	3.48E+10	4.76E+10	6.51E+10	1.02E+11
56	1.93E+11	8.93E+21	9.45E+10	25.882	0.46252	8.12E+10	1.27E+11	1.74E+11	2.37E+11	3.72E+11
57	7.08E+09	1.20E+19	3.47E+09	22.574	0.46334	2.97E+09	4.66E+09	6.36E+09	8.70E+09	1.36E+10
58	3.93E+11	3.68E+22	1.92E+11	26.59	0.46252	1.65E+11	2.59E+11	3.53E+11	4.82E+11	7.56E+11
59	2.06E+11	1.01E+22	1.01E+11	25.942	0.46346	8.61E+10	1.35E+11	1.85E+11	2.52E+11	3.96E+11
60	1.63E+10	6.36E+19	7.98E+09	23.407	0.46323	6.84E+09	1.07E+10	1.46E+10	2.00E+10	3.14E+10
61	2.72E+11	1.78E+22	1.33E+11	26.223	0.46358	1.14E+11	1.79E+11	2.45E+11	3.34E+11	5.24E+11
62	1.59E+10	6.04E+19	7.77E+09	23.382	0.46301	6.67E+09	1.05E+10	1.43E+10	1.95E+10	3.06E+10
63	5.22E+10	6.50E+20	2.55E+10	24.571	0.46291	2.19E+10	3.43E+10	4.69E+10	6.40E+10	1.00E+11
64	4.72E+09	5.32E+18	2.31E+09	22.167	0.46281	1.98E+09	3.10E+09	4.24E+09	5.79E+09	9.07E+09
65	1.40E+11	4.70E+21	6.85E+10	25.559	0.46291	5.88E+10	9.22E+10	1.26E+11	1.72E+11	2.70E+11
66	1.18E+11	3.35E+21	5.79E+10	25.388	0.46358	4.95E+10	7.77E+10	1.06E+11	1.45E+11	2.28E+11
67	2.45E+10	1.43E+20	1.20E+10	23.813	0.46334	1.03E+10	1.61E+10	2.20E+10	3.00E+10	4.71E+10
68	4.85E+10	5.62E+20	2.37E+10	24.498	0.46261	2.04E+10	3.19E+10	4.36E+10	5.96E+10	9.33E+10
69	4.34E+10	4.51E+20	2.12E+10	24.387	0.46312	1.82E+10	2.85E+10	3.90E+10	5.33E+10	8.35E+10
70	1.49E+10	5.33E+19	7.30E+09	23.32	0.46291	6.27E+09	9.82E+09	1.34E+10	1.83E+10	2.87E+10
71	1.84E+09	8.12E+17	9.01E+08	21.228	0.46281	7.74E+08	1.21E+09	1.66E+09	2.26E+09	3.55E+09
72	2.57E+08	1.58E+16	1.26E+08	19.259	0.46281	1.08E+08	1.69E+08	2.31E+08	3.16E+08	4.95E+08
73	4.59E+10	5.05E+20	2.25E+10	24.443	0.46334	1.92E+10	3.02E+10	4.12E+10	5.64E+10	8.84E+10
74	4.19E+10	4.19E+20	2.05E+10	24.352	0.46281	1.76E+10	2.76E+10	3.76E+10	5.14E+10	8.06E+10
75	2.73E+10	1.78E+20	1.34E+10	23.922	0.46358	1.14E+10	1.79E+10	2.45E+10	3.35E+10	5.25E+10
76	4.09E+10	4.00E+20	2.00E+10	24.327	0.46301	1.72E+10	2.69E+10	3.67E+10	5.02E+10	7.87E+10
77	6.15E+10	9.07E+20	3.01E+10	24.736	0.46323	2.58E+10	4.05E+10	5.53E+10	7.55E+10	1.18E+11
78	5.52E+10	7.30E+20	2.70E+10	24.627	0.46346	2.31E+10	3.63E+10	4.96E+10	6.77E+10	1.06E+11
79	2.04E+09	9.95E+17	9.98E+08	21.327	0.4637	8.53E+08	1.34E+09	1.83E+09	2.50E+09	3.92E+09
P.P.C.	5.45E+12	7.11E+24	2.67E+12			2.29E+12	3.59E+12	4.90E+12	6.69E+12	1.05E+13

Table 6. List of sub-plays in the Muddy transition play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :	Frontier Overpressured					a =	0.52	0.014	0	(Panel 1)
						b =	14.7	505	1.095	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	7.52	120	7	100	50	14,000	7294.7	701	1.095	2.95E+11
2	5.18	110	7	100	50	14,500	7554.7	708	1.095	1.91E+11
3	11.81	75	7	100	50	14,000	7294.7	701	1.095	2.90E+11
4	55.49	75	7	100	50	15,000	7814.7	715	1.095	1.43E+12
5	8.53	40	7	100	50	14,500	7554.7	708	1.095	1.15E+11
6	13.33	40	7	100	50	15,500	8074.7	722	1.095	1.88E+11
7	6.17	120	7	100	50	14,500	7554.7	708	1.095	2.49E+11
8	8.94	75	7	100	50	14,500	7554.7	708	1.095	2.25E+11
9	6.03	110	7	100	50	15,500	8074.7	722	1.095	2.33E+11
10	4.99	75	7	100	50	14,500	7554.7	708	1.095	1.26E+11
11	5.77	40	7	100	50	14,500	7554.7	708	1.095	7.75E+10
12	0.24	100	7	100	50	16,000	8334.7	729	1.095	8.63E+09
13	0.38	100	7	100	50	16,000	8334.7	729	1.095	1.37E+10
14	92.3	75	7	100	50	16,500	8594.7	736	1.095	2.54E+12
15	0.15	50	7	100	50	14,000	7294.7	701	1.095	2.46E+09
16	3.27	75	7	100	50	15,500	8074.7	722	1.095	8.63E+10
17	45.08	80	7	100	50	14,000	7294.7	701	1.095	1.18E+12
18	54.09	80	7	100	50	15,000	7814.7	715	1.095	1.49E+12
19	1.99	75	7	100	50	16,500	8594.7	736	1.095	5.48E+10
20	65.23	75	7	100	50	17,500	9114.7	750	1.095	1.87E+12
21	2.65	100	7	100	50	14,000	7294.7	701	1.095	8.67E+10
22	38.98	75	7	100	50	18,500	9634.7	764	1.095	1.16E+12
23	19.55	85	7	100	50	19,500	10154.7	778	1.095	6.82E+11
24	0.09	100	7	100	50	19,500	10154.7	778	1.095	3.70E+09
25	62.38	125	7	100	50	20,000	10414.7	785	1.095	3.25E+12
26	21.86	125	7	100	50	14,500	7554.7	708	1.095	9.17E+11
27	0.48	100	7	100	50	20,000	10414.7	785	1.095	2.00E+10
28	27.11	125	7	100	50	21,000	10934.7	799	1.095	1.46E+12
29	11.01	125	7	100	50	19,500	10154.7	778	1.095	5.65E+11
30	9.33	125	7	100	50	18,500	9634.7	764	1.095	4.63E+11
31	9.86	125	7	100	50	17,500	9114.7	750	1.095	4.71E+11
32	14.31	125	7	100	50	15,500	8074.7	722	1.095	6.29E+11
33	17.79	125	7	100	50	16,500	8594.7	736	1.095	8.17E+11
34	23.72	170	7	100	50	18,500	9634.7	764	1.095	1.60E+12
35	9.4	170	7	100	50	19,500	10154.7	778	1.095	6.56E+11
36	5.79	160	7	100	50	20,500	10674.7	792	1.095	3.93E+11
37	22.7	170	7	100	50	17,500	9114.7	750	1.095	1.48E+12
38	25.36	170	7	100	50	16,500	8594.7	736	1.095	1.58E+12
39	44.61	170	7	100	50	15,500	8074.7	722	1.095	2.67E+12
40	30.17	170	7	100	50	14,500	7554.7	708	1.095	1.72E+12
41	40.57	130	7	100	50	19,000	9894.7	771	1.095	2.13E+12
42	28.71	120	7	100	50	18,000	9374.7	757	1.095	1.34E+12
43	48.79	125	7	100	50	14,000	7294.7	701	1.095	2.00E+12
44	11.01	125	7	100	50	16,500	8594.7	736	1.095	5.06E+11
45	33.8	125	7	100	50	15,500	8074.7	722	1.095	1.49E+12
46	18.72	80	7	100	50	16,500	8594.7	736	1.095	5.50E+11
47	6.94	90	7	100	50	17,000	8854.7	743	1.095	2.34E+11

48	18.74	80	7	100	50	15,500	8074.7	722	1.095	5.27E+11
49	13.12	120	7	100	50	17,000	8854.7	743	1.095	5.90E+11
50	16.05	120	7	100	50	16,000	8334.7	729	1.095	6.93E+11
51	8.69	80	7	100	50	14,500	7554.7	708	1.095	2.33E+11
52	8.07	110	7	100	50	15,000	7814.7	715	1.095	3.05E+11
Total =	1046.85								Total =	4.19E+13

Table 7. List of sub-plays in the Frontier overpressured play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Frontier Overpressured								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe/TZ*	
	Range (%) =	30		30	50	30	20	40		
Subplay	Expect	F95 D.	F5 D.	Expect	Expect	Expect	Expect	Expect	Expect	Expect
No.	*Pe/TZ*	*Pe/TZ*	*Pe/TZ*	(Clo.)^2	(Thick.)^2	(Por.)^2	(Trap)^2	(HC S)^2	(*Pe/TZ*)^2	(Gas)^2
1	9.50	8.43	10.49	57.02	14732.6	49.41	10037.0	2536.95	90.70	9.29E+22
2	9.74	8.66	10.74	27.06	12379.5	49.41	10037.0	2536.95	95.36	3.89E+22
3	9.50	8.43	10.49	140.64	5754.9	49.41	10037.0	2536.95	90.70	8.95E+22
4	9.98	8.88	10.99	3104.74	5754.9	49.41	10037.0	2536.95	100.04	2.18E+24
5	9.74	8.66	10.74	73.37	1637.0	49.41	10037.0	2536.95	95.36	1.40E+22
6	10.21	9.09	11.24	179.17	1637.0	49.41	10037.0	2536.95	104.74	3.74E+22
7	9.74	8.66	10.74	38.39	14732.6	49.41	10037.0	2536.95	95.36	6.57E+22
8	9.74	8.66	10.74	80.59	5754.9	49.41	10037.0	2536.95	95.36	5.39E+22
9	10.21	9.09	11.24	36.66	12379.5	49.41	10037.0	2536.95	104.74	5.79E+22
10	9.74	8.66	10.74	25.11	5754.9	49.41	10037.0	2536.95	95.36	1.68E+22
11	9.74	8.66	10.74	33.57	1637.0	49.41	10037.0	2536.95	95.36	6.39E+21
12	10.44	9.31	11.48	0.06	10231.0	49.41	10037.0	2536.95	109.45	7.93E+19
13	10.44	9.31	11.48	0.15	10231.0	49.41	10037.0	2536.95	109.45	1.99E+20
14	10.66	9.52	11.71	8590.13	5754.9	49.41	10037.0	2536.95	114.18	6.88E+24
15	9.50	8.43	10.49	0.02	2557.7	49.41	10037.0	2536.95	90.70	6.41E+18
16	10.21	9.09	11.24	10.78	5754.9	49.41	10037.0	2536.95	104.74	7.92E+21
17	9.50	8.43	10.49	2049.10	6547.8	49.41	10037.0	2536.95	90.70	1.48E+24
18	9.98	8.88	10.99	2950.05	6547.8	49.41	10037.0	2536.95	100.04	2.35E+24
19	10.66	9.52	11.71	3.99	5754.9	49.41	10037.0	2536.95	114.18	3.20E+21
20	11.10	9.92	12.16	4290.33	5754.9	49.41	10037.0	2536.95	123.64	3.72E+24
21	9.50	8.43	10.49	7.08	10231.0	49.41	10037.0	2536.95	90.70	8.01E+21
22	11.52	10.32	12.60	1532.07	5754.9	49.41	10037.0	2536.95	133.12	1.43E+24
23	11.92	10.70	13.02	385.38	7391.9	49.41	10037.0	2536.95	142.58	4.95E+23
24	11.92	10.70	13.02	0.01	10231.0	49.41	10037.0	2536.95	142.58	1.45E+19
25	12.12	10.88	13.22	3923.62	15985.9	49.41	10037.0	2536.95	147.31	1.13E+25
26	9.74	8.66	10.74	481.83	15985.9	49.41	10037.0	2536.95	95.36	8.95E+23
27	12.12	10.88	13.22	0.23	10231.0	49.41	10037.0	2536.95	147.31	4.27E+20
28	12.50	11.25	13.62	741.06	15985.9	49.41	10037.0	2536.95	156.72	2.26E+24
29	11.92	10.70	13.02	122.23	15985.9	49.41	10037.0	2536.95	142.58	3.40E+23
30	11.52	10.32	12.60	87.77	15985.9	49.41	10037.0	2536.95	133.12	2.28E+23
31	11.10	9.92	12.16	98.03	15985.9	49.41	10037.0	2536.95	123.64	2.36E+23
32	10.21	9.09	11.24	206.48	15985.9	49.41	10037.0	2536.95	104.74	4.21E+23
33	10.66	9.52	11.71	319.12	15985.9	49.41	10037.0	2536.95	114.18	7.10E+23
34	11.52	10.32	12.60	567.32	29567.5	49.41	10037.0	2536.95	133.12	2.72E+24
35	11.92	10.70	13.02	89.09	29567.5	49.41	10037.0	2536.95	142.58	4.58E+23
36	12.31	11.07	13.42	33.80	26191.3	49.41	10037.0	2536.95	152.02	1.64E+23
37	11.10	9.92	12.16	519.57	29567.5	49.41	10037.0	2536.95	123.64	2.31E+24
38	10.66	9.52	11.71	648.48	29567.5	49.41	10037.0	2536.95	114.18	2.67E+24
39	10.21	9.09	11.24	2006.60	29567.5	49.41	10037.0	2536.95	104.74	7.57E+24
40	9.74	8.66	10.74	917.80	29567.5	49.41	10037.0	2536.95	95.36	3.15E+24
41	11.72	10.51	12.81	1659.61	17290.3	49.41	10037.0	2536.95	137.85	4.82E+24
42	11.31	10.12	12.38	831.12	14732.6	49.41	10037.0	2536.95	128.38	1.92E+24
43	9.50	8.43	10.49	2400.26	15985.9	49.41	10037.0	2536.95	90.70	4.24E+24
44	10.66	9.52	11.71	122.23	15985.9	49.41	10037.0	2536.95	114.18	2.72E+23
45	10.21	9.09	11.24	1151.94	15985.9	49.41	10037.0	2536.95	104.74	2.35E+24
46	10.66	9.52	11.71	353.35	6547.8	49.41	10037.0	2536.95	114.18	3.22E+23
47	10.88	9.72	11.94	48.56	8287.1	49.41	10037.0	2536.95	118.91	5.83E+22

48	10.21	9.09	11.24	354.11	6547.8	49.41	10037.0	2536.95	104.74	2.96E+23
49	10.88	9.72	11.94	173.57	14732.6	49.41	10037.0	2536.95	118.91	3.71E+23
50	10.44	9.31	11.48	259.74	14732.6	49.41	10037.0	2536.95	109.45	5.10E+23
51	9.74	8.66	10.74	76.14	6547.8	49.41	10037.0	2536.95	95.36	5.79E+22
52	9.98	8.88	10.99	65.67	12379.5	49.41	10037.0	2536.95	100.04	9.91E+22

Table 8. List of sub-plays in the Frontier overpressured play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :		Frontier Overpressured								(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	2.95E+11	5.59E+21	7.47E+10	26.381	0.24911	1.90E+11	2.42E+11	2.86E+11	3.39E+11	4.31E+11
2	1.91E+11	2.34E+21	4.84E+10	25.946	0.24894	1.23E+11	1.57E+11	1.85E+11	2.19E+11	2.79E+11
3	2.90E+11	5.38E+21	7.34E+10	26.362	0.24911	1.87E+11	2.38E+11	2.81E+11	3.32E+11	4.23E+11
4	1.43E+12	1.31E+23	3.62E+11	27.958	0.24878	9.21E+11	1.17E+12	1.39E+12	1.64E+12	2.09E+12
5	1.15E+11	8.39E+20	2.90E+10	25.433	0.24894	7.37E+10	9.39E+10	1.11E+11	1.31E+11	1.67E+11
6	1.88E+11	2.24E+21	4.74E+10	25.927	0.24862	1.21E+11	1.54E+11	1.82E+11	2.15E+11	2.74E+11
7	2.49E+11	3.95E+21	6.28E+10	26.208	0.24894	1.60E+11	2.04E+11	2.41E+11	2.85E+11	3.63E+11
8	2.25E+11	3.24E+21	5.69E+10	26.109	0.24894	1.45E+11	1.84E+11	2.18E+11	2.58E+11	3.29E+11
9	2.33E+11	3.47E+21	5.89E+10	26.145	0.24862	1.50E+11	1.91E+11	2.26E+11	2.68E+11	3.41E+11
10	1.26E+11	1.01E+21	3.18E+10	25.526	0.24894	8.09E+10	1.03E+11	1.22E+11	1.44E+11	1.83E+11
11	7.75E+10	3.84E+20	1.96E+10	25.042	0.24894	4.99E+10	6.35E+10	7.51E+10	8.88E+10	1.13E+11
12	8.63E+09	4.74E+18	2.18E+09	22.848	0.24847	5.56E+09	7.08E+09	8.37E+09	9.90E+09	1.26E+10
13	1.37E+10	1.19E+19	3.45E+09	23.307	0.24847	8.81E+09	1.12E+10	1.33E+10	1.57E+10	1.99E+10
14	2.54E+12	4.11E+23	6.41E+11	28.534	0.24832	1.64E+12	2.09E+12	2.47E+12	2.92E+12	3.71E+12
15	2.46E+09	3.86E+17	6.21E+08	21.59	0.24911	1.58E+09	2.01E+09	2.38E+09	2.82E+09	3.59E+09
16	8.63E+10	4.75E+20	2.18E+10	25.15	0.24862	5.56E+10	7.08E+10	8.37E+10	9.89E+10	1.26E+11
17	1.18E+12	8.92E+22	2.99E+11	27.766	0.24911	7.60E+11	9.68E+11	1.14E+12	1.35E+12	1.72E+12
18	1.49E+12	1.41E+23	3.76E+11	27.997	0.24878	9.58E+11	1.22E+12	1.44E+12	1.71E+12	2.17E+12
19	5.48E+10	1.91E+20	1.38E+10	24.697	0.24832	3.53E+10	4.50E+10	5.32E+10	6.28E+10	8.00E+10
20	1.87E+12	2.22E+23	4.71E+11	28.226	0.24803	1.21E+12	1.53E+12	1.81E+12	2.14E+12	2.73E+12
21	8.67E+10	4.82E+20	2.19E+10	25.155	0.24911	5.58E+10	7.11E+10	8.41E+10	9.95E+10	1.27E+11
22	1.16E+12	8.52E+22	2.92E+11	27.749	0.24776	7.48E+11	9.52E+11	1.12E+12	1.33E+12	1.69E+12
23	6.82E+11	2.94E+22	1.71E+11	27.218	0.2475	4.40E+11	5.60E+11	6.62E+11	7.82E+11	9.94E+11
24	3.70E+09	8.63E+17	9.29E+08	22	0.2475	2.39E+09	3.03E+09	3.58E+09	4.23E+09	5.38E+09
25	3.25E+12	6.68E+23	8.18E+11	28.78	0.24738	2.10E+12	2.67E+12	3.16E+12	3.73E+12	4.74E+12
26	9.17E+11	5.38E+22	2.32E+11	27.514	0.24894	5.90E+11	7.52E+11	8.89E+11	1.05E+12	1.34E+12
27	2.00E+10	2.53E+19	5.03E+09	23.69	0.24738	1.29E+10	1.64E+10	1.94E+10	2.30E+10	2.92E+10
28	1.46E+12	1.34E+23	3.66E+11	27.978	0.24714	9.42E+11	1.20E+12	1.42E+12	1.67E+12	2.12E+12
29	5.65E+11	2.02E+22	1.42E+11	27.03	0.2475	3.65E+11	4.64E+11	5.48E+11	6.48E+11	8.23E+11
30	4.63E+11	1.36E+22	1.16E+11	26.83	0.24776	2.98E+11	3.80E+11	4.49E+11	5.30E+11	6.74E+11
31	4.71E+11	1.41E+22	1.19E+11	26.848	0.24803	3.04E+11	3.87E+11	4.57E+11	5.40E+11	6.87E+11
32	6.29E+11	2.53E+22	1.59E+11	27.137	0.24862	4.05E+11	5.16E+11	6.10E+11	7.21E+11	9.18E+11
33	8.17E+11	4.24E+22	2.06E+11	27.398	0.24832	5.26E+11	6.70E+11	7.92E+11	9.36E+11	1.19E+12
34	1.60E+12	1.62E+23	4.03E+11	28.07	0.24776	1.03E+12	1.31E+12	1.55E+12	1.83E+12	2.33E+12
35	6.56E+11	2.72E+22	1.65E+11	27.179	0.2475	4.24E+11	5.39E+11	6.36E+11	7.52E+11	9.56E+11
36	3.93E+11	9.73E+21	9.86E+10	26.666	0.24726	2.54E+11	3.22E+11	3.81E+11	4.50E+11	5.72E+11
37	1.48E+12	1.38E+23	3.72E+11	27.989	0.24803	9.51E+11	1.21E+12	1.43E+12	1.69E+12	2.15E+12
38	1.58E+12	1.60E+23	3.99E+11	28.06	0.24832	1.02E+12	1.30E+12	1.54E+12	1.82E+12	2.31E+12
39	2.67E+12	4.54E+23	6.74E+11	28.581	0.24862	1.72E+12	2.19E+12	2.59E+12	3.06E+12	3.89E+12
40	1.72E+12	1.89E+23	4.35E+11	28.143	0.24894	1.11E+12	1.41E+12	1.67E+12	1.97E+12	2.51E+12
41	2.13E+12	2.87E+23	5.35E+11	28.356	0.24763	1.37E+12	1.75E+12	2.06E+12	2.44E+12	3.10E+12
42	1.34E+12	1.14E+23	3.38E+11	27.895	0.24789	8.66E+11	1.10E+12	1.30E+12	1.54E+12	1.96E+12
43	2.00E+12	2.55E+23	5.05E+11	28.291	0.24911	1.28E+12	1.64E+12	1.94E+12	2.29E+12	2.92E+12
44	5.06E+11	1.63E+22	1.28E+11	26.918	0.24832	3.26E+11	4.15E+11	4.90E+11	5.80E+11	7.38E+11
45	1.49E+12	1.41E+23	3.75E+11	27.997	0.24862	9.57E+11	1.22E+12	1.44E+12	1.70E+12	2.17E+12
46	5.50E+11	1.93E+22	1.39E+11	27.003	0.24832	3.55E+11	4.51E+11	5.33E+11	6.31E+11	8.03E+11
47	2.34E+11	3.48E+21	5.90E+10	26.148	0.24817	1.51E+11	1.92E+11	2.27E+11	2.68E+11	3.42E+11

48	5.27E+11	1.77E+22	1.33E+11	26.96	0.24862	3.40E+11	4.32E+11	5.11E+11	6.05E+11	7.70E+11
49	5.90E+11	2.21E+22	1.49E+11	27.073	0.24817	3.81E+11	4.84E+11	5.72E+11	6.77E+11	8.61E+11
50	6.93E+11	3.06E+22	1.75E+11	27.233	0.24847	4.46E+11	5.68E+11	6.72E+11	7.94E+11	1.01E+12
51	2.33E+11	3.48E+21	5.90E+10	26.145	0.24894	1.50E+11	1.91E+11	2.26E+11	2.68E+11	3.41E+11
52	3.05E+11	5.95E+21	7.71E+10	26.413	0.24878	1.97E+11	2.50E+11	2.96E+11	3.50E+11	4.46E+11
P.P.C.	4.19E+13	1.12E+26	1.06E+13			2.70E+13	3.44E+13	4.06E+13	4.80E+13	6.11E+13

Table 9. List of sub-plays in the Frontier overpressured play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :	Frontier Transition					a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.9074	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	44.09	75	7	50	50	8,500	2989.7	624	0.9074	3.01E+11
2	28.7	75	7	50	50	9,500	3339.7	638	0.9074	2.14E+11
3	60.47	75	7	50	50	10,500	3689.7	652	0.9074	4.87E+11
4	48.71	75	7	50	50	11,500	4039.7	666	0.9074	4.21E+11
5	13.94	40	7	50	50	7,500	2639.7	610	0.9074	4.58E+10
6	23.44	80	7	50	50	12,500	4389.7	680	0.9074	2.30E+11
7	5.99	40	7	50	50	8,500	2989.7	624	0.9074	2.18E+10
8	14.53	80	7	50	50	14,000	4914.7	701	0.9074	1.55E+11
9	2.12	50	7	50	50	11,000	3864.7	659	0.9074	1.18E+10
10	20.51	75	7	50	50	9,000	3164.7	631	0.9074	1.46E+11
11	15.32	75	7	50	50	10,000	3514.7	645	0.9074	1.19E+11
12	0.11	50	7	50	50	7,500	2639.7	610	0.9074	4.52E+08
13	3.53	110	7	50	50	12,500	4389.7	680	0.9074	4.76E+10
14	28.37	120	7	50	50	11,000	3864.7	659	0.9074	3.79E+11
15	26.4	120	7	50	50	11,000	3864.7	659	0.9074	3.53E+11
16	29.62	120	7	50	50	10,000	3514.7	645	0.9074	3.68E+11
17	12.42	120	7	70	50	12,000	4214.7	673	0.9074	2.48E+11
18	10.11	110	7	50	50	10,000	3514.7	645	0.9074	1.15E+11
19	1.28	100	7	50	50	7,500	2639.7	610	0.9074	1.05E+10
20	9.93	120	7	70	50	13,000	4564.7	687	0.9074	2.10E+11
21	6.67	80	7	50	50	8,500	2989.7	624	0.9074	4.85E+10
22	6.52	80	7	50	50	10,000	3514.7	645	0.9074	5.39E+10
23	2.17	100	7	50	50	8,500	2989.7	624	0.9074	1.97E+10
24	4.41	80	7	50	50	9,500	3339.7	638	0.9074	3.51E+10
25	3.41	90	7	50	50	9,000	3164.7	631	0.9074	2.92E+10
26	5.49	110	7	50	50	8,500	2989.7	624	0.9074	5.49E+10
27	21.56	75	7	70	50	12,000	4214.7	673	0.9074	2.69E+11
28	12.66	75	7	70	50	13,000	4564.7	687	0.9074	1.68E+11
29	3.5	110	7	50	50	9,500	3339.7	638	0.9074	3.83E+10
30	0.4	100	7	50	50	11,500	4039.7	666	0.9074	4.61E+09
31	0.61	90	7	50	50	12,000	4214.7	673	0.9074	6.53E+09
32	5.5	110	7	50	50	8,500	2989.7	624	0.9074	5.50E+10
33	6.2	110	7	50	50	9,500	3339.7	638	0.9074	6.78E+10
34	8.16	110	7	50	50	10,500	3689.7	652	0.9074	9.64E+10
35	2.83	110	7	50	50	10,500	3689.7	652	0.9074	3.34E+10
36	5.24	80	7	50	50	8,000	2814.7	617	0.9074	3.63E+10
37	5.76	80	7	50	50	9,000	3164.7	631	0.9074	4.39E+10
38	6.72	110	7	50	50	11,500	4039.7	666	0.9074	8.51E+10
39	5.52	90	7	50	50	9,000	3164.7	631	0.9074	4.73E+10
40	7.57	110	7	50	50	11,000	3864.7	659	0.9074	9.27E+10
41	10.32	75	7	50	50	11,500	4039.7	666	0.9074	8.91E+10
42	3.48	90	7	50	50	11,000	3864.7	659	0.9074	3.49E+10
43	1.38	100	7	50	50	9,500	3339.7	638	0.9074	1.37E+10
44	0.48	100	7	50	50	14,000	4914.7	701	0.9074	6.39E+09
45	9.19	120	7	70	50	12,000	4214.7	673	0.9074	1.84E+11
46	4.92	90	7	70	50	12,500	4389.7	680	0.9074	7.60E+10
47	1.26	100	7	50	50	11,500	4039.7	666	0.9074	1.45E+10

48	10.09	120	7	50	50	8,000	2814.7	617	0.9074	1.05E+11
49	8.42	120	7	50	50	9,000	3164.7	631	0.9074	9.62E+10
50	9.09	120	7	70	50	13,000	4564.7	687	0.9074	1.93E+11
51	8.36	40	7	70	50	13,500	4739.7	694	0.9074	6.07E+10
52	5.01	120	7	50	50	9,000	3164.7	631	0.9074	5.72E+10
53	6.14	90	7	70	50	12,500	4389.7	680	0.9074	9.48E+10
54	2.74	110	7	70	50	12,500	4389.7	680	0.9074	5.17E+10
55	0.67	50	7	70	50	13,000	4564.7	687	0.9074	5.91E+09
56	19.38	110	7	50	50	8,000	2814.7	617	0.9074	1.85E+11
57	1.06	100	7	70	50	14,000	4914.7	701	0.9074	1.97E+10
58	74.64	125	7	50	50	8,500	2989.7	624	0.9074	8.48E+11
59	1.26	100	7	50	50	9,500	3339.7	638	0.9074	1.25E+10
60	12.07	90	7	50	50	10,000	3514.7	645	0.9074	1.12E+11
61	13.07	90	7	50	50	11,000	3864.7	659	0.9074	1.31E+11
62	3.55	60	7	70	50	13,500	4739.7	694	0.9074	3.87E+10
63	3.82	80	7	70	50	13,500	4739.7	694	0.9074	5.55E+10
64	19.32	90	7	70	50	12,000	4214.7	673	0.9074	2.89E+11
65	114.85	125	7	50	50	9,500	3339.7	638	0.9074	1.43E+12
66	0.48	100	7	50	50	9,500	3339.7	638	0.9074	4.77E+09
67	27.2	90	7	70	50	13,000	4564.7	687	0.9074	4.32E+11
68	0.14	100	7	50	50	9,500	3339.7	638	0.9074	1.39E+09
69	5.64	90	7	50	50	9,500	3339.7	638	0.9074	5.04E+10
70	0.63	100	7	50	50	8,500	2989.7	624	0.9074	5.73E+09
71	3.63	90	7	50	50	9,000	3164.7	631	0.9074	3.11E+10
72	10.08	75	7	70	50	14,000	4914.7	701	0.9074	1.41E+11
73	3.54	80	7	70	50	12,500	4389.7	680	0.9074	4.86E+10
74	8.38	75	7	70	50	12,500	4389.7	680	0.9074	1.08E+11
75	5.2	120	7	70	50	13,500	4739.7	694	0.9074	1.13E+11
76	103.15	120	7	50	50	10,500	3689.7	652	0.9074	1.33E+12
77	9.52	120	7	70	50	13,000	4564.7	687	0.9074	2.02E+11
78	2.46	80	7	70	50	13,000	4564.7	687	0.9074	3.47E+10
79	74.66	125	7	70	50	12,000	4214.7	673	0.9074	1.55E+12
80	4.8	80	7	50	50	12,000	4214.7	673	0.9074	4.56E+10
81	5.88	120	7	50	50	12,000	4214.7	673	0.9074	8.39E+10
82	59.35	125	7	70	50	13,000	4564.7	687	0.9074	1.31E+12
83	1.55	120	7	50	50	11,500	4039.7	666	0.9074	2.14E+10
84	1.05	80	7	50	50	11,500	4039.7	666	0.9074	9.67E+09
85	0.48	160	7	50	50	10,000	3514.7	645	0.9074	7.94E+09
86	0.99	80	7	50	50	10,500	3689.7	652	0.9074	8.51E+09
87	1.27	125	7	50	50	10,500	3689.7	652	0.9074	1.71E+10
88	1.01	80	7	50	50	9,500	3339.7	638	0.9074	8.03E+09
89	0.97	125	7	50	50	9,500	3339.7	638	0.9074	1.20E+10
90	0.26	160	7	50	50	11,500	4039.7	666	0.9074	4.79E+09
91	0.25	160	7	50	50	10,500	3689.7	652	0.9074	4.30E+09
92	0.19	160	7	50	50	9,500	3339.7	638	0.9074	3.02E+09
93	78.05	125	7	50	50	8,000	2814.7	617	0.9074	8.45E+11
94	16.49	160	7	70	50	13,000	4564.7	687	0.9074	4.66E+11
95	1.07	150	7	70	50	12,500	4389.7	680	0.9074	2.75E+10
96	70.29	125	7	70	50	13,000	4564.7	687	0.9074	1.55E+12
97	8.1	80	7	50	50	11,000	3864.7	659	0.9074	7.21E+10
98	6.38	80	7	50	50	10,000	3514.7	645	0.9074	5.28E+10
99	5.01	80	7	70	50	12,000	4214.7	673	0.9074	6.67E+10

100	2	80	7	50	50	11,500	4039.7	666	0.9074	1.84E+10
101	0.15	100	7	70	50	12,500	4389.7	680	0.9074	2.57E+09
102	21.44	160	7	50	50	8,500	2989.7	624	0.9074	3.12E+11
103	55.84	125	7	50	50	10,000	3514.7	645	0.9074	7.22E+11
104	43.36	120	7	50	50	11,000	3864.7	659	0.9074	5.79E+11
105	35.44	120	7	70	50	12,000	4214.7	673	0.9074	7.08E+11
106	10.79	160	7	50	50	8,500	2989.7	624	0.9074	1.57E+11
107	11.97	90	7	50	50	8,000	2814.7	617	0.9074	9.33E+10
108	1.97	160	7	50	50	7,500	2639.7	610	0.9074	2.59E+10
109	1.86	160	7	50	50	9,000	3164.7	631	0.9074	2.83E+10
110	1.2	140	7	50	50	8,500	2989.7	624	0.9074	1.53E+10
111	12.15	125	7	50	50	8,500	2989.7	624	0.9074	1.38E+11
112	24.07	80	7	50	50	10,000	3514.7	645	0.9074	1.99E+11
113	48.25	80	7	50	50	9,000	3164.7	631	0.9074	3.67E+11
114	7.53	160	7	50	50	8,500	2989.7	624	0.9074	1.10E+11
115	12.81	130	7	50	50	9,000	3164.7	631	0.9074	1.59E+11
116	0.15	100	7	70	50	11,500	4039.7	666	0.9074	2.42E+09
117	0.13	100	7	70	50	12,500	4389.7	680	0.9074	2.23E+09
118	0.95	100	7	70	50	13,000	4564.7	687	0.9074	1.68E+10
119	14.49	80	7	70	50	12,500	4389.7	680	0.9074	1.99E+11
120	32.29	80	7	50	50	11,500	4039.7	666	0.9074	2.97E+11
121	17.44	120	7	50	50	10,000	3514.7	645	0.9074	2.16E+11
122	3.22	80	7	70	50	14,000	4914.7	701	0.9074	4.80E+10
123	53.22	80	7	50	50	8,000	2814.7	617	0.9074	3.69E+11
124	2.47	110	7	50	50	11,000	3864.7	659	0.9074	3.02E+10
125	0.2	100	7	70	50	11,500	4039.7	666	0.9074	3.22E+09
126	10.31	90	7	50	50	11,000	3864.7	659	0.9074	1.03E+11
127	11.84	120	7	50	50	10,500	3689.7	652	0.9074	1.53E+11
128	9.74	120	7	50	50	11,000	3864.7	659	0.9074	1.30E+11
129	1.27	100	7	50	50	10,500	3689.7	652	0.9074	1.36E+10
130	9.67	120	7	50	50	11,500	4039.7	666	0.9074	1.34E+11
131	2.68	125	7	50	50	10,500	3689.7	652	0.9074	3.60E+10
132	12.16	130	7	50	50	11,500	4039.7	666	0.9074	1.82E+11
133	6.25	110	7	50	50	9,000	3164.7	631	0.9074	6.54E+10
134	1.52	160	7	50	50	11,000	3864.7	659	0.9074	2.71E+10
135	5.56	160	7	50	50	10,000	3514.7	645	0.9074	9.20E+10
136	11.11	125	7	50	50	10,000	3514.7	645	0.9074	1.44E+11
137	10.55	160	7	50	50	9,000	3164.7	631	0.9074	1.61E+11
138	0.56	100	7	50	50	7,500	2639.7	610	0.9074	4.60E+09
139	15.65	125	7	50	50	9,000	3164.7	631	0.9074	1.86E+11
140	7.5	160	7	50	50	8,000	2814.7	617	0.9074	1.04E+11
141	1.81	90	7	50	50	9,500	3339.7	638	0.9074	1.62E+10
142	14.7	125	7	50	50	8,000	2814.7	617	0.9074	1.59E+11
143	4.93	90	7	50	50	8,000	2814.7	617	0.9074	3.84E+10
144	0.47	50	7	70	50	15,000	5264.7	715	0.9074	4.60E+09
Total =	1936.88								Total =	2.46E+13

Table 10. List of sub-plays in the Frontier transition play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Frontier Transition								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe/TZ*	
	Range (%) =	30		30	50	60	100	80		
Subplay No.	Expect *Pe/TZ*	F95 D. *Pe/TZ*	F5 D. *Pe/TZ*	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect (*Pe/TZ*)^2	Expect (Gas)^2
1	5.28	4.62	5.90	1960.09	5754.9	50.63	2731.0	2647.82	28.03	1.12E+23
2	5.77	5.07	6.43	830.54	5754.9	50.63	2731.0	2647.82	33.45	5.67E+22
3	6.24	5.49	6.93	3687.02	5754.9	50.63	2731.0	2647.82	39.09	2.94E+23
4	6.68	5.90	7.41	2392.39	5754.9	50.63	2731.0	2647.82	44.90	2.19E+23
5	4.77	4.17	5.34	195.94	1637.0	50.63	2731.0	2647.82	22.87	2.60E+21
6	7.11	6.29	7.87	554.00	6547.8	50.63	2731.0	2647.82	50.84	6.54E+22
7	5.28	4.62	5.90	36.18	1637.0	50.63	2731.0	2647.82	28.03	5.89E+20
8	7.73	6.86	8.52	212.88	6547.8	50.63	2731.0	2647.82	59.95	2.96E+22
9	6.46	5.70	7.18	4.53	2557.7	50.63	2731.0	2647.82	41.97	1.73E+20
10	5.53	4.85	6.17	424.16	5754.9	50.63	2731.0	2647.82	30.71	2.66E+22
11	6.01	5.28	6.68	236.65	5754.9	50.63	2731.0	2647.82	36.25	1.75E+22
12	4.77	4.17	5.34	0.01	2557.7	50.63	2731.0	2647.82	22.87	2.53E+17
13	7.11	6.29	7.87	12.56	12379.5	50.63	2731.0	2647.82	50.84	2.80E+21
14	6.46	5.70	7.18	811.55	14732.6	50.63	2731.0	2647.82	41.97	1.78E+23
15	6.46	5.70	7.18	702.76	14732.6	50.63	2731.0	2647.82	41.97	1.54E+23
16	6.01	5.28	6.68	884.64	14732.6	50.63	2731.0	2647.82	36.25	1.68E+23
17	6.90	6.10	7.65	155.54	14732.6	50.63	5352.7	2647.82	47.85	7.62E+22
18	6.01	5.28	6.68	103.06	12379.5	50.63	2731.0	2647.82	36.25	1.64E+22
19	4.77	4.17	5.34	1.65	10231.0	50.63	2731.0	2647.82	22.87	1.37E+20
20	7.32	6.49	8.10	99.42	14732.6	50.63	5352.7	2647.82	53.86	5.48E+22
21	5.28	4.62	5.90	44.86	6547.8	50.63	2731.0	2647.82	28.03	2.92E+21
22	6.01	5.28	6.68	42.86	6547.8	50.63	2731.0	2647.82	36.25	3.61E+21
23	5.28	4.62	5.90	4.75	10231.0	50.63	2731.0	2647.82	28.03	4.83E+20
24	5.77	5.07	6.43	19.61	6547.8	50.63	2731.0	2647.82	33.45	1.52E+21
25	5.53	4.85	6.17	11.72	8287.1	50.63	2731.0	2647.82	30.71	1.06E+21
26	5.28	4.62	5.90	30.39	12379.5	50.63	2731.0	2647.82	28.03	3.74E+21
27	6.90	6.10	7.65	468.70	5754.9	50.63	5352.7	2647.82	47.85	8.97E+22
28	7.32	6.49	8.10	161.61	5754.9	50.63	5352.7	2647.82	53.86	3.48E+22
29	5.77	5.07	6.43	12.35	12379.5	50.63	2731.0	2647.82	33.45	1.81E+21
30	6.68	5.90	7.41	0.16	10231.0	50.63	2731.0	2647.82	44.90	2.63E+19
31	6.90	6.10	7.65	0.38	8287.1	50.63	2731.0	2647.82	47.85	5.28E+19
32	5.28	4.62	5.90	30.50	12379.5	50.63	2731.0	2647.82	28.03	3.75E+21
33	5.77	5.07	6.43	38.76	12379.5	50.63	2731.0	2647.82	33.45	5.69E+21
34	6.24	5.49	6.93	67.14	12379.5	50.63	2731.0	2647.82	39.09	1.15E+22
35	6.24	5.49	6.93	8.08	12379.5	50.63	2731.0	2647.82	39.09	1.39E+21
36	5.03	4.40	5.62	27.69	6547.8	50.63	2731.0	2647.82	25.41	1.63E+21
37	5.53	4.85	6.17	33.45	6547.8	50.63	2731.0	2647.82	30.71	2.39E+21
38	6.68	5.90	7.41	45.53	12379.5	50.63	2731.0	2647.82	44.90	8.97E+21
39	5.53	4.85	6.17	30.72	8287.1	50.63	2731.0	2647.82	30.71	2.77E+21
40	6.46	5.70	7.18	57.78	12379.5	50.63	2731.0	2647.82	41.97	1.06E+22
41	6.68	5.90	7.41	107.39	5754.9	50.63	2731.0	2647.82	44.90	9.84E+21
42	6.46	5.70	7.18	12.21	8287.1	50.63	2731.0	2647.82	41.97	1.51E+21
43	5.77	5.07	6.43	1.92	10231.0	50.63	2731.0	2647.82	33.45	2.33E+20
44	7.73	6.86	8.52	0.23	10231.0	50.63	2731.0	2647.82	59.95	5.05E+19
45	6.90	6.10	7.65	85.16	14732.6	50.63	5352.7	2647.82	47.85	4.17E+22
46	7.11	6.29	7.87	24.41	8287.1	50.63	5352.7	2647.82	50.84	7.15E+21
47	6.68	5.90	7.41	1.60	10231.0	50.63	2731.0	2647.82	44.90	2.61E+20

48	5.03	4.40	5.62	102.65	14732.6	50.63	2731.0	2647.82	25.41	1.36E+22
49	5.53	4.85	6.17	71.49	14732.6	50.63	2731.0	2647.82	30.71	1.15E+22
50	7.32	6.49	8.10	83.32	14732.6	50.63	5352.7	2647.82	53.86	4.59E+22
51	7.53	6.67	8.31	70.47	1637.0	50.63	5352.7	2647.82	56.90	4.56E+21
52	5.53	4.85	6.17	25.31	14732.6	50.63	2731.0	2647.82	30.71	4.06E+21
53	7.11	6.29	7.87	38.01	8287.1	50.63	5352.7	2647.82	50.84	1.11E+22
54	7.11	6.29	7.87	7.57	12379.5	50.63	5352.7	2647.82	50.84	3.31E+21
55	7.32	6.49	8.10	0.45	2557.7	50.63	5352.7	2647.82	53.86	4.33E+19
56	5.03	4.40	5.62	378.71	12379.5	50.63	2731.0	2647.82	25.41	4.23E+22
57	7.73	6.86	8.52	1.13	10231.0	50.63	5352.7	2647.82	59.95	4.83E+20
58	5.28	4.62	5.90	5617.45	15985.9	50.63	2731.0	2647.82	28.03	8.93E+23
59	5.77	5.07	6.43	1.60	10231.0	50.63	2731.0	2647.82	33.45	1.94E+20
60	6.01	5.28	6.68	146.90	8287.1	50.63	2731.0	2647.82	36.25	1.56E+22
61	6.46	5.70	7.18	172.25	8287.1	50.63	2731.0	2647.82	41.97	2.12E+22
62	7.53	6.67	8.31	12.71	3683.1	50.63	5352.7	2647.82	56.90	1.85E+21
63	7.53	6.67	8.31	14.71	6547.8	50.63	5352.7	2647.82	56.90	3.81E+21
64	6.90	6.10	7.65	376.37	8287.1	50.63	5352.7	2647.82	47.85	1.04E+23
65	5.77	5.07	6.43	13300.20	15985.9	50.63	2731.0	2647.82	33.45	2.52E+24
66	5.77	5.07	6.43	0.23	10231.0	50.63	2731.0	2647.82	33.45	2.82E+19
67	7.32	6.49	8.10	745.99	8287.1	50.63	5352.7	2647.82	53.86	2.31E+23
68	5.77	5.07	6.43	0.02	10231.0	50.63	2731.0	2647.82	33.45	2.40E+18
69	5.77	5.07	6.43	32.07	8287.1	50.63	2731.0	2647.82	33.45	3.15E+21
70	5.28	4.62	5.90	0.40	10231.0	50.63	2731.0	2647.82	28.03	4.07E+19
71	5.53	4.85	6.17	13.29	8287.1	50.63	2731.0	2647.82	30.71	1.20E+21
72	7.73	6.86	8.52	102.45	5754.9	50.63	5352.7	2647.82	59.95	2.46E+22
73	7.11	6.29	7.87	12.64	6547.8	50.63	5352.7	2647.82	50.84	2.92E+21
74	7.11	6.29	7.87	70.81	5754.9	50.63	5352.7	2647.82	50.84	1.44E+22
75	7.53	6.67	8.31	27.26	14732.6	50.63	5352.7	2647.82	56.90	1.59E+22
76	6.24	5.49	6.93	10728.39	14732.6	50.63	2731.0	2647.82	39.09	2.19E+24
77	7.32	6.49	8.10	91.38	14732.6	50.63	5352.7	2647.82	53.86	5.04E+22
78	7.32	6.49	8.10	6.10	6547.8	50.63	5352.7	2647.82	53.86	1.50E+21
79	6.90	6.10	7.65	5620.46	15985.9	50.63	5352.7	2647.82	47.85	2.99E+24
80	6.90	6.10	7.65	23.23	6547.8	50.63	2731.0	2647.82	47.85	2.58E+21
81	6.90	6.10	7.65	34.86	14732.6	50.63	2731.0	2647.82	47.85	8.72E+21
82	7.32	6.49	8.10	3551.71	15985.9	50.63	5352.7	2647.82	53.86	2.13E+24
83	6.68	5.90	7.41	2.42	14732.6	50.63	2731.0	2647.82	44.90	5.68E+20
84	6.68	5.90	7.41	1.11	6547.8	50.63	2731.0	2647.82	44.90	1.16E+20
85	6.01	5.28	6.68	0.23	26191.3	50.63	2731.0	2647.82	36.25	7.82E+19
86	6.24	5.49	6.93	0.99	6547.8	50.63	2731.0	2647.82	39.09	8.97E+19
87	6.24	5.49	6.93	1.63	15985.9	50.63	2731.0	2647.82	39.09	3.60E+20
88	5.77	5.07	6.43	1.03	6547.8	50.63	2731.0	2647.82	33.45	7.99E+19
89	5.77	5.07	6.43	0.95	15985.9	50.63	2731.0	2647.82	33.45	1.80E+20
90	6.68	5.90	7.41	0.07	26191.3	50.63	2731.0	2647.82	44.90	2.84E+19
91	6.24	5.49	6.93	0.06	26191.3	50.63	2731.0	2647.82	39.09	2.29E+19
92	5.77	5.07	6.43	0.04	26191.3	50.63	2731.0	2647.82	33.45	1.13E+19
93	5.03	4.40	5.62	6142.45	15985.9	50.63	2731.0	2647.82	25.41	8.85E+23
94	7.32	6.49	8.10	274.18	26191.3	50.63	5352.7	2647.82	53.86	2.69E+23
95	7.11	6.29	7.87	1.15	23019.7	50.63	5352.7	2647.82	50.84	9.39E+20
96	7.32	6.49	8.10	4981.76	15985.9	50.63	5352.7	2647.82	53.86	2.98E+24
97	6.46	5.70	7.18	66.16	6547.8	50.63	2731.0	2647.82	41.97	6.45E+21
98	6.01	5.28	6.68	41.04	6547.8	50.63	2731.0	2647.82	36.25	3.45E+21
99	6.90	6.10	7.65	25.31	6547.8	50.63	5352.7	2647.82	47.85	5.51E+21

100	6.68	5.90	7.41	4.03	6547.8	50.63	2731.0	2647.82	44.90	4.20E+20
101	7.11	6.29	7.87	0.02	10231.0	50.63	5352.7	2647.82	50.84	8.20E+18
102	5.28	4.62	5.90	463.50	26191.3	50.63	2731.0	2647.82	28.03	1.21E+23
103	6.01	5.28	6.68	3144.03	15985.9	50.63	2731.0	2647.82	36.25	6.46E+23
104	6.46	5.70	7.18	1895.72	14732.6	50.63	2731.0	2647.82	41.97	4.16E+23
105	6.90	6.10	7.65	1266.44	14732.6	50.63	5352.7	2647.82	47.85	6.21E+23
106	5.28	4.62	5.90	117.39	26191.3	50.63	2731.0	2647.82	28.03	3.06E+22
107	5.03	4.40	5.62	144.47	8287.1	50.63	2731.0	2647.82	25.41	1.08E+22
108	4.77	4.17	5.34	3.91	26191.3	50.63	2731.0	2647.82	22.87	8.31E+20
109	5.53	4.85	6.17	3.49	26191.3	50.63	2731.0	2647.82	30.71	9.95E+20
110	5.28	4.62	5.90	1.45	20052.7	50.63	2731.0	2647.82	28.03	2.89E+20
111	5.28	4.62	5.90	148.85	15985.9	50.63	2731.0	2647.82	28.03	2.37E+22
112	6.01	5.28	6.68	584.18	6547.8	50.63	2731.0	2647.82	36.25	4.92E+22
113	5.53	4.85	6.17	2347.42	6547.8	50.63	2731.0	2647.82	30.71	1.67E+23
114	5.28	4.62	5.90	57.17	26191.3	50.63	2731.0	2647.82	28.03	1.49E+22
115	5.53	4.85	6.17	165.46	17290.3	50.63	2731.0	2647.82	30.71	3.12E+22
116	6.68	5.90	7.41	0.02	10231.0	50.63	5352.7	2647.82	44.90	7.24E+18
117	7.11	6.29	7.87	0.02	10231.0	50.63	5352.7	2647.82	50.84	6.16E+18
118	7.32	6.49	8.10	0.91	10231.0	50.63	5352.7	2647.82	53.86	3.49E+20
119	7.11	6.29	7.87	211.71	6547.8	50.63	5352.7	2647.82	50.84	4.90E+22
120	6.68	5.90	7.41	1051.31	6547.8	50.63	2731.0	2647.82	44.90	1.10E+23
121	6.01	5.28	6.68	306.68	14732.6	50.63	2731.0	2647.82	36.25	5.81E+22
122	7.73	6.86	8.52	10.45	6547.8	50.63	5352.7	2647.82	59.95	2.85E+21
123	5.03	4.40	5.62	2855.92	6547.8	50.63	2731.0	2647.82	25.41	1.69E+23
124	6.46	5.70	7.18	6.15	12379.5	50.63	2731.0	2647.82	41.97	1.13E+21
125	6.68	5.90	7.41	0.04	10231.0	50.63	5352.7	2647.82	44.90	1.29E+19
126	6.46	5.70	7.18	107.18	8287.1	50.63	2731.0	2647.82	41.97	1.32E+22
127	6.24	5.49	6.93	141.35	14732.6	50.63	2731.0	2647.82	39.09	2.89E+22
128	6.46	5.70	7.18	95.66	14732.6	50.63	2731.0	2647.82	41.97	2.10E+22
129	6.24	5.49	6.93	1.63	10231.0	50.63	2731.0	2647.82	39.09	2.31E+20
130	6.68	5.90	7.41	94.29	14732.6	50.63	2731.0	2647.82	44.90	2.21E+22
131	6.24	5.49	6.93	7.24	15985.9	50.63	2731.0	2647.82	39.09	1.60E+21
132	6.68	5.90	7.41	149.10	17290.3	50.63	2731.0	2647.82	44.90	4.10E+22
133	5.53	4.85	6.17	39.39	12379.5	50.63	2731.0	2647.82	30.71	5.31E+21
134	6.46	5.70	7.18	2.33	26191.3	50.63	2731.0	2647.82	41.97	9.08E+20
135	6.01	5.28	6.68	31.17	26191.3	50.63	2731.0	2647.82	36.25	1.05E+22
136	6.01	5.28	6.68	124.46	15985.9	50.63	2731.0	2647.82	36.25	2.56E+22
137	5.53	4.85	6.17	112.23	26191.3	50.63	2731.0	2647.82	30.71	3.20E+22
138	4.77	4.17	5.34	0.32	10231.0	50.63	2731.0	2647.82	22.87	2.62E+19
139	5.53	4.85	6.17	246.96	15985.9	50.63	2731.0	2647.82	30.71	4.30E+22
140	5.03	4.40	5.62	56.72	26191.3	50.63	2731.0	2647.82	25.41	1.34E+22
141	5.77	5.07	6.43	3.30	8287.1	50.63	2731.0	2647.82	33.45	3.25E+20
142	5.03	4.40	5.62	217.89	15985.9	50.63	2731.0	2647.82	25.41	3.14E+22
143	5.03	4.40	5.62	24.51	8287.1	50.63	2731.0	2647.82	25.41	1.83E+21
144	8.11	7.22	8.93	0.22	2557.7	50.63	5352.7	2647.82	66.12	2.62E+19

Table 11. List of sub-plays in the Frontier transition play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :		Frontier Transition								(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	3.01E+11	2.17E+22	1.47E+11	26.322	0.4637	1.26E+11	1.98E+11	2.70E+11	3.69E+11	5.79E+11
2	2.14E+11	1.10E+22	1.05E+11	25.981	0.46346	8.96E+10	1.41E+11	1.92E+11	2.63E+11	4.12E+11
3	4.87E+11	5.68E+22	2.38E+11	26.805	0.46323	2.04E+11	3.20E+11	4.38E+11	5.98E+11	9.38E+11
4	4.21E+11	4.23E+22	2.06E+11	26.658	0.46301	1.76E+11	2.77E+11	3.78E+11	5.16E+11	8.09E+11
5	4.58E+10	5.04E+20	2.24E+10	24.44	0.46396	1.92E+10	3.01E+10	4.11E+10	5.62E+10	8.82E+10
6	2.30E+11	1.26E+22	1.12E+11	26.053	0.46281	9.64E+10	1.51E+11	2.06E+11	2.82E+11	4.42E+11
7	2.18E+10	1.14E+20	1.07E+10	23.697	0.4637	9.13E+09	1.43E+10	1.96E+10	2.67E+10	4.20E+10
8	1.55E+11	5.71E+21	7.55E+10	25.658	0.46252	6.49E+10	1.02E+11	1.39E+11	1.90E+11	2.97E+11
9	1.18E+10	3.33E+19	5.77E+09	23.084	0.46312	4.95E+09	7.76E+09	1.06E+10	1.45E+10	2.27E+10
10	1.46E+11	5.14E+21	7.17E+10	25.602	0.46358	6.13E+10	9.62E+10	1.32E+11	1.80E+11	2.82E+11
11	1.19E+11	3.38E+21	5.82E+10	25.394	0.46334	4.98E+10	7.81E+10	1.07E+11	1.46E+11	2.29E+11
12	4.52E+08	4.90E+16	2.21E+08	19.821	0.46396	1.89E+08	2.97E+08	4.06E+08	5.55E+08	8.70E+08
13	4.76E+10	5.41E+20	2.33E+10	24.479	0.46281	2.00E+10	3.13E+10	4.27E+10	5.84E+10	9.15E+10
14	3.79E+11	3.44E+22	1.85E+11	26.553	0.46312	1.59E+11	2.49E+11	3.40E+11	4.65E+11	7.29E+11
15	3.53E+11	2.97E+22	1.72E+11	26.481	0.46312	1.48E+11	2.32E+11	3.17E+11	4.33E+11	6.79E+11
16	3.68E+11	3.24E+22	1.80E+11	26.523	0.46334	1.54E+11	2.42E+11	3.30E+11	4.51E+11	7.08E+11
17	2.48E+11	1.47E+22	1.21E+11	26.13	0.46291	1.04E+11	1.63E+11	2.23E+11	3.04E+11	4.77E+11
18	1.15E+11	3.17E+21	5.63E+10	25.361	0.46334	4.82E+10	7.56E+10	1.03E+11	1.41E+11	2.21E+11
19	1.05E+10	2.65E+19	5.15E+09	22.968	0.46396	4.40E+09	6.91E+09	9.44E+09	1.29E+10	2.03E+10
20	2.10E+11	1.06E+22	1.03E+11	25.965	0.46271	8.83E+10	1.38E+11	1.89E+11	2.58E+11	4.05E+11
21	4.85E+10	5.65E+20	2.38E+10	24.498	0.4637	2.03E+10	3.19E+10	4.36E+10	5.96E+10	9.34E+10
22	5.39E+10	6.97E+20	2.64E+10	24.604	0.46334	2.26E+10	3.55E+10	4.85E+10	6.62E+10	1.04E+11
23	1.97E+10	9.34E+19	9.67E+09	23.598	0.4637	8.27E+09	1.30E+10	1.77E+10	2.42E+10	3.80E+10
24	3.51E+10	2.94E+20	1.72E+10	24.173	0.46346	1.47E+10	2.30E+10	3.15E+10	4.30E+10	6.75E+10
25	2.92E+10	2.05E+20	1.43E+10	23.991	0.46358	1.22E+10	1.92E+10	2.62E+10	3.59E+10	5.63E+10
26	5.49E+10	7.24E+20	2.69E+10	24.622	0.4637	2.30E+10	3.61E+10	4.93E+10	6.74E+10	1.06E+11
27	2.69E+11	1.73E+22	1.32E+11	26.211	0.46291	1.13E+11	1.77E+11	2.42E+11	3.30E+11	5.18E+11
28	1.68E+11	6.71E+21	8.19E+10	25.738	0.46271	7.04E+10	1.10E+11	1.51E+11	2.06E+11	3.22E+11
29	3.83E+10	3.51E+20	1.87E+10	24.26	0.46346	1.60E+10	2.51E+10	3.44E+10	4.70E+10	7.36E+10
30	4.61E+09	5.07E+18	2.25E+09	22.143	0.46301	1.93E+09	3.03E+09	4.14E+09	5.65E+09	8.86E+09
31	6.53E+09	1.02E+19	3.19E+09	22.492	0.46291	2.74E+09	4.29E+09	5.86E+09	8.01E+09	1.26E+10
32	5.50E+10	7.26E+20	2.69E+10	24.623	0.4637	2.30E+10	3.61E+10	4.94E+10	6.75E+10	1.06E+11
33	6.78E+10	1.10E+21	3.32E+10	24.832	0.46346	2.84E+10	4.45E+10	6.09E+10	8.32E+10	1.30E+11
34	9.64E+10	2.22E+21	4.72E+10	25.185	0.46323	4.04E+10	6.34E+10	8.66E+10	1.18E+11	1.86E+11
35	3.34E+10	2.68E+20	1.64E+10	24.126	0.46323	1.40E+10	2.20E+10	3.00E+10	4.10E+10	6.44E+10
36	3.63E+10	3.16E+20	1.78E+10	24.207	0.46383	1.52E+10	2.38E+10	3.26E+10	4.46E+10	6.99E+10
37	4.39E+10	4.61E+20	2.15E+10	24.397	0.46358	1.84E+10	2.88E+10	3.94E+10	5.38E+10	8.45E+10
38	8.51E+10	1.73E+21	4.16E+10	25.06	0.46301	3.57E+10	5.60E+10	7.65E+10	1.04E+11	1.64E+11
39	4.73E+10	5.36E+20	2.32E+10	24.472	0.46358	1.98E+10	3.11E+10	4.25E+10	5.81E+10	9.11E+10
40	9.27E+10	2.06E+21	4.53E+10	25.145	0.46312	3.89E+10	6.09E+10	8.33E+10	1.14E+11	1.78E+11
41	8.91E+10	1.90E+21	4.36E+10	25.106	0.46301	3.74E+10	5.86E+10	8.01E+10	1.09E+11	1.71E+11
42	3.49E+10	2.91E+20	1.71E+10	24.167	0.46312	1.46E+10	2.29E+10	3.13E+10	4.28E+10	6.71E+10
43	1.37E+10	4.50E+19	6.71E+09	23.234	0.46346	5.75E+09	9.01E+09	1.23E+10	1.68E+10	2.64E+10
44	6.39E+09	9.73E+18	3.12E+09	22.471	0.46252	2.68E+09	4.20E+09	5.74E+09	7.84E+09	1.23E+10
45	1.84E+11	8.05E+21	8.97E+10	25.828	0.46291	7.70E+10	1.21E+11	1.65E+11	2.25E+11	3.53E+11
46	7.60E+10	1.38E+21	3.71E+10	24.946	0.46281	3.19E+10	5.00E+10	6.82E+10	9.32E+10	1.46E+11
47	1.45E+10	5.03E+19	7.09E+09	23.291	0.46301	6.08E+09	9.54E+09	1.30E+10	1.78E+10	2.79E+10

48	1.05E+11	2.64E+21	5.14E+10	25.268	0.46383	4.39E+10	6.89E+10	9.42E+10	1.29E+11	2.02E+11
49	9.62E+10	2.22E+21	4.71E+10	25.182	0.46358	4.03E+10	6.32E+10	8.64E+10	1.18E+11	1.85E+11
50	1.93E+11	8.86E+21	9.41E+10	25.877	0.46271	8.08E+10	1.27E+11	1.73E+11	2.36E+11	3.70E+11
51	6.07E+10	8.79E+20	2.96E+10	24.722	0.46261	2.55E+10	3.99E+10	5.45E+10	7.45E+10	1.17E+11
52	5.72E+10	7.85E+20	2.80E+10	24.663	0.46358	2.40E+10	3.76E+10	5.14E+10	7.03E+10	1.10E+11
53	9.48E+10	2.15E+21	4.63E+10	25.168	0.46281	3.98E+10	6.23E+10	8.52E+10	1.16E+11	1.82E+11
54	5.17E+10	6.39E+20	2.53E+10	24.562	0.46281	2.17E+10	3.40E+10	4.65E+10	6.35E+10	9.95E+10
55	5.91E+09	8.35E+18	2.89E+09	22.394	0.46271	2.48E+09	3.89E+09	5.31E+09	7.26E+09	1.14E+10
56	1.85E+11	8.18E+21	9.04E+10	25.834	0.46383	7.73E+10	1.21E+11	1.66E+11	2.27E+11	3.56E+11
57	1.97E+10	9.30E+19	9.65E+09	23.599	0.46252	8.29E+09	1.30E+10	1.77E+10	2.42E+10	3.80E+10
58	8.48E+11	1.73E+23	4.16E+11	27.359	0.4637	3.55E+11	5.57E+11	7.62E+11	1.04E+12	1.63E+12
59	1.25E+10	3.76E+19	6.13E+09	23.143	0.46346	5.25E+09	8.23E+09	1.12E+10	1.54E+10	2.41E+10
60	1.12E+11	3.02E+21	5.50E+10	25.338	0.46334	4.71E+10	7.39E+10	1.01E+11	1.38E+11	2.16E+11
61	1.31E+11	4.10E+21	6.40E+10	25.491	0.46312	5.49E+10	8.61E+10	1.18E+11	1.61E+11	2.52E+11
62	3.87E+10	3.57E+20	1.89E+10	24.271	0.46261	1.62E+10	2.54E+10	3.47E+10	4.74E+10	7.43E+10
63	5.55E+10	7.34E+20	2.71E+10	24.632	0.46261	2.33E+10	3.65E+10	4.98E+10	6.81E+10	1.07E+11
64	2.89E+11	2.00E+22	1.41E+11	26.284	0.46291	1.21E+11	1.90E+11	2.60E+11	3.55E+11	5.57E+11
65	1.43E+12	4.88E+23	6.98E+11	27.879	0.46346	5.98E+11	9.37E+11	1.28E+12	1.75E+12	2.75E+12
66	4.77E+09	5.45E+18	2.33E+09	22.178	0.46346	2.00E+09	3.13E+09	4.28E+09	5.85E+09	9.18E+09
67	4.32E+11	4.46E+22	2.11E+11	26.685	0.46271	1.81E+11	2.84E+11	3.88E+11	5.30E+11	8.31E+11
68	1.39E+09	4.64E+17	6.81E+08	20.946	0.46346	5.83E+08	9.14E+08	1.25E+09	1.71E+09	2.68E+09
69	5.04E+10	6.09E+20	2.47E+10	24.537	0.46346	2.11E+10	3.31E+10	4.53E+10	6.19E+10	9.71E+10
70	5.73E+09	7.87E+18	2.81E+09	22.361	0.4637	2.40E+09	3.76E+09	5.15E+09	7.03E+09	1.10E+10
71	3.11E+10	2.32E+20	1.52E+10	24.053	0.46358	1.30E+10	2.04E+10	2.79E+10	3.82E+10	5.99E+10
72	1.41E+11	4.73E+21	6.88E+10	25.564	0.46252	5.91E+10	9.27E+10	1.27E+11	1.73E+11	2.71E+11
73	4.86E+10	5.64E+20	2.37E+10	24.499	0.46281	2.04E+10	3.20E+10	4.36E+10	5.96E+10	9.35E+10
74	1.08E+11	2.78E+21	5.27E+10	25.297	0.46281	4.52E+10	7.09E+10	9.69E+10	1.32E+11	2.07E+11
75	1.13E+11	3.06E+21	5.53E+10	25.346	0.46261	4.75E+10	7.45E+10	1.02E+11	1.39E+11	2.18E+11
76	1.33E+12	4.23E+23	6.50E+11	27.809	0.46323	5.57E+11	8.74E+11	1.19E+12	1.63E+12	2.56E+12
77	2.02E+11	9.71E+21	9.86E+10	25.923	0.46271	8.47E+10	1.33E+11	1.81E+11	2.48E+11	3.88E+11
78	3.47E+10	2.88E+20	1.70E+10	24.164	0.46271	1.46E+10	2.29E+10	3.12E+10	4.26E+10	6.68E+10
79	1.55E+12	5.76E+23	7.59E+11	27.964	0.46291	6.52E+11	1.02E+12	1.40E+12	1.91E+12	2.99E+12
80	4.56E+10	4.98E+20	2.23E+10	24.437	0.46291	1.91E+10	3.00E+10	4.10E+10	5.60E+10	8.78E+10
81	8.39E+10	1.68E+21	4.10E+10	25.045	0.46291	3.52E+10	5.52E+10	7.54E+10	1.03E+11	1.61E+11
82	1.31E+12	4.10E+23	6.40E+11	27.794	0.46271	5.50E+11	8.62E+11	1.18E+12	1.61E+12	2.52E+12
83	2.14E+10	1.10E+20	1.05E+10	23.68	0.46301	8.98E+09	1.41E+10	1.92E+10	2.63E+10	4.12E+10
84	9.67E+09	2.24E+19	4.73E+09	22.885	0.46301	4.06E+09	6.36E+09	8.69E+09	1.19E+10	1.86E+10
85	7.94E+09	1.51E+19	3.89E+09	22.688	0.46334	3.33E+09	5.22E+09	7.13E+09	9.75E+09	1.53E+10
86	8.51E+09	1.73E+19	4.16E+09	22.757	0.46323	3.57E+09	5.59E+09	7.64E+09	1.04E+10	1.64E+10
87	1.71E+10	6.96E+19	8.34E+09	23.452	0.46323	7.15E+09	1.12E+10	1.53E+10	2.09E+10	3.28E+10
88	8.03E+09	1.54E+19	3.93E+09	22.699	0.46346	3.36E+09	5.28E+09	7.21E+09	9.85E+09	1.55E+10
89	1.20E+10	3.48E+19	5.90E+09	23.105	0.46346	5.05E+09	7.92E+09	1.08E+10	1.48E+10	2.32E+10
90	4.79E+09	5.48E+18	2.34E+09	22.182	0.46301	2.01E+09	3.15E+09	4.30E+09	5.88E+09	9.22E+09
91	4.30E+09	4.42E+18	2.10E+09	22.074	0.46323	1.80E+09	2.82E+09	3.86E+09	5.27E+09	8.27E+09
92	3.02E+09	2.19E+18	1.48E+09	21.721	0.46346	1.27E+09	1.99E+09	2.71E+09	3.71E+09	5.81E+09
93	8.45E+11	1.71E+23	4.14E+11	27.355	0.46383	3.54E+11	5.55E+11	7.59E+11	1.04E+12	1.63E+12
94	4.66E+11	5.18E+22	2.28E+11	26.76	0.46271	1.96E+11	3.06E+11	4.19E+11	5.72E+11	8.96E+11
95	2.75E+10	1.81E+20	1.35E+10	23.932	0.46281	1.16E+10	1.81E+10	2.47E+10	3.38E+10	5.30E+10
96	1.55E+12	5.75E+23	7.58E+11	27.963	0.46271	6.51E+11	1.02E+12	1.39E+12	1.90E+12	2.98E+12
97	7.21E+10	1.24E+21	3.53E+10	24.895	0.46312	3.02E+10	4.74E+10	6.48E+10	8.85E+10	1.39E+11
98	5.28E+10	6.67E+20	2.58E+10	24.582	0.46334	2.21E+10	3.47E+10	4.74E+10	6.48E+10	1.02E+11
99	6.67E+10	1.06E+21	3.26E+10	24.816	0.46291	2.80E+10	4.39E+10	5.99E+10	8.19E+10	1.28E+11

100	1.84E+10	8.11E+19	9.01E+09	23.53	0.46301	7.73E+09	1.21E+10	1.65E+10	2.26E+10	3.54E+10
101	2.57E+09	1.58E+18	1.26E+09	21.561	0.46281	1.08E+09	1.69E+09	2.31E+09	3.16E+09	4.95E+09
102	3.12E+11	2.33E+22	1.53E+11	26.359	0.4637	1.31E+11	2.05E+11	2.80E+11	3.83E+11	6.01E+11
103	7.22E+11	1.25E+23	3.53E+11	27.198	0.46334	3.03E+11	4.75E+11	6.48E+11	8.86E+11	1.39E+12
104	5.79E+11	8.02E+22	2.83E+11	26.978	0.46312	2.43E+11	3.81E+11	5.20E+11	7.11E+11	1.11E+12
105	7.08E+11	1.20E+23	3.46E+11	27.178	0.46291	2.97E+11	4.65E+11	6.36E+11	8.69E+11	1.36E+12
106	1.57E+11	5.91E+21	7.69E+10	25.672	0.4637	6.58E+10	1.03E+11	1.41E+11	1.93E+11	3.02E+11
107	9.33E+10	2.09E+21	4.57E+10	25.151	0.46383	3.91E+10	6.13E+10	8.38E+10	1.15E+11	1.80E+11
108	2.59E+10	1.61E+20	1.27E+10	23.869	0.46396	1.08E+10	1.70E+10	2.32E+10	3.18E+10	4.99E+10
109	2.83E+10	1.92E+20	1.39E+10	23.96	0.46358	1.19E+10	1.86E+10	2.54E+10	3.48E+10	5.45E+10
110	1.53E+10	5.60E+19	7.48E+09	23.342	0.4637	6.40E+09	1.00E+10	1.37E+10	1.88E+10	2.94E+10
111	1.38E+11	4.58E+21	6.76E+10	25.544	0.4637	5.78E+10	9.07E+10	1.24E+11	1.70E+11	2.66E+11
112	1.99E+11	9.50E+21	9.75E+10	25.91	0.46334	8.35E+10	1.31E+11	1.79E+11	2.44E+11	3.83E+11
113	3.67E+11	3.24E+22	1.80E+11	26.522	0.46358	1.54E+11	2.41E+11	3.30E+11	4.51E+11	7.08E+11
114	1.10E+11	2.88E+21	5.37E+10	25.312	0.4637	4.59E+10	7.20E+10	9.84E+10	1.34E+11	2.11E+11
115	1.59E+11	6.03E+21	7.76E+10	25.682	0.46358	6.64E+10	1.04E+11	1.42E+11	1.95E+11	3.05E+11
116	2.42E+09	1.40E+18	1.18E+09	21.499	0.46301	1.01E+09	1.59E+09	2.17E+09	2.97E+09	4.65E+09
117	2.23E+09	1.19E+18	1.09E+09	21.418	0.46281	9.36E+08	1.47E+09	2.00E+09	2.74E+09	4.29E+09
118	1.68E+10	6.72E+19	8.20E+09	23.436	0.46271	7.04E+09	1.10E+10	1.51E+10	2.06E+10	3.23E+10
119	1.99E+11	9.45E+21	9.72E+10	25.909	0.46281	8.34E+10	1.31E+11	1.79E+11	2.44E+11	3.83E+11
120	2.97E+11	2.11E+22	1.45E+11	26.311	0.46301	1.25E+11	1.96E+11	2.67E+11	3.65E+11	5.72E+11
121	2.16E+11	1.12E+22	1.06E+11	25.993	0.46334	9.07E+10	1.42E+11	1.94E+11	2.66E+11	4.17E+11
122	4.80E+10	5.49E+20	2.34E+10	24.487	0.46252	2.02E+10	3.16E+10	4.31E+10	5.89E+10	9.23E+10
123	3.69E+11	3.26E+22	1.81E+11	26.526	0.46383	1.54E+11	2.42E+11	3.31E+11	4.53E+11	7.10E+11
124	3.02E+10	2.19E+20	1.48E+10	24.025	0.46312	1.27E+10	1.99E+10	2.72E+10	3.71E+10	5.82E+10
125	3.22E+09	2.48E+18	1.58E+09	21.787	0.46301	1.35E+09	2.12E+09	2.90E+09	3.96E+09	6.20E+09
126	1.03E+11	2.55E+21	5.05E+10	25.254	0.46312	4.33E+10	6.79E+10	9.28E+10	1.27E+11	1.99E+11
127	1.53E+11	5.57E+21	7.47E+10	25.644	0.46323	6.40E+10	1.00E+11	1.37E+11	1.87E+11	2.94E+11
128	1.30E+11	4.05E+21	6.36E+10	25.484	0.46312	5.46E+10	8.55E+10	1.17E+11	1.60E+11	2.50E+11
129	1.36E+10	4.45E+19	6.67E+09	23.229	0.46323	5.72E+09	8.97E+09	1.23E+10	1.67E+10	2.63E+10
130	1.34E+11	4.27E+21	6.53E+10	25.511	0.46301	5.60E+10	8.78E+10	1.20E+11	1.64E+11	2.57E+11
131	3.60E+10	3.10E+20	1.76E+10	24.199	0.46323	1.51E+10	2.37E+10	3.23E+10	4.42E+10	6.93E+10
132	1.82E+11	7.92E+21	8.90E+10	25.82	0.46301	7.63E+10	1.20E+11	1.64E+11	2.23E+11	3.50E+11
133	6.54E+10	1.03E+21	3.20E+10	24.797	0.46358	2.74E+10	4.30E+10	5.88E+10	8.03E+10	1.26E+11
134	2.71E+10	1.75E+20	1.32E+10	23.915	0.46312	1.14E+10	1.78E+10	2.43E+10	3.32E+10	5.21E+10
135	9.20E+10	2.03E+21	4.50E+10	25.138	0.46334	3.86E+10	6.05E+10	8.26E+10	1.13E+11	1.77E+11
136	1.44E+11	4.94E+21	7.03E+10	25.583	0.46334	6.02E+10	9.44E+10	1.29E+11	1.76E+11	2.76E+11
137	1.61E+11	6.19E+21	7.87E+10	25.695	0.46358	6.73E+10	1.06E+11	1.44E+11	1.97E+11	3.09E+11
138	4.60E+09	5.08E+18	2.25E+09	22.142	0.46396	1.93E+09	3.02E+09	4.13E+09	5.65E+09	8.86E+09
139	1.86E+11	8.31E+21	9.12E+10	25.843	0.46358	7.80E+10	1.22E+11	1.67E+11	2.29E+11	3.59E+11
140	1.04E+11	2.59E+21	5.09E+10	25.259	0.46383	4.35E+10	6.83E+10	9.33E+10	1.28E+11	2.00E+11
141	1.62E+10	6.28E+19	7.92E+09	23.4	0.46346	6.78E+09	1.06E+10	1.45E+10	1.99E+10	3.12E+10
142	1.59E+11	6.08E+21	7.80E+10	25.685	0.46383	6.66E+10	1.05E+11	1.43E+11	1.95E+11	3.06E+11
143	3.84E+10	3.54E+20	1.88E+10	24.264	0.46383	1.61E+10	2.52E+10	3.45E+10	4.72E+10	7.40E+10
144	4.60E+09	5.04E+18	2.24E+09	22.142	0.46235	1.93E+09	3.03E+09	4.13E+09	5.64E+09	8.84E+09
P.P.C.	2.46E+13	1.45E+26	1.20E+13			1.03E+13	1.62E+13	2.21E+13	3.02E+13	4.74E+13

Table 12. List of sub-plays in the Frontier transition play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :	Kmv Overpressured					*a* =	0.52	0.014	0	(Panel 1)
						b =	14.7	505	1.2	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	7.38	450	7	100	50	13,000	6774.7	687	1.2	9.40E+11
2	43.67	450	7	100	50	13,500	7034.7	694	1.2	5.72E+12
3	19.01	425	7	100	50	15,500	8074.7	722	1.2	2.59E+12
4	19.23	375	7	100	50	14,000	7294.7	701	1.2	2.15E+12
5	88.88	375	7	100	50	15,500	8074.7	722	1.2	1.07E+13
6	18.6	425	7	100	50	16,500	8594.7	736	1.2	2.65E+12
7	0.6	400	7	100	50	13,500	7034.7	694	1.2	6.98E+10
8	69.71	375	7	100	50	16,500	8594.7	736	1.2	8.76E+12
9	18.05	425	7	100	50	17,500	9114.7	750	1.2	2.68E+12
10	16.31	400	7	100	50	17,000	8854.7	743	1.2	2.23E+12
Total =	301.44								Total =	3.85E+13

Table 13. List of sub-plays in the Mesaverde overpressured play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Kmv Overpressured								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe/TZ*	
	Range (%) =	30		30	50	30	20	40		
Subplay No.	Expect *Pe/TZ*	F95 D. *Pe/TZ*	F5 D. *Pe/TZ*	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect *(Pe/TZ)*^2	Expect (Gas)^2
1	8.22	7.28	9.09	54.92	207177.1	49.41	10037.0	2536.95	67.83	9.41E+23
2	8.45	7.49	9.33	1922.93	207177.1	49.41	10037.0	2536.95	71.67	3.48E+25
3	9.32	8.30	10.25	364.38	184796.8	49.41	10037.0	2536.95	87.21	7.16E+24
4	8.67	7.70	9.57	372.87	143873.0	49.41	10037.0	2536.95	75.52	4.94E+24
5	9.32	8.30	10.25	7965.34	143873.0	49.41	10037.0	2536.95	87.21	1.22E+26
6	9.73	8.68	10.69	348.84	184796.8	49.41	10037.0	2536.95	95.07	7.47E+24
7	8.45	7.49	9.33	0.36	163695.5	49.41	10037.0	2536.95	71.67	5.19E+21
8	9.73	8.68	10.69	4899.89	143873.0	49.41	10037.0	2536.95	95.07	8.17E+25
9	10.13	9.05	11.10	328.51	184796.8	49.41	10037.0	2536.95	102.95	7.62E+24
10	9.93	8.87	10.89	268.23	163695.5	49.41	10037.0	2536.95	99.01	5.30E+24

Table 14. List of sub-plays in the Mesaverde overpressured play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :	Kmv Overpressured									(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	9.40E+11	5.67E+22	2.38E+11	27.538	0.24945	6.05E+11	7.70E+11	9.11E+11	1.08E+12	1.37E+12
2	5.72E+12	2.10E+24	1.45E+12	29.344	0.24928	3.68E+12	4.69E+12	5.54E+12	6.56E+12	8.35E+12
3	2.59E+12	4.29E+23	6.55E+11	28.553	0.24862	1.67E+12	2.13E+12	2.51E+12	2.97E+12	3.79E+12
4	2.15E+12	2.97E+23	5.45E+11	28.367	0.24911	1.39E+12	1.77E+12	2.09E+12	2.47E+12	3.15E+12
5	1.07E+13	7.30E+24	2.70E+12	29.97	0.24862	6.89E+12	8.77E+12	1.04E+13	1.23E+13	1.56E+13
6	2.65E+12	4.47E+23	6.68E+11	28.575	0.24832	1.71E+12	2.17E+12	2.57E+12	3.04E+12	3.87E+12
7	6.98E+10	3.13E+20	1.77E+10	24.938	0.24928	4.49E+10	5.72E+10	6.77E+10	8.01E+10	1.02E+11
8	8.76E+12	4.88E+24	2.21E+12	29.771	0.24832	5.65E+12	7.19E+12	8.50E+12	1.00E+13	1.28E+13
9	2.68E+12	4.54E+23	6.74E+11	28.585	0.24803	1.73E+12	2.20E+12	2.60E+12	3.07E+12	3.90E+12
10	2.23E+12	3.16E+23	5.63E+11	28.403	0.24817	1.44E+12	1.83E+12	2.16E+12	2.56E+12	3.26E+12
P.P.C.	3.85E+13	9.45E+25	9.72E+12			2.48E+13	3.16E+13	3.73E+13	4.41E+13	5.62E+13

Table 15. List of sub-plays in the Mesaverde overpressured play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :		Kmv Transition				a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.91	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	53.44	450	7	30	50	5,000	1764.7	575	0.91	8.38E+11
2	75.33	450	7	30	50	7,000	2464.7	603	0.91	1.57E+12
3	51.58	450	7	50	50	8,000	2814.7	617	0.91	2.00E+12
4	25.16	450	7	50	50	9,000	3164.7	631	0.91	1.07E+12
5	19.68	450	7	50	50	10,000	3514.7	645	0.91	9.13E+11
6	13.05	375	7	30	50	5,000	1764.7	575	0.91	1.71E+11
7	8.86	475	7	50	50	10,500	3689.7	652	0.91	4.51E+11
8	4.92	400	7	30	50	5,500	1939.7	582	0.91	7.45E+10
9	3.5	525	7	50	50	10,500	3689.7	652	0.91	1.97E+11
10	19.81	425	7	30	50	6,000	2114.7	589	0.91	3.43E+11
11	6.08	525	7	50	50	10,000	3514.7	645	0.91	3.29E+11
12	7.41	525	7	50	50	9,000	3164.7	631	0.91	3.69E+11
13	1.93	525	7	50	50	8,000	2814.7	617	0.91	8.75E+10
14	0.96	525	7	50	50	7,000	2464.7	603	0.91	3.90E+10
15	5.83	525	7	50	50	8,500	2989.7	624	0.91	2.78E+11
16	0.46	525	7	50	50	6,500	2289.7	596	0.91	1.76E+10
17	0.05	500	7	50	50	8,500	2989.7	624	0.91	2.27E+09
18	1.04	450	7	50	50	6,000	2114.7	589	0.91	3.18E+10
19	1.32	450	7	50	50	7,000	2464.7	603	0.91	4.60E+10
20	0.46	425	7	50	50	5,500	1939.7	582	0.91	1.23E+10
21	7.39	350	7	50	50	8,000	2814.7	617	0.91	2.23E+11
22	10.08	350	7	30	50	7,000	2464.7	603	0.91	1.64E+11
23	1.27	350	7	50	50	7,000	2464.7	603	0.91	3.44E+10
24	3.58	350	7	50	50	8,500	2989.7	624	0.91	1.14E+11
25	1.44	350	7	50	50	6,000	2114.7	589	0.91	3.42E+10
26	0.5	350	7	50	50	5,000	1764.7	575	0.91	1.02E+10
27	2.04	400	7	30	50	6,500	2289.7	596	0.91	3.56E+10
28	15.49	275	7	50	50	9,000	3164.7	631	0.91	4.04E+11
29	11.61	350	7	30	50	6,000	2114.7	589	0.91	1.66E+11
30	6.21	275	7	50	50	8,000	2814.7	617	0.91	1.47E+11
31	2.73	275	7	50	50	8,000	2814.7	617	0.91	6.48E+10
32	1.82	275	7	50	50	7,000	2464.7	603	0.91	3.87E+10
33	0.87	275	7	50	50	6,000	2114.7	589	0.91	1.63E+10
34	0.05	400	7	30	50	6,500	2289.7	596	0.91	8.73E+08
35	14.88	275	7	50	50	10,000	3514.7	645	0.91	4.22E+11
36	8.85	275	7	30	50	6,000	2114.7	589	0.91	9.92E+10
37	0.08	400	7	30	50	5,500	1939.7	582	0.91	1.21E+09
38	2.86	425	7	20	50	5,500	1939.7	582	0.91	3.07E+10
39	0.48	400	7	20	50	5,500	1939.7	582	0.91	4.84E+09
40	3.15	275	7	30	50	7,000	2464.7	603	0.91	4.02E+10
41	2.9	425	7	30	50	6,500	2289.7	596	0.91	5.38E+10
42	4.48	350	7	30	50	7,000	2464.7	603	0.91	7.28E+10
43	8.31	275	7	70	50	11,000	3864.7	659	0.91	3.55E+11
44	0.13	400	7	20	50	5,500	1939.7	582	0.91	1.31E+09
45	7.28	425	7	30	50	7,000	2464.7	603	0.91	1.44E+11
46	2.02	350	7	50	50	8,000	2814.7	617	0.91	6.10E+10
47	0.94	400	7	20	50	6,500	2289.7	596	0.91	1.09E+10

48	3.55	375	7	20	50	5,500	1939.7	582	0.91	3.36E+10
49	9.09	375	7	20	50	6,000	2114.7	589	0.91	9.27E+10
50	2.12	350	7	50	50	9,000	3164.7	631	0.91	7.04E+10
51	10.79	350	7	20	50	5,500	1939.7	582	0.91	9.53E+10
52	9.12	425	7	50	50	8,000	2814.7	617	0.91	3.35E+11
53	3.07	300	7	70	50	11,500	4039.7	666	0.91	1.48E+11
54	11.2	375	7	20	50	7,000	2464.7	603	0.91	1.30E+11
55	3.2	350	7	50	50	10,000	3514.7	645	0.91	1.16E+11
56	11.27	425	7	50	50	9,000	3164.7	631	0.91	4.55E+11
57	2.89	375	7	30	50	7,000	2464.7	603	0.91	5.03E+10
58	1.95	350	7	70	50	11,000	3864.7	659	0.91	1.06E+11
59	9.65	350	7	70	50	12,000	4214.7	673	0.91	5.60E+11
60	3.98	350	7	70	50	11,000	3864.7	659	0.91	2.16E+11
61	11.37	350	7	20	50	6,500	2289.7	596	0.91	1.16E+11
62	5.53	350	7	70	50	12,500	4389.7	680	0.91	3.31E+11
63	6.88	375	7	50	50	8,000	2814.7	617	0.91	2.23E+11
64	1.04	400	7	20	50	7,500	2639.7	610	0.91	1.36E+10
65	8.7	425	7	50	50	10,000	3514.7	645	0.91	3.81E+11
66	0.94	400	7	50	50	8,500	2989.7	624	0.91	3.41E+10
67	6.49	425	7	70	50	11,000	3864.7	659	0.91	4.29E+11
68	9.29	350	7	70	50	7,500	2639.7	610	0.91	3.73E+11
69	5.92	425	7	50	50	12,000	4214.7	673	0.91	2.98E+11
70	0.01	400	7	70	50	10,500	3689.7	652	0.91	6.00E+08
71	15.93	425	7	70	50	12,500	4389.7	680	0.91	1.16E+12
72	3	425	7	70	50	10,500	3689.7	652	0.91	1.91E+11
73	2.02	425	7	50	50	11,000	3864.7	659	0.91	9.53E+10
74	2.26	425	7	50	50	12,000	4214.7	673	0.91	1.14E+11
75	0.16	400	7	20	50	7,500	2639.7	610	0.91	2.10E+09
76	0.94	400	7	20	50	8,000	2814.7	617	0.91	1.30E+10
77	7.03	375	7	20	50	8,000	2814.7	617	0.91	9.10E+10
78	2.24	400	7	50	50	8,000	2814.7	617	0.91	7.74E+10
79	9.26	375	7	20	50	8,500	2989.7	624	0.91	1.26E+11
80	6.51	375	7	50	50	8,000	2814.7	617	0.91	2.11E+11
81	13	375	7	20	50	9,000	3164.7	631	0.91	1.85E+11
82	13.94	375	7	50	50	9,000	3164.7	631	0.91	4.96E+11
83	22.91	375	7	50	50	10,000	3514.7	645	0.91	8.86E+11
84	10.58	375	7	70	50	11,000	3864.7	659	0.91	6.17E+11
85	12.69	375	7	70	50	12,000	4214.7	673	0.91	7.90E+11
86	14.3	375	7	70	50	12,500	4389.7	680	0.91	9.17E+11
87	9.4	375	7	20	50	9,500	3339.7	638	0.91	1.40E+11
88	0.66	375	7	70	50	10,500	3689.7	652	0.91	3.71E+10
89	1.53	375	7	70	50	11,000	3864.7	659	0.91	8.92E+10
90	10.83	400	7	50	50	10,000	3514.7	645	0.91	4.47E+11
91	2.22	400	7	20	50	7,500	2639.7	610	0.91	2.91E+10
92	3.54	400	7	50	50	10,500	3689.7	652	0.91	1.52E+11
93	0.69	400	7	20	50	7,500	2639.7	610	0.91	9.04E+09
94	13.4	450	7	70	50	11,000	3864.7	659	0.91	9.37E+11
95	19.85	450	7	50	50	10,000	3514.7	645	0.91	9.21E+11
96	3.48	400	7	20	50	8,500	2989.7	624	0.91	5.05E+10
97	8.89	425	7	20	50	9,500	3339.7	638	0.91	1.50E+11
98	67.95	450	7	50	50	10,500	3689.7	652	0.91	3.28E+12
99	7.37	400	7	20	50	8,500	2989.7	624	0.91	1.07E+11

100	3.11	400	7	70	50	11,500	4039.7	666	0.91	2.00E+11
101	11.75	450	7	50	50	10,500	3689.7	652	0.91	5.66E+11
102	53.25	475	7	50	50	11,500	4039.7	666	0.91	2.90E+12
103	8.11	400	7	20	50	9,500	3339.7	638	0.91	1.29E+11
104	2.25	450	7	50	50	11,000	3864.7	659	0.91	1.12E+11
105	3.03	400	7	50	50	9,500	3339.7	638	0.91	1.20E+11
106	33.71	450	7	70	50	12,500	4389.7	680	0.91	2.59E+12
107	0.67	450	7	50	50	9,500	3339.7	638	0.91	2.99E+10
108	6.6	525	7	50	50	10,000	3514.7	645	0.91	3.57E+11
109	0.17	400	7	20	50	10,000	3514.7	645	0.91	2.81E+09
110	0.81	500	7	50	50	9,500	3339.7	638	0.91	4.01E+10
111	2.28	500	7	50	50	10,500	3689.7	652	0.91	1.22E+11
112	3.66	450	7	50	50	10,000	3514.7	645	0.91	1.70E+11
113	22.84	425	7	20	50	9,500	3339.7	638	0.91	3.85E+11
114	0.29	425	7	20	50	8,000	2814.7	617	0.91	4.26E+09
115	7.67	425	7	20	50	8,500	2989.7	624	0.91	1.18E+11
116	0.04	500	7	50	50	10,500	3689.7	652	0.91	2.14E+09
117	26.68	325	7	20	50	8,500	2989.7	624	0.91	3.15E+11
118	44.25	550	7	70	50	13,000	4564.7	687	0.91	4.28E+12
119	65.54	350	7	20	50	9,500	3339.7	638	0.91	9.09E+11
120	0.66	425	7	70	50	13,500	4739.7	694	0.91	5.08E+10
121	12.4	575	7	50	50	12,000	4214.7	673	0.91	8.45E+11
122	0.62	300	7	20	50	8,000	2814.7	617	0.91	6.42E+09
123	1.82	400	7	70	50	13,500	4739.7	694	0.91	1.32E+11
124	56.12	400	7	70	50	14,500	5089.7	708	0.91	4.28E+12
125	18.65	375	7	50	50	10,000	3514.7	645	0.91	7.21E+11
126	2.53	300	7	20	50	8,000	2814.7	617	0.91	2.62E+10
127	1.05	300	7	20	50	8,000	2814.7	617	0.91	1.09E+10
128	34.23	450	7	70	50	13,500	4739.7	694	0.91	2.79E+12
129	3.25	300	7	20	50	8,000	2814.7	617	0.91	3.37E+10
130	36.04	625	7	50	50	12,000	4214.7	673	0.91	2.67E+12
131	3.35	600	7	70	50	12,500	4389.7	680	0.91	3.44E+11
132	12.42	275	7	20	50	7,500	2639.7	610	0.91	1.12E+11
133	53.44	550	7	50	50	11,000	3864.7	659	0.91	3.26E+12
134	24.59	625	7	50	50	11,500	4039.7	666	0.91	1.76E+12
135	55.44	450	7	70	50	13,000	4564.7	687	0.91	4.39E+12
136	20.7	275	7	20	50	8,500	2989.7	624	0.91	2.06E+11
137	44.1	450	7	20	50	9,500	3339.7	638	0.91	7.86E+11
138	15.06	550	7	20	50	10,000	3514.7	645	0.91	3.42E+11
139	1.61	300	7	20	50	9,000	3164.7	631	0.91	1.83E+10
140	62.05	550	7	50	50	12,000	4214.7	673	0.91	4.05E+12
141	26.24	350	7	20	50	8,500	2989.7	624	0.91	3.33E+11
142	2.83	400	7	20	50	9,000	3164.7	631	0.91	4.30E+10
143	3.76	325	7	20	50	8,000	2814.7	617	0.91	4.22E+10
144	13.89	375	7	70	50	15,000	5264.7	715	0.91	1.02E+12
145	11.18	375	7	20	50	9,500	3339.7	638	0.91	1.66E+11
146	8.48	475	7	50	50	10,000	3514.7	645	0.91	4.15E+11
147	12.23	400	7	70	50	14,000	4914.7	701	0.91	9.09E+11
148	42.32	450	7	50	50	12,000	4214.7	673	0.91	2.26E+12
149	9.86	525	7	20	50	10,000	3514.7	645	0.91	2.14E+11
150	2.02	450	7	20	50	10,000	3514.7	645	0.91	3.75E+10
151	21.85	450	7	50	50	11,000	3864.7	659	0.91	1.09E+12

152	2.9	400	7	50	50	13,500	4739.7	694	0.91	1.50E+11
153	4.2	525	7	20	50	9,000	3164.7	631	0.91	8.37E+10
154	11.35	475	7	20	50	10,000	3514.7	645	0.91	2.22E+11
155	3.89	475	7	20	50	9,500	3339.7	638	0.91	7.32E+10
Total =	1780.78								Total =	7.58E+13

Table 16. List of sub-plays in the Mesaverde transition play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Kmv Transition								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe /TZ*	
	Range (%) =	30		30	50	60	100	80		
Subplay No.	Expect *Pe /TZ*	F95 D. *Pe /TZ*	F5 D. *Pe /TZ*	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect *(Pe /TZ)*^2	Expect (Gas)^2
1	3.37	2.92	3.80	2879.58	207177.1	50.63	983.1	2647.82	11.45	8.72E+23
2	4.49	3.92	5.04	5721.79	207177.1	50.63	983.1	2647.82	20.29	3.07E+24
3	5.01	4.38	5.61	2682.62	207177.1	50.63	2731.0	2647.82	25.27	4.98E+24
4	5.51	4.83	6.15	638.29	207177.1	50.63	2731.0	2647.82	30.54	1.43E+24
5	5.99	5.27	6.67	390.52	207177.1	50.63	2731.0	2647.82	36.04	1.03E+24
6	3.37	2.92	3.80	171.72	143873.0	50.63	983.1	2647.82	11.45	3.61E+22
7	6.22	5.47	6.91	79.15	230836.2	50.63	2731.0	2647.82	38.86	2.52E+23
8	3.66	3.18	4.13	24.41	163695.5	50.63	983.1	2647.82	13.50	6.88E+21
9	6.22	5.47	6.91	12.35	281991.0	50.63	2731.0	2647.82	38.86	4.80E+22
10	3.95	3.43	4.44	395.70	184796.8	50.63	983.1	2647.82	15.66	1.46E+23
11	5.99	5.27	6.67	37.27	281991.0	50.63	2731.0	2647.82	36.04	1.34E+23
12	5.51	4.83	6.15	55.36	281991.0	50.63	2731.0	2647.82	30.54	1.69E+23
13	5.01	4.38	5.61	3.76	281991.0	50.63	2731.0	2647.82	25.27	9.49E+21
14	4.49	3.92	5.04	0.93	281991.0	50.63	2731.0	2647.82	20.29	1.89E+21
15	5.27	4.61	5.88	34.27	281991.0	50.63	2731.0	2647.82	27.87	9.55E+22
16	4.22	3.68	4.74	0.21	281991.0	50.63	2731.0	2647.82	17.93	3.83E+20
17	5.27	4.61	5.88	0.00	255774.2	50.63	2731.0	2647.82	27.87	6.37E+18
18	3.95	3.43	4.44	1.09	207177.1	50.63	2731.0	2647.82	15.66	1.25E+21
19	4.49	3.92	5.04	1.76	207177.1	50.63	2731.0	2647.82	20.29	2.62E+21
20	3.66	3.18	4.13	0.21	184796.8	50.63	2731.0	2647.82	13.50	1.89E+20
21	5.01	4.38	5.61	55.07	125329.3	50.63	2731.0	2647.82	25.27	6.18E+22
22	4.49	3.92	5.04	102.45	125329.3	50.63	983.1	2647.82	20.29	3.33E+22
23	4.49	3.92	5.04	1.63	125329.3	50.63	2731.0	2647.82	20.29	1.47E+21
24	5.27	4.61	5.88	12.92	125329.3	50.63	2731.0	2647.82	27.87	1.60E+22
25	3.95	3.43	4.44	2.09	125329.3	50.63	2731.0	2647.82	15.66	1.46E+21
26	3.37	2.92	3.80	0.25	125329.3	50.63	2731.0	2647.82	11.45	1.28E+20
27	4.22	3.68	4.74	4.20	163695.5	50.63	983.1	2647.82	17.93	1.57E+21
28	5.51	4.83	6.15	241.94	77371.7	50.63	2731.0	2647.82	30.54	2.03E+23
29	3.95	3.43	4.44	135.91	125329.3	50.63	983.1	2647.82	15.66	3.41E+22
30	5.01	4.38	5.61	38.88	77371.7	50.63	2731.0	2647.82	25.27	2.70E+22
31	5.01	4.38	5.61	7.51	77371.7	50.63	2731.0	2647.82	25.27	5.21E+21
32	4.49	3.92	5.04	3.34	77371.7	50.63	2731.0	2647.82	20.29	1.86E+21
33	3.95	3.43	4.44	0.76	77371.7	50.63	2731.0	2647.82	15.66	3.28E+20
34	4.22	3.68	4.74	0.00	163695.5	50.63	983.1	2647.82	17.93	9.44E+17
35	5.99	5.27	6.67	223.26	77371.7	50.63	2731.0	2647.82	36.04	2.21E+23
36	3.95	3.43	4.44	78.97	77371.7	50.63	983.1	2647.82	15.66	1.22E+22
37	3.66	3.18	4.13	0.01	163695.5	50.63	983.1	2647.82	13.50	1.82E+18
38	3.66	3.18	4.13	8.25	184796.8	50.63	437.0	2647.82	13.50	1.17E+21
39	3.66	3.18	4.13	0.23	163695.5	50.63	437.0	2647.82	13.50	2.91E+19
40	4.49	3.92	5.04	10.01	77371.7	50.63	983.1	2647.82	20.29	2.01E+21
41	4.22	3.68	4.74	8.48	184796.8	50.63	983.1	2647.82	17.93	3.59E+21
42	4.49	3.92	5.04	20.24	125329.3	50.63	983.1	2647.82	20.29	6.57E+21
43	6.44	5.68	7.16	69.63	77371.7	50.63	5352.7	2647.82	41.73	1.56E+23
44	3.66	3.18	4.13	0.02	163695.5	50.63	437.0	2647.82	13.50	2.14E+18
45	4.49	3.92	5.04	53.44	184796.8	50.63	983.1	2647.82	20.29	2.56E+22
46	5.01	4.38	5.61	4.11	125329.3	50.63	2731.0	2647.82	25.27	4.62E+21
47	4.22	3.68	4.74	0.89	163695.5	50.63	437.0	2647.82	17.93	1.48E+20

48	3.66	3.18	4.13	12.71	143873.0	50.63	437.0	2647.82	13.50	1.40E+21
49	3.95	3.43	4.44	83.32	143873.0	50.63	437.0	2647.82	15.66	1.07E+22
50	5.51	4.83	6.15	4.53	125329.3	50.63	2731.0	2647.82	30.54	6.15E+21
51	3.66	3.18	4.13	117.39	125329.3	50.63	437.0	2647.82	13.50	1.13E+22
52	5.01	4.38	5.61	83.87	184796.8	50.63	2731.0	2647.82	25.27	1.39E+23
53	6.67	5.88	7.39	9.50	92078.7	50.63	5352.7	2647.82	44.64	2.72E+22
54	4.49	3.92	5.04	126.48	143873.0	50.63	437.0	2647.82	20.29	2.10E+22
55	5.99	5.27	6.67	10.33	125329.3	50.63	2731.0	2647.82	36.04	1.65E+22
56	5.51	4.83	6.15	128.07	184796.8	50.63	2731.0	2647.82	30.54	2.56E+23
57	4.49	3.92	5.04	8.42	143873.0	50.63	983.1	2647.82	20.29	3.14E+21
58	6.44	5.68	7.16	3.83	125329.3	50.63	5352.7	2647.82	41.73	1.39E+22
59	6.88	6.08	7.63	93.90	125329.3	50.63	5352.7	2647.82	47.58	3.89E+23
60	6.44	5.68	7.16	15.97	125329.3	50.63	5352.7	2647.82	41.73	5.81E+22
61	4.22	3.68	4.74	130.35	125329.3	50.63	437.0	2647.82	17.93	1.66E+22
62	7.09	6.28	7.85	30.84	125329.3	50.63	5352.7	2647.82	50.55	1.36E+23
63	5.01	4.38	5.61	47.73	143873.0	50.63	2731.0	2647.82	25.27	6.15E+22
64	4.76	4.15	5.33	1.09	163695.5	50.63	437.0	2647.82	22.74	2.30E+20
65	5.99	5.27	6.67	76.32	184796.8	50.63	2731.0	2647.82	36.04	1.80E+23
66	5.27	4.61	5.88	0.89	163695.5	50.63	2731.0	2647.82	27.87	1.44E+21
67	6.44	5.68	7.16	42.47	184796.8	50.63	5352.7	2647.82	41.73	2.28E+23
68	4.76	4.15	5.33	87.02	125329.3	50.63	5352.7	2647.82	22.74	1.72E+23
69	6.88	6.08	7.63	35.34	184796.8	50.63	2731.0	2647.82	47.58	1.10E+23
70	6.22	5.47	6.91	0.00	163695.5	50.63	5352.7	2647.82	38.86	4.46E+17
71	7.09	6.28	7.85	255.87	184796.8	50.63	5352.7	2647.82	50.55	1.66E+24
72	6.22	5.47	6.91	9.07	184796.8	50.63	5352.7	2647.82	38.86	4.53E+22
73	6.44	5.68	7.16	4.11	184796.8	50.63	2731.0	2647.82	41.73	1.13E+22
74	6.88	6.08	7.63	5.15	184796.8	50.63	2731.0	2647.82	47.58	1.61E+22
75	4.76	4.15	5.33	0.03	163695.5	50.63	437.0	2647.82	22.74	5.45E+18
76	5.01	4.38	5.61	0.89	163695.5	50.63	437.0	2647.82	25.27	2.09E+20
77	5.01	4.38	5.61	49.83	143873.0	50.63	437.0	2647.82	25.27	1.03E+22
78	5.01	4.38	5.61	5.06	163695.5	50.63	2731.0	2647.82	25.27	7.42E+21
79	5.27	4.61	5.88	86.46	143873.0	50.63	437.0	2647.82	27.87	1.97E+22
80	5.01	4.38	5.61	42.73	143873.0	50.63	2731.0	2647.82	25.27	5.51E+22
81	5.51	4.83	6.15	170.41	143873.0	50.63	437.0	2647.82	30.54	4.25E+22
82	5.51	4.83	6.15	195.94	143873.0	50.63	2731.0	2647.82	30.54	3.05E+23
83	5.99	5.27	6.67	529.23	143873.0	50.63	2731.0	2647.82	36.04	9.73E+23
84	6.44	5.68	7.16	112.87	143873.0	50.63	5352.7	2647.82	41.73	4.71E+23
85	6.88	6.08	7.63	162.38	143873.0	50.63	5352.7	2647.82	47.58	7.73E+23
86	7.09	6.28	7.85	206.19	143873.0	50.63	5352.7	2647.82	50.55	1.04E+24
87	5.75	5.05	6.41	89.09	143873.0	50.63	437.0	2647.82	33.26	2.42E+22
88	6.22	5.47	6.91	0.44	143873.0	50.63	5352.7	2647.82	38.86	1.71E+21
89	6.44	5.68	7.16	2.36	143873.0	50.63	5352.7	2647.82	41.73	9.85E+21
90	5.99	5.27	6.67	118.26	163695.5	50.63	2731.0	2647.82	36.04	2.47E+23
91	4.76	4.15	5.33	4.97	163695.5	50.63	437.0	2647.82	22.74	1.05E+21
92	6.22	5.47	6.91	12.64	163695.5	50.63	2731.0	2647.82	38.86	2.85E+22
93	4.76	4.15	5.33	0.48	163695.5	50.63	437.0	2647.82	22.74	1.01E+20
94	6.44	5.68	7.16	181.05	207177.1	50.63	5352.7	2647.82	41.73	1.09E+24
95	5.99	5.27	6.67	397.30	207177.1	50.63	2731.0	2647.82	36.04	1.05E+24
96	5.27	4.61	5.88	12.21	163695.5	50.63	437.0	2647.82	27.87	3.16E+21
97	5.75	5.05	6.41	79.69	184796.8	50.63	437.0	2647.82	33.26	2.78E+22
98	6.22	5.47	6.91	4655.59	207177.1	50.63	2731.0	2647.82	38.86	1.33E+25
99	5.27	4.61	5.88	54.77	163695.5	50.63	437.0	2647.82	27.87	1.42E+22

100	6.67	5.88	7.39	9.75	163695.5	50.63	5352.7	2647.82	44.64	4.95E+22
101	6.22	5.47	6.91	139.21	207177.1	50.63	2731.0	2647.82	38.86	3.97E+23
102	6.67	5.88	7.39	2859.14	230836.2	50.63	2731.0	2647.82	44.64	1.04E+25
103	5.75	5.05	6.41	66.32	163695.5	50.63	437.0	2647.82	33.26	2.05E+22
104	6.44	5.68	7.16	5.10	207177.1	50.63	2731.0	2647.82	41.73	1.57E+22
105	5.75	5.05	6.41	9.26	163695.5	50.63	2731.0	2647.82	33.26	1.79E+22
106	7.09	6.28	7.85	1145.81	207177.1	50.63	5352.7	2647.82	50.55	8.34E+24
107	5.75	5.05	6.41	0.45	207177.1	50.63	2731.0	2647.82	33.26	1.11E+21
108	5.99	5.27	6.67	43.92	281991.0	50.63	2731.0	2647.82	36.04	1.58E+23
109	5.99	5.27	6.67	0.03	163695.5	50.63	437.0	2647.82	36.04	9.75E+18
110	5.75	5.05	6.41	0.66	255774.2	50.63	2731.0	2647.82	33.26	2.00E+21
111	6.22	5.47	6.91	5.24	255774.2	50.63	2731.0	2647.82	38.86	1.85E+22
112	5.99	5.27	6.67	13.51	207177.1	50.63	2731.0	2647.82	36.04	3.58E+22
113	5.75	5.05	6.41	526.00	184796.8	50.63	437.0	2647.82	33.26	1.83E+23
114	5.01	4.38	5.61	0.08	184796.8	50.63	437.0	2647.82	25.27	2.25E+19
115	5.27	4.61	5.88	59.32	184796.8	50.63	437.0	2647.82	27.87	1.73E+22
116	6.22	5.47	6.91	0.00	255774.2	50.63	2731.0	2647.82	38.86	5.69E+18
117	5.27	4.61	5.88	717.74	108064.6	50.63	437.0	2647.82	27.87	1.23E+23
118	7.30	6.47	8.07	1974.34	309486.7	50.63	5352.7	2647.82	53.55	2.27E+25
119	5.75	5.05	6.41	4331.21	125329.3	50.63	437.0	2647.82	33.26	1.02E+24
120	7.50	6.65	8.29	0.44	184796.8	50.63	5352.7	2647.82	56.57	3.19E+21
121	6.88	6.08	7.63	155.04	338261.3	50.63	2731.0	2647.82	47.58	8.85E+23
122	5.01	4.38	5.61	0.39	92078.7	50.63	437.0	2647.82	25.27	5.12E+19
123	7.50	6.65	8.29	3.34	163695.5	50.63	5352.7	2647.82	56.57	2.15E+22
124	7.90	7.02	8.71	3175.64	163695.5	50.63	5352.7	2647.82	62.67	2.26E+25
125	5.99	5.27	6.67	350.71	143873.0	50.63	2731.0	2647.82	36.04	6.45E+23
126	5.01	4.38	5.61	6.45	92078.7	50.63	437.0	2647.82	25.27	8.52E+20
127	5.01	4.38	5.61	1.11	92078.7	50.63	437.0	2647.82	25.27	1.47E+20
128	7.50	6.65	8.29	1181.44	207177.1	50.63	5352.7	2647.82	56.57	9.62E+24
129	5.01	4.38	5.61	10.65	92078.7	50.63	437.0	2647.82	25.27	1.41E+21
130	6.88	6.08	7.63	1309.68	399647.1	50.63	2731.0	2647.82	47.58	8.83E+24
131	7.09	6.28	7.85	11.32	368314.8	50.63	5352.7	2647.82	50.55	1.46E+23
132	4.76	4.15	5.33	155.54	77371.7	50.63	437.0	2647.82	22.74	1.55E+22
133	6.44	5.68	7.16	2879.58	309486.7	50.63	2731.0	2647.82	41.73	1.32E+25
134	6.67	5.88	7.39	609.70	399647.1	50.63	2731.0	2647.82	44.64	3.86E+24
135	7.30	6.47	8.07	3099.15	207177.1	50.63	5352.7	2647.82	53.55	2.39E+25
136	5.27	4.61	5.88	432.05	77371.7	50.63	437.0	2647.82	27.87	5.29E+22
137	5.75	5.05	6.41	1960.98	207177.1	50.63	437.0	2647.82	33.26	7.67E+23
138	5.99	5.27	6.67	228.69	309486.7	50.63	437.0	2647.82	36.04	1.45E+23
139	5.51	4.83	6.15	2.61	92078.7	50.63	437.0	2647.82	30.54	4.17E+20
140	6.88	6.08	7.63	3882.22	309486.7	50.63	2731.0	2647.82	47.58	2.03E+25
141	5.27	4.61	5.88	694.26	125329.3	50.63	437.0	2647.82	27.87	1.38E+23
142	5.51	4.83	6.15	8.08	163695.5	50.63	437.0	2647.82	30.54	2.29E+21
143	5.01	4.38	5.61	14.26	108064.6	50.63	437.0	2647.82	25.27	2.21E+21
144	8.09	7.20	8.91	194.54	143873.0	50.63	5352.7	2647.82	65.74	1.28E+24
145	5.75	5.05	6.41	126.03	143873.0	50.63	437.0	2647.82	33.26	3.42E+22
146	5.99	5.27	6.67	72.51	230836.2	50.63	2731.0	2647.82	36.04	2.14E+23
147	7.70	6.84	8.50	150.82	163695.5	50.63	5352.7	2647.82	59.61	1.02E+24
148	6.88	6.08	7.63	1805.87	207177.1	50.63	2731.0	2647.82	47.58	6.31E+24
149	5.99	5.27	6.67	98.03	281991.0	50.63	437.0	2647.82	36.04	5.65E+22
150	5.99	5.27	6.67	4.11	207177.1	50.63	437.0	2647.82	36.04	1.74E+21
151	6.44	5.68	7.16	481.39	207177.1	50.63	2731.0	2647.82	41.73	1.48E+24

152	7.50	6.65	8.29	8.48	163695.5	50.63	2731.0	2647.82	56.57	2.78E+22
153	5.51	4.83	6.15	17.79	281991.0	50.63	437.0	2647.82	30.54	8.69E+21
154	5.99	5.27	6.67	129.89	230836.2	50.63	437.0	2647.82	36.04	6.13E+22
155	5.75	5.05	6.41	15.26	230836.2	50.63	437.0	2647.82	33.26	6.65E+21

Table 17. List of sub-plays in the Mesaverde transition play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :	Kmv Transition									(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	8.38E+11	1.69E+23	4.11E+11	27.346	0.46467	3.50E+11	5.50E+11	7.52E+11	1.03E+12	1.62E+12
2	1.57E+12	5.95E+23	7.71E+11	27.977	0.46409	6.58E+11	1.03E+12	1.41E+12	1.93E+12	3.03E+12
3	2.00E+12	9.64E+23	9.82E+11	28.219	0.46383	8.39E+11	1.32E+12	1.80E+12	2.46E+12	3.86E+12
4	1.07E+12	2.77E+23	5.26E+11	27.596	0.46358	4.50E+11	7.06E+11	9.65E+11	1.32E+12	2.07E+12
5	9.13E+11	2.00E+23	4.47E+11	27.433	0.46334	3.83E+11	6.00E+11	8.20E+11	1.12E+12	1.76E+12
6	1.71E+11	7.01E+21	8.37E+10	25.754	0.46467	7.13E+10	1.12E+11	1.53E+11	2.09E+11	3.29E+11
7	4.51E+11	4.86E+22	2.21E+11	26.727	0.46323	1.89E+11	2.96E+11	4.05E+11	5.53E+11	8.68E+11
8	7.45E+10	1.34E+21	3.66E+10	24.926	0.46452	3.11E+10	4.89E+10	6.69E+10	9.14E+10	1.44E+11
9	1.97E+11	9.27E+21	9.63E+10	25.898	0.46323	8.25E+10	1.29E+11	1.77E+11	2.42E+11	3.79E+11
10	3.43E+11	2.84E+22	1.68E+11	26.454	0.46437	1.44E+11	2.25E+11	3.08E+11	4.21E+11	6.62E+11
11	3.29E+11	2.60E+22	1.61E+11	26.413	0.46334	1.38E+11	2.16E+11	2.96E+11	4.04E+11	6.34E+11
12	3.69E+11	3.27E+22	1.81E+11	26.527	0.46358	1.55E+11	2.43E+11	3.32E+11	4.53E+11	7.11E+11
13	8.75E+10	1.84E+21	4.29E+10	25.087	0.46383	3.66E+10	5.75E+10	7.86E+10	1.07E+11	1.68E+11
14	3.90E+10	3.65E+20	1.91E+10	24.279	0.46409	1.63E+10	2.56E+10	3.50E+10	4.79E+10	7.51E+10
15	2.78E+11	1.85E+22	1.36E+11	26.242	0.4637	1.16E+11	1.82E+11	2.49E+11	3.41E+11	5.34E+11
16	1.76E+10	7.42E+19	8.61E+09	23.481	0.46423	7.35E+09	1.15E+10	1.58E+10	2.16E+10	3.38E+10
17	2.27E+09	1.23E+18	1.11E+09	21.434	0.4637	9.50E+08	1.49E+09	2.04E+09	2.78E+09	4.37E+09
18	3.18E+10	2.43E+20	1.56E+10	24.075	0.46437	1.33E+10	2.09E+10	2.86E+10	3.90E+10	6.13E+10
19	4.60E+10	5.08E+20	2.25E+10	24.443	0.46409	1.92E+10	3.02E+10	4.13E+10	5.64E+10	8.85E+10
20	1.23E+10	3.66E+19	6.05E+09	23.128	0.46452	5.16E+09	8.09E+09	1.11E+10	1.51E+10	2.38E+10
21	2.23E+11	1.20E+22	1.09E+11	26.024	0.46383	9.35E+10	1.47E+11	2.01E+11	2.74E+11	4.30E+11
22	1.64E+11	6.45E+21	8.03E+10	25.714	0.46409	6.85E+10	1.08E+11	1.47E+11	2.01E+11	3.15E+11
23	3.44E+10	2.84E+20	1.69E+10	24.153	0.46409	1.44E+10	2.26E+10	3.09E+10	4.22E+10	6.62E+10
24	1.14E+11	3.10E+21	5.57E+10	25.349	0.4637	4.76E+10	7.47E+10	1.02E+11	1.39E+11	2.19E+11
25	3.42E+10	2.82E+20	1.68E+10	24.149	0.46437	1.43E+10	2.25E+10	3.07E+10	4.20E+10	6.60E+10
26	1.02E+10	2.49E+19	4.99E+09	22.934	0.46467	4.25E+09	6.67E+09	9.12E+09	1.25E+10	1.96E+10
27	3.56E+10	3.05E+20	1.75E+10	24.188	0.46423	1.49E+10	2.34E+10	3.20E+10	4.37E+10	6.86E+10
28	4.04E+11	3.92E+22	1.98E+11	26.618	0.46358	1.69E+11	2.66E+11	3.63E+11	4.96E+11	7.79E+11
29	1.66E+11	6.61E+21	8.13E+10	25.725	0.46437	6.93E+10	1.09E+11	1.49E+11	2.03E+11	3.19E+11
30	1.47E+11	5.22E+21	7.22E+10	25.609	0.46383	6.17E+10	9.69E+10	1.32E+11	1.81E+11	2.84E+11
31	6.48E+10	1.01E+21	3.18E+10	24.787	0.46383	2.71E+10	4.26E+10	5.82E+10	7.96E+10	1.25E+11
32	3.87E+10	3.60E+20	1.90E+10	24.272	0.46409	1.62E+10	2.54E+10	3.48E+10	4.75E+10	7.46E+10
33	1.63E+10	6.36E+19	7.98E+09	23.404	0.46437	6.80E+09	1.07E+10	1.46E+10	2.00E+10	3.13E+10
34	8.73E+08	1.83E+17	4.28E+08	20.479	0.46423	3.65E+08	5.73E+08	7.83E+08	1.07E+09	1.68E+09
35	4.22E+11	4.27E+22	2.07E+11	26.661	0.46334	1.77E+11	2.77E+11	3.79E+11	5.18E+11	8.12E+11
36	9.92E+10	2.37E+21	4.87E+10	25.213	0.46437	4.15E+10	6.51E+10	8.91E+10	1.22E+11	1.91E+11
37	1.21E+09	3.53E+17	5.94E+08	20.807	0.46452	5.06E+08	7.95E+08	1.09E+09	1.49E+09	2.33E+09
38	3.07E+10	2.27E+20	1.51E+10	24.039	0.46452	1.28E+10	2.01E+10	2.75E+10	3.77E+10	5.91E+10
39	4.84E+09	5.65E+18	2.38E+09	22.193	0.46452	2.03E+09	3.18E+09	4.35E+09	5.95E+09	9.34E+09
40	4.02E+10	3.89E+20	1.97E+10	24.31	0.46409	1.68E+10	2.64E+10	3.61E+10	4.94E+10	7.75E+10
41	5.38E+10	6.95E+20	2.64E+10	24.6	0.46423	2.25E+10	3.53E+10	4.83E+10	6.60E+10	1.04E+11
42	7.28E+10	1.27E+21	3.57E+10	24.903	0.46409	3.05E+10	4.78E+10	6.54E+10	8.94E+10	1.40E+11
43	3.55E+11	3.02E+22	1.74E+11	26.488	0.46312	1.49E+11	2.33E+11	3.19E+11	4.36E+11	6.83E+11
44	1.31E+09	4.15E+17	6.44E+08	20.887	0.46452	5.49E+08	8.61E+08	1.18E+09	1.61E+09	2.53E+09
45	1.44E+11	4.96E+21	7.04E+10	25.583	0.46409	6.01E+10	9.43E+10	1.29E+11	1.76E+11	2.77E+11
46	6.10E+10	8.94E+20	2.99E+10	24.727	0.46383	2.56E+10	4.01E+10	5.48E+10	7.49E+10	1.18E+11
47	1.09E+10	2.88E+19	5.36E+09	23.008	0.46423	4.58E+09	7.18E+09	9.82E+09	1.34E+10	2.11E+10

48	3.36E+10	2.72E+20	1.65E+10	24.13	0.46452	1.40E+10	2.20E+10	3.02E+10	4.12E+10	6.47E+10
49	9.27E+10	2.07E+21	4.55E+10	25.144	0.46437	3.88E+10	6.08E+10	8.32E+10	1.14E+11	1.79E+11
50	7.04E+10	1.19E+21	3.45E+10	24.87	0.46358	2.95E+10	4.63E+10	6.33E+10	8.65E+10	1.36E+11
51	9.53E+10	2.19E+21	4.68E+10	25.172	0.46452	3.98E+10	6.25E+10	8.55E+10	1.17E+11	1.84E+11
52	3.35E+11	2.69E+22	1.64E+11	26.429	0.46383	1.40E+11	2.20E+11	3.01E+11	4.11E+11	6.45E+11
53	1.48E+11	5.24E+21	7.24E+10	25.613	0.46301	6.21E+10	9.73E+10	1.33E+11	1.82E+11	2.85E+11
54	1.30E+11	4.06E+21	6.37E+10	25.483	0.46409	5.44E+10	8.54E+10	1.17E+11	1.60E+11	2.50E+11
55	1.16E+11	3.20E+21	5.65E+10	25.365	0.46334	4.84E+10	7.59E+10	1.04E+11	1.42E+11	2.22E+11
56	4.55E+11	4.96E+22	2.23E+11	26.735	0.46358	1.90E+11	2.99E+11	4.08E+11	5.58E+11	8.75E+11
57	5.03E+10	6.08E+20	2.47E+10	24.534	0.46409	2.11E+10	3.30E+10	4.52E+10	6.18E+10	9.69E+10
58	1.06E+11	2.69E+21	5.19E+10	25.28	0.46312	4.45E+10	6.97E+10	9.53E+10	1.30E+11	2.04E+11
59	5.60E+11	7.51E+22	2.74E+11	26.945	0.46291	2.35E+11	3.69E+11	5.04E+11	6.88E+11	1.08E+12
60	2.16E+11	1.12E+22	1.06E+11	25.993	0.46312	9.08E+10	1.42E+11	1.94E+11	2.66E+11	4.17E+11
61	1.16E+11	3.22E+21	5.68E+10	25.367	0.46423	4.84E+10	7.60E+10	1.04E+11	1.42E+11	2.23E+11
62	3.31E+11	2.62E+22	1.62E+11	26.419	0.46281	1.39E+11	2.18E+11	2.97E+11	4.06E+11	6.37E+11
63	2.23E+11	1.19E+22	1.09E+11	26.022	0.46383	9.33E+10	1.46E+11	2.00E+11	2.73E+11	4.29E+11
64	1.36E+10	4.46E+19	6.68E+09	23.228	0.46396	5.70E+09	8.95E+09	1.22E+10	1.67E+10	2.63E+10
65	3.81E+11	3.48E+22	1.87E+11	26.56	0.46334	1.60E+11	2.51E+11	3.43E+11	4.68E+11	7.34E+11
66	3.41E+10	2.79E+20	1.67E+10	24.145	0.4637	1.43E+10	2.24E+10	3.06E+10	4.19E+10	6.57E+10
67	4.29E+11	4.39E+22	2.10E+11	26.677	0.46312	1.80E+11	2.82E+11	3.85E+11	5.26E+11	8.25E+11
68	3.73E+11	3.34E+22	1.83E+11	26.537	0.46396	1.56E+11	2.45E+11	3.35E+11	4.58E+11	7.18E+11
69	2.98E+11	2.13E+22	1.46E+11	26.314	0.46291	1.25E+11	1.96E+11	2.68E+11	3.66E+11	5.74E+11
70	6.00E+08	8.61E+16	2.93E+08	20.105	0.46323	2.51E+08	3.94E+08	5.39E+08	7.36E+08	1.15E+09
71	1.16E+12	3.20E+23	5.66E+11	27.671	0.46281	4.86E+11	7.62E+11	1.04E+12	1.42E+12	2.23E+12
72	1.91E+11	8.75E+21	9.35E+10	25.869	0.46323	8.02E+10	1.26E+11	1.72E+11	2.35E+11	3.68E+11
73	9.53E+10	2.17E+21	4.66E+10	25.173	0.46312	4.00E+10	6.26E+10	8.56E+10	1.17E+11	1.83E+11
74	1.14E+11	3.10E+21	5.57E+10	25.351	0.46291	4.78E+10	7.49E+10	1.02E+11	1.40E+11	2.19E+11
75	2.10E+09	1.06E+18	1.03E+09	21.356	0.46396	8.78E+08	1.38E+09	1.88E+09	2.57E+09	4.04E+09
76	1.30E+10	4.05E+19	6.36E+09	23.18	0.46383	5.44E+09	8.53E+09	1.17E+10	1.59E+10	2.50E+10
77	9.10E+10	1.99E+21	4.46E+10	25.127	0.46383	3.81E+10	5.98E+10	8.18E+10	1.12E+11	1.75E+11
78	7.74E+10	1.44E+21	3.79E+10	24.964	0.46383	3.24E+10	5.08E+10	6.95E+10	9.50E+10	1.49E+11
79	1.26E+11	3.81E+21	6.17E+10	25.452	0.4637	5.28E+10	8.28E+10	1.13E+11	1.55E+11	2.43E+11
80	2.11E+11	1.07E+22	1.03E+11	25.967	0.46383	8.83E+10	1.38E+11	1.89E+11	2.59E+11	4.06E+11
81	1.85E+11	8.21E+21	9.06E+10	25.837	0.46358	7.75E+10	1.22E+11	1.66E+11	2.27E+11	3.56E+11
82	4.96E+11	5.90E+22	2.43E+11	26.823	0.46358	2.08E+11	3.26E+11	4.46E+11	6.09E+11	9.55E+11
83	8.86E+11	1.88E+23	4.34E+11	27.403	0.46334	3.71E+11	5.82E+11	7.96E+11	1.09E+12	1.71E+12
84	6.17E+11	9.09E+22	3.02E+11	27.04	0.46312	2.59E+11	4.05E+11	5.54E+11	7.57E+11	1.19E+12
85	7.90E+11	1.49E+23	3.86E+11	27.288	0.46291	3.31E+11	5.19E+11	7.09E+11	9.69E+11	1.52E+12
86	9.17E+11	2.01E+23	4.48E+11	27.438	0.46281	3.85E+11	6.03E+11	8.24E+11	1.13E+12	1.76E+12
87	1.40E+11	4.68E+21	6.84E+10	25.555	0.46346	5.85E+10	9.18E+10	1.25E+11	1.71E+11	2.69E+11
88	3.71E+10	3.30E+20	1.82E+10	24.23	0.46323	1.56E+10	2.44E+10	3.33E+10	4.56E+10	7.14E+10
89	8.92E+10	1.90E+21	4.36E+10	25.106	0.46312	3.74E+10	5.86E+10	8.01E+10	1.09E+11	1.72E+11
90	4.47E+11	4.78E+22	2.19E+11	26.718	0.46334	1.87E+11	2.94E+11	4.01E+11	5.48E+11	8.60E+11
91	2.91E+10	2.03E+20	1.43E+10	23.986	0.46396	1.22E+10	1.91E+10	2.61E+10	3.57E+10	5.60E+10
92	1.52E+11	5.51E+21	7.42E+10	25.638	0.46323	6.36E+10	9.97E+10	1.36E+11	1.86E+11	2.92E+11
93	9.04E+09	1.96E+19	4.43E+09	22.818	0.46396	3.79E+09	5.94E+09	8.12E+09	1.11E+10	1.74E+10
94	9.37E+11	2.10E+23	4.58E+11	27.459	0.46312	3.93E+11	6.16E+11	8.42E+11	1.15E+12	1.80E+12
95	9.21E+11	2.03E+23	4.51E+11	27.442	0.46334	3.86E+11	6.06E+11	8.27E+11	1.13E+12	1.77E+12
96	5.05E+10	6.12E+20	2.47E+10	24.538	0.4637	2.11E+10	3.32E+10	4.53E+10	6.20E+10	9.72E+10
97	1.50E+11	5.37E+21	7.33E+10	25.625	0.46346	6.27E+10	9.84E+10	1.34E+11	1.84E+11	2.88E+11
98	3.28E+12	2.57E+24	1.60E+12	28.71	0.46323	1.37E+12	2.15E+12	2.94E+12	4.02E+12	6.30E+12
99	1.07E+11	2.74E+21	5.24E+10	25.288	0.4637	4.48E+10	7.03E+10	9.60E+10	1.31E+11	2.06E+11

100	2.00E+11	9.56E+21	9.78E+10	25.914	0.46301	8.39E+10	1.31E+11	1.80E+11	2.45E+11	3.85E+11
101	5.66E+11	7.68E+22	2.77E+11	26.955	0.46323	2.37E+11	3.72E+11	5.09E+11	6.95E+11	1.09E+12
102	2.90E+12	2.02E+24	1.42E+12	28.59	0.46301	1.22E+12	1.91E+12	2.61E+12	3.56E+12	5.59E+12
103	1.29E+11	3.96E+21	6.29E+10	25.472	0.46346	5.39E+10	8.45E+10	1.15E+11	1.58E+11	2.47E+11
104	1.12E+11	3.02E+21	5.50E+10	25.338	0.46312	4.71E+10	7.39E+10	1.01E+11	1.38E+11	2.16E+11
105	1.20E+11	3.45E+21	5.88E+10	25.404	0.46346	5.03E+10	7.89E+10	1.08E+11	1.47E+11	2.31E+11
106	2.59E+12	1.61E+24	1.27E+12	28.477	0.46281	1.09E+12	1.71E+12	2.33E+12	3.18E+12	4.99E+12
107	2.99E+10	2.14E+20	1.46E+10	24.013	0.46346	1.25E+10	1.96E+10	2.68E+10	3.67E+10	5.75E+10
108	3.57E+11	3.06E+22	1.75E+11	26.495	0.46334	1.50E+11	2.35E+11	3.21E+11	4.39E+11	6.88E+11
109	2.81E+09	1.88E+18	1.37E+09	21.647	0.46334	1.18E+09	1.84E+09	2.52E+09	3.44E+09	5.40E+09
110	4.01E+10	3.86E+20	1.96E+10	24.308	0.46346	1.68E+10	2.64E+10	3.60E+10	4.93E+10	7.72E+10
111	1.22E+11	3.57E+21	5.97E+10	25.421	0.46323	5.12E+10	8.03E+10	1.10E+11	1.50E+11	2.35E+11
112	1.70E+11	6.91E+21	8.31E+10	25.751	0.46334	7.12E+10	1.12E+11	1.53E+11	2.09E+11	3.27E+11
113	3.85E+11	3.55E+22	1.88E+11	26.568	0.46346	1.61E+11	2.53E+11	3.46E+11	4.72E+11	7.41E+11
114	4.26E+09	4.35E+18	2.09E+09	22.064	0.46383	1.78E+09	2.80E+09	3.82E+09	5.23E+09	8.20E+09
115	1.18E+11	3.35E+21	5.79E+10	25.388	0.4637	4.95E+10	7.77E+10	1.06E+11	1.45E+11	2.28E+11
116	2.14E+09	1.10E+18	1.05E+09	21.378	0.46323	8.98E+08	1.41E+09	1.92E+09	2.63E+09	4.12E+09
117	3.15E+11	2.37E+22	1.54E+11	26.367	0.4637	1.32E+11	2.07E+11	2.82E+11	3.86E+11	6.06E+11
118	4.28E+12	4.38E+24	2.09E+12	28.979	0.46271	1.80E+12	2.82E+12	3.85E+12	5.26E+12	8.24E+12
119	9.09E+11	1.98E+23	4.45E+11	27.428	0.46346	3.81E+11	5.97E+11	8.17E+11	1.12E+12	1.75E+12
120	5.08E+10	6.15E+20	2.48E+10	24.543	0.46261	2.13E+10	3.34E+10	4.56E+10	6.23E+10	9.76E+10
121	8.45E+11	1.71E+23	4.13E+11	27.356	0.46291	3.55E+11	5.56E+11	7.59E+11	1.04E+12	1.63E+12
122	6.42E+09	9.91E+18	3.15E+09	22.476	0.46383	2.69E+09	4.22E+09	5.77E+09	7.89E+09	1.24E+10
123	1.32E+11	4.14E+21	6.44E+10	25.497	0.46261	5.53E+10	8.67E+10	1.18E+11	1.62E+11	2.53E+11
124	4.28E+12	4.36E+24	2.09E+12	28.977	0.46243	1.80E+12	2.81E+12	3.84E+12	5.25E+12	8.22E+12
125	7.21E+11	1.25E+23	3.53E+11	27.197	0.46334	3.02E+11	4.74E+11	6.48E+11	8.85E+11	1.39E+12
126	2.62E+10	1.65E+20	1.28E+10	23.882	0.46383	1.10E+10	1.72E+10	2.35E+10	3.22E+10	5.05E+10
127	1.09E+10	2.84E+19	5.33E+09	23.003	0.46383	4.56E+09	7.15E+09	9.77E+09	1.34E+10	2.10E+10
128	2.79E+12	1.85E+24	1.36E+12	28.549	0.46261	1.17E+12	1.83E+12	2.50E+12	3.42E+12	5.36E+12
129	3.37E+10	2.72E+20	1.65E+10	24.132	0.46383	1.41E+10	2.21E+10	3.02E+10	4.13E+10	6.49E+10
130	2.67E+12	1.70E+24	1.31E+12	28.506	0.46291	1.12E+12	1.76E+12	2.40E+12	3.28E+12	5.14E+12
131	3.44E+11	2.82E+22	1.68E+11	26.456	0.46281	1.44E+11	2.26E+11	3.09E+11	4.22E+11	6.61E+11
132	1.12E+11	3.01E+21	5.48E+10	25.333	0.46396	4.68E+10	7.35E+10	1.00E+11	1.37E+11	2.16E+11
133	3.26E+12	2.55E+24	1.60E+12	28.706	0.46312	1.37E+12	2.14E+12	2.93E+12	4.00E+12	6.28E+12
134	1.76E+12	7.44E+23	8.63E+11	28.092	0.46301	7.40E+11	1.16E+12	1.59E+12	2.17E+12	3.39E+12
135	4.39E+12	4.61E+24	2.15E+12	29.004	0.46271	1.84E+12	2.89E+12	3.95E+12	5.39E+12	8.45E+12
136	2.06E+11	1.02E+22	1.01E+11	25.946	0.4637	8.65E+10	1.36E+11	1.85E+11	2.53E+11	3.98E+11
137	7.86E+11	1.48E+23	3.85E+11	27.283	0.46346	3.30E+11	5.17E+11	7.06E+11	9.65E+11	1.51E+12
138	3.42E+11	2.80E+22	1.67E+11	26.45	0.46334	1.43E+11	2.25E+11	3.07E+11	4.19E+11	6.58E+11
139	1.83E+10	8.06E+19	8.98E+09	23.525	0.46358	7.68E+09	1.21E+10	1.65E+10	2.25E+10	3.53E+10
140	4.05E+12	3.91E+24	1.98E+12	28.921	0.46291	1.70E+12	2.66E+12	3.63E+12	4.96E+12	7.78E+12
141	3.33E+11	2.66E+22	1.63E+11	26.424	0.4637	1.40E+11	2.19E+11	2.99E+11	4.09E+11	6.41E+11
142	4.30E+10	4.43E+20	2.10E+10	24.377	0.46358	1.80E+10	2.82E+10	3.86E+10	5.28E+10	8.28E+10
143	4.22E+10	4.28E+20	2.07E+10	24.358	0.46383	1.77E+10	2.77E+10	3.79E+10	5.18E+10	8.13E+10
144	1.02E+12	2.46E+23	4.96E+11	27.54	0.46235	4.27E+11	6.69E+11	9.13E+11	1.25E+12	1.95E+12
145	1.66E+11	6.61E+21	8.13E+10	25.729	0.46346	6.96E+10	1.09E+11	1.49E+11	2.04E+11	3.20E+11
146	4.15E+11	4.13E+22	2.03E+11	26.645	0.46334	1.74E+11	2.73E+11	3.73E+11	5.10E+11	8.00E+11
147	9.09E+11	1.97E+23	4.44E+11	27.428	0.46252	3.82E+11	5.98E+11	8.17E+11	1.12E+12	1.75E+12
148	2.26E+12	1.22E+24	1.10E+12	28.338	0.46291	9.47E+11	1.48E+12	2.03E+12	2.77E+12	4.34E+12
149	2.14E+11	1.09E+22	1.05E+11	25.98	0.46334	8.95E+10	1.40E+11	1.92E+11	2.62E+11	4.11E+11
150	3.75E+10	3.37E+20	1.84E+10	24.24	0.46334	1.57E+10	2.46E+10	3.37E+10	4.60E+10	7.22E+10
151	1.09E+12	2.85E+23	5.34E+11	27.611	0.46312	4.58E+11	7.18E+11	9.80E+11	1.34E+12	2.10E+12

152	1.50E+11	5.37E+21	7.32E+10	25.627	0.46261	6.29E+10	9.86E+10	1.35E+11	1.84E+11	2.88E+11
153	8.37E+10	1.68E+21	4.10E+10	25.043	0.46358	3.51E+10	5.50E+10	7.52E+10	1.03E+11	1.61E+11
154	2.22E+11	1.18E+22	1.09E+11	26.02	0.46334	9.32E+10	1.46E+11	2.00E+11	2.73E+11	4.28E+11
155	7.32E+10	1.28E+21	3.58E+10	24.909	0.46346	3.07E+10	4.81E+10	6.58E+10	8.99E+10	1.41E+11
P.P.C.	7.58E+13	1.37E+27	3.71E+13			3.18E+13	4.98E+13	6.81E+13	9.30E+13	1.46E+14

Table 18 List of sub-plays in the Mesaverde transition play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :	Meeteetse Transition					a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.97	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	1.81	175	7	50	50	5,500	1939.7	582	0.97	1.87E+10
2	5.05	175	7	50	50	6,500	2289.7	596	0.97	6.03E+10
3	19.86	225	7	50	50	7,500	2639.7	610	0.97	3.43E+11
4	1.11	200	7	50	50	7,000	2464.7	603	0.97	1.61E+10
5	1.85	200	7	50	50	5,000	1764.7	575	0.97	2.02E+10
6	40.99	225	7	50	50	6,500	2289.7	596	0.97	6.29E+11
7	14.51	225	7	50	50	9,000	3164.7	631	0.97	2.91E+11
8	10.72	175	7	70	50	10,000	3514.7	645	0.97	2.54E+11
9	1.03	200	7	70	50	9,500	3339.7	638	0.97	2.68E+10
10	0.37	175	7	70	50	11,500	4039.7	666	0.97	9.76E+09
11	2.85	200	7	50	50	5,000	1764.7	575	0.97	3.11E+10
12	1.25	200	7	50	50	5,500	1939.7	582	0.97	1.48E+10
13	5.84	200	7	50	50	9,500	3339.7	638	0.97	1.09E+11
14	13.84	250	7	50	50	5,000	1764.7	575	0.97	1.89E+11
15	1.64	175	7	50	50	9,000	3164.7	631	0.97	2.56E+10
16	0.99	175	7	50	50	8,000	2814.7	617	0.97	1.40E+10
17	0.3	200	7	50	50	7,000	2464.7	603	0.97	4.35E+09
18	4.15	225	7	50	50	6,500	2289.7	596	0.97	6.37E+10
19	3.35	250	7	50	50	5,500	1939.7	582	0.97	4.96E+10
20	0.88	250	7	50	50	5,000	1764.7	575	0.97	1.20E+10
21	6.45	275	7	50	50	7,000	2464.7	603	0.97	1.29E+11
22	3.83	325	7	50	50	5,500	1939.7	582	0.97	7.37E+10
23	6.66	325	7	50	50	6,500	2289.7	596	0.97	1.48E+11
24	9.37	325	7	50	50	7,500	2639.7	610	0.97	2.34E+11
25	0.12	300	7	50	50	8,000	2814.7	617	0.97	2.92E+09
26	16.66	325	7	50	50	8,500	2989.7	624	0.97	4.61E+11
27	4.04	325	7	50	50	8,000	2814.7	617	0.97	1.06E+11
28	1.63	250	7	50	50	5,500	1939.7	582	0.97	2.41E+10
29	0.11	300	7	50	50	5,500	1939.7	582	0.97	1.95E+09
30	0.89	300	7	50	50	6,000	2114.7	589	0.97	1.70E+10
31	1.47	300	7	50	50	7,000	2464.7	603	0.97	3.20E+10
32	3.24	250	7	50	50	6,500	2289.7	596	0.97	5.53E+10
33	1.75	150	7	50	50	5,500	1939.7	582	0.97	1.55E+10
34	11.82	325	7	70	50	9,500	3339.7	638	0.97	5.00E+11
35	16.37	150	7	50	50	6,500	2289.7	596	0.97	1.68E+11
36	2.67	250	7	50	50	7,500	2639.7	610	0.97	5.13E+10
37	3.84	75	7	50	50	6,000	2114.7	589	0.97	1.84E+10
38	9.52	325	7	70	50	10,500	3689.7	652	0.97	4.35E+11
39	0.09	100	7	50	50	6,000	2114.7	589	0.97	5.74E+08
40	2.76	150	7	50	50	6,000	2114.7	589	0.97	2.64E+10
41	2.53	75	7	50	50	6,000	2114.7	589	0.97	1.21E+10
42	2.12	125	7	50	50	6,000	2114.7	589	0.97	1.69E+10
43	20.92	150	7	50	50	8,000	2814.7	617	0.97	2.54E+11
44	2.56	250	7	50	50	8,500	2989.7	624	0.97	5.44E+10
45	3.76	325	7	70	50	11,000	3864.7	659	0.97	1.78E+11
46	1.82	175	7	50	50	7,000	2464.7	603	0.97	2.31E+10
47	4.34	250	7	70	50	10,500	3689.7	652	0.97	1.53E+11

48	2.9	250	7	70	50	9,500	3339.7	638	0.97	9.43E+10
49	2.02	325	7	50	50	10,000	3514.7	645	0.97	6.35E+10
50	46.89	150	7	50	50	9,000	3164.7	631	0.97	6.26E+11
51	9.57	225	7	70	50	11,500	4039.7	666	0.97	3.25E+11
52	5.55	225	7	50	50	6,000	2114.7	589	0.97	7.96E+10
53	4.34	225	7	50	50	6,500	2289.7	596	0.97	6.66E+10
54	29.17	175	7	70	50	10,000	3514.7	645	0.97	6.91E+11
55	18.36	175	7	70	50	11,000	3864.7	659	0.97	4.68E+11
56	22.42	175	7	70	50	11,500	4039.7	666	0.97	5.92E+11
57	7.36	225	7	50	50	6,000	2114.7	589	0.97	1.06E+11
58	4.47	250	7	70	50	11,000	3864.7	659	0.97	1.63E+11
59	3.11	225	7	70	50	11,000	3864.7	659	0.97	1.02E+11
60	2.23	275	7	70	50	10,000	3514.7	645	0.97	8.31E+10
61	2.87	225	7	50	50	7,500	2639.7	610	0.97	4.96E+10
62	6.43	225	7	50	50	7,000	2464.7	603	0.97	1.05E+11
63	12.27	225	7	50	50	8,000	2814.7	617	0.97	2.24E+11
64	4.03	200	7	50	50	7,000	2464.7	603	0.97	5.85E+10
65	4.79	175	7	50	50	6,500	2289.7	596	0.97	5.72E+10
66	6.87	175	7	50	50	7,500	2639.7	610	0.97	9.24E+10
67	0.5	200	7	50	50	8,000	2814.7	617	0.97	8.10E+09
68	13.86	175	7	50	50	8,500	2989.7	624	0.97	2.06E+11
69	3.63	225	7	50	50	8,000	2814.7	617	0.97	6.62E+10
70	0.72	200	7	50	50	7,500	2639.7	610	0.97	1.11E+10
71	21.1	175	7	50	50	9,000	3164.7	631	0.97	3.29E+11
72	1.5	225	7	50	50	6,500	2289.7	596	0.97	2.30E+10
73	17.92	175	7	50	50	9,500	3339.7	638	0.97	2.91E+11
74	2.65	225	7	50	50	7,500	2639.7	610	0.97	4.58E+10
75	2.99	225	7	50	50	10,500	3689.7	652	0.97	6.76E+10
76	4.31	225	7	50	50	8,500	2989.7	624	0.97	8.25E+10
77	6.3	200	7	50	50	10,000	3514.7	645	0.97	1.22E+11
78	14.84	250	7	50	50	10,500	3689.7	652	0.97	3.73E+11
79	4.51	175	7	50	50	8,000	2814.7	617	0.97	6.39E+10
80	1.83	150	7	50	50	8,500	2989.7	624	0.97	2.34E+10
81	0.12	200	7	50	50	8,500	2989.7	624	0.97	2.04E+09
82	55.6	250	7	70	50	11,500	4039.7	666	0.97	2.10E+12
83	49.01	75	7	50	50	8,500	2989.7	624	0.97	3.13E+11
84	1.58	75	7	50	50	7,500	2639.7	610	0.97	9.11E+09
85	47.96	75	7	50	50	9,500	3339.7	638	0.97	3.34E+11
86	35.98	90	7	50	50	10,500	3689.7	652	0.97	3.25E+11
87	36.85	175	7	70	50	13,000	4564.7	687	0.97	1.07E+12
88	2.79	100	7	50	50	10,500	3689.7	652	0.97	2.80E+10
89	6.86	225	7	50	50	9,000	3164.7	631	0.97	1.37E+11
90	2.98	100	7	50	50	7,500	2639.7	610	0.97	2.29E+10
91	0.17	200	7	50	50	9,000	3164.7	631	0.97	3.03E+09
92	26.52	225	7	70	50	13,000	4564.7	687	0.97	9.86E+11
93	3.53	100	7	50	50	7,500	2639.7	610	0.97	2.71E+10
94	43.55	225	7	70	50	14,000	4914.7	701	0.97	1.71E+12
95	3.42	100	7	50	50	7,500	2639.7	610	0.97	2.63E+10
96	22.19	150	7	50	50	11,000	3864.7	659	0.97	3.47E+11
97	12.71	225	7	70	50	12,000	4214.7	673	0.97	4.45E+11
98	32.52	225	7	70	50	10,000	3514.7	645	0.97	9.91E+11
99	13.13	75	7	50	50	7,500	2639.7	610	0.97	7.57E+10

100	1.83	100	7	50	50	6,500	2289.7	596	0.97	1.25E+10
101	11.77	225	7	70	50	16,000	5614.7	729	0.97	5.07E+11
102	19.84	175	7	70	50	13,000	4564.7	687	0.97	5.73E+11
103	21.15	150	7	50	50	6,000	2114.7	589	0.97	2.02E+11
104	23.43	175	7	70	50	14,000	4914.7	701	0.97	7.15E+11
105	54.18	150	7	50	50	7,500	2639.7	610	0.97	6.24E+11
106	26.3	150	7	50	50	9,500	3339.7	638	0.97	3.67E+11
107	43.33	150	7	50	50	8,500	2989.7	624	0.97	5.53E+11
108	19.58	175	7	70	50	15,000	5264.7	715	0.97	6.27E+11
109	49.59	250	7	50	50	9,500	3339.7	638	0.97	1.15E+12
110	38.45	250	7	50	50	11,000	3864.7	659	0.97	1.00E+12
111	9.34	200	7	70	50	16,500	5789.7	736	0.97	3.65E+11
112	79.66	250	7	70	50	12,000	4214.7	673	0.97	3.10E+12
113	70.07	250	7	70	50	13,000	4564.7	687	0.97	2.89E+12
114	60.58	225	7	50	50	8,500	2989.7	624	0.97	1.16E+12
115	54.57	250	7	70	50	14,000	4914.7	701	0.97	2.38E+12
116	12.81	225	7	70	50	16,500	5789.7	736	0.97	5.64E+11
117	36.25	250	7	70	50	15,500	5439.7	722	0.97	1.70E+12
118	82.98	325	7	50	50	11,000	3864.7	659	0.97	2.81E+12
119	34.79	325	7	50	50	9,500	3339.7	638	0.97	1.05E+12
120	0.41	200	7	50	50	8,500	2989.7	624	0.97	6.98E+09
121	6.39	250	7	50	50	8,000	2814.7	617	0.97	1.29E+11
122	7.63	300	7	70	50	12,000	4214.7	673	0.97	3.56E+11
123	15.7	325	7	50	50	8,500	2989.7	624	0.97	4.34E+11
124	4.24	300	7	50	50	8,000	2814.7	617	0.97	1.03E+11
125	7.14	275	7	50	50	11,500	4039.7	666	0.97	2.11E+11
126	22.35	275	7	50	50	11,500	4039.7	666	0.97	6.62E+11
127	6.7	275	7	50	50	11,000	3864.7	659	0.97	1.92E+11
128	11.05	250	7	50	50	9,000	3164.7	631	0.97	2.46E+11
129	2.17	250	7	50	50	8,000	2814.7	617	0.97	4.39E+10
130	2.75	175	7	50	50	9,500	3339.7	638	0.97	4.47E+10
131	2.85	250	7	50	50	8,500	2989.7	624	0.97	6.06E+10
132	0.8	300	7	50	50	11,500	4039.7	666	0.97	2.58E+10
133	0.48	200	7	50	50	8,500	2989.7	624	0.97	8.17E+09
Total =	1804.67								Total =	4.49E+13

Table 19. List of sub-plays in the Meeteetse transition play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Meeteetse Transition								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	Pe/TZ	
	Range (%) =	30		30	50	60	100	80		
Subplay No.	Expect Pe/TZ	F95 D. Pe/TZ	F5 D. Pe/TZ	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect (Pe/TZ)^2	Expect (Gas)^2
1	3.44	2.98	3.87	3.30	31332.3	50.63	2731.0	2647.82	11.88	4.36E+20
2	3.96	3.45	4.45	25.71	31332.3	50.63	2731.0	2647.82	15.78	4.51E+21
3	4.46	3.90	5.00	397.70	51794.3	50.63	2731.0	2647.82	20.01	1.46E+23
4	4.21	3.68	4.73	1.24	40923.9	50.63	2731.0	2647.82	17.86	3.22E+20
5	3.16	2.74	3.57	3.45	40923.9	50.63	2731.0	2647.82	10.07	5.05E+20
6	3.96	3.45	4.45	1694.15	51794.3	50.63	2731.0	2647.82	15.78	4.91E+23
7	5.17	4.53	5.77	212.29	51794.3	50.63	2731.0	2647.82	26.87	1.05E+23
8	5.62	4.94	6.25	115.87	31332.3	50.63	5352.7	2647.82	31.72	8.00E+22
9	5.40	4.74	6.01	1.07	40923.9	50.63	5352.7	2647.82	29.27	8.91E+20
10	6.25	5.52	6.94	0.14	31332.3	50.63	5352.7	2647.82	39.29	1.18E+20
11	3.16	2.74	3.57	8.19	40923.9	50.63	2731.0	2647.82	10.07	1.20E+21
12	3.44	2.98	3.87	1.58	40923.9	50.63	2731.0	2647.82	11.88	2.72E+20
13	5.40	4.74	6.01	34.39	40923.9	50.63	2731.0	2647.82	29.27	1.46E+22
14	3.16	2.74	3.57	193.14	63943.5	50.63	2731.0	2647.82	10.07	4.41E+22
15	5.17	4.53	5.77	2.71	31332.3	50.63	2731.0	2647.82	26.87	8.10E+20
16	4.70	4.11	5.26	0.99	31332.3	50.63	2731.0	2647.82	22.24	2.44E+20
17	4.21	3.68	4.73	0.09	40923.9	50.63	2731.0	2647.82	17.86	2.35E+19
18	3.96	3.45	4.45	17.37	51794.3	50.63	2731.0	2647.82	15.78	5.03E+21
19	3.44	2.98	3.87	11.32	63943.5	50.63	2731.0	2647.82	11.88	3.05E+21
20	3.16	2.74	3.57	0.78	63943.5	50.63	2731.0	2647.82	10.07	1.78E+20
21	4.21	3.68	4.73	41.95	77371.7	50.63	2731.0	2647.82	17.86	2.06E+22
22	3.44	2.98	3.87	14.79	108064.6	50.63	2731.0	2647.82	11.88	6.73E+21
23	3.96	3.45	4.45	44.72	108064.6	50.63	2731.0	2647.82	15.78	2.70E+22
24	4.46	3.90	5.00	88.53	108064.6	50.63	2731.0	2647.82	20.01	6.79E+22
25	4.70	4.11	5.26	0.01	92078.7	50.63	2731.0	2647.82	22.24	1.05E+19
26	4.94	4.33	5.52	279.86	108064.6	50.63	2731.0	2647.82	24.53	2.63E+23
27	4.70	4.11	5.26	16.46	108064.6	50.63	2731.0	2647.82	22.24	1.40E+22
28	3.44	2.98	3.87	2.68	63943.5	50.63	2731.0	2647.82	11.88	7.22E+20
29	3.44	2.98	3.87	0.01	92078.7	50.63	2731.0	2647.82	11.88	4.73E+18
30	3.70	3.22	4.16	0.80	92078.7	50.63	2731.0	2647.82	13.78	3.59E+20
31	4.21	3.68	4.73	2.18	92078.7	50.63	2731.0	2647.82	17.86	1.27E+21
32	3.96	3.45	4.45	10.58	63943.5	50.63	2731.0	2647.82	15.78	3.79E+21
33	3.44	2.98	3.87	3.09	23019.7	50.63	2731.0	2647.82	11.88	2.99E+20
34	5.40	4.74	6.01	140.87	108064.6	50.63	5352.7	2647.82	29.27	3.10E+23
35	3.96	3.45	4.45	270.21	23019.7	50.63	2731.0	2647.82	15.78	3.48E+22
36	4.46	3.90	5.00	7.19	63943.5	50.63	2731.0	2647.82	20.01	3.26E+21
37	3.70	3.22	4.16	14.87	5754.9	50.63	2731.0	2647.82	13.78	4.18E+20
38	5.83	5.14	6.49	91.38	108064.6	50.63	5352.7	2647.82	34.20	2.35E+23
39	3.70	3.22	4.16	0.01	10231.0	50.63	2731.0	2647.82	13.78	4.08E+17
40	3.70	3.22	4.16	7.68	23019.7	50.63	2731.0	2647.82	13.78	8.64E+20
41	3.70	3.22	4.16	6.45	5754.9	50.63	2731.0	2647.82	13.78	1.82E+20
42	3.70	3.22	4.16	4.53	15985.9	50.63	2731.0	2647.82	13.78	3.54E+20
43	4.70	4.11	5.26	441.29	23019.7	50.63	2731.0	2647.82	22.24	8.01E+22
44	4.94	4.33	5.52	6.61	63943.5	50.63	2731.0	2647.82	24.53	3.68E+21
45	6.05	5.33	6.71	14.26	108064.6	50.63	5352.7	2647.82	36.73	3.93E+22
46	4.21	3.68	4.73	3.34	31332.3	50.63	2731.0	2647.82	17.86	6.63E+20
47	5.83	5.14	6.49	18.99	63943.5	50.63	5352.7	2647.82	34.20	2.89E+22

48	5.40	4.74	6.01	8.48	63943.5	50.63	5352.7	2647.82	29.27	1.10E+22
49	5.62	4.94	6.25	4.11	108064.6	50.63	2731.0	2647.82	31.72	5.00E+21
50	5.17	4.53	5.77	2216.95	23019.7	50.63	2731.0	2647.82	26.87	4.86E+23
51	6.25	5.52	6.94	92.35	51794.3	50.63	5352.7	2647.82	39.29	1.31E+23
52	3.70	3.22	4.16	31.06	51794.3	50.63	2731.0	2647.82	13.78	7.86E+21
53	3.96	3.45	4.45	18.99	51794.3	50.63	2731.0	2647.82	15.78	5.50E+21
54	5.62	4.94	6.25	857.96	31332.3	50.63	5352.7	2647.82	31.72	5.93E+23
55	6.05	5.33	6.71	339.89	31332.3	50.63	5352.7	2647.82	36.73	2.72E+23
56	6.25	5.52	6.94	506.84	31332.3	50.63	5352.7	2647.82	39.29	4.34E+23
57	3.70	3.22	4.16	54.62	51794.3	50.63	2731.0	2647.82	13.78	1.38E+22
58	6.05	5.33	6.71	20.15	63943.5	50.63	5352.7	2647.82	36.73	3.29E+22
59	6.05	5.33	6.71	9.75	51794.3	50.63	5352.7	2647.82	36.73	1.29E+22
60	5.62	4.94	6.25	5.01	77371.7	50.63	5352.7	2647.82	31.72	8.55E+21
61	4.46	3.90	5.00	8.31	51794.3	50.63	2731.0	2647.82	20.01	3.05E+21
62	4.21	3.68	4.73	41.69	51794.3	50.63	2731.0	2647.82	17.86	1.37E+22
63	4.70	4.11	5.26	151.80	51794.3	50.63	2731.0	2647.82	22.24	6.20E+22
64	4.21	3.68	4.73	16.38	40923.9	50.63	2731.0	2647.82	17.86	4.24E+21
65	3.96	3.45	4.45	23.13	31332.3	50.63	2731.0	2647.82	15.78	4.06E+21
66	4.46	3.90	5.00	47.59	31332.3	50.63	2731.0	2647.82	20.01	1.06E+22
67	4.70	4.11	5.26	0.25	40923.9	50.63	2731.0	2647.82	22.24	8.14E+19
68	4.94	4.33	5.52	193.70	31332.3	50.63	2731.0	2647.82	24.53	5.28E+22
69	4.70	4.11	5.26	13.29	51794.3	50.63	2731.0	2647.82	22.24	5.43E+21
70	4.46	3.90	5.00	0.52	40923.9	50.63	2731.0	2647.82	20.01	1.52E+20
71	5.17	4.53	5.77	448.91	31332.3	50.63	2731.0	2647.82	26.87	1.34E+23
72	3.96	3.45	4.45	2.27	51794.3	50.63	2731.0	2647.82	15.78	6.58E+20
73	5.40	4.74	6.01	323.80	31332.3	50.63	2731.0	2647.82	29.27	1.05E+23
74	4.46	3.90	5.00	7.08	51794.3	50.63	2731.0	2647.82	20.01	2.60E+21
75	5.83	5.14	6.49	9.01	51794.3	50.63	2731.0	2647.82	34.20	5.66E+21
76	4.94	4.33	5.52	18.73	51794.3	50.63	2731.0	2647.82	24.53	8.44E+21
77	5.62	4.94	6.25	40.02	40923.9	50.63	2731.0	2647.82	31.72	1.84E+22
78	5.83	5.14	6.49	222.06	63943.5	50.63	2731.0	2647.82	34.20	1.72E+23
79	4.70	4.11	5.26	20.51	31332.3	50.63	2731.0	2647.82	22.24	5.07E+21
80	4.94	4.33	5.52	3.38	23019.7	50.63	2731.0	2647.82	24.53	6.76E+20
81	4.94	4.33	5.52	0.01	40923.9	50.63	2731.0	2647.82	24.53	5.17E+18
82	6.25	5.52	6.94	3117.06	63943.5	50.63	5352.7	2647.82	39.29	5.44E+24
83	4.94	4.33	5.52	2421.95	5754.9	50.63	2731.0	2647.82	24.53	1.21E+23
84	4.46	3.90	5.00	2.52	5754.9	50.63	2731.0	2647.82	20.01	1.03E+20
85	5.40	4.74	6.01	2319.29	5754.9	50.63	2731.0	2647.82	29.27	1.39E+23
86	5.83	5.14	6.49	1305.32	8287.1	50.63	2731.0	2647.82	34.20	1.31E+23
87	6.85	6.07	7.57	1369.21	31332.3	50.63	5352.7	2647.82	47.13	1.41E+24
88	5.83	5.14	6.49	7.85	10231.0	50.63	2731.0	2647.82	34.20	9.74E+20
89	5.17	4.53	5.77	47.45	51794.3	50.63	2731.0	2647.82	26.87	2.34E+22
90	4.46	3.90	5.00	8.95	10231.0	50.63	2731.0	2647.82	20.01	6.50E+20
91	5.17	4.53	5.77	0.03	40923.9	50.63	2731.0	2647.82	26.87	1.14E+19
92	6.85	6.07	7.57	709.16	51794.3	50.63	5352.7	2647.82	47.13	1.20E+24
93	4.46	3.90	5.00	12.56	10231.0	50.63	2731.0	2647.82	20.01	9.12E+20
94	7.23	6.42	7.97	1912.37	51794.3	50.63	5352.7	2647.82	52.47	3.61E+24
95	4.46	3.90	5.00	11.79	10231.0	50.63	2731.0	2647.82	20.01	8.56E+20
96	6.05	5.33	6.71	496.49	23019.7	50.63	2731.0	2647.82	36.73	1.49E+23
97	6.46	5.70	7.15	162.89	51794.3	50.63	5352.7	2647.82	41.88	2.46E+23
98	5.62	4.94	6.25	1066.34	51794.3	50.63	5352.7	2647.82	31.72	1.22E+24
99	4.46	3.90	5.00	173.83	5754.9	50.63	2731.0	2647.82	20.01	7.10E+21

100	3.96	3.45	4.45	3.38	10231.0	50.63	2731.0	2647.82	15.78	1.93E+20
101	7.94	7.08	8.73	139.68	51794.3	50.63	5352.7	2647.82	63.30	3.18E+23
102	6.85	6.07	7.57	396.90	31332.3	50.63	5352.7	2647.82	47.13	4.07E+23
103	3.70	3.22	4.16	451.04	23019.7	50.63	2731.0	2647.82	13.78	5.07E+22
104	7.23	6.42	7.97	553.53	31332.3	50.63	5352.7	2647.82	52.47	6.32E+23
105	4.46	3.90	5.00	2959.88	23019.7	50.63	2731.0	2647.82	20.01	4.84E+23
106	5.40	4.74	6.01	697.44	23019.7	50.63	2731.0	2647.82	29.27	1.67E+23
107	4.94	4.33	5.52	1893.10	23019.7	50.63	2731.0	2647.82	24.53	3.79E+23
108	7.59	6.75	8.36	386.56	31332.3	50.63	5352.7	2647.82	57.86	4.87E+23
109	5.40	4.74	6.01	2479.62	63943.5	50.63	2731.0	2647.82	29.27	1.65E+24
110	6.05	5.33	6.71	1490.70	63943.5	50.63	2731.0	2647.82	36.73	1.24E+24
111	8.11	7.24	8.90	87.96	40923.9	50.63	5352.7	2647.82	66.02	1.65E+23
112	6.46	5.70	7.15	6398.48	63943.5	50.63	5352.7	2647.82	41.88	1.19E+25
113	6.85	6.07	7.57	4950.63	63943.5	50.63	5352.7	2647.82	47.13	1.04E+25
114	4.94	4.33	5.52	3700.45	51794.3	50.63	2731.0	2647.82	24.53	1.67E+24
115	7.23	6.42	7.97	3002.65	63943.5	50.63	5352.7	2647.82	52.47	7.00E+24
116	8.11	7.24	8.90	165.46	51794.3	50.63	5352.7	2647.82	66.02	3.93E+23
117	7.77	6.92	8.54	1324.99	63943.5	50.63	5352.7	2647.82	60.57	3.57E+24
118	6.05	5.33	6.71	6942.93	108064.6	50.63	2731.0	2647.82	36.73	9.77E+24
119	5.40	4.74	6.01	1220.41	108064.6	50.63	2731.0	2647.82	29.27	1.37E+24
120	4.94	4.33	5.52	0.17	40923.9	50.63	2731.0	2647.82	24.53	6.03E+19
121	4.70	4.11	5.26	41.17	63943.5	50.63	2731.0	2647.82	22.24	2.08E+22
122	6.46	5.70	7.15	58.70	92078.7	50.63	5352.7	2647.82	41.88	1.57E+23
123	4.94	4.33	5.52	248.54	108064.6	50.63	2731.0	2647.82	24.53	2.34E+23
124	4.70	4.11	5.26	18.13	92078.7	50.63	2731.0	2647.82	22.24	1.32E+22
125	6.25	5.52	6.94	51.40	77371.7	50.63	2731.0	2647.82	39.29	5.54E+22
126	6.25	5.52	6.94	503.68	77371.7	50.63	2731.0	2647.82	39.29	5.43E+23
127	6.05	5.33	6.71	45.26	77371.7	50.63	2731.0	2647.82	36.73	4.56E+22
128	5.17	4.53	5.77	123.12	63943.5	50.63	2731.0	2647.82	26.87	7.50E+22
129	4.70	4.11	5.26	4.75	63943.5	50.63	2731.0	2647.82	22.24	2.39E+21
130	5.40	4.74	6.01	7.63	31332.3	50.63	2731.0	2647.82	29.27	2.48E+21
131	4.94	4.33	5.52	8.19	63943.5	50.63	2731.0	2647.82	24.53	4.56E+21
132	6.25	5.52	6.94	0.65	92078.7	50.63	2731.0	2647.82	39.29	8.28E+20
133	4.94	4.33	5.52	0.23	40923.9	50.63	2731.0	2647.82	24.53	8.27E+19

Table 20. List of sub-plays in the Meeteetse transition play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :	Meeteetse Transition									(Panel 3)
	In-place	In-place	In-place			In-place Fractiles				
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	1.87E+10	8.46E+19	9.20E+09	23.546	0.46452	7.84E+09	1.23E+10	1.68E+10	2.30E+10	3.61E+10
2	6.03E+10	8.74E+20	2.96E+10	24.715	0.46423	2.52E+10	3.96E+10	5.41E+10	7.40E+10	1.16E+11
3	3.43E+11	2.83E+22	1.68E+11	26.454	0.46396	1.44E+11	2.26E+11	3.08E+11	4.21E+11	6.61E+11
4	1.61E+10	6.24E+19	7.90E+09	23.395	0.46409	6.74E+09	1.06E+10	1.45E+10	1.98E+10	3.10E+10
5	2.02E+10	9.80E+19	9.90E+09	23.619	0.46467	8.43E+09	1.32E+10	1.81E+10	2.48E+10	3.89E+10
6	6.29E+11	9.52E+22	3.09E+11	27.06	0.46423	2.63E+11	4.13E+11	5.65E+11	7.72E+11	1.21E+12
7	2.91E+11	2.03E+22	1.42E+11	26.288	0.46358	1.22E+11	1.91E+11	2.61E+11	3.57E+11	5.60E+11
8	2.54E+11	1.55E+22	1.24E+11	26.154	0.46334	1.07E+11	1.67E+11	2.28E+11	3.12E+11	4.89E+11
9	2.68E+10	1.72E+20	1.31E+10	23.904	0.46346	1.12E+10	1.76E+10	2.41E+10	3.29E+10	5.16E+10
10	9.76E+09	2.28E+19	4.77E+09	22.895	0.46301	4.10E+09	6.42E+09	8.77E+09	1.20E+10	1.88E+10
11	3.11E+10	2.33E+20	1.52E+10	24.051	0.46467	1.30E+10	2.04E+10	2.79E+10	3.81E+10	5.99E+10
12	1.48E+10	5.27E+19	7.26E+09	23.31	0.46452	6.19E+09	9.71E+09	1.33E+10	1.82E+10	2.85E+10
13	1.09E+11	2.82E+21	5.31E+10	25.303	0.46346	4.55E+10	7.13E+10	9.75E+10	1.33E+11	2.09E+11
14	1.89E+11	8.57E+21	9.26E+10	25.855	0.46467	7.88E+10	1.24E+11	1.69E+11	2.32E+11	3.64E+11
15	2.56E+10	1.57E+20	1.25E+10	23.857	0.46358	1.07E+10	1.68E+10	2.30E+10	3.14E+10	4.92E+10
16	1.40E+10	4.73E+19	6.88E+09	23.257	0.46383	5.88E+09	9.22E+09	1.26E+10	1.72E+10	2.70E+10
17	4.35E+09	4.56E+18	2.13E+09	22.087	0.46409	1.82E+09	2.86E+09	3.91E+09	5.35E+09	8.39E+09
18	6.37E+10	9.76E+20	3.12E+10	24.77	0.46423	2.66E+10	4.18E+10	5.72E+10	7.82E+10	1.23E+11
19	4.96E+10	5.92E+20	2.43E+10	24.519	0.46452	2.07E+10	3.25E+10	4.45E+10	6.08E+10	9.55E+10
20	1.20E+10	3.46E+19	5.89E+09	23.099	0.46467	5.01E+09	7.87E+09	1.08E+10	1.47E+10	2.31E+10
21	1.29E+11	3.98E+21	6.31E+10	25.473	0.46409	5.39E+10	8.45E+10	1.16E+11	1.58E+11	2.48E+11
22	7.37E+10	1.31E+21	3.61E+10	24.915	0.46452	3.08E+10	4.84E+10	6.61E+10	9.04E+10	1.42E+11
23	1.48E+11	5.24E+21	7.24E+10	25.61	0.46423	6.18E+10	9.70E+10	1.33E+11	1.81E+11	2.85E+11
24	2.34E+11	1.31E+22	1.15E+11	26.071	0.46396	9.79E+10	1.54E+11	2.10E+11	2.87E+11	4.51E+11
25	2.92E+09	2.04E+18	1.43E+09	21.686	0.46383	1.22E+09	1.92E+09	2.62E+09	3.58E+09	5.62E+09
26	4.61E+11	5.09E+22	2.26E+11	26.748	0.4637	1.93E+11	3.03E+11	4.14E+11	5.65E+11	8.87E+11
27	1.06E+11	2.72E+21	5.21E+10	25.282	0.46383	4.45E+10	6.99E+10	9.55E+10	1.31E+11	2.05E+11
28	2.41E+10	1.40E+20	1.18E+10	23.798	0.46452	1.01E+10	1.58E+10	2.16E+10	2.96E+10	4.65E+10
29	1.95E+09	9.18E+17	9.58E+08	21.285	0.46452	8.16E+08	1.28E+09	1.75E+09	2.40E+09	3.76E+09
30	1.70E+10	6.97E+19	8.35E+09	23.45	0.46437	7.12E+09	1.12E+10	1.53E+10	2.09E+10	3.28E+10
31	3.20E+10	2.46E+20	1.57E+10	24.081	0.46409	1.34E+10	2.10E+10	2.87E+10	3.93E+10	6.17E+10
32	5.53E+10	7.34E+20	2.71E+10	24.627	0.46423	2.31E+10	3.63E+10	4.96E+10	6.78E+10	1.06E+11
33	1.55E+10	5.81E+19	7.62E+09	23.358	0.46452	6.49E+09	1.02E+10	1.39E+10	1.91E+10	2.99E+10
34	5.00E+11	5.99E+22	2.45E+11	26.83	0.46346	2.09E+11	3.29E+11	4.49E+11	6.14E+11	9.62E+11
35	1.68E+11	6.75E+21	8.21E+10	25.737	0.46423	7.01E+10	1.10E+11	1.50E+11	2.06E+11	3.23E+11
36	5.13E+10	6.32E+20	2.51E+10	24.553	0.46396	2.15E+10	3.37E+10	4.61E+10	6.30E+10	9.88E+10
37	1.84E+10	8.11E+19	9.01E+09	23.526	0.46437	7.68E+09	1.21E+10	1.65E+10	2.25E+10	3.54E+10
38	4.35E+11	4.53E+22	2.13E+11	26.692	0.46323	1.82E+11	2.86E+11	3.91E+11	5.34E+11	8.38E+11
39	5.74E+08	7.92E+16	2.81E+08	20.06	0.46437	2.40E+08	3.77E+08	5.15E+08	7.04E+08	1.11E+09
40	2.64E+10	1.68E+20	1.29E+10	23.889	0.46437	1.10E+10	1.73E+10	2.37E+10	3.24E+10	5.09E+10
41	1.21E+10	3.52E+19	5.93E+09	23.108	0.46437	5.06E+09	7.94E+09	1.09E+10	1.49E+10	2.33E+10
42	1.69E+10	6.87E+19	8.29E+09	23.442	0.46437	7.07E+09	1.11E+10	1.52E+10	2.07E+10	3.26E+10
43	2.54E+11	1.55E+22	1.25E+11	26.154	0.46383	1.06E+11	1.67E+11	2.28E+11	3.12E+11	4.90E+11
44	5.44E+10	7.11E+20	2.67E+10	24.613	0.4637	2.28E+10	3.58E+10	4.89E+10	6.68E+10	1.05E+11
45	1.78E+11	7.59E+21	8.71E+10	25.799	0.46312	7.47E+10	1.17E+11	1.60E+11	2.19E+11	3.43E+11
46	2.31E+10	1.28E+20	1.13E+10	23.756	0.46409	9.67E+09	1.52E+10	2.08E+10	2.84E+10	4.45E+10
47	1.53E+11	5.58E+21	7.47E+10	25.644	0.46323	6.40E+10	1.00E+11	1.37E+11	1.87E+11	2.94E+11

48	9.43E+10	2.13E+21	4.62E+10	25.163	0.46346	3.95E+10	6.20E+10	8.47E+10	1.16E+11	1.82E+11
49	6.35E+10	9.66E+20	3.11E+10	24.767	0.46334	2.66E+10	4.18E+10	5.71E+10	7.80E+10	1.22E+11
50	6.26E+11	9.41E+22	3.07E+11	27.056	0.46358	2.62E+11	4.12E+11	5.63E+11	7.69E+11	1.21E+12
51	3.25E+11	2.52E+22	1.59E+11	26.399	0.46301	1.36E+11	2.13E+11	2.92E+11	3.98E+11	6.25E+11
52	7.96E+10	1.53E+21	3.91E+10	24.993	0.46437	3.33E+10	5.23E+10	7.15E+10	9.77E+10	1.53E+11
53	6.66E+10	1.07E+21	3.27E+10	24.814	0.46423	2.79E+10	4.37E+10	5.98E+10	8.18E+10	1.28E+11
54	6.91E+11	1.14E+23	3.38E+11	27.155	0.46334	2.90E+11	4.54E+11	6.21E+11	8.49E+11	1.33E+12
55	4.68E+11	5.25E+22	2.29E+11	26.765	0.46312	1.96E+11	3.08E+11	4.21E+11	5.75E+11	9.01E+11
56	5.92E+11	8.37E+22	2.89E+11	26.999	0.46301	2.48E+11	3.89E+11	5.31E+11	7.26E+11	1.14E+12
57	1.06E+11	2.68E+21	5.18E+10	25.275	0.46437	4.42E+10	6.93E+10	9.48E+10	1.30E+11	2.03E+11
58	1.63E+11	6.35E+21	7.97E+10	25.709	0.46312	6.83E+10	1.07E+11	1.46E+11	2.00E+11	3.13E+11
59	1.02E+11	2.49E+21	4.99E+10	25.241	0.46312	4.28E+10	6.71E+10	9.16E+10	1.25E+11	1.96E+11
60	8.31E+10	1.65E+21	4.07E+10	25.036	0.46334	3.48E+10	5.46E+10	7.46E+10	1.02E+11	1.60E+11
61	4.96E+10	5.91E+20	2.43E+10	24.52	0.46396	2.08E+10	3.26E+10	4.46E+10	6.09E+10	9.56E+10
62	1.05E+11	2.65E+21	5.15E+10	25.27	0.46409	4.39E+10	6.90E+10	9.43E+10	1.29E+11	2.02E+11
63	2.24E+11	1.20E+22	1.10E+11	26.026	0.46383	9.36E+10	1.47E+11	2.01E+11	2.75E+11	4.31E+11
64	5.85E+10	8.22E+20	2.87E+10	24.685	0.46409	2.45E+10	3.84E+10	5.25E+10	7.18E+10	1.13E+11
65	5.72E+10	7.86E+20	2.80E+10	24.662	0.46423	2.39E+10	3.75E+10	5.13E+10	7.02E+10	1.10E+11
66	9.24E+10	2.05E+21	4.53E+10	25.142	0.46396	3.87E+10	6.07E+10	8.30E+10	1.13E+11	1.78E+11
67	8.10E+09	1.57E+19	3.97E+09	22.708	0.46383	3.39E+09	5.32E+09	7.27E+09	9.94E+09	1.56E+10
68	2.06E+11	1.02E+22	1.01E+11	25.945	0.4637	8.64E+10	1.36E+11	1.85E+11	2.53E+11	3.97E+11
69	6.62E+10	1.05E+21	3.24E+10	24.808	0.46383	2.77E+10	4.35E+10	5.94E+10	8.12E+10	1.27E+11
70	1.11E+10	2.94E+19	5.42E+09	23.019	0.46396	4.63E+09	7.27E+09	9.94E+09	1.36E+10	2.13E+10
71	3.29E+11	2.59E+22	1.61E+11	26.411	0.46358	1.38E+11	2.16E+11	2.95E+11	4.04E+11	6.33E+11
72	2.30E+10	1.27E+20	1.13E+10	23.752	0.46423	9.63E+09	1.51E+10	2.07E+10	2.83E+10	4.44E+10
73	2.91E+11	2.04E+22	1.43E+11	26.291	0.46346	1.22E+11	1.92E+11	2.62E+11	3.58E+11	5.61E+11
74	4.58E+10	5.04E+20	2.25E+10	24.44	0.46396	1.92E+10	3.01E+10	4.11E+10	5.62E+10	8.82E+10
75	6.76E+10	1.09E+21	3.31E+10	24.83	0.46323	2.83E+10	4.44E+10	6.07E+10	8.30E+10	1.30E+11
76	8.25E+10	1.63E+21	4.04E+10	25.029	0.4637	3.46E+10	5.42E+10	7.41E+10	1.01E+11	1.59E+11
77	1.22E+11	3.56E+21	5.97E+10	25.419	0.46334	5.11E+10	8.01E+10	1.10E+11	1.50E+11	2.35E+11
78	3.73E+11	3.33E+22	1.82E+11	26.537	0.46323	1.56E+11	2.45E+11	3.35E+11	4.58E+11	7.17E+11
79	6.39E+10	9.81E+20	3.13E+10	24.773	0.46383	2.68E+10	4.20E+10	5.74E+10	7.85E+10	1.23E+11
80	2.34E+10	1.31E+20	1.14E+10	23.766	0.4637	9.78E+09	1.53E+10	2.10E+10	2.87E+10	4.50E+10
81	2.04E+09	1.00E+18	1.00E+09	21.33	0.4637	8.55E+08	1.34E+09	1.83E+09	2.51E+09	3.93E+09
82	2.10E+12	1.05E+24	1.02E+12	28.264	0.46301	8.79E+11	1.38E+12	1.88E+12	2.57E+12	4.03E+12
83	3.13E+11	2.35E+22	1.53E+11	26.361	0.4637	1.31E+11	2.05E+11	2.81E+11	3.84E+11	6.02E+11
84	9.11E+09	1.99E+19	4.46E+09	22.824	0.46396	3.81E+09	5.98E+09	8.18E+09	1.12E+10	1.75E+10
85	3.34E+11	2.68E+22	1.64E+11	26.428	0.46346	1.40E+11	2.20E+11	3.00E+11	4.10E+11	6.44E+11
86	3.25E+11	2.53E+22	1.59E+11	26.401	0.46323	1.36E+11	2.14E+11	2.92E+11	3.99E+11	6.26E+11
87	1.07E+12	2.71E+23	5.20E+11	27.587	0.46271	4.47E+11	7.01E+11	9.57E+11	1.31E+12	2.05E+12
88	2.80E+10	1.88E+20	1.37E+10	23.949	0.46323	1.18E+10	1.84E+10	2.52E+10	3.44E+10	5.40E+10
89	1.37E+11	4.53E+21	6.73E+10	25.539	0.46358	5.76E+10	9.03E+10	1.23E+11	1.69E+11	2.65E+11
90	2.29E+10	1.26E+20	1.12E+10	23.747	0.46396	9.58E+09	1.50E+10	2.06E+10	2.81E+10	4.41E+10
91	3.03E+09	2.20E+18	1.48E+09	21.724	0.46358	1.27E+09	1.99E+09	2.72E+09	3.72E+09	5.83E+09
92	9.86E+11	2.32E+23	4.82E+11	27.509	0.46271	4.14E+11	6.48E+11	8.86E+11	1.21E+12	1.90E+12
93	2.71E+10	1.77E+20	1.33E+10	23.916	0.46396	1.14E+10	1.78E+10	2.44E+10	3.33E+10	5.22E+10
94	1.71E+12	6.96E+23	8.34E+11	28.059	0.46252	7.17E+11	1.12E+12	1.53E+12	2.10E+12	3.28E+12
95	2.63E+10	1.66E+20	1.29E+10	23.884	0.46396	1.10E+10	1.73E+10	2.36E+10	3.23E+10	5.06E+10
96	3.47E+11	2.87E+22	1.70E+11	26.464	0.46312	1.45E+11	2.28E+11	3.11E+11	4.25E+11	6.67E+11
97	4.45E+11	4.74E+22	2.18E+11	26.715	0.46291	1.87E+11	2.93E+11	4.00E+11	5.46E+11	8.57E+11
98	9.91E+11	2.35E+23	4.85E+11	27.515	0.46334	4.15E+11	6.51E+11	8.90E+11	1.22E+12	1.91E+12
99	7.57E+10	1.38E+21	3.71E+10	24.942	0.46396	3.17E+10	4.97E+10	6.79E+10	9.29E+10	1.46E+11

100	1.25E+10	3.75E+19	6.12E+09	23.14	0.46423	5.22E+09	8.20E+09	1.12E+10	1.53E+10	2.41E+10
101	5.07E+11	6.12E+22	2.47E+11	26.845	0.46218	2.13E+11	3.34E+11	4.56E+11	6.22E+11	9.75E+11
102	5.73E+11	7.85E+22	2.80E+11	26.968	0.46271	2.41E+11	3.77E+11	5.15E+11	7.04E+11	1.10E+12
103	2.02E+11	9.84E+21	9.92E+10	25.925	0.46437	8.46E+10	1.33E+11	1.82E+11	2.48E+11	3.90E+11
104	7.15E+11	1.22E+23	3.49E+11	27.188	0.46252	3.00E+11	4.70E+11	6.42E+11	8.77E+11	1.37E+12
105	6.24E+11	9.37E+22	3.06E+11	27.053	0.46396	2.61E+11	4.10E+11	5.61E+11	7.67E+11	1.20E+12
106	3.67E+11	3.22E+22	1.79E+11	26.52	0.46346	1.54E+11	2.41E+11	3.29E+11	4.50E+11	7.06E+11
107	5.53E+11	7.33E+22	2.71E+11	26.931	0.4637	2.32E+11	3.63E+11	4.97E+11	6.79E+11	1.06E+12
108	6.27E+11	9.37E+22	3.06E+11	27.058	0.46235	2.63E+11	4.13E+11	5.64E+11	7.70E+11	1.21E+12
109	1.15E+12	3.18E+23	5.64E+11	27.665	0.46346	4.83E+11	7.57E+11	1.03E+12	1.41E+12	2.22E+12
110	1.00E+12	2.40E+23	4.90E+11	27.525	0.46312	4.20E+11	6.58E+11	8.99E+11	1.23E+12	1.93E+12
111	3.65E+11	3.18E+22	1.78E+11	26.517	0.4621	1.54E+11	2.40E+11	3.28E+11	4.48E+11	7.02E+11
112	3.10E+12	2.30E+24	1.52E+12	28.655	0.46291	1.30E+12	2.04E+12	2.79E+12	3.81E+12	5.96E+12
113	2.89E+12	2.00E+24	1.41E+12	28.586	0.46271	1.21E+12	1.90E+12	2.60E+12	3.55E+12	5.57E+12
114	1.16E+12	3.23E+23	5.68E+11	27.672	0.4637	4.86E+11	7.62E+11	1.04E+12	1.42E+12	2.23E+12
115	2.38E+12	1.35E+24	1.16E+12	28.39	0.46252	9.98E+11	1.56E+12	2.14E+12	2.92E+12	4.57E+12
116	5.64E+11	7.56E+22	2.75E+11	26.951	0.4621	2.37E+11	3.71E+11	5.07E+11	6.92E+11	1.08E+12
117	1.70E+12	6.86E+23	8.28E+11	28.053	0.46226	7.13E+11	1.12E+12	1.53E+12	2.08E+12	3.26E+12
118	2.81E+12	1.89E+24	1.37E+12	28.556	0.46312	1.18E+12	1.85E+12	2.52E+12	3.45E+12	5.40E+12
119	1.05E+12	2.65E+23	5.14E+11	27.573	0.46346	4.40E+11	6.91E+11	9.44E+11	1.29E+12	2.02E+12
120	6.98E+09	1.17E+19	3.42E+09	22.558	0.4637	2.92E+09	4.58E+09	6.26E+09	8.56E+09	1.34E+10
121	1.29E+11	4.02E+21	6.34E+10	25.479	0.46383	5.42E+10	8.50E+10	1.16E+11	1.59E+11	2.49E+11
122	3.56E+11	3.03E+22	1.74E+11	26.492	0.46291	1.49E+11	2.34E+11	3.20E+11	4.37E+11	6.86E+11
123	4.34E+11	4.52E+22	2.13E+11	26.689	0.4637	1.82E+11	2.85E+11	3.90E+11	5.33E+11	8.36E+11
124	1.03E+11	2.55E+21	5.05E+10	25.251	0.46383	4.31E+10	6.77E+10	9.25E+10	1.26E+11	1.98E+11
125	2.11E+11	1.07E+22	1.03E+11	25.97	0.46301	8.87E+10	1.39E+11	1.90E+11	2.60E+11	4.07E+11
126	6.62E+11	1.05E+23	3.24E+11	27.111	0.46301	2.78E+11	4.35E+11	5.95E+11	8.12E+11	1.27E+12
127	1.92E+11	8.81E+21	9.38E+10	25.873	0.46312	8.05E+10	1.26E+11	1.72E+11	2.35E+11	3.69E+11
128	2.46E+11	1.45E+22	1.20E+11	26.121	0.46358	1.03E+11	1.62E+11	2.21E+11	3.02E+11	4.74E+11
129	4.39E+10	4.63E+20	2.15E+10	24.399	0.46383	1.84E+10	2.89E+10	3.95E+10	5.39E+10	8.46E+10
130	4.47E+10	4.79E+20	2.19E+10	24.417	0.46346	1.87E+10	2.94E+10	4.02E+10	5.49E+10	8.61E+10
131	6.06E+10	8.81E+20	2.97E+10	24.72	0.4637	2.54E+10	3.98E+10	5.44E+10	7.44E+10	1.17E+11
132	2.58E+10	1.60E+20	1.26E+10	23.868	0.46301	1.08E+10	1.70E+10	2.32E+10	3.17E+10	4.97E+10
133	8.17E+09	1.60E+19	4.00E+09	22.716	0.4637	3.42E+09	5.37E+09	7.33E+09	1.00E+10	1.57E+10
P.P.C.	4.49E+13	4.83E+26	2.20E+13			1.88E+13	2.96E+13	4.04E+13	5.52E+13	8.65E+13

Table 21. List of sub-plays in the Meeteetse transition play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Play Name :		Lance Transition				a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.93	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	15.43	100	7	50	50	6,000	2114.7	589	0.93	1.03E+11
2	31.42	100	7	50	50	7,000	2464.7	603	0.93	2.38E+11
3	25.19	100	7	50	50	8,000	2814.7	617	0.93	2.13E+11
4	12.04	100	7	50	50	9,500	3339.7	638	0.93	1.17E+11
5	21.86	150	7	50	50	6,000	2114.7	589	0.93	2.18E+11
6	4.99	150	7	50	50	5,000	1764.7	575	0.93	4.25E+10
7	3.22	150	7	50	50	4,000	1414.7	561	0.93	2.26E+10
8	0.95	150	7	50	50	3,500	1239.7	554	0.93	5.91E+09
9	22.65	175	7	50	50	6,500	2289.7	596	0.93	2.82E+11
10	18.42	200	7	50	50	7,500	2639.7	610	0.93	2.95E+11
11	11.63	225	7	50	50	8,500	2989.7	624	0.93	2.32E+11
12	8	225	7	70	50	9,500	3339.7	638	0.93	2.44E+11
13	0.21	260	7	50	50	7,500	2639.7	610	0.93	4.38E+09
14	3.92	260	7	50	50	8,500	2989.7	624	0.93	9.04E+10
15	28.97	275	7	70	50	10,000	3514.7	645	0.93	1.13E+12
16	8.36	275	7	50	50	6,500	2289.7	596	0.93	1.64E+11
17	35.66	275	7	70	50	11,000	3864.7	659	0.93	1.49E+12
18	24.14	275	7	50	50	7,000	2464.7	603	0.93	5.03E+11
19	43.64	275	7	50	50	8,000	2814.7	617	0.93	1.01E+12
20	22.14	275	7	50	50	9,000	3164.7	631	0.93	5.66E+11
21	2.97	275	7	50	50	8,500	2989.7	624	0.93	7.25E+10
22	4.81	300	7	50	50	6,000	2114.7	589	0.93	9.59E+10
23	26.53	350	7	50	50	6,000	2114.7	589	0.93	6.17E+11
24	6.72	400	7	50	50	7,250	2552.2	606.5	0.93	2.09E+11
25	12.47	400	7	50	50	8,250	2902.2	620.5	0.93	4.32E+11
26	7.89	260	7	50	50	9,000	3164.7	631	0.93	1.91E+11
27	11.81	400	7	50	50	9,250	3252.2	634.5	0.93	4.48E+11
28	0.39	550	7	50	50	7,750	2727.2	613.5	0.93	1.77E+10
29	1.65	275	7	50	50	7,500	2639.7	610	0.93	3.64E+10
30	12.68	550	7	50	50	8,250	2902.2	620.5	0.93	6.04E+11
31	2.86	240	7	50	50	7,500	2639.7	610	0.93	5.50E+10
32	5.5	240	7	50	50	8,500	2989.7	624	0.93	1.17E+11
33	10.47	400	7	50	50	10,250	3602.2	648.5	0.93	4.31E+11
34	11.23	550	7	50	50	9,250	3252.2	634.5	0.93	5.86E+11
35	8.36	240	7	50	50	9,000	3164.7	631	0.93	1.86E+11
36	15.24	550	7	50	50	10,250	3602.2	648.5	0.93	8.62E+11
37	26.29	400	7	70	50	11,250	3952.2	662.5	0.93	1.63E+12
38	0.65	525	7	50	50	7,750	2727.2	613.5	0.93	2.81E+10
39	9.93	240	7	50	50	8,000	2814.7	617	0.93	2.01E+11
40	30.53	550	7	70	50	11,250	3952.2	662.5	0.93	2.60E+12
41	0.92	275	7	50	50	8,500	2989.7	624	0.93	2.24E+10
42	46.84	400	7	50	50	7,250	2552.2	606.5	0.93	1.46E+12
43	106.63	400	7	50	50	8,250	2902.2	620.5	0.93	3.69E+12
44	68.13	450	7	50	50	9,250	3252.2	634.5	0.93	2.91E+12
45	30.08	475	7	50	50	10,750	3777.2	655.5	0.93	1.52E+12
46	6.02	475	7	70	50	12,250	4302.2	676.5	0.93	4.71E+11
47	35.02	625	7	70	50	12,750	4477.2	683.5	0.93	3.72E+12

48	7.3	475	7	70	50	11,250	3952.2	662.5	0.93	5.36E+11
49	28.6	650	7	70	50	13,750	4827.2	697.5	0.93	3.34E+12
50	92.82	650	7	50	50	10,750	3777.2	655.5	0.93	6.44E+12
51	6.72	700	7	70	50	15,250	5352.2	718.5	0.93	9.09E+11
52	115.57	600	7	50	50	9,250	3252.2	634.5	0.93	6.58E+12
53	67.57	825	7	70	50	11,750	4127.2	669.5	0.93	8.91E+12
54	79.88	875	7	70	50	12,750	4477.2	683.5	0.93	1.19E+13
55	2.63	760	7	50	50	11,250	3952.2	662.5	0.93	2.21E+11
56	59.99	850	7	70	50	14,250	5002.2	704.5	0.93	9.39E+12
57	26.6	825	7	70	50	15,250	5352.2	718.5	0.93	4.24E+12
58	20.39	700	7	70	50	11,250	3952.2	662.5	0.93	2.21E+12
59	13.26	550	7	50	50	7,750	2727.2	613.5	0.93	6.00E+11
60	64.1	550	7	50	50	8,250	2902.2	620.5	0.93	3.05E+12
61	0.69	1050	7	70	50	12,750	4477.2	683.5	0.93	1.23E+11
62	6.71	875	7	50	50	11,250	3952.2	662.5	0.93	6.49E+11
63	1.12	1050	7	70	50	12,250	4302.2	676.5	0.93	1.94E+11
64	0.33	1050	7	70	50	11,750	4127.2	669.5	0.93	5.54E+10
65	1.76	850	7	50	50	10,750	3777.2	655.5	0.93	1.60E+11
66	0.17	550	7	50	50	9,750	3427.2	641.5	0.93	9.25E+09
67	2.17	450	7	50	50	9,750	3427.2	641.5	0.93	9.66E+10
Total =	1443.84								Total =	8.98E+13

Table 22. List of sub-plays in the Lance transition play, Bighorn Basin. Point estimates were made of the six attributes listed in columns 2 through 7. An estimate of the Z factor or gas compressibility factor is listed in column 10. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). The point estimate of in-place gas in a sub-play listed in the last column is taken as a mean estimate.

Play Name :		Lance Transition								(Panel 2)
		Depth		Closure	Thickness	Porosity	Trap Fill	HC Sat.	*Pe/TZ*	
	Range (%) =	30		30	50	60 .	100	80		
Subplay No.	Expect *Pe/TZ*	F95 D. *Pe/TZ*	F5 D. *Pe/TZ*	Expect (Clo.)^2	Expect (Thick.)^2	Expect (Por.)^2	Expect (Trap)^2	Expect (HC S)^2	Expect (*Pe/TZ*)^2	Expect (Gas)^2
1	3.86	3.36	4.34	240.06	10231.0	50.63	2731.0	2647.82	14.99	1.31E+22
2	4.40	3.83	4.93	995.42	10231.0	50.63	2731.0	2647.82	19.43	7.02E+22
3	4.91	4.29	5.49	639.81	10231.0	50.63	2731.0	2647.82	24.19	5.62E+22
4	5.63	4.94	6.27	146.17	10231.0	50.63	2731.0	2647.82	31.85	1.69E+22
5	3.86	3.36	4.34	481.83	23019.7	50.63	2731.0	2647.82	14.99	5.90E+22
6	3.30	2.86	3.72	25.11	23019.7	50.63	2731.0	2647.82	10.96	2.25E+21
7	2.71	2.34	3.07	10.45	23019.7	50.63	2731.0	2647.82	7.40	6.32E+20
8	2.41	2.08	2.73	0.91	23019.7	50.63	2731.0	2647.82	5.83	4.33E+19
9	4.13	3.60	4.64	517.29	31332.3	50.63	2731.0	2647.82	17.17	9.87E+22
10	4.65	4.06	5.21	342.12	40923.9	50.63	2731.0	2647.82	21.77	1.08E+23
11	5.15	4.51	5.76	136.38	51794.3	50.63	2731.0	2647.82	26.68	6.68E+22
12	5.63	4.94	6.27	64.53	51794.3	50.63	5352.7	2647.82	31.85	7.40E+22
13	4.65	4.06	5.21	0.04	69161.3	50.63	2731.0	2647.82	21.77	2.37E+19
14	5.15	4.51	5.76	15.49	69161.3	50.63	2731.0	2647.82	26.68	1.01E+22
15	5.86	5.15	6.52	846.24	77371.7	50.63	5352.7	2647.82	34.50	1.57E+24
16	4.13	3.60	4.64	70.47	77371.7	50.63	2731.0	2647.82	17.17	3.32E+22
17	6.31	5.56	7.00	1282.21	77371.7	50.63	5352.7	2647.82	39.96	2.76E+24
18	4.40	3.83	4.93	587.58	77371.7	50.63	2731.0	2647.82	19.43	3.13E+23
19	4.91	4.29	5.49	1920.28	77371.7	50.63	2731.0	2647.82	24.19	1.27E+24
20	5.39	4.73	6.02	494.26	77371.7	50.63	2731.0	2647.82	29.24	3.96E+23
21	5.15	4.51	5.76	8.89	77371.7	50.63	2731.0	2647.82	26.68	6.51E+21
22	3.86	3.36	4.34	23.33	92078.7	50.63	2731.0	2647.82	14.99	1.14E+22
23	3.86	3.36	4.34	709.69	125329.3	50.63	2731.0	2647.82	14.99	4.73E+23
24	4.52	3.95	5.07	45.53	163695.5	50.63	2731.0	2647.82	20.59	5.44E+22
25	5.03	4.40	5.62	156.79	163695.5	50.63	2731.0	2647.82	25.43	2.31E+23
26	5.39	4.73	6.02	62.77	69161.3	50.63	2731.0	2647.82	29.24	4.50E+22
27	5.51	4.84	6.15	140.64	163695.5	50.63	2731.0	2647.82	30.53	2.49E+23
28	4.78	4.18	5.35	0.15	309486.7	50.63	2731.0	2647.82	22.97	3.87E+20
29	4.65	4.06	5.21	2.75	77371.7	50.63	2731.0	2647.82	21.77	1.64E+21
30	5.03	4.40	5.62	162.12	309486.7	50.63	2731.0	2647.82	25.43	4.52E+23
31	4.65	4.06	5.21	8.25	58930.4	50.63	2731.0	2647.82	21.77	3.75E+21
32	5.15	4.51	5.76	30.50	58930.4	50.63	2731.0	2647.82	26.68	1.70E+22
33	5.97	5.25	6.64	110.53	163695.5	50.63	2731.0	2647.82	35.85	2.30E+23
34	5.51	4.84	6.15	127.16	309486.7	50.63	2731.0	2647.82	30.53	4.26E+23
35	5.39	4.73	6.02	70.47	58930.4	50.63	2731.0	2647.82	29.24	4.31E+22
36	5.97	5.25	6.64	234.19	309486.7	50.63	2731.0	2647.82	35.85	9.21E+23
37	6.41	5.66	7.12	696.91	163695.5	50.63	5352.7	2647.82	41.34	3.28E+24
38	4.78	4.18	5.35	0.43	281991.0	50.63	2731.0	2647.82	22.97	9.79E+20
39	4.91	4.29	5.49	99.42	58930.4	50.63	2731.0	2647.82	24.19	5.03E+22
40	6.41	5.66	7.12	939.83	309486.7	50.63	5352.7	2647.82	41.34	8.36E+24
41	5.15	4.51	5.76	0.85	77371.7	50.63	2731.0	2647.82	26.68	6.25E+20
42	4.52	3.95	5.07	2212.23	163695.5	50.63	2731.0	2647.82	20.59	2.64E+24
43	5.03	4.40	5.62	11464.50	163695.5	50.63	2731.0	2647.82	25.43	1.69E+25
44	5.51	4.84	6.15	4680.29	207177.1	50.63	2731.0	2647.82	30.53	1.05E+25
45	6.20	5.46	6.88	912.33	230836.2	50.63	2731.0	2647.82	38.58	2.88E+24
46	6.84	6.05	7.57	36.54	230836.2	50.63	5352.7	2647.82	46.98	2.75E+23
47	7.04	6.23	7.79	1236.60	399647.1	50.63	5352.7	2647.82	49.83	1.71E+25

48	6.41	5.66	7.12	53.73	230836.2	50.63	5352.7	2647.82	41.34	3.56E+23
49	7.44	6.60	8.21	824.76	432258.3	50.63	5352.7	2647.82	55.62	1.38E+25
50	6.20	5.46	6.88	8687.19	432258.3	50.63	2731.0	2647.82	38.58	5.14E+25
51	8.01	7.13	8.82	45.53	501317.3	50.63	5352.7	2647.82	64.42	1.02E+24
52	5.51	4.84	6.15	13467.48	368314.8	50.63	2731.0	2647.82	30.53	5.37E+25
53	6.63	5.85	7.35	4603.67	696345.1	50.63	5352.7	2647.82	44.14	9.84E+25
54	7.04	6.23	7.79	6433.87	783308.3	50.63	5352.7	2647.82	49.83	1.75E+26
55	6.41	5.66	7.12	6.97	590940.6	50.63	2731.0	2647.82	41.34	6.04E+22
56	7.63	6.78	8.42	3628.72	739187.3	50.63	5352.7	2647.82	58.54	1.09E+26
57	8.01	7.13	8.82	713.44	696345.1	50.63	5352.7	2647.82	64.42	2.22E+25
58	6.41	5.66	7.12	419.21	501317.3	50.63	5352.7	2647.82	41.34	6.04E+24
59	4.78	4.18	5.35	177.29	309486.7	50.63	2731.0	2647.82	22.97	4.47E+23
60	5.03	4.40	5.62	4142.97	309486.7	50.63	2731.0	2647.82	25.43	1.16E+25
61	7.04	6.23	7.79	0.48	1127964.0	50.63	5352.7	2647.82	49.83	1.88E+22
62	6.41	5.66	7.12	45.40	783308.3	50.63	2731.0	2647.82	41.34	5.21E+23
63	6.84	6.05	7.57	1.26	1127964.0	50.63	5352.7	2647.82	46.98	4.66E+22
64	6.63	5.85	7.35	0.11	1127964.0	50.63	5352.7	2647.82	44.14	3.80E+21
65	6.20	5.46	6.88	3.12	739187.3	50.63	2731.0	2647.82	38.58	3.16E+22
66	5.74	5.05	6.40	0.03	309486.7	50.63	2731.0	2647.82	33.17	1.06E+20
67	5.74	5.05	6.40	4.75	207177.1	50.63	2731.0	2647.82	33.17	1.16E+22

Table 23. List of sub-plays in the Lance transition play, Bighorn Basin, with estimates of ranges in percent for the six play attributes. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999).

Play Name :	Lance Transition								(Panel 3)
	In-place	In-place	In-place			In-place Fractiles			
Subplay	Mean gas	Var. gas	S.D. gas			F95	F75	F50	F25	F5
No.	(CF)	(CF)^2	(CF)	Mu	Sigma	(CF)	(CF)	(CF)	(CF)	(CF)
1	1.03E+11	2.53E+21	5.03E+10	25.246	0.46437	4.29E+10	6.74E+10	9.21E+10	1.26E+11	1.98E+11
2	2.38E+11	1.36E+22	1.17E+11	26.087	0.46409	9.95E+10	1.56E+11	2.14E+11	2.92E+11	4.58E+11
3	2.13E+11	1.09E+22	1.04E+11	25.976	0.46383	8.91E+10	1.40E+11	1.91E+11	2.61E+11	4.10E+11
4	1.17E+11	3.26E+21	5.71E+10	25.376	0.46346	4.89E+10	7.67E+10	1.05E+11	1.43E+11	2.25E+11
5	2.18E+11	1.14E+22	1.07E+11	26	0.46437	9.12E+10	1.43E+11	1.96E+11	2.68E+11	4.20E+11
6	4.25E+10	4.36E+20	2.09E+10	24.366	0.46467	1.78E+10	2.79E+10	3.82E+10	5.22E+10	8.20E+10
7	2.26E+10	1.23E+20	1.11E+10	23.731	0.46498	9.42E+09	1.48E+10	2.02E+10	2.77E+10	4.35E+10
8	5.91E+09	8.42E+18	2.90E+09	22.391	0.46514	2.47E+09	3.87E+09	5.30E+09	7.25E+09	1.14E+10
9	2.82E+11	1.91E+22	1.38E+11	26.257	0.46423	1.18E+11	1.85E+11	2.53E+11	3.46E+11	5.43E+11
10	2.95E+11	2.09E+22	1.45E+11	26.303	0.46396	1.24E+11	1.94E+11	2.65E+11	3.62E+11	5.69E+11
11	2.32E+11	1.29E+22	1.14E+11	26.063	0.4637	9.72E+10	1.53E+11	2.09E+11	2.85E+11	4.47E+11
12	2.44E+11	1.43E+22	1.20E+11	26.114	0.46346	1.02E+11	1.61E+11	2.19E+11	3.00E+11	4.70E+11
13	4.38E+09	4.60E+18	2.14E+09	22.092	0.46396	1.83E+09	2.87E+09	3.93E+09	5.37E+09	8.43E+09
14	9.04E+10	1.96E+21	4.43E+10	25.12	0.4637	3.79E+10	5.94E+10	8.12E+10	1.11E+11	1.74E+11
15	1.13E+12	3.03E+23	5.51E+11	27.642	0.46334	4.72E+11	7.40E+11	1.01E+12	1.38E+12	2.17E+12
16	1.64E+11	6.43E+21	8.02E+10	25.713	0.46423	6.84E+10	1.07E+11	1.47E+11	2.01E+11	3.15E+11
17	1.49E+12	5.32E+23	7.29E+11	27.923	0.46312	6.25E+11	9.80E+11	1.34E+12	1.83E+12	2.87E+12
18	5.03E+11	6.07E+22	2.46E+11	26.835	0.46409	2.10E+11	3.30E+11	4.51E+11	6.17E+11	9.68E+11
19	1.01E+12	2.47E+23	4.97E+11	27.537	0.46383	4.25E+11	6.66E+11	9.11E+11	1.24E+12	1.95E+12
20	5.66E+11	7.67E+22	2.77E+11	26.954	0.46358	2.37E+11	3.72E+11	5.08E+11	6.94E+11	1.09E+12
21	7.25E+10	1.26E+21	3.55E+10	24.899	0.4637	3.04E+10	4.76E+10	6.51E+10	8.90E+10	1.40E+11
22	9.59E+10	2.22E+21	4.71E+10	25.179	0.46437	4.01E+10	6.30E+10	8.61E+10	1.18E+11	1.85E+11
23	6.17E+11	9.17E+22	3.03E+11	27.041	0.46437	2.58E+11	4.05E+11	5.54E+11	7.58E+11	1.19E+12
24	2.09E+11	1.05E+22	1.03E+11	25.96	0.46402	8.77E+10	1.38E+11	1.88E+11	2.57E+11	4.04E+11
25	4.32E+11	4.48E+22	2.12E+11	26.684	0.46376	1.81E+11	2.84E+11	3.88E+11	5.30E+11	8.32E+11
26	1.91E+11	8.70E+21	9.33E+10	25.866	0.46358	7.98E+10	1.25E+11	1.71E+11	2.34E+11	3.67E+11
27	4.48E+11	4.82E+22	2.20E+11	26.722	0.46351	1.88E+11	2.95E+11	4.03E+11	5.50E+11	8.63E+11
28	1.77E+10	7.49E+19	8.65E+09	23.487	0.46389	7.39E+09	1.16E+10	1.59E+10	2.17E+10	3.40E+10
29	3.64E+10	3.18E+20	1.78E+10	24.209	0.46396	1.52E+10	2.39E+10	3.27E+10	4.46E+10	7.00E+10
30	6.04E+11	8.76E+22	2.96E+11	27.019	0.46376	2.53E+11	3.97E+11	5.42E+11	7.42E+11	1.16E+12
31	5.50E+10	7.27E+20	2.70E+10	24.623	0.46396	2.30E+10	3.61E+10	4.94E+10	6.75E+10	1.06E+11
32	1.17E+11	3.29E+21	5.74E+10	25.379	0.4637	4.91E+10	7.70E+10	1.05E+11	1.44E+11	2.26E+11
33	4.31E+11	4.44E+22	2.11E+11	26.682	0.46328	1.81E+11	2.83E+11	3.87E+11	5.29E+11	8.29E+11
34	5.86E+11	8.24E+22	2.87E+11	26.99	0.46351	2.46E+11	3.85E+11	5.27E+11	7.20E+11	1.13E+12
35	1.86E+11	8.33E+21	9.12E+10	25.844	0.46358	7.81E+10	1.22E+11	1.67E+11	2.29E+11	3.59E+11
36	8.62E+11	1.78E+23	4.22E+11	27.376	0.46328	3.61E+11	5.67E+11	7.75E+11	1.06E+12	1.66E+12
37	1.63E+12	6.33E+23	7.95E+11	28.01	0.46306	6.82E+11	1.07E+12	1.46E+12	2.00E+12	3.13E+12
38	2.81E+10	1.90E+20	1.38E+10	23.951	0.46389	1.18E+10	1.85E+10	2.52E+10	3.45E+10	5.41E+10
39	2.01E+11	9.73E+21	9.86E+10	25.921	0.46383	8.43E+10	1.32E+11	1.81E+11	2.47E+11	3.88E+11
40	2.60E+12	1.61E+24	1.27E+12	28.478	0.46306	1.09E+12	1.71E+12	2.33E+12	3.19E+12	5.00E+12
41	2.24E+10	1.21E+20	1.10E+10	23.727	0.4637	9.40E+09	1.47E+10	2.02E+10	2.76E+10	4.32E+10
42	1.46E+12	5.12E+23	7.16E+11	27.902	0.46402	6.11E+11	9.59E+11	1.31E+12	1.79E+12	2.81E+12
43	3.69E+12	3.28E+24	1.81E+12	28.83	0.46376	1.55E+12	2.43E+12	3.32E+12	4.54E+12	7.12E+12
44	2.91E+12	2.03E+24	1.42E+12	28.592	0.46351	1.22E+12	1.91E+12	2.61E+12	3.57E+12	5.60E+12
45	1.52E+12	5.56E+23	7.46E+11	27.946	0.46317	6.39E+11	1.00E+12	1.37E+12	1.87E+12	2.93E+12
46	4.71E+11	5.31E+22	2.30E+11	26.772	0.46286	1.98E+11	3.10E+11	4.24E+11	5.79E+11	9.07E+11
47	3.72E+12	3.30E+24	1.82E+12	28.837	0.46276	1.56E+12	2.44E+12	3.34E+12	4.56E+12	7.15E+12

48	5.36E+11	6.88E+22	2.62E+11	26.901	0.46306	2.25E+11	3.53E+11	4.82E+11	6.58E+11	1.03E+12
49	3.34E+12	2.65E+24	1.63E+12	28.729	0.46257	1.40E+12	2.19E+12	3.00E+12	4.09E+12	6.41E+12
50	6.44E+12	9.92E+24	3.15E+12	29.386	0.46317	2.70E+12	4.23E+12	5.78E+12	7.90E+12	1.24E+13
51	9.09E+11	1.97E+23	4.43E+11	27.428	0.4623	3.82E+11	5.98E+11	8.16E+11	1.11E+12	1.75E+12
52	6.58E+12	1.04E+25	3.22E+12	29.408	0.46351	2.76E+12	4.33E+12	5.91E+12	8.08E+12	1.27E+13
53	8.91E+12	1.90E+25	4.36E+12	29.711	0.46296	3.74E+12	5.86E+12	8.00E+12	1.09E+13	1.71E+13
54	1.19E+13	3.37E+25	5.80E+12	29.998	0.46276	4.98E+12	7.81E+12	1.07E+13	1.46E+13	2.28E+13
55	2.21E+11	1.17E+22	1.08E+11	26.013	0.46306	9.26E+10	1.45E+11	1.98E+11	2.71E+11	4.25E+11
56	9.39E+12	2.10E+25	4.58E+12	29.763	0.46248	3.94E+12	6.18E+12	8.44E+12	1.15E+13	1.81E+13
57	4.24E+12	4.28E+24	2.07E+12	28.968	0.4623	1.78E+12	2.79E+12	3.81E+12	5.20E+12	8.15E+12
58	2.21E+12	1.17E+24	1.08E+12	28.316	0.46306	9.26E+11	1.45E+12	1.98E+12	2.71E+12	4.25E+12
59	6.00E+11	8.66E+22	2.94E+11	27.013	0.46389	2.51E+11	3.94E+11	5.39E+11	7.37E+11	1.16E+12
60	3.05E+12	2.24E+24	1.50E+12	28.64	0.46376	1.28E+12	2.01E+12	2.74E+12	3.75E+12	5.88E+12
61	1.23E+11	3.62E+21	6.01E+10	25.429	0.46276	5.16E+10	8.09E+10	1.11E+11	1.51E+11	2.37E+11
62	6.49E+11	1.01E+23	3.17E+11	27.091	0.46306	2.72E+11	4.26E+11	5.83E+11	7.96E+11	1.25E+12
63	1.94E+11	8.98E+21	9.48E+10	25.884	0.46286	8.14E+10	1.28E+11	1.74E+11	2.38E+11	3.73E+11
64	5.54E+10	7.33E+20	2.71E+10	24.63	0.46296	2.32E+10	3.64E+10	4.98E+10	6.80E+10	1.07E+11
65	1.60E+11	6.10E+21	7.81E+10	25.689	0.46317	6.69E+10	1.05E+11	1.43E+11	1.96E+11	3.07E+11
66	9.25E+09	2.05E+19	4.53E+09	22.841	0.4634	3.88E+09	6.08E+09	8.31E+09	1.14E+10	1.78E+10
67	9.66E+10	2.24E+21	4.73E+10	25.187	0.4634	4.05E+10	6.35E+10	8.68E+10	1.19E+11	1.86E+11
P.P.C.	8.98E+13	1.93E+27	4.39E+13			3.76E+13	5.90E+13	8.06E+13	1.10E+14	1.73E+14

Table 24. List of sub-plays in the Lance transition play, Bighorn Basin with calculated fractiles for in-place gas. For a detailed explanation of the symbols and formulas used in the spreadsheets see Crovelli and others (1999). Mean in-place gas is listed in column 2 for comparison.

Aggregation Name:	Bighorn Basin							
	In-place	In-place	In-place	In-place Fractiles				
Play	Mean gas	Var. gas	S.D. gas	F95	F75	F50	F25	F5
Code	(CF)	(CF)^2	(CF)	(CF)	(CF)	(CF)	(CF)	(CF)
LanT	8.98E+13	1.93E+27	4.39E+13	3.76E+13	5.90E+13	8.06E+13	1.10E+14	1.73E+14
MeeT	4.49E+13	4.83E+26	2.20E+13	1.88E+13	2.96E+13	4.04E+13	5.52E+13	8.65E+13
KmvO	3.85E+13	9.45E+25	9.72E+12	2.48E+13	3.16E+13	3.73E+13	4.41E+13	5.62E+13
KmvT	7.58E+13	1.37E+27	3.71E+13	3.18E+13	4.98E+13	6.81E+13	9.30E+13	1.46E+14
FroO	4.19E+13	1.12E+26	1.06E+13	2.70E+13	3.44E+13	4.06E+13	4.80E+13	6.11E+13
FroT	2.46E+13	1.45E+26	1.20E+13	1.03E+13	1.62E+13	2.21E+13	3.02E+13	4.74E+13
MudO	1.34E+13	1.14E+25	3.38E+12	8.66E+12	1.10E+13	1.30E+13	1.54E+13	1.96E+13
MudT	5.45E+12	7.11E+24	2.67E+12	2.29E+12	3.59E+12	4.90E+12	6.69E+12	1.05E+13
Aggregation:								
P.P.C.	3.34E+14	2.00E+28	1.41E+14	1.61E+14	2.35E+14	3.07E+14	4.03E+14	6.00E+14

Table 25. List of mean in-place gas and the five fractiles for in-place gas for each of the 8 plays in the Bighorn Basin. An aggregation of in-place gas for all 22 plays is listed at the bottom of the table.

Play Name :	Muddy Overpressured					a =	0.52	0.014	0	(Panel 1)
						b =	14.7	505	1.095	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	1.71	80	7	100	50	15,000	7814.7	715	1.095	4.70E+10
2	11.86	120	7	100	50	15,000	7814.7	715	1.095	4.89E+11
7	0.12	20	7	100	50	15,000	7814.7	715	1.095	8.25E+08
15	7.33	75	7	100	50	15,000	7814.7	715	1.095	1.89E+11
19	43.29	25	7	100	50	15,000	7814.7	715	1.095	3.72E+11
29	21.44	60	7	100	50	15,000	7814.7	715	1.095	4.42E+11
						15,000 Total				1.54E+12
4	3.36	30	7	100	50	15,500	8074.7	722	1.095	3.55E+10
6	1.63	60	7	100	50	15,500	8074.7	722	1.095	3.44E+10
28	9.14	25	7	100	50	15,500	8074.7	722	1.095	8.04E+10
33	52.26	25	7	100	50	15,500	8074.7	722	1.095	4.60E+11
						15,500 Total				6.10E+11
5	15.95	120	7	100	50	16,000	8334.7	729	1.095	6.88E+11
11	0.19	55	7	100	50	16,000	8334.7	729	1.095	3.76E+09
18	6.88	75	7	100	50	16,000	8334.7	729	1.095	1.86E+11
32	6.66	55	7	100	50	16,000	8334.7	729	1.095	1.32E+11
36	9.6	25	7	100	50	16,000	8334.7	729	1.095	8.63E+10
						16,000 Total				1.10E+12
3	2.11	80	7	100	50	16,500	8594.7	736	1.095	6.20E+10
10	3.09	25	7	100	50	16,500	8594.7	736	1.095	2.84E+10
23	126.31	25	7	100	50	16,500	8594.7	736	1.095	1.16E+12
						16,500 Total				1.25E+12
35	18.19	25	7	100	50	17,000	8854.7	743	1.095	1.70E+11
						17,000 Total				1.70E+11
8	7.61	75	7	100	50	17,500	9114.7	750	1.095	2.18E+11
9	40.51	120	7	100	50	17,500	9114.7	750	1.095	1.86E+12
13	1.99	25	7	100	50	17,500	9114.7	750	1.095	1.90E+10
21	18.53	75	7	100	50	17,500	9114.7	750	1.095	5.31E+11
24	81.4	25	7	100	50	17,500	9114.7	750	1.095	7.78E+11
						17,500 Total				3.41E+12
12	2.98	25	7	100	50	18,000	9374.7	757	1.095	2.90E+10
17	6.1	110	7	100	50	18,000	9374.7	757	1.095	2.61E+11
34	15.3	25	7	100	50	18,000	9374.7	757	1.095	1.49E+11
						18,000 Total				4.39E+11
14	34.52	75	7	100	50	18,500	9634.7	764	1.095	1.03E+12
16	10.94	25	7	100	50	18,500	9634.7	764	1.095	1.09E+11
26	80.06	25	7	100	50	18,500	9634.7	764	1.095	7.94E+11
						18,500 Total				1.93E+12
22	5.4	55	7	100	50	19,000	9894.7	771	1.095	1.20E+11
						19,000 Total				1.20E+11
20	106.59	25	7	100	50	19,500	10154.7	778	1.095	1.09E+12
						19,500 Total				1.09E+12
25	99.47	30	7	100	50	20,000	10414.7	785	1.095	1.25E+12
						20,000 Total				1.25E+12
31	0.69	55	7	100	50	20,500	10674.7	792	1.095	1.61E+10
						20,500 Total				1.61E+10
30	2.86	55	7	100	50	21,000	10934.7	799	1.095	6.77E+10

					21,000 Total					6.77E+10
27	33.38	30	7	100	50	22,000	11454.7	813	1.095	4.44E+11
					22,000 Total					4.44E+11
					Grand Total					1.34E+13

Table 26. Mean in-place gas for sub-plays in the Muddy Formation overpressured play, Bighorn Basin arranged according to depth.

Play Name :	Muddy Transition					a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.9074	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
53	8.06	70	7	50	50	8,500	2989.7	624	0.9074	5.13E+10
79	0.56	40	7	50	50	8,500	2989.7	624	0.9074	2.04E+09
					8,500 Total					5.33E+10
1	12.37	30	7	50	50	9,000	3164.7	631	0.9074	3.53E+10
16	4.58	60	7	50	50	9,000	3164.7	631	0.9074	2.62E+10
52	1.03	50	7	50	50	9,000	3164.7	631	0.9074	4.90E+09
61	114.42	25	7	50	50	9,000	3164.7	631	0.9074	2.72E+11
66	22.57	55	7	50	50	9,000	3164.7	631	0.9074	1.18E+11
75	14.33	20	7	50	50	9,000	3164.7	631	0.9074	2.73E+10
					9,000 Total					4.84E+11
4	4.04	40	7	50	50	9,500	3339.7	638	0.9074	1.61E+10
32	45.58	20	7	50	50	9,500	3339.7	638	0.9074	9.06E+10
51	0.29	20	7	50	50	9,500	3339.7	638	0.9074	5.76E+08
55	8.89	60	7	50	50	9,500	3339.7	638	0.9074	5.30E+10
59	82.75	25	7	50	50	9,500	3339.7	638	0.9074	2.06E+11
78	27.77	20	7	50	50	9,500	3339.7	638	0.9074	5.52E+10
					9,500 Total					4.21E+11
2	5.39	20	7	50	50	10,000	3514.7	645	0.9074	1.11E+10
15	8.43	75	7	50	50	10,000	3514.7	645	0.9074	6.54E+10
33	6.32	30	7	50	50	10,000	3514.7	645	0.9074	1.96E+10
57	1.37	50	7	50	50	10,000	3514.7	645	0.9074	7.08E+09
67	6.76	35	7	50	50	10,000	3514.7	645	0.9074	2.45E+10
73	22.2	20	7	50	50	10,000	3514.7	645	0.9074	4.59E+10
					10,000 Total					1.74E+11
5	5	40	7	50	50	10,500	3689.7	652	0.9074	2.15E+10
50	0.28	20	7	50	50	10,500	3689.7	652	0.9074	6.02E+08
60	2.76	55	7	50	50	10,500	3689.7	652	0.9074	1.63E+10
77	28.65	20	7	50	50	10,500	3689.7	652	0.9074	6.15E+10
					10,500 Total					9.99E+10
3	6.09	20	7	50	50	11,000	3864.7	659	0.9074	1.36E+10
8	0.84	20	7	50	50	11,000	3864.7	659	0.9074	1.87E+09
17	9.83	75	7	50	50	11,000	3864.7	659	0.9074	8.21E+10
35	214.08	25	7	50	50	11,000	3864.7	659	0.9074	5.96E+11
49	0.07	20	7	50	50	11,000	3864.7	659	0.9074	1.56E+08
69	11.14	35	7	50	50	11,000	3864.7	659	0.9074	4.34E+10
					11,000 Total					7.37E+11
6	5.63	40	7	50	50	11,500	4039.7	666	0.9074	2.59E+10
9	7.68	20	7	50	50	11,500	4039.7	666	0.9074	1.77E+10
20	1.35	55	7	50	50	11,500	4039.7	666	0.9074	8.55E+09
28	1.62	110	7	50	50	11,500	4039.7	666	0.9074	2.05E+10
48	0.27	20	7	50	50	11,500	4039.7	666	0.9074	6.22E+08
62	2.51	55	7	50	50	11,500	4039.7	666	0.9074	1.59E+10
76	17.76	20	7	50	50	11,500	4039.7	666	0.9074	4.09E+10
					11,500 Total					1.30E+11
18	3.55	75	7	50	50	12,000	4214.7	673	0.9074	3.16E+10
21	3.62	60	7	50	50	12,000	4214.7	673	0.9074	2.58E+10
27	3.08	110	7	50	50	12,000	4214.7	673	0.9074	4.03E+10

34	3.76	75	7	50	50	12,000	4214.7	673	0.9074	3.35E+10
37	124.66	25	7	50	50	12,000	4214.7	673	0.9074	3.70E+11
46	0.38	20	7	50	50	12,000	4214.7	673	0.9074	9.03E+08
47	0.28	20	7	50	50	12,000	4214.7	673	0.9074	6.66E+08
63	7.98	55	7	50	50	12,000	4214.7	673	0.9074	5.22E+10
65	58.98	20	7	50	50	12,000	4214.7	673	0.9074	1.40E+11
70	3.59	35	7	50	50	12,000	4214.7	673	0.9074	1.49E+10
					12,000 Total					7.11E+11
7	4.34	40	7	50	50	12,500	4389.7	680	0.9074	2.13E+10
10	3.23	25	7	50	50	12,500	4389.7	680	0.9074	9.89E+09
11	9.3	20	7	50	50	12,500	4389.7	680	0.9074	2.28E+10
45	2.52	20	7	50	50	12,500	4389.7	680	0.9074	6.18E+09
64	0.7	55	7	50	50	12,500	4389.7	680	0.9074	4.72E+09
71	0.43	35	7	50	50	12,500	4389.7	680	0.9074	1.84E+09
72	0.06	35	7	50	50	12,500	4389.7	680	0.9074	2.57E+08
74	13.68	25	7	50	50	12,500	4389.7	680	0.9074	4.19E+10
					12,500 Total					1.09E+11
13	1.11	20	7	70	50	13,000	4564.7	687	0.9074	3.92E+09
19	4.42	75	7	70	50	13,000	4564.7	687	0.9074	5.85E+10
24	4.84	60	7	70	50	13,000	4564.7	687	0.9074	5.13E+10
26	6.66	120	7	70	50	13,000	4564.7	687	0.9074	1.41E+11
36	6.82	75	7	70	50	13,000	4564.7	687	0.9074	9.03E+10
40	115.06	25	7	70	50	13,000	4564.7	687	0.9074	5.08E+11
54	10.05	60	7	70	50	13,000	4564.7	687	0.9074	1.06E+11
					13,000 Total					9.60E+11
12	3.23	20	7	70	50	13,500	4739.7	694	0.9074	1.17E+10
14	8.35	20	7	70	50	13,500	4739.7	694	0.9074	3.03E+10
44	2.03	20	7	70	50	13,500	4739.7	694	0.9074	7.37E+09
68	13.37	20	7	70	50	13,500	4739.7	694	0.9074	4.85E+10
					13,500 Total					9.79E+10
22	3.36	75	7	70	50	14,000	4914.7	701	0.9074	4.69E+10
25	6.79	20	7	70	50	14,000	4914.7	701	0.9074	2.53E+10
29	19.38	20	7	50	50	14,000	4914.7	701	0.9074	5.16E+10
30	11.76	120	7	70	50	14,000	4914.7	701	0.9074	2.63E+11
38	0.55	20	7	70	50	14,000	4914.7	701	0.9074	2.05E+09
39	6.75	20	7	70	50	14,000	4914.7	701	0.9074	2.52E+10
41	5.22	75	7	70	50	14,000	4914.7	701	0.9074	7.29E+10
42	73.01	25	7	70	50	14,000	4914.7	701	0.9074	3.40E+11
43	1.83	20	7	70	50	14,000	4914.7	701	0.9074	6.82E+09
56	17.31	60	7	70	50	14,000	4914.7	701	0.9074	1.93E+11
58	70.32	30	7	70	50	14,000	4914.7	701	0.9074	3.93E+11
					14,000 Total					1.42E+12
23	3.41	20	7	70	50	14,500	5089.7	708	0.9074	1.30E+10
31	3.8	60	7	70	50	14,500	5089.7	708	0.9074	4.36E+10
					14,500 Total					5.66E+10
					Grand Total					5.45E+12

Table 27. Mean in-place gas for sub-plays in the Muddy Formation transition play, Bighorn Basin arranged according to depth.

Play Name :	Frontier Overpressured					a =	0.52	0.014	0	(Panel 1)
						b =	14.7	505	1.095	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	7.52	120	7	100	50	14,000	7294.7	701	1.095	2.95E+11
3	11.81	75	7	100	50	14,000	7294.7	701	1.095	2.90E+11
15	0.15	50	7	100	50	14,000	7294.7	701	1.095	2.46E+09
17	45.08	80	7	100	50	14,000	7294.7	701	1.095	1.18E+12
21	2.65	100	7	100	50	14,000	7294.7	701	1.095	8.67E+10
43	48.79	125	7	100	50	14,000	7294.7	701	1.095	2.00E+12
					14,000 Total					3.85E+12
2	5.18	110	7	100	50	14,500	7554.7	708	1.095	1.91E+11
5	8.53	40	7	100	50	14,500	7554.7	708	1.095	1.15E+11
7	6.17	120	7	100	50	14,500	7554.7	708	1.095	2.49E+11
8	8.94	75	7	100	50	14,500	7554.7	708	1.095	2.25E+11
10	4.99	75	7	100	50	14,500	7554.7	708	1.095	1.26E+11
11	5.77	40	7	100	50	14,500	7554.7	708	1.095	7.75E+10
26	21.86	125	7	100	50	14,500	7554.7	708	1.095	9.17E+11
40	30.17	170	7	100	50	14,500	7554.7	708	1.095	1.72E+12
51	8.69	80	7	100	50	14,500	7554.7	708	1.095	2.33E+11
					14,500 Total					3.85E+12
4	55.49	75	7	100	50	15,000	7814.7	715	1.095	1.43E+12
18	54.09	80	7	100	50	15,000	7814.7	715	1.095	1.49E+12
52	8.07	110	7	100	50	15,000	7814.7	715	1.095	3.05E+11
					15,000 Total					3.22E+12
6	13.33	40	7	100	50	15,500	8074.7	722	1.095	1.88E+11
9	6.03	110	7	100	50	15,500	8074.7	722	1.095	2.33E+11
16	3.27	75	7	100	50	15,500	8074.7	722	1.095	8.63E+10
32	14.31	125	7	100	50	15,500	8074.7	722	1.095	6.29E+11
39	44.61	170	7	100	50	15,500	8074.7	722	1.095	2.67E+12
45	33.8	125	7	100	50	15,500	8074.7	722	1.095	1.49E+12
48	18.74	80	7	100	50	15,500	8074.7	722	1.095	5.27E+11
					15,500 Total					5.82E+12
12	0.24	100	7	100	50	16,000	8334.7	729	1.095	8.63E+09
13	0.38	100	7	100	50	16,000	8334.7	729	1.095	1.37E+10
50	16.05	120	7	100	50	16,000	8334.7	729	1.095	6.93E+11
					16,000 Total					7.15E+11
14	92.3	75	7	100	50	16,500	8594.7	736	1.095	2.54E+12
19	1.99	75	7	100	50	16,500	8594.7	736	1.095	5.48E+10
33	17.79	125	7	100	50	16,500	8594.7	736	1.095	8.17E+11
38	25.36	170	7	100	50	16,500	8594.7	736	1.095	1.58E+12
44	11.01	125	7	100	50	16,500	8594.7	736	1.095	5.06E+11
46	18.72	80	7	100	50	16,500	8594.7	736	1.095	5.50E+11
					16,500 Total					6.05E+12
47	6.94	90	7	100	50	17,000	8854.7	743	1.095	2.34E+11
49	13.12	120	7	100	50	17,000	8854.7	743	1.095	5.90E+11
					17,000 Total					8.24E+11
20	65.23	75	7	100	50	17,500	9114.7	750	1.095	1.87E+12
31	9.86	125	7	100	50	17,500	9114.7	750	1.095	4.71E+11
37	22.7	170	7	100	50	17,500	9114.7	750	1.095	1.48E+12
					17,500 Total					3.82E+12

42	28.71	120	7	100	50	18,000	9374.7	757	1.095	1.34E+12
					18,000 Total					1.34E+12
22	38.98	75	7	100	50	18,500	9634.7	764	1.095	1.16E+12
30	9.33	125	7	100	50	18,500	9634.7	764	1.095	4.63E+11
34	23.72	170	7	100	50	18,500	9634.7	764	1.095	1.60E+12
					18,500 Total					3.22E+12
41	40.57	130	7	100	50	19,000	9894.7	771	1.095	2.13E+12
					19,000 Total					2.13E+12
23	19.55	85	7	100	50	19,500	10154.7	778	1.095	6.82E+11
24	0.09	100	7	100	50	19,500	10154.7	778	1.095	3.70E+09
29	11.01	125	7	100	50	19,500	10154.7	778	1.095	5.65E+11
35	9.4	170	7	100	50	19,500	10154.7	778	1.095	6.56E+11
					19,500 Total					1.91E+12
25	62.38	125	7	100	50	20,000	10414.7	785	1.095	3.25E+12
27	0.48	100	7	100	50	20,000	10414.7	785	1.095	2.00E+10
					20,000 Total					3.27E+12
36	5.79	160	7	100	50	20,500	10674.7	792	1.095	3.93E+11
					20,500 Total					3.93E+11
28	27.11	125	7	100	50	21,000	10934.7	799	1.095	1.46E+12
					21,000 Total					1.46E+12
					Grand Total					4.19E+13

Table 28. Mean in-place gas for sub-plays in the Frontier Formation overpressured play, Bighorn Basin arranged according to depth.

Play Name :	Frontier Transition					a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.9074	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
5	13.94	40	7	50	50	7,500	2639.7	610	0.9074	4.58E+10
12	0.11	50	7	50	50	7,500	2639.7	610	0.9074	4.52E+08
19	1.28	100	7	50	50	7,500	2639.7	610	0.9074	1.05E+10
108	1.97	160	7	50	50	7,500	2639.7	610	0.9074	2.59E+10
138	0.56	100	7	50	50	7,500	2639.7	610	0.9074	4.60E+09
						7,500 Total				8.73E+10
36	5.24	80	7	50	50	8,000	2814.7	617	0.9074	3.63E+10
48	10.09	120	7	50	50	8,000	2814.7	617	0.9074	1.05E+11
56	19.38	110	7	50	50	8,000	2814.7	617	0.9074	1.85E+11
93	78.05	125	7	50	50	8,000	2814.7	617	0.9074	8.45E+11
107	11.97	90	7	50	50	8,000	2814.7	617	0.9074	9.33E+10
123	53.22	80	7	50	50	8,000	2814.7	617	0.9074	3.69E+11
140	7.5	160	7	50	50	8,000	2814.7	617	0.9074	1.04E+11
142	14.7	125	7	50	50	8,000	2814.7	617	0.9074	1.59E+11
143	4.93	90	7	50	50	8,000	2814.7	617	0.9074	3.84E+10
						8,000 Total				1.93E+12
1	44.09	75	7	50	50	8,500	2989.7	624	0.9074	3.01E+11
7	5.99	40	7	50	50	8,500	2989.7	624	0.9074	2.18E+10
21	6.67	80	7	50	50	8,500	2989.7	624	0.9074	4.85E+10
23	2.17	100	7	50	50	8,500	2989.7	624	0.9074	1.97E+10
26	5.49	110	7	50	50	8,500	2989.7	624	0.9074	5.49E+10
32	5.5	110	7	50	50	8,500	2989.7	624	0.9074	5.50E+10
58	74.64	125	7	50	50	8,500	2989.7	624	0.9074	8.48E+11
70	0.63	100	7	50	50	8,500	2989.7	624	0.9074	5.73E+09
102	21.44	160	7	50	50	8,500	2989.7	624	0.9074	3.12E+11
106	10.79	160	7	50	50	8,500	2989.7	624	0.9074	1.57E+11
110	1.2	140	7	50	50	8,500	2989.7	624	0.9074	1.53E+10
111	12.15	125	7	50	50	8,500	2989.7	624	0.9074	1.38E+11
114	7.53	160	7	50	50	8,500	2989.7	624	0.9074	1.10E+11
						8,500 Total				2.09E+12
10	20.51	75	7	50	50	9,000	3164.7	631	0.9074	1.46E+11
25	3.41	90	7	50	50	9,000	3164.7	631	0.9074	2.92E+10
37	5.76	80	7	50	50	9,000	3164.7	631	0.9074	4.39E+10
39	5.52	90	7	50	50	9,000	3164.7	631	0.9074	4.73E+10
49	8.42	120	7	50	50	9,000	3164.7	631	0.9074	9.62E+10
52	5.01	120	7	50	50	9,000	3164.7	631	0.9074	5.72E+10
71	3.63	90	7	50	50	9,000	3164.7	631	0.9074	3.11E+10
109	1.86	160	7	50	50	9,000	3164.7	631	0.9074	2.83E+10
113	48.25	80	7	50	50	9,000	3164.7	631	0.9074	3.67E+11
115	12.81	130	7	50	50	9,000	3164.7	631	0.9074	1.59E+11
133	6.25	110	7	50	50	9,000	3164.7	631	0.9074	6.54E+10
137	10.55	160	7	50	50	9,000	3164.7	631	0.9074	1.61E+11
139	15.65	125	7	50	50	9,000	3164.7	631	0.9074	1.86E+11
						9,000 Total				1.42E+12
2	28.7	75	7	50	50	9,500	3339.7	638	0.9074	2.14E+11
24	4.41	80	7	50	50	9,500	3339.7	638	0.9074	3.51E+10
29	3.5	110	7	50	50	9,500	3339.7	638	0.9074	3.83E+10

33	6.2	110	7	50	50	9,500	3339.7	638	0.9074	6.78E+10
43	1.38	100	7	50	50	9,500	3339.7	638	0.9074	1.37E+10
59	1.26	100	7	50	50	9,500	3339.7	638	0.9074	1.25E+10
65	114.85	125	7	50	50	9,500	3339.7	638	0.9074	1.43E+12
66	0.48	100	7	50	50	9,500	3339.7	638	0.9074	4.77E+09
68	0.14	100	7	50	50	9,500	3339.7	638	0.9074	1.39E+09
69	5.64	90	7	50	50	9,500	3339.7	638	0.9074	5.04E+10
88	1.01	80	7	50	50	9,500	3339.7	638	0.9074	8.03E+09
89	0.97	125	7	50	50	9,500	3339.7	638	0.9074	1.20E+10
92	0.19	160	7	50	50	9,500	3339.7	638	0.9074	3.02E+09
141	1.81	90	7	50	50	9,500	3339.7	638	0.9074	1.62E+10
						9,500 Total				1.90E+12
11	15.32	75	7	50	50	10,000	3514.7	645	0.9074	1.19E+11
16	29.62	120	7	50	50	10,000	3514.7	645	0.9074	3.68E+11
18	10.11	110	7	50	50	10,000	3514.7	645	0.9074	1.15E+11
22	6.52	80	7	50	50	10,000	3514.7	645	0.9074	5.39E+10
60	12.07	90	7	50	50	10,000	3514.7	645	0.9074	1.12E+11
85	0.48	160	7	50	50	10,000	3514.7	645	0.9074	7.94E+09
98	6.38	80	7	50	50	10,000	3514.7	645	0.9074	5.28E+10
103	55.84	125	7	50	50	10,000	3514.7	645	0.9074	7.22E+11
112	24.07	80	7	50	50	10,000	3514.7	645	0.9074	1.99E+11
121	17.44	120	7	50	50	10,000	3514.7	645	0.9074	2.16E+11
135	5.56	160	7	50	50	10,000	3514.7	645	0.9074	9.20E+10
136	11.11	125	7	50	50	10,000	3514.7	645	0.9074	1.44E+11
						10,000 Total				2.20E+12
3	60.47	75	7	50	50	10,500	3689.7	652	0.9074	4.87E+11
34	8.16	110	7	50	50	10,500	3689.7	652	0.9074	9.64E+10
35	2.83	110	7	50	50	10,500	3689.7	652	0.9074	3.34E+10
76	103.15	120	7	50	50	10,500	3689.7	652	0.9074	1.33E+12
86	0.99	80	7	50	50	10,500	3689.7	652	0.9074	8.51E+09
87	1.27	125	7	50	50	10,500	3689.7	652	0.9074	1.71E+10
91	0.25	160	7	50	50	10,500	3689.7	652	0.9074	4.30E+09
127	11.84	120	7	50	50	10,500	3689.7	652	0.9074	1.53E+11
129	1.27	100	7	50	50	10,500	3689.7	652	0.9074	1.36E+10
131	2.68	125	7	50	50	10,500	3689.7	652	0.9074	3.60E+10
						10,500 Total				2.18E+12
9	2.12	50	7	50	50	11,000	3864.7	659	0.9074	1.18E+10
14	28.37	120	7	50	50	11,000	3864.7	659	0.9074	3.79E+11
15	26.4	120	7	50	50	11,000	3864.7	659	0.9074	3.53E+11
40	7.57	110	7	50	50	11,000	3864.7	659	0.9074	9.27E+10
42	3.48	90	7	50	50	11,000	3864.7	659	0.9074	3.49E+10
61	13.07	90	7	50	50	11,000	3864.7	659	0.9074	1.31E+11
97	8.1	80	7	50	50	11,000	3864.7	659	0.9074	7.21E+10
104	43.36	120	7	50	50	11,000	3864.7	659	0.9074	5.79E+11
124	2.47	110	7	50	50	11,000	3864.7	659	0.9074	3.02E+10
126	10.31	90	7	50	50	11,000	3864.7	659	0.9074	1.03E+11
128	9.74	120	7	50	50	11,000	3864.7	659	0.9074	1.30E+11
134	1.52	160	7	50	50	11,000	3864.7	659	0.9074	2.71E+10
						11,000 Total				1.94E+12
4	48.71	75	7	50	50	11,500	4039.7	666	0.9074	4.21E+11
30	0.4	100	7	50	50	11,500	4039.7	666	0.9074	4.61E+09
38	6.72	110	7	50	50	11,500	4039.7	666	0.9074	8.51E+10

41	10.32	75	7	50	50	11,500	4039.7	666	0.9074	8.91E+10
47	1.26	100	7	50	50	11,500	4039.7	666	0.9074	1.45E+10
83	1.55	120	7	50	50	11,500	4039.7	666	0.9074	2.14E+10
84	1.05	80	7	50	50	11,500	4039.7	666	0.9074	9.67E+09
90	0.26	160	7	50	50	11,500	4039.7	666	0.9074	4.79E+09
100	2	80	7	50	50	11,500	4039.7	666	0.9074	1.84E+10
116	0.15	100	7	70	50	11,500	4039.7	666	0.9074	2.42E+09
120	32.29	80	7	50	50	11,500	4039.7	666	0.9074	2.97E+11
125	0.2	100	7	70	50	11,500	4039.7	666	0.9074	3.22E+09
130	9.67	120	7	50	50	11,500	4039.7	666	0.9074	1.34E+11
132	12.16	130	7	50	50	11,500	4039.7	666	0.9074	1.82E+11
					11,500 Total					1.29E+12
17	12.42	120	7	70	50	12,000	4214.7	673	0.9074	2.48E+11
27	21.56	75	7	70	50	12,000	4214.7	673	0.9074	2.69E+11
31	0.61	90	7	50	50	12,000	4214.7	673	0.9074	6.53E+09
45	9.19	120	7	70	50	12,000	4214.7	673	0.9074	1.84E+11
64	19.32	90	7	70	50	12,000	4214.7	673	0.9074	2.89E+11
79	74.66	125	7	70	50	12,000	4214.7	673	0.9074	1.55E+12
80	4.8	80	7	50	50	12,000	4214.7	673	0.9074	4.56E+10
81	5.88	120	7	50	50	12,000	4214.7	673	0.9074	8.39E+10
99	5.01	80	7	70	50	12,000	4214.7	673	0.9074	6.67E+10
105	35.44	120	7	70	50	12,000	4214.7	673	0.9074	7.08E+11
					12,000 Total					3.45E+12
6	23.44	80	7	50	50	12,500	4389.7	680	0.9074	2.30E+11
13	3.53	110	7	50	50	12,500	4389.7	680	0.9074	4.76E+10
46	4.92	90	7	70	50	12,500	4389.7	680	0.9074	7.60E+10
53	6.14	90	7	70	50	12,500	4389.7	680	0.9074	9.48E+10
54	2.74	110	7	70	50	12,500	4389.7	680	0.9074	5.17E+10
73	3.54	80	7	70	50	12,500	4389.7	680	0.9074	4.86E+10
74	8.38	75	7	70	50	12,500	4389.7	680	0.9074	1.08E+11
95	1.07	150	7	70	50	12,500	4389.7	680	0.9074	2.75E+10
101	0.15	100	7	70	50	12,500	4389.7	680	0.9074	2.57E+09
117	0.13	100	7	70	50	12,500	4389.7	680	0.9074	2.23E+09
119	14.49	80	7	70	50	12,500	4389.7	680	0.9074	1.99E+11
					12,500 Total					8.87E+11
20	9.93	120	7	70	50	13,000	4564.7	687	0.9074	2.10E+11
28	12.66	75	7	70	50	13,000	4564.7	687	0.9074	1.68E+11
50	9.09	120	7	70	50	13,000	4564.7	687	0.9074	1.93E+11
55	0.67	50	7	70	50	13,000	4564.7	687	0.9074	5.91E+09
67	27.2	90	7	70	50	13,000	4564.7	687	0.9074	4.32E+11
77	9.52	120	7	70	50	13,000	4564.7	687	0.9074	2.02E+11
78	2.46	80	7	70	50	13,000	4564.7	687	0.9074	3.47E+10
82	59.35	125	7	70	50	13,000	4564.7	687	0.9074	1.31E+12
94	16.49	160	7	70	50	13,000	4564.7	687	0.9074	4.66E+11
96	70.29	125	7	70	50	13,000	4564.7	687	0.9074	1.55E+12
118	0.95	100	7	70	50	13,000	4564.7	687	0.9074	1.68E+10
					13,000 Total					4.59E+12
51	8.36	40	7	70	50	13,500	4739.7	694	0.9074	6.07E+10
62	3.55	60	7	70	50	13,500	4739.7	694	0.9074	3.87E+10
63	3.82	80	7	70	50	13,500	4739.7	694	0.9074	5.55E+10
75	5.2	120	7	70	50	13,500	4739.7	694	0.9074	1.13E+11
					13,500 Total					2.68E+11

8	14.53	80	7	50	50	14,000	4914.7	701	0.9074	1.55E+11
44	0.48	100	7	50	50	14,000	4914.7	701	0.9074	6.39E+09
57	1.06	100	7	70	50	14,000	4914.7	701	0.9074	1.97E+10
72	10.08	75	7	70	50	14,000	4914.7	701	0.9074	1.41E+11
122	3.22	80	7	70	50	14,000	4914.7	701	0.9074	4.80E+10
					14,000 Total					3.70E+11
144	0.47	50	7	70	50	15,000	5264.7	715	0.9074	4.60E+09
					15,000 Total					4.60E+09
					Grand Total					2.46E+13

Table 29. Mean in-place gas for sub-plays in the Frontier Formation transition play, Bighorn Basin arranged according to depth.

Play Name :		Kmv Overpressured				*a* =	0.52	0.014	0	(Panel 1)
						b =	14.7	505	1.2	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	7.38	450	7	100	50	13,000	6774.7	687	1.2	9.40E+11
					13,000 Total					9.40E+11
2	43.67	450	7	100	50	13,500	7034.7	694	1.2	5.72E+12
7	0.6	400	7	100	50	13,500	7034.7	694	1.2	6.98E+10
					13,500 Total					5.79E+12
4	19.23	375	7	100	50	14,000	7294.7	701	1.2	2.15E+12
					14,000 Total					2.15E+12
3	19.01	425	7	100	50	15,500	8074.7	722	1.2	2.59E+12
5	88.88	375	7	100	50	15,500	8074.7	722	1.2	1.07E+13
					15,500 Total					1.33E+13
6	18.6	425	7	100	50	16,500	8594.7	736	1.2	2.65E+12
8	69.71	375	7	100	50	16,500	8594.7	736	1.2	8.76E+12
					16,500 Total					1.14E+13
10	16.31	400	7	100	50	17,000	8854.7	743	1.2	2.23E+12
					17,000 Total					2.23E+12
9	18.05	425	7	100	50	17,500	9114.7	750	1.2	2.68E+12
					17,500 Total					2.68E+12
					Grand Total					3.85E+13

Table 30. Mean in-place gas for sub-plays in the Mesaverde Formation overpressured play, Bighorn Basin arranged according to depth.

Play Name :		Kmv Transition				*a* =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.91	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
1	53.44	450	7	30	50	5,000	1764.7	575	0.91	8.38E+11
6	13.05	375	7	30	50	5,000	1764.7	575	0.91	1.71E+11
26	0.5	350	7	50	50	5,000	1764.7	575	0.91	1.02E+10
					5,000 Total					1.02E+12
8	4.92	400	7	30	50	5,500	1939.7	582	0.91	7.45E+10
20	0.46	425	7	50	50	5,500	1939.7	582	0.91	1.23E+10
37	0.08	400	7	30	50	5,500	1939.7	582	0.91	1.21E+09
38	2.86	425	7	20	50	5,500	1939.7	582	0.91	3.07E+10
39	0.48	400	7	20	50	5,500	1939.7	582	0.91	4.84E+09
44	0.13	400	7	20	50	5,500	1939.7	582	0.91	1.31E+09
48	3.55	375	7	20	50	5,500	1939.7	582	0.91	3.36E+10
51	10.79	350	7	20	50	5,500	1939.7	582	0.91	9.53E+10
					5,500 Total					2.54E+11
10	19.81	425	7	30	50	6,000	2114.7	589	0.91	3.43E+11
18	1.04	450	7	50	50	6,000	2114.7	589	0.91	3.18E+10
25	1.44	350	7	50	50	6,000	2114.7	589	0.91	3.42E+10
29	11.61	350	7	30	50	6,000	2114.7	589	0.91	1.66E+11
33	0.87	275	7	50	50	6,000	2114.7	589	0.91	1.63E+10
36	8.85	275	7	30	50	6,000	2114.7	589	0.91	9.92E+10
49	9.09	375	7	20	50	6,000	2114.7	589	0.91	9.27E+10
					6,000 Total					7.83E+11
16	0.46	525	7	50	50	6,500	2289.7	596	0.91	1.76E+10
27	2.04	400	7	30	50	6,500	2289.7	596	0.91	3.56E+10
34	0.05	400	7	30	50	6,500	2289.7	596	0.91	8.73E+08
41	2.9	425	7	30	50	6,500	2289.7	596	0.91	5.38E+10
47	0.94	400	7	20	50	6,500	2289.7	596	0.91	1.09E+10
61	11.37	350	7	20	50	6,500	2289.7	596	0.91	1.16E+11
					6,500 Total					2.34E+11
2	75.33	450	7	30	50	7,000	2464.7	603	0.91	1.57E+12
14	0.96	525	7	50	50	7,000	2464.7	603	0.91	3.90E+10
19	1.32	450	7	50	50	7,000	2464.7	603	0.91	4.60E+10
22	10.08	350	7	30	50	7,000	2464.7	603	0.91	1.64E+11
23	1.27	350	7	50	50	7,000	2464.7	603	0.91	3.44E+10
32	1.82	275	7	50	50	7,000	2464.7	603	0.91	3.87E+10
40	3.15	275	7	30	50	7,000	2464.7	603	0.91	4.02E+10
42	4.48	350	7	30	50	7,000	2464.7	603	0.91	7.28E+10
45	7.28	425	7	30	50	7,000	2464.7	603	0.91	1.44E+11
54	11.2	375	7	20	50	7,000	2464.7	603	0.91	1.30E+11
57	2.89	375	7	30	50	7,000	2464.7	603	0.91	5.03E+10
					7,000 Total					2.33E+12
64	1.04	400	7	20	50	7,500	2639.7	610	0.91	1.36E+10
68	9.29	350	7	70	50	7,500	2639.7	610	0.91	3.73E+11
75	0.16	400	7	20	50	7,500	2639.7	610	0.91	2.10E+09
91	2.22	400	7	20	50	7,500	2639.7	610	0.91	2.91E+10
93	0.69	400	7	20	50	7,500	2639.7	610	0.91	9.04E+09
132	12.42	275	7	20	50	7,500	2639.7	610	0.91	1.12E+11
					7,500 Total					5.39E+11

3	51.58	450	7	50	50	8,000	2814.7	617	0.91	2.00E+12
13	1.93	525	7	50	50	8,000	2814.7	617	0.91	8.75E+10
21	7.39	350	7	50	50	8,000	2814.7	617	0.91	2.23E+11
30	6.21	275	7	50	50	8,000	2814.7	617	0.91	1.47E+11
31	2.73	275	7	50	50	8,000	2814.7	617	0.91	6.48E+10
46	2.02	350	7	50	50	8,000	2814.7	617	0.91	6.10E+10
52	9.12	425	7	50	50	8,000	2814.7	617	0.91	3.35E+11
63	6.88	375	7	50	50	8,000	2814.7	617	0.91	2.23E+11
76	0.94	400	7	20	50	8,000	2814.7	617	0.91	1.30E+10
77	7.03	375	7	20	50	8,000	2814.7	617	0.91	9.10E+10
78	2.24	400	7	50	50	8,000	2814.7	617	0.91	7.74E+10
80	6.51	375	7	50	50	8,000	2814.7	617	0.91	2.11E+11
114	0.29	425	7	20	50	8,000	2814.7	617	0.91	4.26E+09
122	0.62	300	7	20	50	8,000	2814.7	617	0.91	6.42E+09
126	2.53	300	7	20	50	8,000	2814.7	617	0.91	2.62E+10
127	1.05	300	7	20	50	8,000	2814.7	617	0.91	1.09E+10
129	3.25	300	7	20	50	8,000	2814.7	617	0.91	3.37E+10
143	3.76	325	7	20	50	8,000	2814.7	617	0.91	4.22E+10
					8,000 Total					3.66E+12
15	5.83	525	7	50	50	8,500	2989.7	624	0.91	2.78E+11
17	0.05	500	7	50	50	8,500	2989.7	624	0.91	2.27E+09
24	3.58	350	7	50	50	8,500	2989.7	624	0.91	1.14E+11
66	0.94	400	7	50	50	8,500	2989.7	624	0.91	3.41E+10
79	9.26	375	7	20	50	8,500	2989.7	624	0.91	1.26E+11
96	3.48	400	7	20	50	8,500	2989.7	624	0.91	5.05E+10
99	7.37	400	7	20	50	8,500	2989.7	624	0.91	1.07E+11
115	7.67	425	7	20	50	8,500	2989.7	624	0.91	1.18E+11
117	26.68	325	7	20	50	8,500	2989.7	624	0.91	3.15E+11
136	20.7	275	7	20	50	8,500	2989.7	624	0.91	2.06E+11
141	26.24	350	7	20	50	8,500	2989.7	624	0.91	3.33E+11
					8,500 Total					1.68E+12
4	25.16	450	7	50	50	9,000	3164.7	631	0.91	1.07E+12
12	7.41	525	7	50	50	9,000	3164.7	631	0.91	3.69E+11
28	15.49	275	7	50	50	9,000	3164.7	631	0.91	4.04E+11
50	2.12	350	7	50	50	9,000	3164.7	631	0.91	7.04E+10
56	11.27	425	7	50	50	9,000	3164.7	631	0.91	4.55E+11
81	13	375	7	20	50	9,000	3164.7	631	0.91	1.85E+11
82	13.94	375	7	50	50	9,000	3164.7	631	0.91	4.96E+11
139	1.61	300	7	20	50	9,000	3164.7	631	0.91	1.83E+10
142	2.83	400	7	20	50	9,000	3164.7	631	0.91	4.30E+10
153	4.2	525	7	20	50	9,000	3164.7	631	0.91	8.37E+10
					9,000 Total					3.20E+12
87	9.4	375	7	20	50	9,500	3339.7	638	0.91	1.40E+11
97	8.89	425	7	20	50	9,500	3339.7	638	0.91	1.50E+11
103	8.11	400	7	20	50	9,500	3339.7	638	0.91	1.29E+11
105	3.03	400	7	50	50	9,500	3339.7	638	0.91	1.20E+11
107	0.67	450	7	50	50	9,500	3339.7	638	0.91	2.99E+10
110	0.81	500	7	50	50	9,500	3339.7	638	0.91	4.01E+10
113	22.84	425	7	20	50	9,500	3339.7	638	0.91	3.85E+11
119	65.54	350	7	20	50	9,500	3339.7	638	0.91	9.09E+11
137	44.1	450	7	20	50	9,500	3339.7	638	0.91	7.86E+11
145	11.18	375	7	20	50	9,500	3339.7	638	0.91	1.66E+11

155	3.89	475	7	20	50	9,500	3339.7	638	0.91	7.32E+10
					9,500 Total					2.93E+12
5	19.68	450	7	50	50	10,000	3514.7	645	0.91	9.13E+11
11	6.08	525	7	50	50	10,000	3514.7	645	0.91	3.29E+11
35	14.88	275	7	50	50	10,000	3514.7	645	0.91	4.22E+11
55	3.2	350	7	50	50	10,000	3514.7	645	0.91	1.16E+11
65	8.7	425	7	50	50	10,000	3514.7	645	0.91	3.81E+11
83	22.91	375	7	50	50	10,000	3514.7	645	0.91	8.86E+11
90	10.83	400	7	50	50	10,000	3514.7	645	0.91	4.47E+11
95	19.85	450	7	50	50	10,000	3514.7	645	0.91	9.21E+11
108	6.6	525	7	50	50	10,000	3514.7	645	0.91	3.57E+11
109	0.17	400	7	20	50	10,000	3514.7	645	0.91	2.81E+09
112	3.66	450	7	50	50	10,000	3514.7	645	0.91	1.70E+11
125	18.65	375	7	50	50	10,000	3514.7	645	0.91	7.21E+11
138	15.06	550	7	20	50	10,000	3514.7	645	0.91	3.42E+11
146	8.48	475	7	50	50	10,000	3514.7	645	0.91	4.15E+11
149	9.86	525	7	20	50	10,000	3514.7	645	0.91	2.14E+11
150	2.02	450	7	20	50	10,000	3514.7	645	0.91	3.75E+10
154	11.35	475	7	20	50	10,000	3514.7	645	0.91	2.22E+11
					10,000 Total					6.90E+12
7	8.86	475	7	50	50	10,500	3689.7	652	0.91	4.51E+11
9	3.5	525	7	50	50	10,500	3689.7	652	0.91	1.97E+11
70	0.01	400	7	70	50	10,500	3689.7	652	0.91	6.00E+08
72	3	425	7	70	50	10,500	3689.7	652	0.91	1.91E+11
88	0.66	375	7	70	50	10,500	3689.7	652	0.91	3.71E+10
92	3.54	400	7	50	50	10,500	3689.7	652	0.91	1.52E+11
98	67.95	450	7	50	50	10,500	3689.7	652	0.91	3.28E+12
101	11.75	450	7	50	50	10,500	3689.7	652	0.91	5.66E+11
111	2.28	500	7	50	50	10,500	3689.7	652	0.91	1.22E+11
116	0.04	500	7	50	50	10,500	3689.7	652	0.91	2.14E+09
					10,500 Total					4.99E+12
43	8.31	275	7	70	50	11,000	3864.7	659	0.91	3.55E+11
58	1.95	350	7	70	50	11,000	3864.7	659	0.91	1.06E+11
60	3.98	350	7	70	50	11,000	3864.7	659	0.91	2.16E+11
67	6.49	425	7	70	50	11,000	3864.7	659	0.91	4.29E+11
73	2.02	425	7	50	50	11,000	3864.7	659	0.91	9.53E+10
84	10.58	375	7	70	50	11,000	3864.7	659	0.91	6.17E+11
89	1.53	375	7	70	50	11,000	3864.7	659	0.91	8.92E+10
94	13.4	450	7	70	50	11,000	3864.7	659	0.91	9.37E+11
104	2.25	450	7	50	50	11,000	3864.7	659	0.91	1.12E+11
133	53.44	550	7	50	50	11,000	3864.7	659	0.91	3.26E+12
151	21.85	450	7	50	50	11,000	3864.7	659	0.91	1.09E+12
					11,000 Total					7.31E+12
53	3.07	300	7	70	50	11,500	4039.7	666	0.91	1.48E+11
100	3.11	400	7	70	50	11,500	4039.7	666	0.91	2.00E+11
102	53.25	475	7	50	50	11,500	4039.7	666	0.91	2.90E+12
134	24.59	625	7	50	50	11,500	4039.7	666	0.91	1.76E+12
					11,500 Total					5.02E+12
59	9.65	350	7	70	50	12,000	4214.7	673	0.91	5.60E+11
69	5.92	425	7	50	50	12,000	4214.7	673	0.91	2.98E+11
74	2.26	425	7	50	50	12,000	4214.7	673	0.91	1.14E+11
85	12.69	375	7	70	50	12,000	4214.7	673	0.91	7.90E+11

121	12.4	575	7	50	50	12,000	4214.7	673	0.91	8.45E+11
130	36.04	625	7	50	50	12,000	4214.7	673	0.91	2.67E+12
140	62.05	550	7	50	50	12,000	4214.7	673	0.91	4.05E+12
148	42.32	450	7	50	50	12,000	4214.7	673	0.91	2.26E+12
					12,000 Total					1.16E+13
62	5.53	350	7	70	50	12,500	4389.7	680	0.91	3.31E+11
71	15.93	425	7	70	50	12,500	4389.7	680	0.91	1.16E+12
86	14.3	375	7	70	50	12,500	4389.7	680	0.91	9.17E+11
106	33.71	450	7	70	50	12,500	4389.7	680	0.91	2.59E+12
131	3.35	600	7	70	50	12,500	4389.7	680	0.91	3.44E+11
					12,500 Total					5.35E+12
118	44.25	550	7	70	50	13,000	4564.7	687	0.91	4.28E+12
135	55.44	450	7	70	50	13,000	4564.7	687	0.91	4.39E+12
					13,000 Total					8.68E+12
120	0.66	425	7	70	50	13,500	4739.7	694	0.91	5.08E+10
123	1.82	400	7	70	50	13,500	4739.7	694	0.91	1.32E+11
128	34.23	450	7	70	50	13,500	4739.7	694	0.91	2.79E+12
152	2.9	400	7	50	50	13,500	4739.7	694	0.91	1.50E+11
					13,500 Total					3.12E+12
147	12.23	400	7	70	50	14,000	4914.7	701	0.91	9.09E+11
					14,000 Total					9.09E+11
124	56.12	400	7	70	50	14,500	5089.7	708	0.91	4.28E+12
					14,500 Total					4.28E+12
144	13.89	375	7	70	50	15,000	5264.7	715	0.91	1.02E+12
					15,000 Total					1.02E+12
					Grand Total					7.58E+13

Table 31. Mean in-place gas for sub-plays in the Mesaverde Formation transition play, Bighorn Basin arranged according to depth.

Play Name :	Meeteetse Transition					a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.97	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
5	1.85	200	7	50	50	5,000	1764.7	575	0.97	2.02E+10
11	2.85	200	7	50	50	5,000	1764.7	575	0.97	3.11E+10
14	13.84	250	7	50	50	5,000	1764.7	575	0.97	1.89E+11
20	0.88	250	7	50	50	5,000	1764.7	575	0.97	1.20E+10
					5,000 Total					2.52E+11
1	1.81	175	7	50	50	5,500	1939.7	582	0.97	1.87E+10
12	1.25	200	7	50	50	5,500	1939.7	582	0.97	1.48E+10
19	3.35	250	7	50	50	5,500	1939.7	582	0.97	4.96E+10
22	3.83	325	7	50	50	5,500	1939.7	582	0.97	7.37E+10
28	1.63	250	7	50	50	5,500	1939.7	582	0.97	2.41E+10
29	0.11	300	7	50	50	5,500	1939.7	582	0.97	1.95E+09
33	1.75	150	7	50	50	5,500	1939.7	582	0.97	1.55E+10
					5,500 Total					1.98E+11
30	0.89	300	7	50	50	6,000	2114.7	589	0.97	1.70E+10
37	3.84	75	7	50	50	6,000	2114.7	589	0.97	1.84E+10
39	0.09	100	7	50	50	6,000	2114.7	589	0.97	5.74E+08
40	2.76	150	7	50	50	6,000	2114.7	589	0.97	2.64E+10
41	2.53	75	7	50	50	6,000	2114.7	589	0.97	1.21E+10
42	2.12	125	7	50	50	6,000	2114.7	589	0.97	1.69E+10
52	5.55	225	7	50	50	6,000	2114.7	589	0.97	7.96E+10
57	7.36	225	7	50	50	6,000	2114.7	589	0.97	1.06E+11
103	21.15	150	7	50	50	6,000	2114.7	589	0.97	2.02E+11
					6,000 Total					4.79E+11
2	5.05	175	7	50	50	6,500	2289.7	596	0.97	6.03E+10
6	40.99	225	7	50	50	6,500	2289.7	596	0.97	6.29E+11
18	4.15	225	7	50	50	6,500	2289.7	596	0.97	6.37E+10
23	6.66	325	7	50	50	6,500	2289.7	596	0.97	1.48E+11
32	3.24	250	7	50	50	6,500	2289.7	596	0.97	5.53E+10
35	16.37	150	7	50	50	6,500	2289.7	596	0.97	1.68E+11
53	4.34	225	7	50	50	6,500	2289.7	596	0.97	6.66E+10
65	4.79	175	7	50	50	6,500	2289.7	596	0.97	5.72E+10
72	1.5	225	7	50	50	6,500	2289.7	596	0.97	2.30E+10
100	1.83	100	7	50	50	6,500	2289.7	596	0.97	1.25E+10
					6,500 Total					1.28E+12
4	1.11	200	7	50	50	7,000	2464.7	603	0.97	1.61E+10
17	0.3	200	7	50	50	7,000	2464.7	603	0.97	4.35E+09
21	6.45	275	7	50	50	7,000	2464.7	603	0.97	1.29E+11
31	1.47	300	7	50	50	7,000	2464.7	603	0.97	3.20E+10
46	1.82	175	7	50	50	7,000	2464.7	603	0.97	2.31E+10
62	6.43	225	7	50	50	7,000	2464.7	603	0.97	1.05E+11
64	4.03	200	7	50	50	7,000	2464.7	603	0.97	5.85E+10
					7,000 Total					3.68E+11
3	19.86	225	7	50	50	7,500	2639.7	610	0.97	3.43E+11
24	9.37	325	7	50	50	7,500	2639.7	610	0.97	2.34E+11
36	2.67	250	7	50	50	7,500	2639.7	610	0.97	5.13E+10
61	2.87	225	7	50	50	7,500	2639.7	610	0.97	4.96E+10
66	6.87	175	7	50	50	7,500	2639.7	610	0.97	9.24E+10

70	0.72	200	7	50	50	7,500	2639.7	610	0.97	1.11E+10
74	2.65	225	7	50	50	7,500	2639.7	610	0.97	4.58E+10
84	1.58	75	7	50	50	7,500	2639.7	610	0.97	9.11E+09
90	2.98	100	7	50	50	7,500	2639.7	610	0.97	2.29E+10
93	3.53	100	7	50	50	7,500	2639.7	610	0.97	2.71E+10
95	3.42	100	7	50	50	7,500	2639.7	610	0.97	2.63E+10
99	13.13	75	7	50	50	7,500	2639.7	610	0.97	7.57E+10
105	54.18	150	7	50	50	7,500	2639.7	610	0.97	6.24E+11
					7,500 Total					1.61E+12
16	0.99	175	7	50	50	8,000	2814.7	617	0.97	1.40E+10
25	0.12	300	7	50	50	8,000	2814.7	617	0.97	2.92E+09
27	4.04	325	7	50	50	8,000	2814.7	617	0.97	1.06E+11
43	20.92	150	7	50	50	8,000	2814.7	617	0.97	2.54E+11
63	12.27	225	7	50	50	8,000	2814.7	617	0.97	2.24E+11
67	0.5	200	7	50	50	8,000	2814.7	617	0.97	8.10E+09
69	3.63	225	7	50	50	8,000	2814.7	617	0.97	6.62E+10
79	4.51	175	7	50	50	8,000	2814.7	617	0.97	6.39E+10
121	6.39	250	7	50	50	8,000	2814.7	617	0.97	1.29E+11
124	4.24	300	7	50	50	8,000	2814.7	617	0.97	1.03E+11
129	2.17	250	7	50	50	8,000	2814.7	617	0.97	4.39E+10
					8,000 Total					1.02E+12
26	16.66	325	7	50	50	8,500	2989.7	624	0.97	4.61E+11
44	2.56	250	7	50	50	8,500	2989.7	624	0.97	5.44E+10
68	13.86	175	7	50	50	8,500	2989.7	624	0.97	2.06E+11
76	4.31	225	7	50	50	8,500	2989.7	624	0.97	8.25E+10
80	1.83	150	7	50	50	8,500	2989.7	624	0.97	2.34E+10
81	0.12	200	7	50	50	8,500	2989.7	624	0.97	2.04E+09
83	49.01	75	7	50	50	8,500	2989.7	624	0.97	3.13E+11
107	43.33	150	7	50	50	8,500	2989.7	624	0.97	5.53E+11
114	60.58	225	7	50	50	8,500	2989.7	624	0.97	1.16E+12
120	0.41	200	7	50	50	8,500	2989.7	624	0.97	6.98E+09
123	15.7	325	7	50	50	8,500	2989.7	624	0.97	4.34E+11
131	2.85	250	7	50	50	8,500	2989.7	624	0.97	6.06E+10
133	0.48	200	7	50	50	8,500	2989.7	624	0.97	8.17E+09
					8,500 Total					3.36E+12
7	14.51	225	7	50	50	9,000	3164.7	631	0.97	2.91E+11
15	1.64	175	7	50	50	9,000	3164.7	631	0.97	2.56E+10
50	46.89	150	7	50	50	9,000	3164.7	631	0.97	6.26E+11
71	21.1	175	7	50	50	9,000	3164.7	631	0.97	3.29E+11
89	6.86	225	7	50	50	9,000	3164.7	631	0.97	1.37E+11
91	0.17	200	7	50	50	9,000	3164.7	631	0.97	3.03E+09
128	11.05	250	7	50	50	9,000	3164.7	631	0.97	2.46E+11
					9,000 Total					1.66E+12
9	1.03	200	7	70	50	9,500	3339.7	638	0.97	2.68E+10
13	5.84	200	7	50	50	9,500	3339.7	638	0.97	1.09E+11
34	11.82	325	7	70	50	9,500	3339.7	638	0.97	5.00E+11
48	2.9	250	7	70	50	9,500	3339.7	638	0.97	9.43E+10
73	17.92	175	7	50	50	9,500	3339.7	638	0.97	2.91E+11
85	47.96	75	7	50	50	9,500	3339.7	638	0.97	3.34E+11
106	26.3	150	7	50	50	9,500	3339.7	638	0.97	3.67E+11
109	49.59	250	7	50	50	9,500	3339.7	638	0.97	1.15E+12
119	34.79	325	7	50	50	9,500	3339.7	638	0.97	1.05E+12

130	2.75	175	7	50	50	9,500	3339.7	638	0.97	4.47E+10
					9,500 Total					3.97E+12
8	10.72	175	7	70	50	10,000	3514.7	645	0.97	2.54E+11
49	2.02	325	7	50	50	10,000	3514.7	645	0.97	6.35E+10
54	29.17	175	7	70	50	10,000	3514.7	645	0.97	6.91E+11
60	2.23	275	7	70	50	10,000	3514.7	645	0.97	8.31E+10
77	6.3	200	7	50	50	10,000	3514.7	645	0.97	1.22E+11
98	32.52	225	7	70	50	10,000	3514.7	645	0.97	9.91E+11
					10,000 Total					2.21E+12
38	9.52	325	7	70	50	10,500	3689.7	652	0.97	4.35E+11
47	4.34	250	7	70	50	10,500	3689.7	652	0.97	1.53E+11
75	2.99	225	7	50	50	10,500	3689.7	652	0.97	6.76E+10
78	14.84	250	7	50	50	10,500	3689.7	652	0.97	3.73E+11
86	35.98	90	7	50	50	10,500	3689.7	652	0.97	3.25E+11
88	2.79	100	7	50	50	10,500	3689.7	652	0.97	2.80E+10
					10,500 Total					1.38E+12
45	3.76	325	7	70	50	11,000	3864.7	659	0.97	1.78E+11
55	18.36	175	7	70	50	11,000	3864.7	659	0.97	4.68E+11
58	4.47	250	7	70	50	11,000	3864.7	659	0.97	1.63E+11
59	3.11	225	7	70	50	11,000	3864.7	659	0.97	1.02E+11
96	22.19	150	7	50	50	11,000	3864.7	659	0.97	3.47E+11
110	38.45	250	7	50	50	11,000	3864.7	659	0.97	1.00E+12
118	82.98	325	7	50	50	11,000	3864.7	659	0.97	2.81E+12
127	6.7	275	7	50	50	11,000	3864.7	659	0.97	1.92E+11
					11,000 Total					5.26E+12
10	0.37	175	7	70	50	11,500	4039.7	666	0.97	9.76E+09
51	9.57	225	7	70	50	11,500	4039.7	666	0.97	3.25E+11
56	22.42	175	7	70	50	11,500	4039.7	666	0.97	5.92E+11
82	55.6	250	7	70	50	11,500	4039.7	666	0.97	2.10E+12
125	7.14	275	7	50	50	11,500	4039.7	666	0.97	2.11E+11
126	22.35	275	7	50	50	11,500	4039.7	666	0.97	6.62E+11
132	0.8	300	7	50	50	11,500	4039.7	666	0.97	2.58E+10
					11,500 Total					3.92E+12
97	12.71	225	7	70	50	12,000	4214.7	673	0.97	4.45E+11
112	79.66	250	7	70	50	12,000	4214.7	673	0.97	3.10E+12
122	7.63	300	7	70	50	12,000	4214.7	673	0.97	3.56E+11
					12,000 Total					3.90E+12
87	36.85	175	7	70	50	13,000	4564.7	687	0.97	1.07E+12
92	26.52	225	7	70	50	13,000	4564.7	687	0.97	9.86E+11
102	19.84	175	7	70	50	13,000	4564.7	687	0.97	5.73E+11
113	70.07	250	7	70	50	13,000	4564.7	687	0.97	2.89E+12
					13,000 Total					5.52E+12
94	43.55	225	7	70	50	14,000	4914.7	701	0.97	1.71E+12
104	23.43	175	7	70	50	14,000	4914.7	701	0.97	7.15E+11
115	54.57	250	7	70	50	14,000	4914.7	701	0.97	2.38E+12
					14,000 Total					4.80E+12
108	19.58	175	7	70	50	15,000	5264.7	715	0.97	6.27E+11
					15,000 Total					6.27E+11
117	36.25	250	7	70	50	15,500	5439.7	722	0.97	1.70E+12
					15,500 Total					1.70E+12
101	11.77	225	7	70	50	16,000	5614.7	729	0.97	5.07E+11
					16,000 Total					5.07E+11

111	9.34	200	7	70	50	16,500	5789.7	736	0.97	3.65E+11
116	12.81	225	7	70	50	16,500	5789.7	736	0.97	5.64E+11
					16,500 Total					9.29E+11
					Grand Total					4.49E+13

Table 32. Mean in-place gas for sub-plays in the Meeteetse Formation transition play, Bighorn Basin arranged according to depth.

Play Name :		Lance Transition				a =	0.35	0.014	0	(Panel 1)
						b =	14.7	505	0.93	
	MEAN									
Subplay No.	Closure (sq.mi.)	Thickness (feet)	Porosity (%)	Trap fill (%)	HC Sat. (%)	Depth (feet)	Pressure (PSI)	Temp. (Deg.Rank.)	Gas Comp. (no units)	Gas in place (CF)
8	0.95	150	7	50	50	3,500	1239.7	554	0.93	5.91E+09
					3,500 Total					5.91E+09
7	3.22	150	7	50	50	4,000	1414.7	561	0.93	2.26E+10
					4,000 Total					2.26E+10
6	4.99	150	7	50	50	5,000	1764.7	575	0.93	4.25E+10
					5,000 Total					4.25E+10
1	15.43	100	7	50	50	6,000	2114.7	589	0.93	1.03E+11
5	21.86	150	7	50	50	6,000	2114.7	589	0.93	2.18E+11
22	4.81	300	7	50	50	6,000	2114.7	589	0.93	9.59E+10
23	26.53	350	7	50	50	6,000	2114.7	589	0.93	6.17E+11
					6,000 Total					1.03E+12
9	22.65	175	7	50	50	6,500	2289.7	596	0.93	2.82E+11
16	8.36	275	7	50	50	6,500	2289.7	596	0.93	1.64E+11
					6,500 Total					4.46E+11
2	31.42	100	7	50	50	7,000	2464.7	603	0.93	2.38E+11
18	24.14	275	7	50	50	7,000	2464.7	603	0.93	5.03E+11
					7,000 Total					7.40E+11
24	6.72	400	7	50	50	7,250	2552.2	606.5	0.93	2.09E+11
42	46.84	400	7	50	50	7,250	2552.2	606.5	0.93	1.46E+12
					7,250 Total					1.67E+12
10	18.42	200	7	50	50	7,500	2639.7	610	0.93	2.95E+11
13	0.21	260	7	50	50	7,500	2639.7	610	0.93	4.38E+09
29	1.65	275	7	50	50	7,500	2639.7	610	0.93	3.64E+10
31	2.86	240	7	50	50	7,500	2639.7	610	0.93	5.50E+10
					7,500 Total					3.91E+11
28	0.39	550	7	50	50	7,750	2727.2	613.5	0.93	1.77E+10
38	0.65	525	7	50	50	7,750	2727.2	613.5	0.93	2.81E+10
59	13.26	550	7	50	50	7,750	2727.2	613.5	0.93	6.00E+11
					7,750 Total					6.46E+11
3	25.19	100	7	50	50	8,000	2814.7	617	0.93	2.13E+11
19	43.64	275	7	50	50	8,000	2814.7	617	0.93	1.01E+12
39	9.93	240	7	50	50	8,000	2814.7	617	0.93	2.01E+11
					8,000 Total					1.43E+12
25	12.47	400	7	50	50	8,250	2902.2	620.5	0.93	4.32E+11
30	12.68	550	7	50	50	8,250	2902.2	620.5	0.93	6.04E+11
43	106.63	400	7	50	50	8,250	2902.2	620.5	0.93	3.69E+12
60	64.1	550	7	50	50	8,250	2902.2	620.5	0.93	3.05E+12
					8,250 Total					7.78E+12
11	11.63	225	7	50	50	8,500	2989.7	624	0.93	2.32E+11
14	3.92	260	7	50	50	8,500	2989.7	624	0.93	9.04E+10
21	2.97	275	7	50	50	8,500	2989.7	624	0.93	7.25E+10
32	5.5	240	7	50	50	8,500	2989.7	624	0.93	1.17E+11
41	0.92	275	7	50	50	8,500	2989.7	624	0.93	2.24E+10
					8,500 Total					5.35E+11
20	22.14	275	7	50	50	9,000	3164.7	631	0.93	5.66E+11
26	7.89	260	7	50	50	9,000	3164.7	631	0.93	1.91E+11
35	8.36	240	7	50	50	9,000	3164.7	631	0.93	1.86E+11

					9,000 Total					9.42E+11
27	11.81	400	7	50	50	9,250	3252.2	634.5	0.93	4.48E+11
34	11.23	550	7	50	50	9,250	3252.2	634.5	0.93	5.86E+11
44	68.13	450	7	50	50	9,250	3252.2	634.5	0.93	2.91E+12
52	115.57	600	7	50	50	9,250	3252.2	634.5	0.93	6.58E+12
					9,250 Total					1.05E+13
4	12.04	100	7	50	50	9,500	3339.7	638	0.93	1.17E+11
12	8	225	7	70	50	9,500	3339.7	638	0.93	2.44E+11
					9,500 Total					3.61E+11
66	0.17	550	7	50	50	9,750	3427.2	641.5	0.93	9.25E+09
67	2.17	450	7	50	50	9,750	3427.2	641.5	0.93	9.66E+10
					9,750 Total					1.06E+11
15	28.97	275	7	70	50	10,000	3514.7	645	0.93	1.13E+12
					10,000 Total					1.13E+12
33	10.47	400	7	50	50	10,250	3602.2	648.5	0.93	4.31E+11
36	15.24	550	7	50	50	10,250	3602.2	648.5	0.93	8.62E+11
					10,250 Total					1.29E+12
45	30.08	475	7	50	50	10,750	3777.2	655.5	0.93	1.52E+12
50	92.82	650	7	50	50	10,750	3777.2	655.5	0.93	6.44E+12
65	1.76	850	7	50	50	10,750	3777.2	655.5	0.93	1.60E+11
					10,750 Total					8.12E+12
17	35.66	275	7	70	50	11,000	3864.7	659	0.93	1.49E+12
					11,000 Total					1.49E+12
37	26.29	400	7	70	50	11,250	3952.2	662.5	0.93	1.63E+12
40	30.53	550	7	70	50	11,250	3952.2	662.5	0.93	2.60E+12
48	7.3	475	7	70	50	11,250	3952.2	662.5	0.93	5.36E+11
55	2.63	760	7	50	50	11,250	3952.2	662.5	0.93	2.21E+11
58	20.39	700	7	70	50	11,250	3952.2	662.5	0.93	2.21E+12
62	6.71	875	7	50	50	11,250	3952.2	662.5	0.93	6.49E+11
					11,250 Total					7.84E+12
53	67.57	825	7	70	50	11,750	4127.2	669.5	0.93	8.91E+12
64	0.33	1050	7	70	50	11,750	4127.2	669.5	0.93	5.54E+10
					11,750 Total					8.97E+12
46	6.02	475	7	70	50	12,250	4302.2	676.5	0.93	4.71E+11
63	1.12	1050	7	70	50	12,250	4302.2	676.5	0.93	1.94E+11
					12,250 Total					6.65E+11
47	35.02	625	7	70	50	12,750	4477.2	683.5	0.93	3.72E+12
54	79.88	875	7	70	50	12,750	4477.2	683.5	0.93	1.19E+13
61	0.69	1050	7	70	50	12,750	4477.2	683.5	0.93	1.23E+11
					12,750 Total					1.57E+13
49	28.6	650	7	70	50	13,750	4827.2	697.5	0.93	3.34E+12
					13,750 Total					3.34E+12
56	59.99	850	7	70	50	14,250	5002.2	704.5	0.93	9.39E+12
					14,250 Total					9.39E+12
51	6.72	700	7	70	50	15,250	5352.2	718.5	0.93	9.09E+11
57	26.6	825	7	70	50	15,250	5352.2	718.5	0.93	4.24E+12
					15,250 Total					5.15E+12
					Grand Total					8.98E+13

Table 33. Mean in-place gas for sub-plays in the Lance Formation transition play, Bighorn Basin arranged according to depth.

Bighorn Basin Natural Gas Resources by Depth										
Depth(ft)	LanT	MeeT	KmvO	KmvT	FroO	FroT	MudO	MudT	Total	Cum. Total
3,000									0	0
3,500	5.91E+09								5.905E+09	5.905E+09
4,000	2.26E+10								2.256E+10	2.846E+10
4,500									0	2.846E+10
5,000	4.25E+10	2.52E+11		1.02E+12					1.313E+12	1.342E+12
5,500		1.98E+11		2.54E+11					4.521E+11	1.794E+12
6,000	1.03E+12	4.79E+11		7.83E+11					2.296E+12	4.09E+12
6,500	4.46E+11	1.28E+12		2.34E+11					1.963E+12	6.052E+12
7,000	7.40E+11	3.68E+11		2.33E+12					3.44E+12	9.493E+12
7,250	1.67E+12								1.67E+12	1.116E+13
7,500	3.91E+11	1.61E+12		5.39E+11		8.73E+10			2.63E+12	1.379E+13
7,750	6.46E+11								6.462E+11	1.444E+13
8,000	1.43E+12	1.02E+12		3.66E+12		1.93E+12			8.039E+12	2.248E+13
8,250	7.78E+12								7.784E+12	3.026E+13
8,500	5.35E+11	3.36E+12		1.68E+12		2.09E+12		5.33E+10	7.723E+12	3.798E+13
9,000	9.42E+11	1.66E+12		3.20E+12		1.42E+12		4.84E+11	7.702E+12	4.569E+13
9,250	1.05E+13								1.053E+13	5.621E+13
9,500	3.61E+11	3.97E+12		2.93E+12		1.90E+12		4.21E+11	9.583E+12	6.58E+13
9,750	1.06E+11								1.059E+11	6.59E+13
10,000	1.13E+12	2.21E+12		6.90E+12		2.20E+12		1.74E+11	1.26E+13	7.851E+13
10,250	1.29E+12								1.293E+12	7.98E+13
10,500		1.38E+12		4.99E+12		2.18E+12		9.99E+10	8.654E+12	8.845E+13
10,750	8.12E+12								8.123E+12	9.658E+13
11,000	1.49E+12	5.26E+12		7.31E+12		1.94E+12		7.37E+11	1.674E+13	1.133E+14
11,250	7.84E+12								7.837E+12	1.212E+14
11,500		3.92E+12		5.02E+12		1.29E+12		1.30E+11	1.035E+13	1.315E+14
11,750	8.97E+12								8.965E+12	1.405E+14
12,000		3.90E+12		1.16E+13		3.45E+12		7.11E+11	1.965E+13	1.601E+14
12,250	6.65E+11								6.654E+11	1.608E+14
12,500				5.35E+12		8.87E+11		1.09E+11	6.341E+12	1.671E+14
12,750	1.57E+13								1.571E+13	1.828E+14
13,000		5.52E+12	9.40E+11	8.68E+12		4.59E+12		9.60E+11	2.068E+13	2.035E+14
13,500			5.79E+12	3.12E+12		2.68E+11		9.79E+10	9.274E+12	2.128E+14
13,750	3.34E+12								3.336E+12	2.161E+14
14,000		4.80E+12	2.15E+12	9.09E+11	3.85E+12	3.70E+11		1.42E+12	1.35E+13	2.296E+14
14,250	9.39E+12								9.387E+12	2.39E+14
14,500				4.28E+12	3.85E+12			5.66E+10	8.187E+12	2.472E+14
15,000		6.27E+11		1.02E+12	3.22E+12	4.60E+09	1.54E+12		6.413E+12	2.536E+14
15,250	5.15E+12								5.147E+12	2.588E+14
15,500		1.70E+12	1.33E+13		5.82E+12		6.10E+11		2.142E+13	2.802E+14
16,000		5.07E+11			7.15E+11		1.10E+12		2.318E+12	2.825E+14
16,500		9.29E+11	1.14E+13		6.05E+12		1.25E+12		1.965E+13	3.022E+14
17,000			2.23E+12		8.24E+11		1.70E+11		3.227E+12	3.054E+14
17,500			2.68E+12		3.82E+12		3.41E+12		9.898E+12	3.153E+14
18,000					1.34E+12		4.39E+11		1.782E+12	3.171E+14
18,500					3.22E+12		1.93E+12		5.152E+12	3.222E+14
19,000					2.13E+12		1.20E+11		2.249E+12	3.245E+14
19,500					1.91E+12		1.09E+12		3.001E+12	3.275E+14
20,000					3.27E+12		1.25E+12		4.52E+12	3.32E+14
20,500					3.93E+11		1.61E+10		4.089E+11	3.324E+14
21,000					1.46E+12		6.77E+10		1.527E+12	3.339E+14
21,500									0	3.339E+14
22,000							4.44E+11		4.438E+11	3.344E+14
Total	8.976E+13	4.495E+13	3.85E+13	7.577E+13	4.189E+13	2.461E+13	1.343E+13	5.453E+12	3.344E+14	

Table 34. Summary table showing total gas in each of the eight plays in the Bighorn Basin at various depths and cumulative gas at each depth from shallow to deep.