BRIMSTONE PROPERTY

GEOLOGIC REPORT: THIRD REVISION – JANUARY 15, 2024

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TABLE OF CONTENTS

INTRODUCTION

This report is a revision of the Geologic Report – Second Revision issued by Cougar Dome, LLC in March 2023 on the Brimstone Lease. The only change is to add the Brimstone pipeline to Figure 1 on page 3 as well as a brief discussion of the pipeline on page 8 in the section labeled Pipeline Access

The Brimstone property is located on the Cumberland Plateau of East Tennessee. The center of the property is approximately eight miles south of the Town of Huntsville, Tennessee, see Figure 1. The property consists of 45,205 gross acres MOL (more or less). The surface is in general forested. Access to drilling locations is provided by numerous dirt and gravel roads, as well as by "strip benches". The surface is owned by various Forest Fund Development Properties. The Brimstone Company, however, has retained the mineral rights as well as access to those rights. They have also retained the right to access the existing Diversified Gas and Oil pipelines on the property.

Of this 45,205 MOL gross acreage, 6,583 acres MOL has been developed by Chattanooga Shale and shallower wells, see Figure 2. This leaves 38,622 undeveloped acres MOL open for development by "shallow" drilling. Only 128 acres MOL of the "deep rights" on the Brimstone Lease have been developed, see Figure 3. This leaves a total of 45,077 undeveloped acres MOL open for development below the Chattanooga Shale.

The Brimstone Lease produces both oil and natural gas. Productive horizons range from "shallow" Pennsylvanian age sands to "deep" Knox Dolomite, see Figure 4. The bulk of the present gas production comes from the Chattanooga Shale. Oil production is from wells producing from the Monteagle and Fort Payne Formations. One well appears to be producing oil from the Stones River Group.

The Cathys Formation, which is the stratigraphic equivalent of the Point Pleasant Formation, underlies the entire Brimstone Lease. Point Pleasant is being aggressively developed in eastern Ohio and Western Pennsylvania and is considered an attractive wildcat play on the Brimstone Lease.

DISCLAIMER

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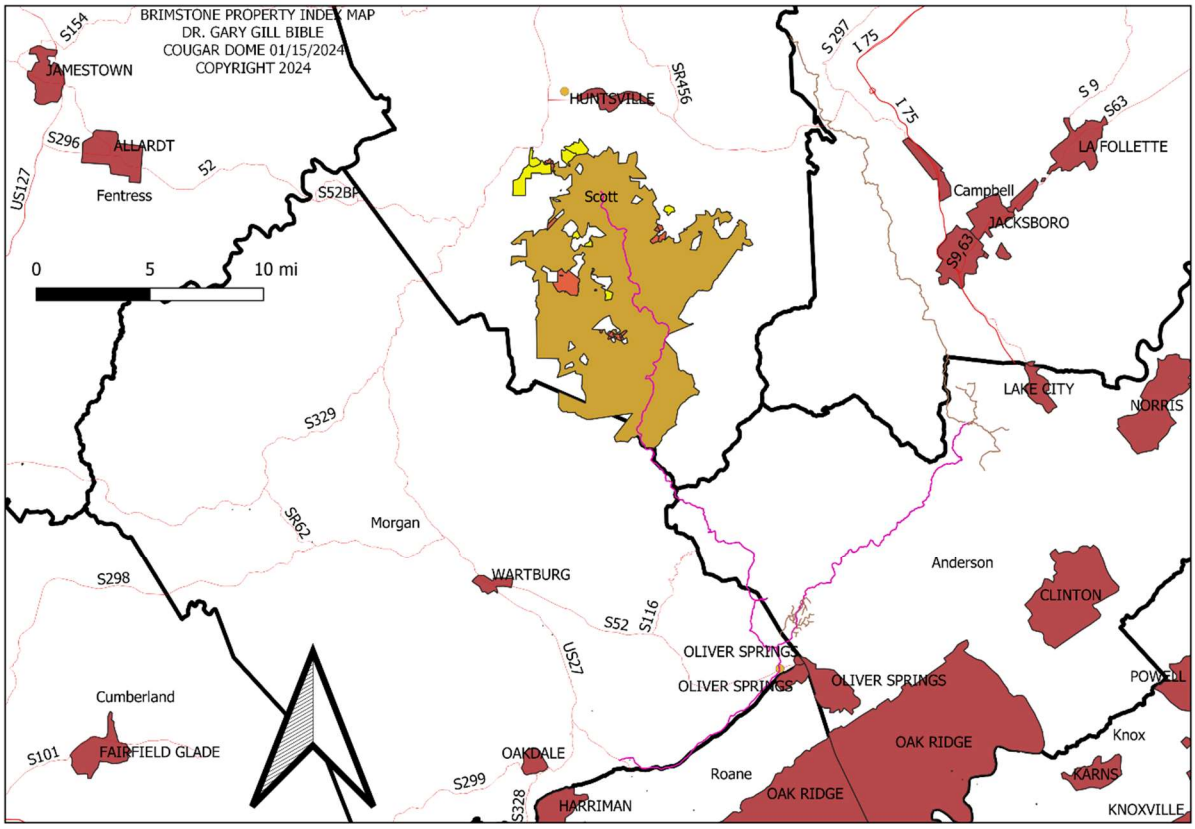

Figure 1. Generalized index map of the Brimstone Property. The Brimstone property is shown in brown, cities and towns are shown in dark red. Interstates are shown as red lines, and state highways are shown as tan lines. The eight-inch steel Brimstone Pipeline is shown as a heavy purple line.

BRIMSTONE-CHATTANOOGA AND SHALLOWER DEVELOPED ACREAGE
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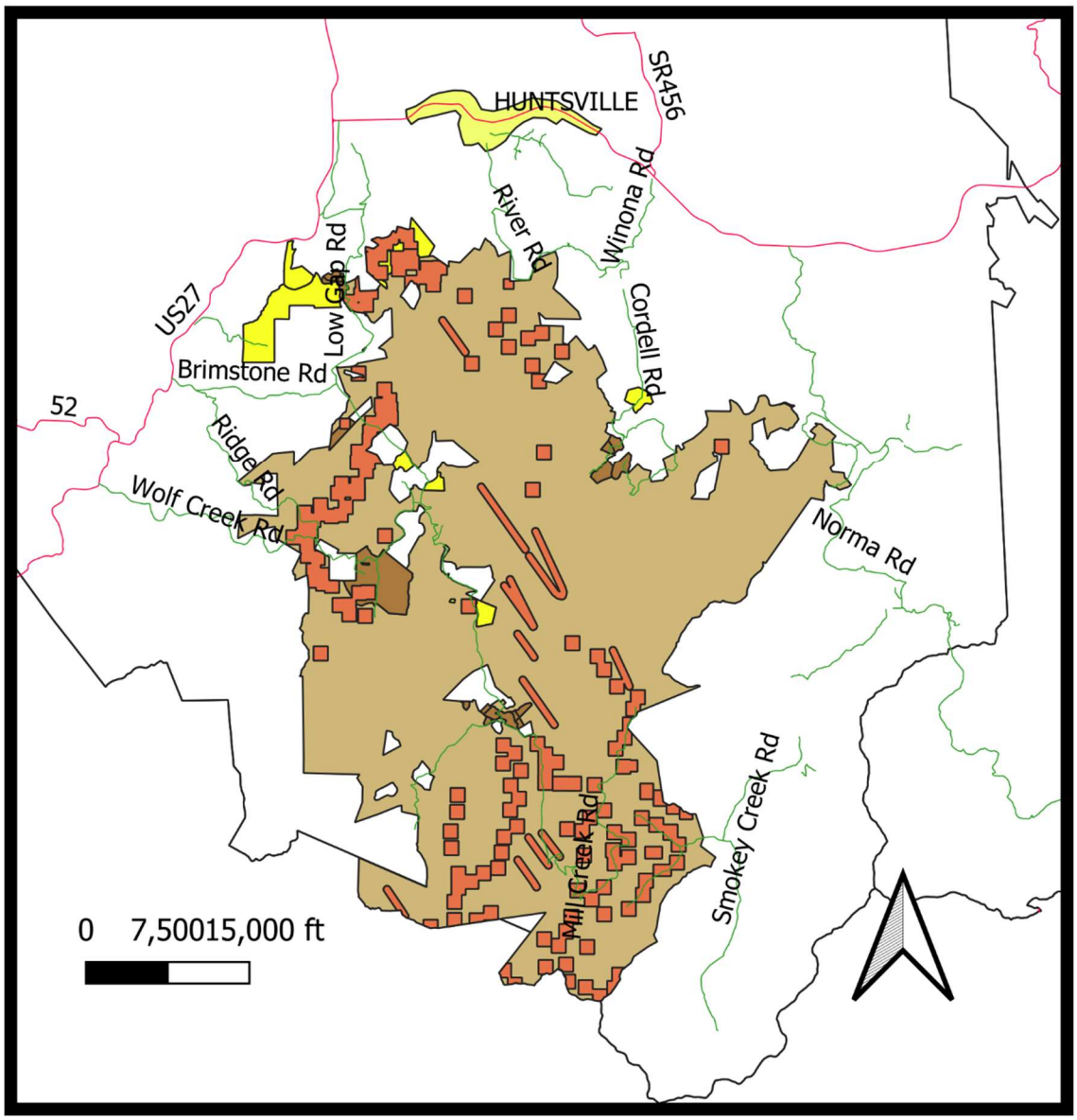

Figure 2. Brimstone - Chattanooga and shallower developed acreage. The currently developed acreage is shown in dark red.

BRIMSTONE-DEEPER THAN BASE OF CHATTANOOGA DEVELOPED ACREAGE
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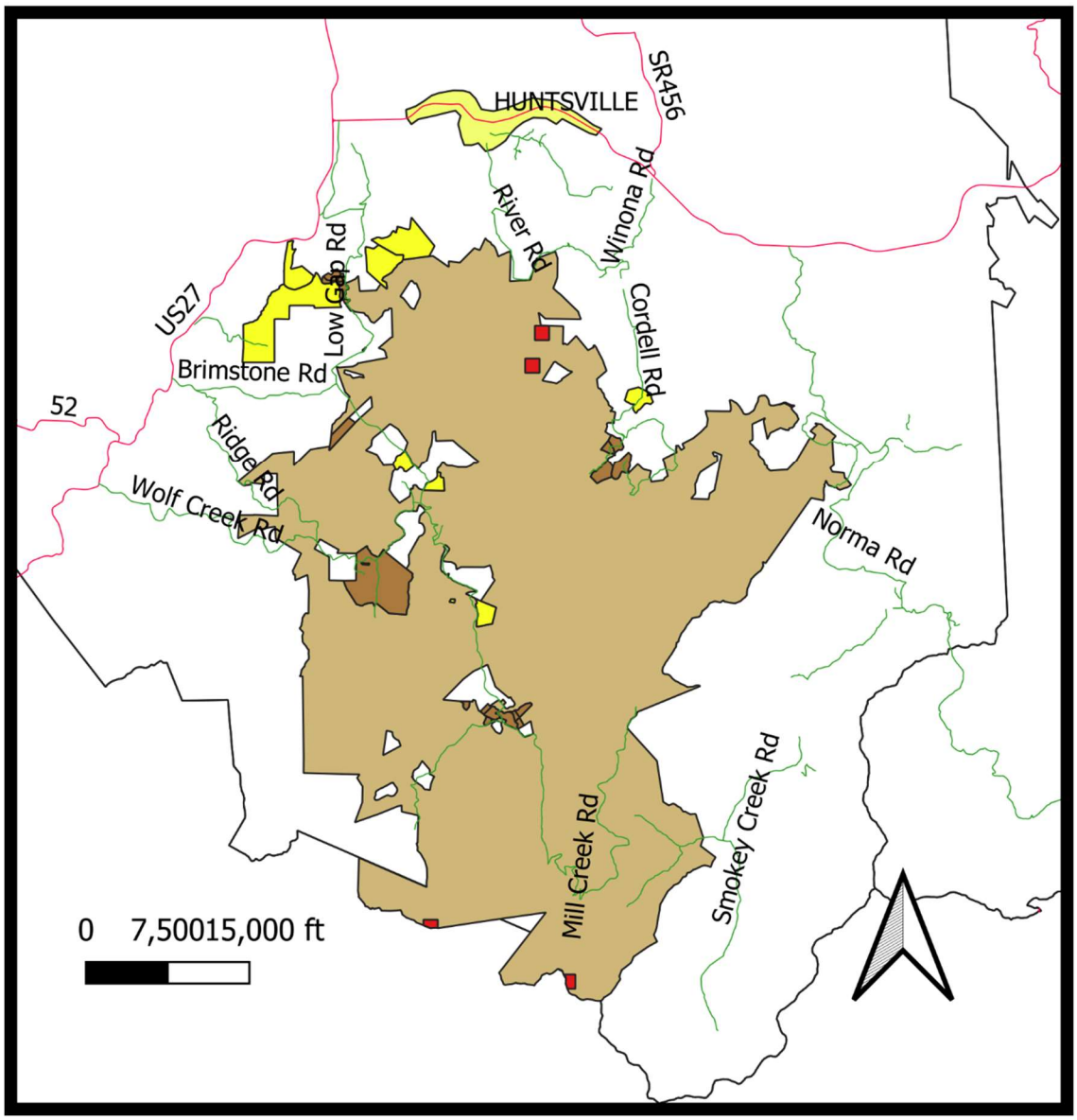

Figure 3. Brimstone - developed acreage from formations below the Chattanooga Shale. Developed acreage is shown in dark red.

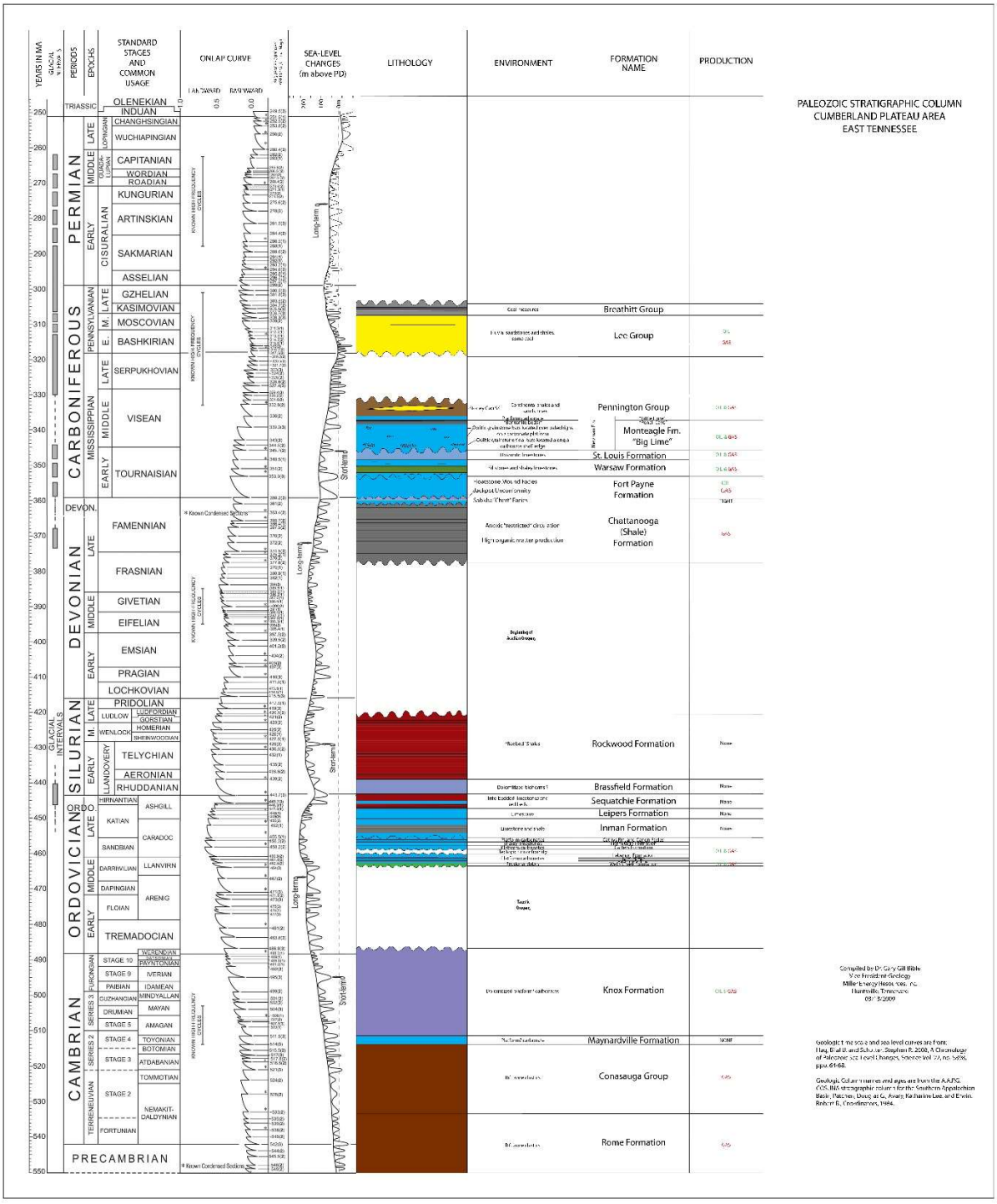

Figure 4. Geologic Column of the Cumberland Plateau of East Tennessee.

ACREAGE ANALYSIS

The acreage calculations used to determine developed acreage for both the Chattanooga and shallower units and the deeper than the base of the Chattanooga units are based on State of Tennessee Oil and Gas Regulations and on the appropriate Brimstone oil and gas lease. Older wells on the lease were drilled by Dixie Shamrock Company. Their lease on page three states that "each well drilled pursuant to this oil and gas lease shall have only the minimum spacing for wells of that depth allowed by the Tennessee Oil and Gas Board or (40) acres, whichever is greater."

All the Dixie Shamrock wells reached total depth in the Fort Payne Formation or the underlying Chattanooga Shale. For these wells, 40-acre boxes were drawn around each well utilizing QGIS GIS software. Where these 40-acre units overlapped, they were merged into one acreage block. Total acreage of the individual blocks was measured utilizing QGIS area calculation and then summed.

The Brimstone Lease with Knox Energy states in section 8 that "The developed portion of the lease shall be the acreage legally required to produce any oil or gas wells drilled by the lessee, including any wells capable of commercial production, that have been recorded by the lessee down to the depth of the deepest commercial production (developed acreage), the balance of the leased acreage and lower depths shall be considered undeveloped".

Where unit plats were available for vertical wells in the State of Tennessee well-base files, those units were drawn on the Brimstone Lease. Where no unit plats were available in the well-base files for vertical wells, units based on Tennessee State Drilling Regulations were drawn centered over the appropriate well. Unit boundaries for horizontal wells in the Chattanooga Shale were drawn based on State of Tennessee drilling regulations. Where units overlapped, the units were merged and then summed to determine the developed acreage.

The breakdown of the developed and undeveloped acreage is shown in Table 1. Unit size in any future drilling will be governed by State of Tennessee Oil and Gas Drillings Regulations.

Table 1. Breakdown of Brimstone Lease Acreage

Formation	Gross Ac.	Developed Ac.	Undeveloped Ac.
Chat. And Shallower	**45,205**	**6,583**	**38,622**
Base Chat & Deeper	**45,205**	**128**	**45,077**

PIPELINE ACCESS

When Knox Energy surrendered the undeveloped acreage on the Brimstone Lease back to the Brimstone Company on September 29th, 2015, Brimstone Company retained the right to have access to the Knox Energy pipelines on the Brimstone Lease. Page 2, Paragraph 8 of the Corrected Partial Surrender of Knox Energy Lease states, "Lessee also hereby excerpts and reserves from this Corrected Partial Surrender the right to use any pipeline or road located upon the leased premises, **subject to the right of Lessor to use same without cost for the transportation of gas or oil products from Lessor's property**, all as more specifically set forth in that Lease. Lessee shall have no other rights with respect to the surrendered lands." The production and pipelines on the Brimstone Lease have subsequently been purchased by Diversified Gas and Oil.

The Brimstone Property is connected to the East Tennessee Gas Pipeline System by the Brimstone 8-inch steel pipeline. This pipeline in shown as the heavy purple line on Figure 1, page 3. A detailed version of the entire Brimstone Gathering System is available for anyone who is seriously interested in pursuing this project.

BEDROCK GEOLOGY

Producing horizons on the Brimstone Lease and the surrounding area range from Pennsylvanian Age sandstones (youngest) to the Knox Dolomite (oldest), see Figure 4. The type-log for the Chattanooga and shallower reservoirs on the Brimstone Company lease is the Brimstone No. BR-1155 A (State of Tennessee Permit # 11691) well. The well-log for the #11691 well is included in the appendices to this report. Measured depths to the tops of the relevant formations are shown in Table 2.

Table 2. Formation Data

Formation	Measured Depth
Bangor Limestone	**2410**
Hartselle	**2450**
Monteagle Limestone	**2468**
Monteagle Second Bench	**2697**
St. Louis Dolomite	**2841**
Warsaw	**2913**
Fort Payne Limestone	**3011**
Fort Payne Jackpot Unconformity	**3057**
Fort Payne Cherty Dolomite	**3057**
Chattanooga	**3129**
Sequatchie	**3172**

The Chattanooga Shale in # 11691 consists of 43 feet of dark gray to black carbonaceous silty shale, see Figure 5. When quickly caught air drilled samples of the shale are placed under a binocular microscope and covered with distilled water, natural gas can be seen bubbling out of the cuttings. TOC (total organic carbon) values in the shale range from 3.5% to as high as 13%. The thermal maturity of the Chattanooga Shale in wells in the general area are in the peak oil window (Cougar Dome, personal knowledge).

The Chattanooga Shale that underlies the Brimstone Lease dips to the southeast at a rate of roughly 60 feet/mile or somewhat less than 1 degree, see Figure 6. A high-resolution version of this map is included in the appendices to this report. The map is a 300 dpi (dot per inch) pdf file that may be opened in Adobe Acrobat. The Brimstone Company lease is in the central portion of the map. Depths to the top of the Chattanooga shale range from 2,400 feet MD (measured depth) in the northern part of the lease to 4,100 (MD) feet in the southern part of the lease. Depths to the top of the Knox Formation range from 4,300 (MD) feet in the northern part of the lease to 6,100 (MD) feet in the southern part of the lease.

It is apparent in Figure 6 that the structure contour lines are spaced much closer together in a zone trending northeast-southwest across the central part of the map area. This indicates an increase in dip from 1/2° in the northwest to 1 and 1/2° in the central area of the map, and then back to 1/2° in the southeast portion of the structure contour map. No fault cuts were observed in any of the well-logs in the map area in the Chattanooga Shale. This indicates structural draping of the Chattanooga Shale over a deeper fault. This deeper fault is quite likely located in the deeper, more brittle Stones River/Knox section. Since the presence of a fault in the Stones River/Knox Section could control the development of karst porosity in these rocks, Cougar Dome, LLC intends to prove or disprove the presence of this fault in subsequent additions of this report.

The Chattanooga Shale is very uniform in thickness throughout the map area. Figure 7 is an isopach map of the Chattanooga Shale; contour interval is 5 feet. A high-resolution version of this map is included in the appendices to this report. The map is a 300 dpi (dot per inch) pdf file that may be opened in Adobe Acrobat. Thickness of the shale ranges from 43 feet to 59 feet over the entire map area. No obvious thickness trends are present in the map area.

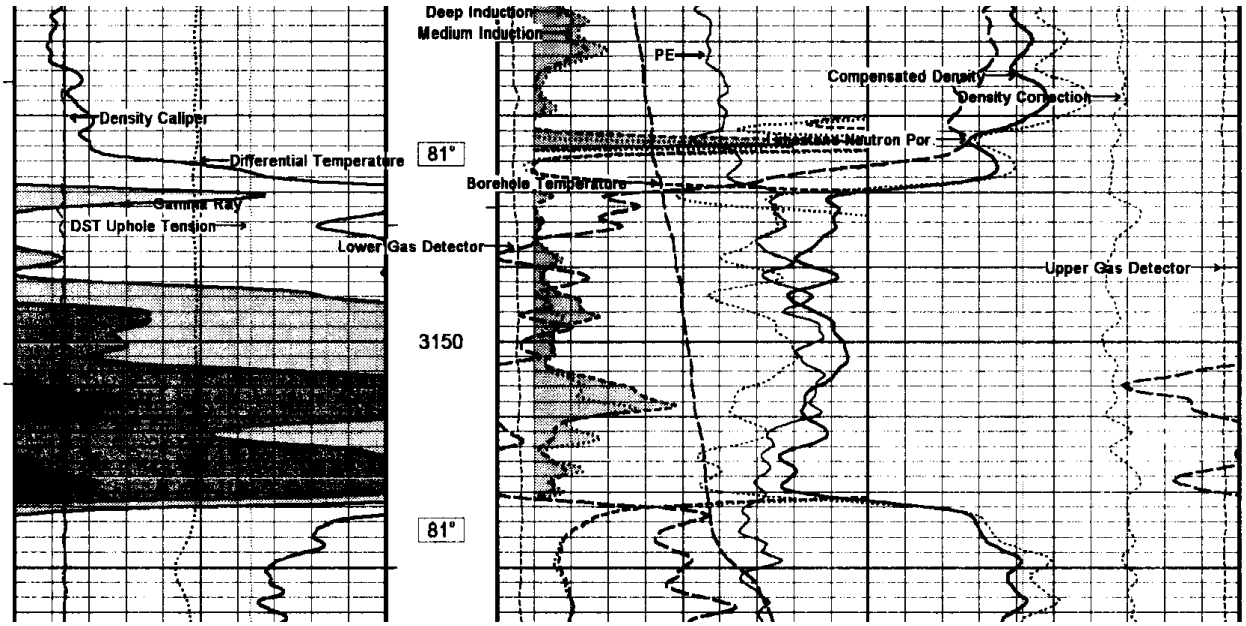

FIGURE 5. Type section of Chattanooga Shale from well # 11691.

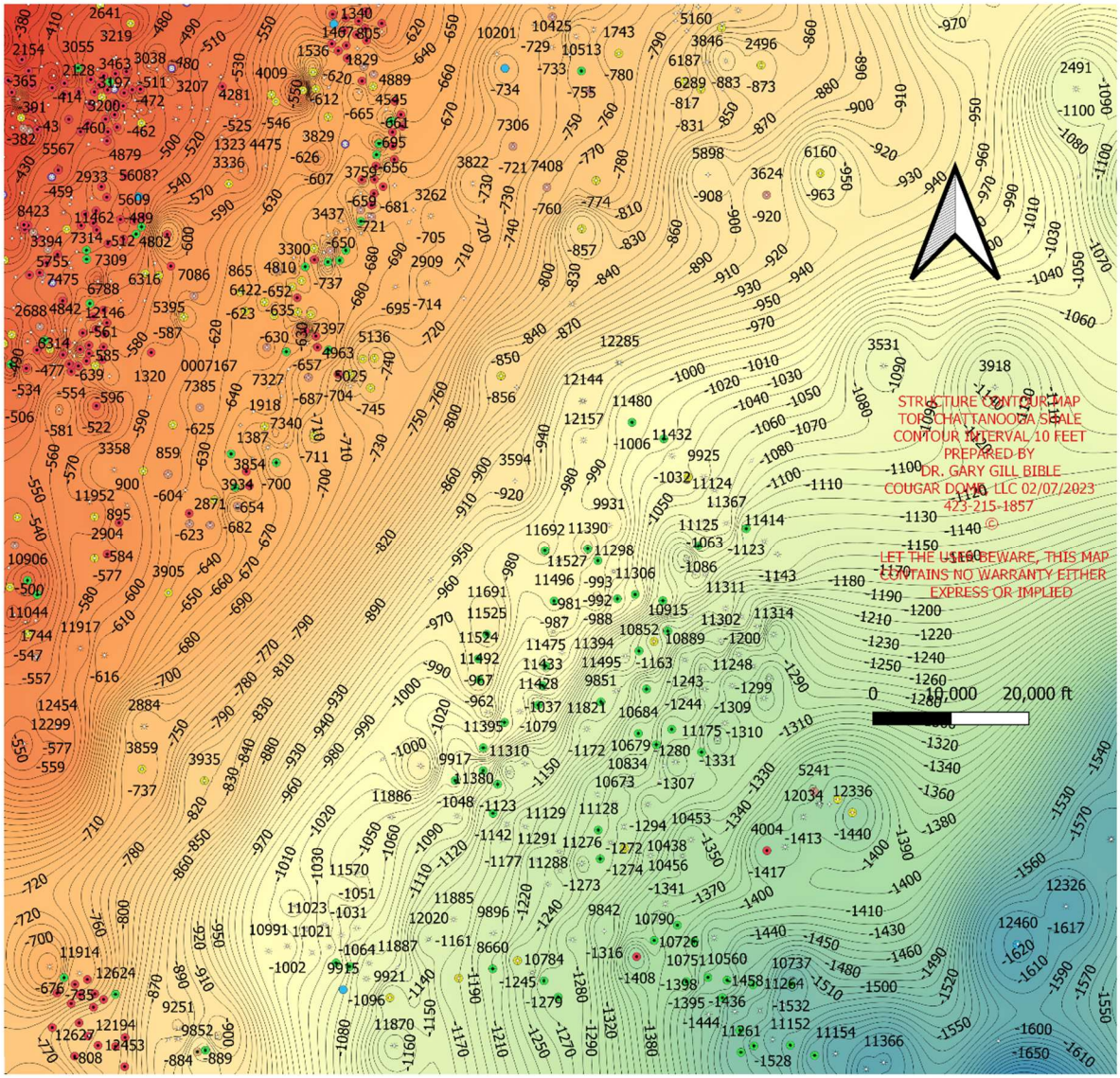

FIGURE 6. Structure Contour Map of the top of the Chattanooga Shale. Contour interval is 10 feet. The Brimstone Lease is in the central part of the map.

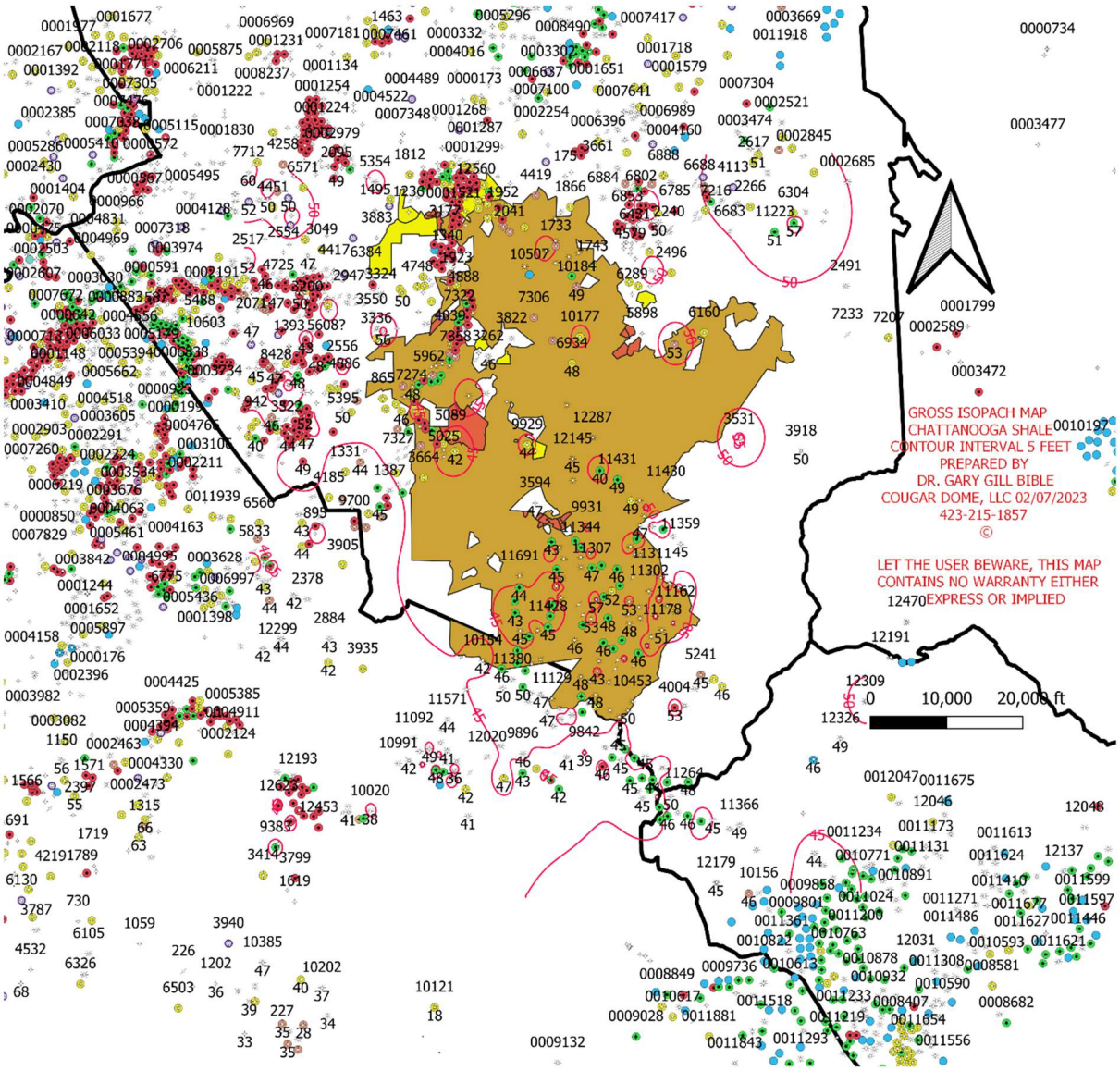

FIGURE 7. Isopach Map of the Chattanooga Shale. Contour interval is 5 feet. The Brimstone Lease is shown in tan in the central part of the map.

SCENIC EASEMENT

A scenic easement has been obtained by the State of Tennessee for the surface of the southeast one/half of the Brimstone Lease from the surface owners, see Figure 8. The Brimstone Company states explicitly, however, that it has not signed an easement on any of its mineral interests.

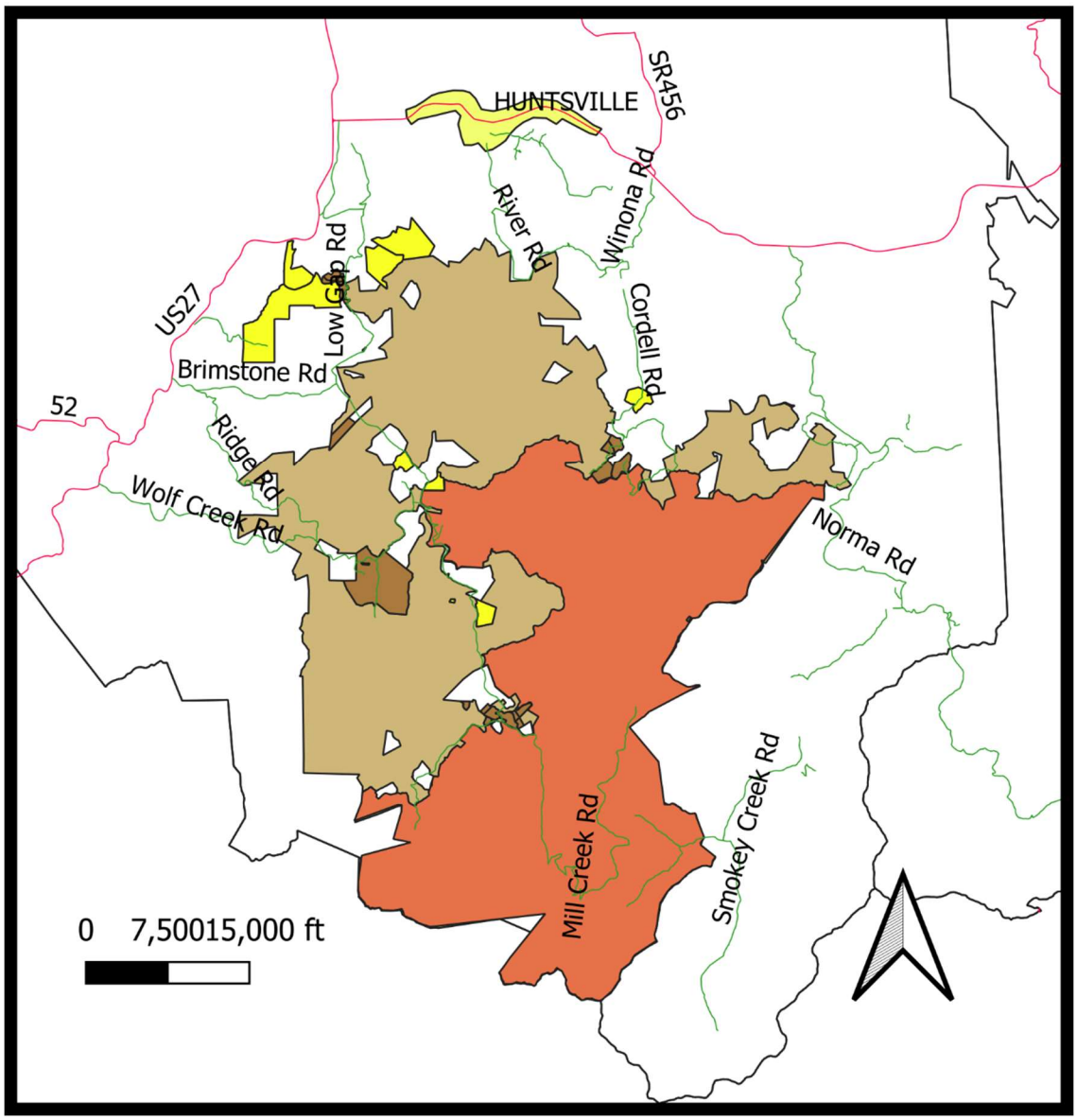

FIGURE 8. Surface scenic easement on the Brimstone Lease. Scenic easement is shown in dark orange.

CHATTANOOGA SHALE RESERVE ANALYSIS: METHODS

To evaluate gas reserves on the Brimstone Lease, 20-year EUR (expected ultimate recovery) decline curves were prepared for all 13 horizontal wells, and all 87 vertical wells drilled by Knox Energy or Atlas Corporation. Oil and gas production data through 2020 is available from the State of Tennessee Oil and Gas Commission. Production data for 2021 was provided by Brimstone Company. 20-year EUR decline curves rather than the more common 30-year curves were used since they provided more reliance on actual measured values. Spread sheets and graphs for all decline curves are in the appendices of this report. They may be opened and scrolled through using Adobe Acrobat**.**

Gas production data for each well was compiled in Excel spread sheets and point graphs were generated using the Excel insert tab. A trendline was then generated for the data by Excel. The trendline equation was used to calculate production for however many additional years it took to reach 20 years of production. Trendlines were exponential, linear, logarithmic, or power functions depending on which function yielded the highest R^2 value. Partial first year production was included in the data. All 20-year EURs were prepared in the same manner. An example of the 20-year EUR decline curve is shown in Figure 9.

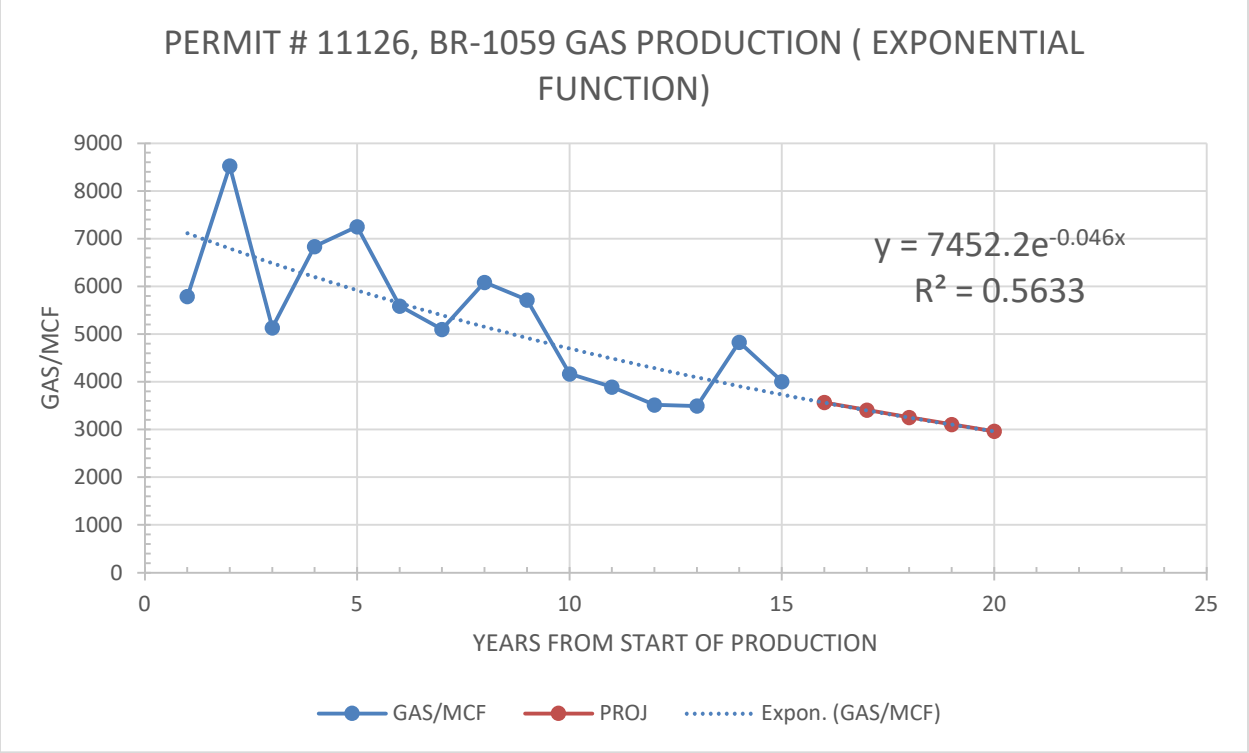

FIGURE 9. 20-year EUR decline for permit # 11126 vertical well. EUR is 96,269 MCFG.

CHATTANOOGA SHALE RESERVE ANALYSIS: VERTICAL WELLS

The single most important conclusion to come from the Chattanooga Shale Reserve Analysis is that under no circumstances should production from the Chattanooga Shale and production from the Second Bench of the Monteagle Limestone be co-mingled. This is regardless of how much porosity is shown on geophysical well-logs of the Monteagle Limestone. When the Chattanooga Shale is not co-mingled with any other formation, it has an average 20-year EUR of 42,112.4 MCFG, see Table 3. When the Chattanooga Shale is co-mingled with the Monteagle Formation the average 20-year EUR is only 26,888.3 MCFG. This is a loss of 15, 224.1 MCFG that is thieved by the lower pressure Monteagle Formation.

Table 3. Production Volumes-Vertical Wells

Horizon	IP-MCFG			20-year EUR-MCFG		
	Avg.	Min.	Max.	Avg.	Min.	Max.
All Formations	38	2	343	38,858.5	1,402	175,224
Chattanooga	47.6	15	179	42,112.4	20,225	96,269
Chat + Fort Payne	31.1	0	73	64,793.7	18,633	175,224
Chat + Monteagle	42.3	2	130	26,888.3	1,402	58,519
Chat + F Payne + Mont	20.9	5	46	48,818.2	20,085	80,910

The Fort Payne Formation immediately overlies the Chattanooga Shale. Where it has developed porosity and permeability, both Knox Energy and Atlas successfully co-mingled the Chattanooga Shale and the Fort Payne. The pressure difference between these two formations is not great enough for the Fort Payne to thieve gas from the Chattanooga. The average 20-Year EUR for the co-mingled formations is 64,793.7 MCFG. This yields a gain of 22681.3 MCFG. Where these two formations are co-mingled with the lower pressure Monteagle Formation, the 20-year EUR is only 48,818.2 MCFG. 64,793.7 for the Chattanooga + Fort Payne minus 48,818.2 when co-mingled shows that the Monteagle has thieved 15,975.5 MCFG from the lower higher pressured formations.

The data shows that the average well on the Brimstone Lease has a 20-Year EUR of 38,858.5 MCFG regardless of whether formations within the well-bore were co-mingled on not. The best completion method is to co-mingle the Chattanooga and Fort Payne. Where the Fort Payne Formation does not have reservoir quality rock, the second-best method is to produce the Chattanooga Shale as a single completion.

All vertical gas wells drilled in the Chattanooga Shale had to be stimulated in order to produce economic rates of production, for details see EXCEL SPREADSHEET ANALYSIS BRIMSTONE VERTICAL WELLS in the report appendices. Please note that the spreadsheet has been sorted based on GAS EUR from greatest to smallest. The data in the spreadsheet was compiled from completion reports turned in to the State of Tennessee Oil and Gas Commission. Unfortunately, SPF (shots per foot), or the phasing of the perforating guns, is not included on these reports. Most stimulations in the shale consisted of approximately 80,000 pounds of sand with varying amounts of water. The largest stimulation consisted of 200,000 pounds carried by 190,974 gallons of water done on well Permit # 11126, see Figure 9. This stimulation yielded a 20-year EUR of 92,269 MCFG from the Chattanooga Shale. This well was completed only in the Chattanooga Shale. Three stimulations were done with sand carried by 70 quality foam, but the results were no better than stimulation with water.

Three different perforating techniques were used in the Chattanooga Shale, see Perf Height and Distance Below Contact columns in the EXCEL SPREADSHEET ANALYSIS BRIMSTONE VERTICAL WELLS in the report appendices. The most conventional approach was to perforate 10 to 15 feet of shale in the center of the formation and stimulate. The next technique was to perforate 10 to 15 feet of shale at the very top of the formation. The overlying Fort Payne cherty dolomite facies is much harder and denser than the Chattanooga Shale. Knox Energy staff said that they felt that the Fort Payne facies would prevent the fracture from migrating upward and force it to extend further horizontally into the Chattanooga Shale. The least conventional technique was to perforate the entire Chattanooga Shale interval and then stimulate the Chattanooga Shale. This is the method that was used in well Permit #11126 with very good results.

On geophysical well-logs, Cougar Dome, LLC interpreted the presence of sharp deflections on the temperature and/or the noise log as indicating the presence of natural fractures in the Chattanooga Shale. Surprisingly, the presence or absence of natural fractures in the Chattanooga Shale does not appear to have any particular correlation with 20-year EUR. The Brimstone Lease is primarily a gas factory 40-acre drilling play in the Chattanooga Shale.

Figure 10 is a plot of IP (initial production) versus 20-year EUR in the Chattanooga Shale. As in the case of the presence or absence of fractures, there is no obvious correlation between IP and 20-year EUR. This seems counterintuitive, and frankly Cougar Dome, LLC has no good explanation for this observation.

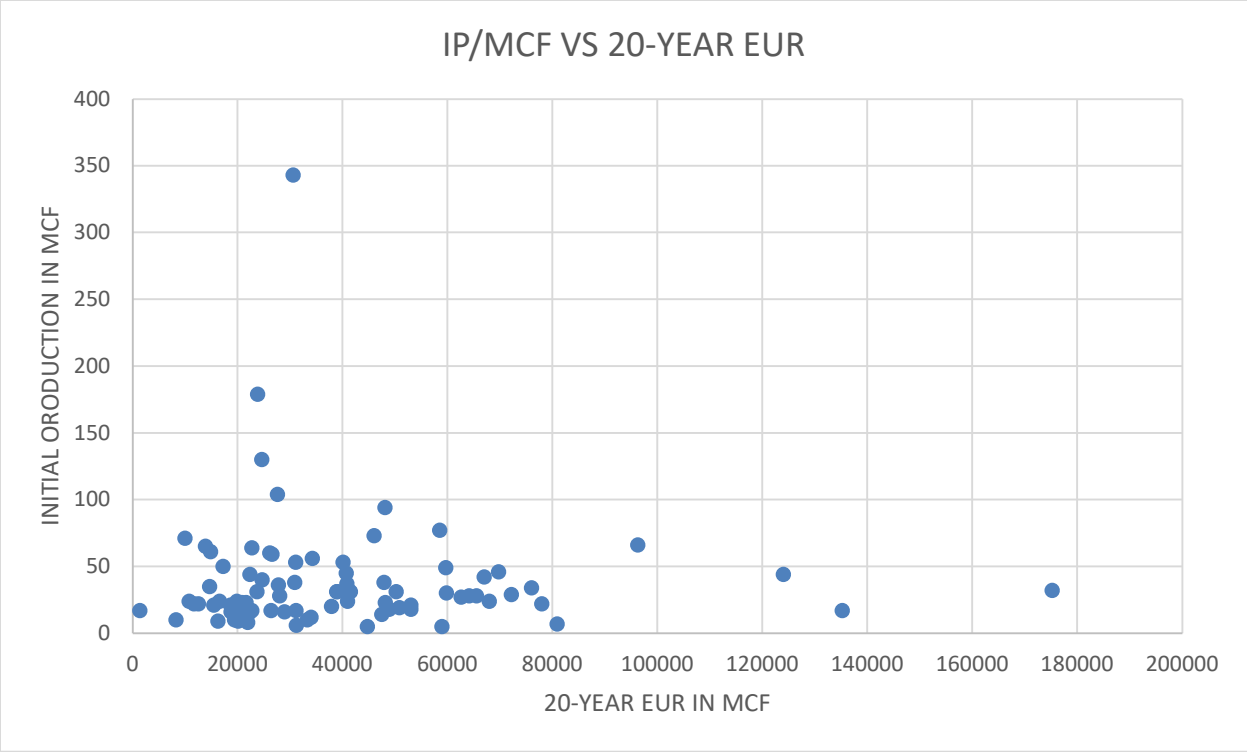

FIGURE 10. IP of vertical Chattanooga Shale wells versus 20-year EUR.

On the vertical well spread sheet in the appendices, the Primary, Secondary, and Tertiary columns show how many different formations were completed in each well. It was common practice for the operators to co-mingle production from the Fort Payne and Monteagle Limestone with the Chattanooga Shale in an effort to increase the overall gas production. The Fort Payne Formation immediately overlies the Chattanooga Shale. Where the Fort Payne has good porosity on geophysical well-logs, the co-mingling of the Chattanooga Shale and Fort Payne do produce many of the higher 20-year EURs.

The poorer performing vertical wells in terms of 20-year EUR are wells where the Chattanooga Shale/Fort Payne has been co-mingled with the Monteagle Limestone. The porosity zones in the Monteagle Limestones are 400 to 500 feet above the Chattanooga Shale. Assuming a normal pressure gradient of 0.465 psi/ft (pounds square inch/foot), the reservoir pressure in the Monteagle reservoirs is between 190 psi and 230 psi lower than the reservoir pressure in the Chattanooga Shale. The lower 20-year EUR indicates that the lower pressure Monteagle reservoirs are thieving gas from the Chattanooga Shale/Fort Payne. In the EXCEL SPREADSHEET MONTEAGLE GAS POROSITY VERSUS EUR located in the appendices, 13 wells were stimulated with sand and water in the Monteagle Limestone. These wells were selected based on the strong gas effect on geophysical well-logs in the Monteagle Limestone reservoirs. These same wells were also stimulated with sand and water in the Chattanooga Shale. The volumes of sand used

in the stimulations is different, but Cougar Dome, LLC feels that this is as close to an apples-to-apples comparison as can be had with real world data. The Monteagle Limestone is an oolitic grainstone reservoir where permeability increases as porosity increases. Figure 11 is a plot of porosity in the Monteagle gas bearing reservoirs versus the 20-year EUR. It is clear, as porosity and permeability increase in the lower pressured Monteagle Limestone, the 20-year EUR decreases, i.e., more and more gas from the Chattanooga Shale/Fort Payne is being lost into the Monteagle Limestone. The 15-years-plus production history also shows that the Monteagle Limestone does not produce this thieved gas at a later date. **Under no circumstances should operators co-mingle these two reservoir zones.**

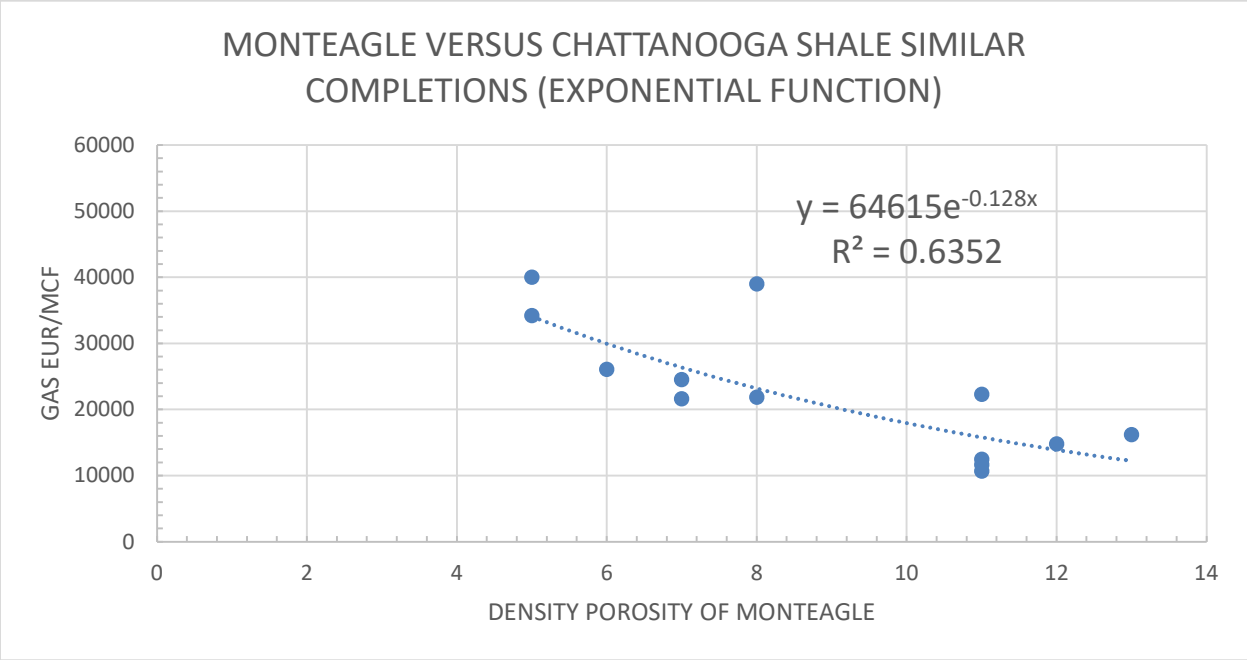

FIGURE 11. Monteagle Limestone porosity from gas bearing zones versus 20-year EUR.

There are 38,662 undeveloped acres on the Brimstone Lease. If this lease is a "gas factory" play, based on the State of Tennessee spacing regulations of 40 acres per well, there are over 950 Chattanooga Shale wells remaining to be drilled. However, Cougar Dome, LLC feels that a vertical well drilled and completed in the Chattanooga Shale does not drain 40 acres of low permeability Chattanooga Shale. Any future operator should determine what the proper reservoir spacing is. If the wells are only draining 20-acre or 10-acre spacings, then they should petition the Tennessee Oil and Gas Commission for special field rules to allow for the maximum production of natural gas from the Brimstone Lease.

CHATTANOOGA SHALE RESERVE ANALYSIS: HORIZONTAL WELLS

A total of 14 horizontal wells were drilled on the Brimstone Lease. The horizontal legs varied in length from 2500 feet to 6700 feet. The wells were completed with 14 to 22 stages through packers plus. 1,000,000 cubic feet of nitrogen per stage was the primary stimulation method. Two wells were completed in four stages with 100,000 pounds of sand, and one well had an 85-quality form frac used as the completion method. All wells were drilled toe up in a north 30 degrees west direction. For details, see the EXCEL SPREADSHEET ANALYSIS BRIMSTONE HORIZONTAL WELLS in the appendices.

Sudden increases in total gas not related to connection gas on the mud-logs of the horizontal wells were interpreted as indicating the presence of natural fractures in the Chattanooga Shale. This data is posted on the horizontal well's spreadsheet. As in the vertical Chattanooga Shale wells, there does not appear to be any obvious correlation between the presence of natural fractures and either IP or 20-year EUR. This indicates that the horizontal well drilling program can also be treated as a gas factory drilling project.

The average IP for horizontal wells completed in the Chattanooga Shale was 272 MCFG/D, see Table 4. The Average 20-year EUR was 268,718 MCFG. The average Chattanooga horizontal well outperforms the average Chattanooga vertical well by a ratio of 6.4 to 1. Unfortunately, Cougar Dome, LLC. does not have access to drilling and completion costs, therefore it is not possible to say whether these wells are more economical than vertical wells.

Table 4. Production Volumes-Horizontal Wells

Horizon	IP-MCFG/D			20-year MCFG		
	Avg.	Min.	Max.	Avg.	Min.	Max.
All Formations	315	107	556	272,809.9	129,439	545,065
Chattanooga	272	200	401	268,718	189,084	397,114
Chat + Fort Payne	347	177	556	275,878.9	118,185	545,065

Knox Energy took the unusual step of co-mingling eight of the horizontal Chattanooga Shale wells with the Fort Payne Formation. The average 20-year EUR of these eight wells is 275,878.9 MCFG. This yields an additional 3,069 MCFG over the horizontal wells completed only in the Chattanooga Shale. Without access to drilling and completion costs, it is unknown whether the additional cost would justify the unusual process of co-mingling these two formations in a horizontal well.

Decline curves were prepared for all 14 horizontal wells in the same manner as those for the vertical wells. Figure 12 is the composite decline curve for the six horizontal Chattanooga Shale

wells. For all 14 wells, see the EXCEL SPREADSHEET BRIMSTONE HORIZONTAL WELLS 20-YEAR DECLINE CURVE in the appendices. The wells IP at 275 MCFG/D and then follow a logarithmic decline with the steepest portion of the curve being in the first five years of production.

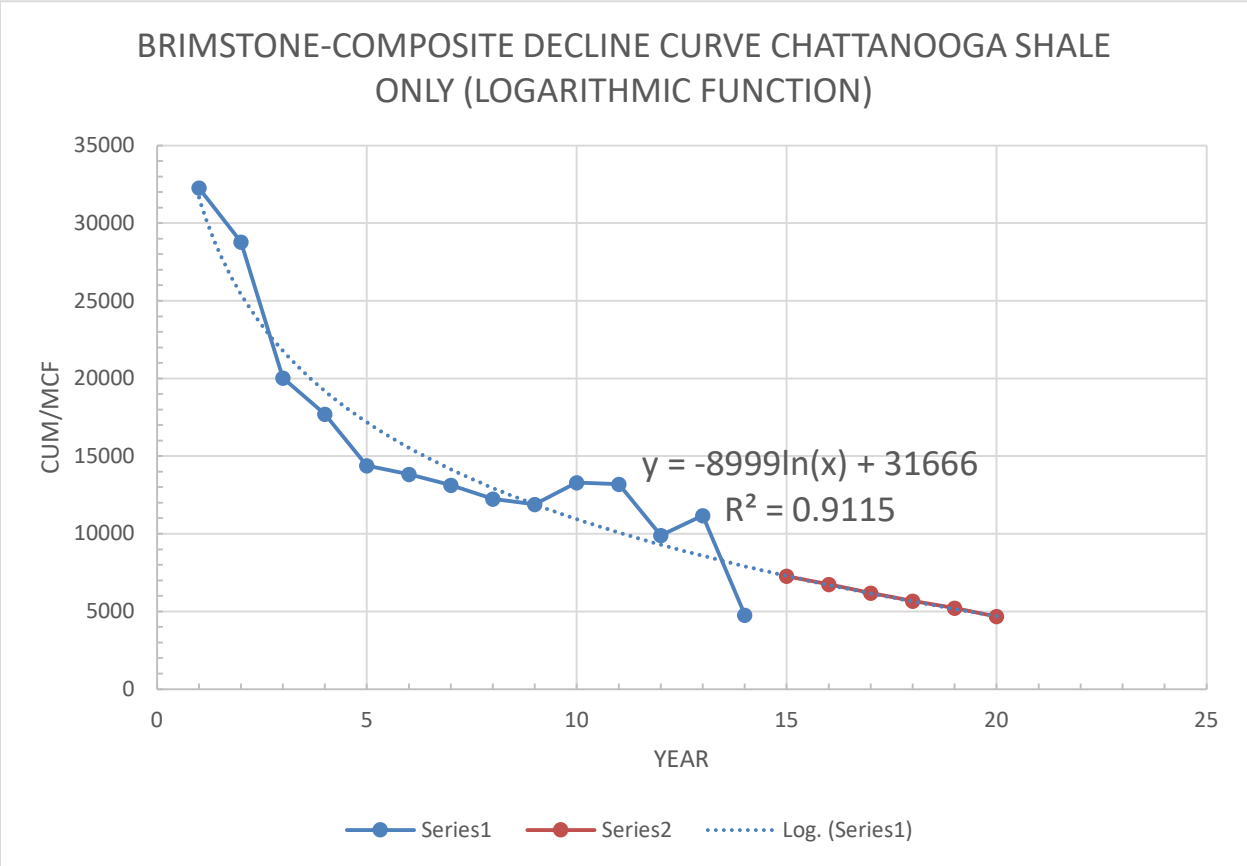

FIGURE 12. Composite 20-year decline curve for the six Chattanooga Shale wells.

Figure 13 is the composite decline curve for the eight wells where the horizontal Chattanooga Shale is co-mingled with the vertical Fort Payne. The wells have a slightly higher IP of 347 MCFG/D, but then follow a similar logarithmic decline curve. The decline is greatest in the first five years.

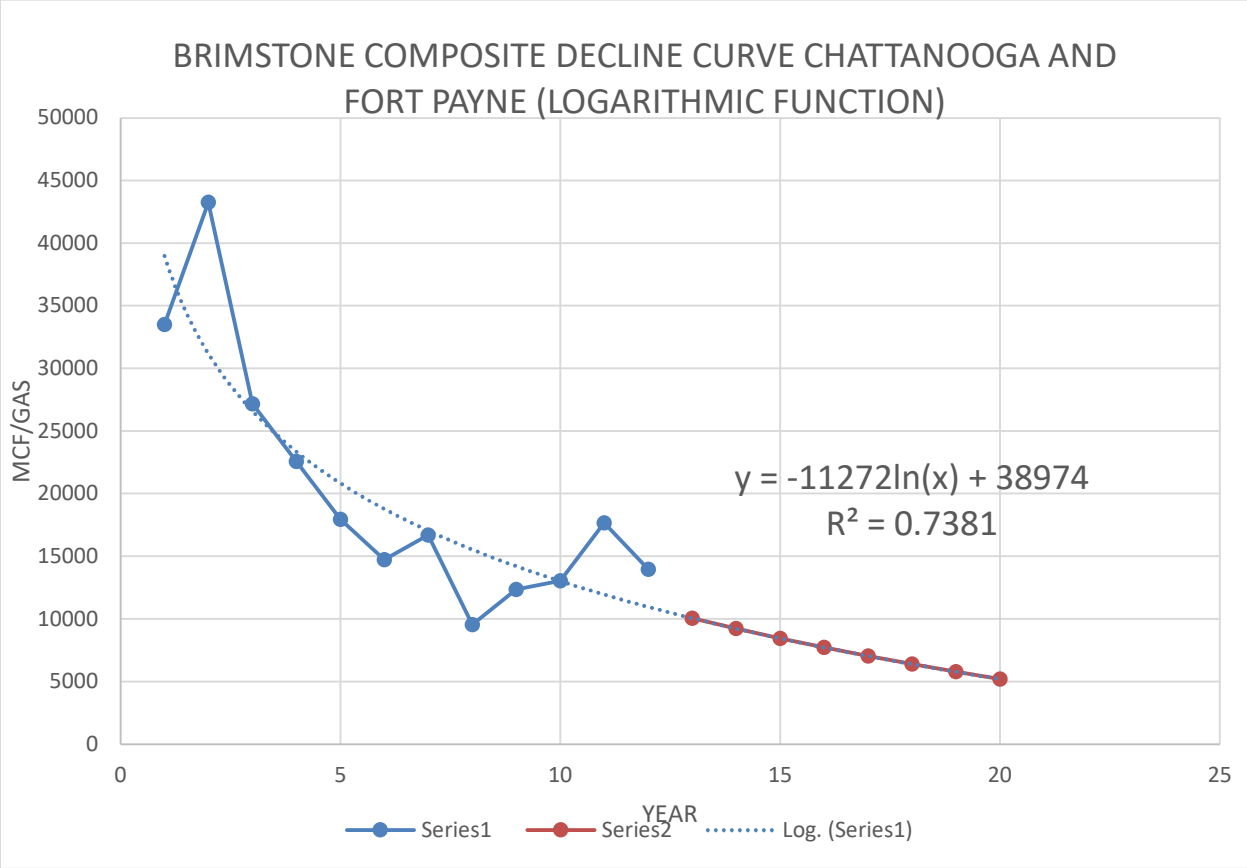

FIGURE 13. Composite 20-year decline curve for the eight co-mingled horizontal Chattanooga Shale and vertical Fort Payne wells.

CHATTANOOGA SHALE RESERVES ANALYSIS, REGIONAL STUDY: METHODS

Including the Brimstone Property and the surrounding area, a total of 77 horizontal wells have been drilled and completed in the Chattanooga Shale in East Tennessee. The locations of these wells were kindly supplied to Cougar Dome, LLC by Mr. Scott Gilbert, see Figure 14. These wells were stimulated using several different methods. 51 of the wells were stimulated using Packers Plus and 1 million standard cubic feet (SCF) nitrogen per stage, with no sand. Two wells were stimulated with nitrogen plus sand. 6 wells were stimulated using 70 to 95 quality foamed nitrogen. 12 wells were stimulated using slick water and varying amounts of HCL, and/or sand. For details of the stimulations and cumulative production, see the **ALL-HORIZONTAL WELLS TENNESSEE SORTED** EXCEL APPENDIX.

With this larger sample size, a slightly more aggressive approach was taken to evaluate reserves than on the Brimstone lease. 30-year EUR (expected ultimate recovery) decline curves were prepared for four horizontal wells. The first well is permit # 11797, which was stimulated with nitrogen and sand and has a 30-year EUR of 1.6 BCFG (billion cubic feet of gas). The second well is permit # 12033, which had the best results of wells stimulated with nitrogen only and no sand. This well has a 30-year EUR of 0.983 BCFG. The third well is permit # 12020, which is typical of the average production for wells stimulated with nitrogen only. This well has a 30-year EUR of 0.368 BCFG. The last well is permit # 11958, which is typical of the average production for wells stimulated with slick water and sand. This well has a 30-year EUR of only 0.228 BCFG. The decline curves start with the first full year of production. Figure 15 shows the decline curves for all 4 of the above-mentioned wells.

Oil and gas production data through 2020 is available from the State of Tennessee Oil and Gas Commission. Spread sheets and graphs for the decline curves are in the appendices of this report. They may be opened and scrolled through using Adobe Acrobat**.**

Gas production data for each well was compiled in Excel spread sheets and point graphs were generated using the Excel insert tab. A trendline was then generated for the data by Excel. The trendline equation was used to calculate production for however many additional years it took to reach 30 years of production. Trendlines were exponential, linear, logarithmic, or power functions depending on which function yielded the highest R^2 value. In this case, power function decline curves had the highest R2 values for all 4 wells, see Table 5. Any initial partial year production was added into the cumulative production at the end of the calculation. All 30-year EURs were prepared in the same manner.

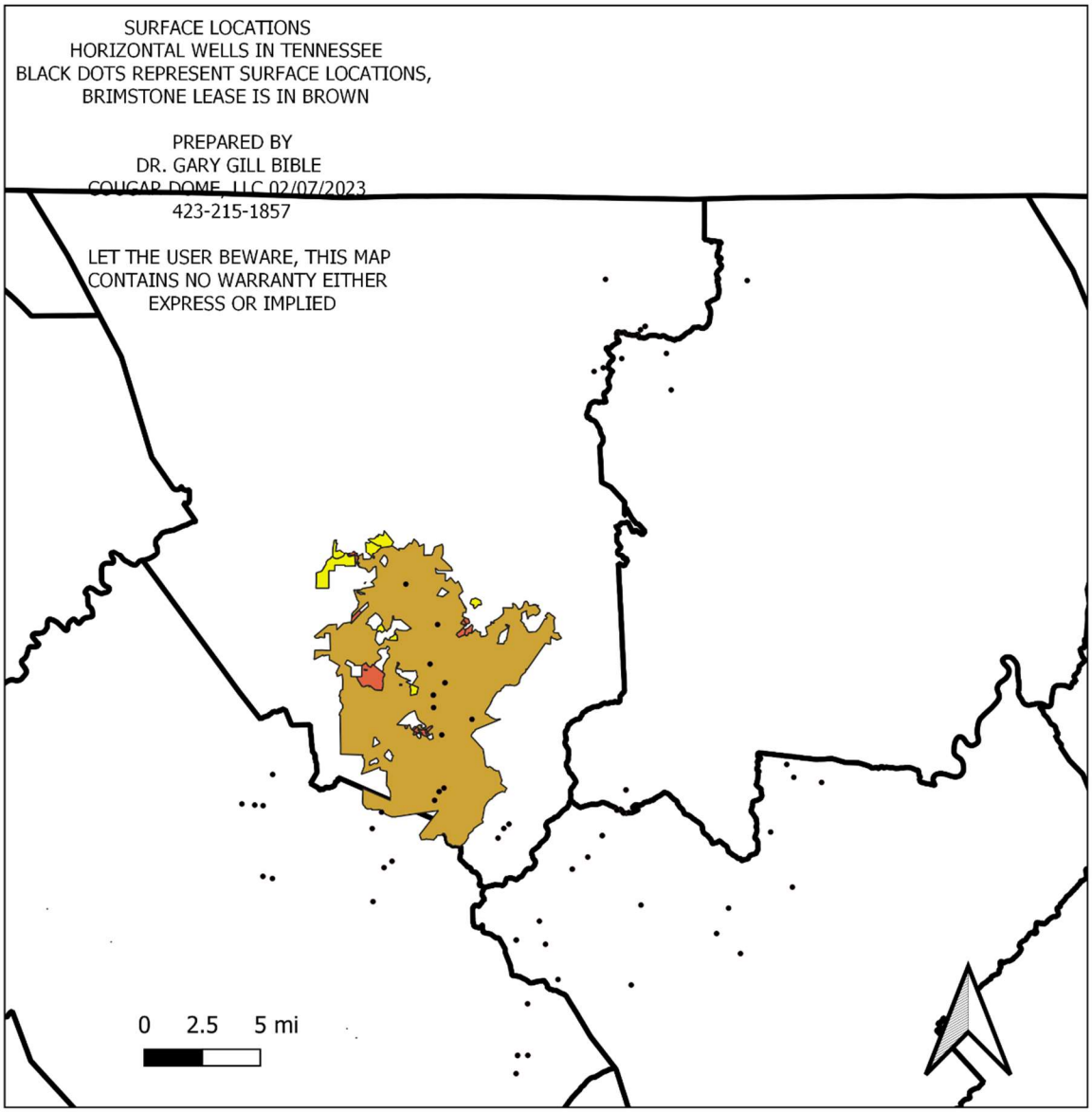

FIGURE 14. Surface locations of horizontal Chattanooga Shale Wells in Tennessee represented by black dots. Brimstone Lease is in tan.

CHATTANOOGA SHALE RESERVES ANALYSIS, REGIONAL STUDY: HORIZONTAL WELLS ANALYSIS

Table 5. R2 Values for 30-year Decline Curves

Permit #	Exponential	Linear	Logarithmic	Power
11797	0.7526	0.6649	0.876	0.9195
12033	0.6907	0.5221	0.7788	0.9336
12020	0.8358	0.7176	0.9262	0.9702
11958	0.8121	0.6927	0.9164	0.9773

CHATTANOOGA SHALE RESERVES ANALYSIS, REGIONAL STUDY: HORIZONTAL WELLS

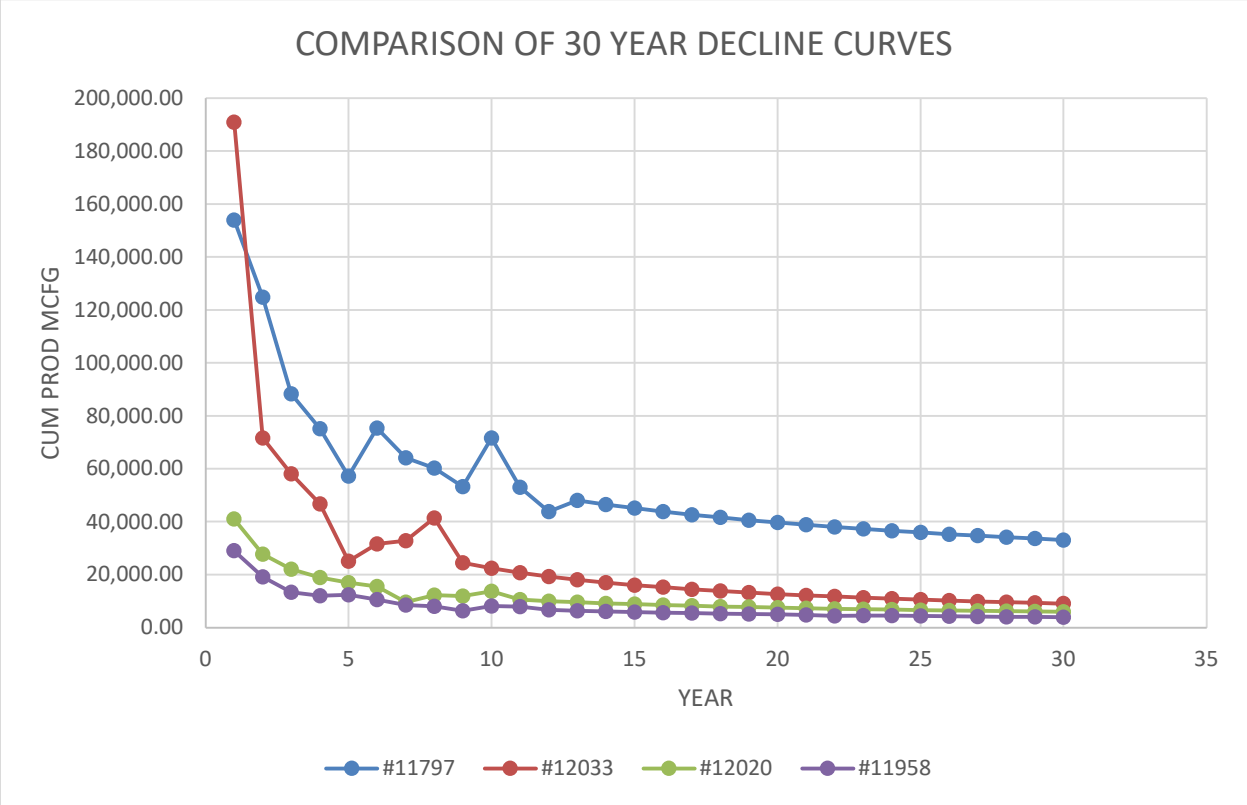

FIGURE 15. Comparison of 30-year decline curves for selected wells. Blue line is well permit # 11797 treated with nitrogen and sand. Red line is well permit # 12033, which is the best well treated with nitrogen only. Green line is well permit # 12020, which is typical of the average

production for wells treated with nitrogen only. Purple line is well permit # 11958, which is typical of wells treated with slick water and sand.

Of the different completion techniques used on the Chattanooga Shale in Tennessee, fracturing with 1,000,000 SCF Nitrogen and 100,000 pounds of sand per stage appears to yield the best results, see Figure 15, permit # 11797. The function of the sand acting as a proppant prevents the closure of the hydraulic fracture in the near well-bore environment, Britt etal, 2009. It should be noted that this well was only fractured with 4 stages. Adding additional stages should increase the 30-year EUR considerably above the projected value of 1.647 BCFG. As was seen on the Brimstone Lease, the normally pressured Chattanooga Shale does not appear to be able to efficiently lift fluids from the relatively shallow depths at which it is found at in East Tennessee.

Well permit # 12033 is the best horizontal Chattanooga Shale well in East Tennessee that was stimulated with nitrogen only. This well has a 30-year EUR of 0.983 BCFG. The well was fractured with 15 stages with 1,000,000 SCF nitrogen per stage. It has a first full year production of 190,874 MCFG. This is actually higher than permit # 11797 which has a first full year production of 153,971 MCFG. This well has a much more rapid decline than permit # 11797, and the trend lines in Figure 15 cross each other by the second year of production. This is quite likely due to the fractures starting to close up around the well-bore due to increasing pressure draw down through time.

Well permit # 12020 represents an average Chattanooga Shale horizontal well that was stimulated with nitrogen only. It has a 30-year EUR of only 0.368 BCFG. Well permit # 11958 is a typical well that was treated with slick water and sand. The well is expected to have a 30-year EUR of only 0.230 BCFG. Cougar Dome, LLC does not have access to drilling and completion costs for these wells, so it is not known if they are economic. They will not be discussed further.

The data at this point supports treating the Chattanooga Shale horizontal wells with nitrogen and at least 100,000 pounds of sand per stage. Figure 15 shows that is takes several years of production before clear differences in production become apparent. Therefore, careful production records must be maintained for every well that an operator drills. Stimulating with nitrogen and sand also has the additional benefit that there are no frac fluids that must be disposed of.

POINT PLEASANT/CATHYS EXPLORATORY PLAY IN EAST TENNESSEE

Currently, drilling programs in the Chattanooga Shale, Fort Payne Formation, and Monteagle Formation are in formations that have already been proven to be hydrocarbon productive. An additional wildcat target below the Chattanooga Shale exists on the Brimstone Lease. It is in the Cathys formation, which is equivalent to the Point Pleasant Formation of eastern Ohio and western Pennsylvania, see Figure 16. These two formations lie immediately above the Trenton

Group. At this point in time, the Point Pleasant Formation is an active horizontal drilling target in eastern Ohio and western Pennsylvania. It is producing both oil and gas in this area.

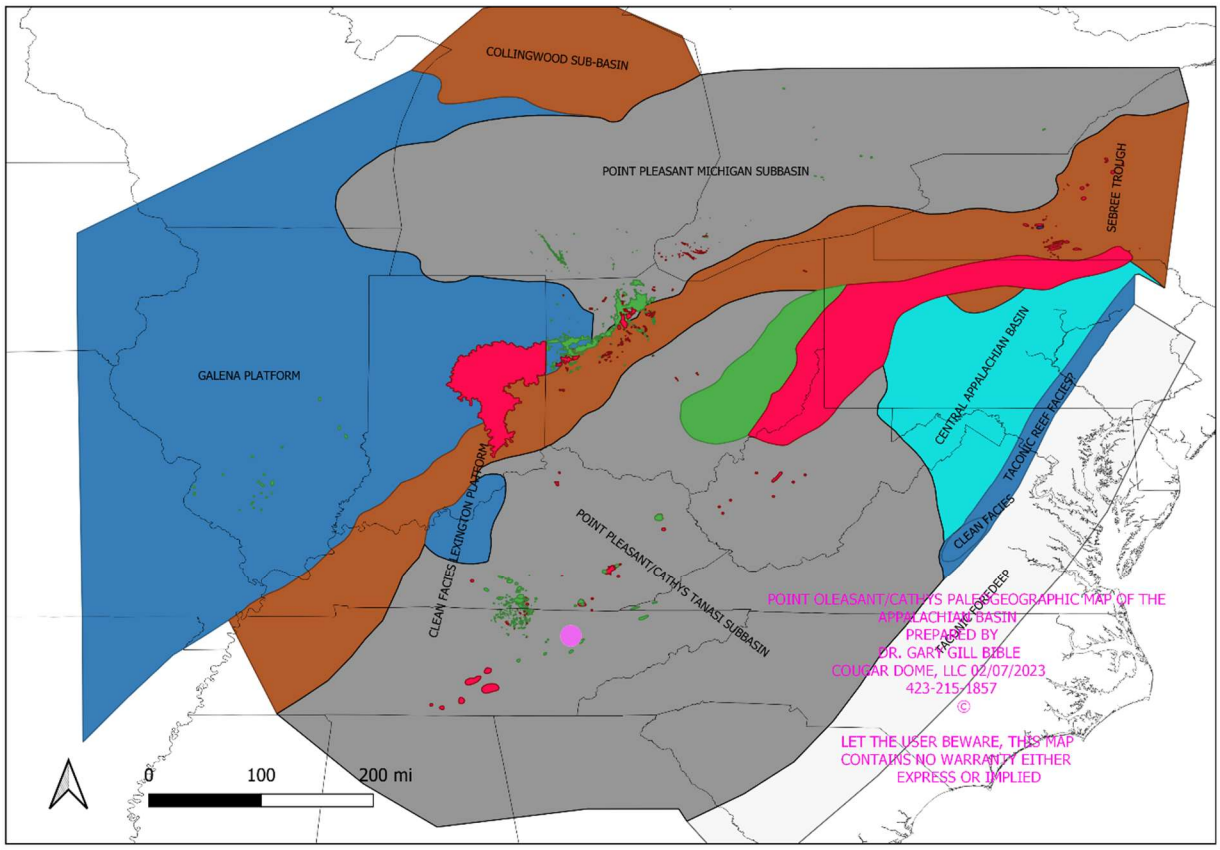

FIGURE 16. Point Pleasant/Cathys Paleogeographic Map of the Appalachian Basin. Trenton/Black River, and Point Pleasant/Cathys oil fields are shown in green. Trenton/Black River, and Point Pleasant/Cathys gas fields are shown in red. The Brimstone Lease is shown by a large purple dot in northern Tennessee.

Drilling depths in the southeastern Ohio oil play are approximately 10,000 feet. Gas production in Pennsylvania is from somewhat greater depths. It should be noted that while the play is referred to as Utica Shale/Point Pleasant, the Utica Shale has too high a clay content to hydraulically fracture and the play is confined to the Point Pleasant Formation, Patchen and Carter 2015. For an excellent review of the petroleum geology of the Trenton/Black River geology in the central and southern Appalachian Basin, see Patchen 2005, and Patchen 2015.

Per the AAPG COSUNA correlation chart for the Southern Appalachian Basin, in Tennessee the stratigraphic equivalent to the Point Pleasant Formation is the Cathys Formation, Patchen 1985.

The Cathys Formation is the uppermost formation in the Nashville Group of Tennessee. Cougar Dome, LLC is presently doing detailed geophysical well-log correlations to fine tune this stratigraphy. The Cathys Formation, as well as the Bigby/Canon, and Stones River Formations produce both oil and gas over a wide area of north central Tennessee, see gray area, Figure 16. The Bigby/Canon Formation is equivalent to the Trenton Formation of Ohio and the Stones River is equivalent to the Black River. This area is generally referred to as the Cumberland Plateau. To the best of Cougar Dome, LLC's knowledge, production has all been from vertical wells.

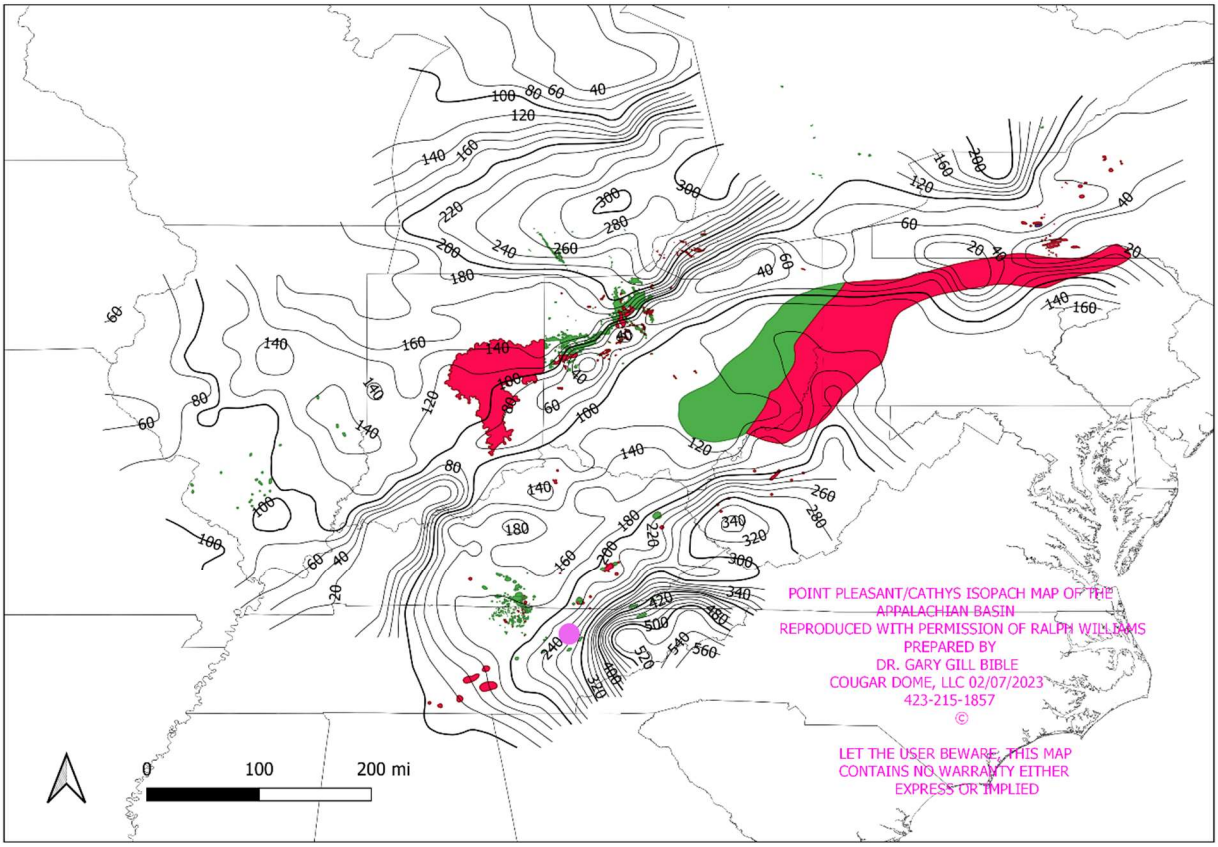

Figure 17. Point Pleasant/Cathys Formation Gross Isopach map of the Appalachian Basin and surrounding area. Reproduced with permission of Ralph Williams.

The Cathys Formation is present under the Brimstone Lease at depths in the range of 4,000 feet, and is considered by Cougar Dome, LLC to be a good exploration target for horizontal drilling. What is unknown at this time is whether it can be successfully hydraulically fractured and produce oil and gas at economic rates at this shallower depth or whether the greater depth of 10,000 is required.

One obvious attraction of the Brimstone Lease is that the Point Pleasant/Cathys Formation is thicker under the Brimstone Lease than it is in eastern Ohio and western Pennsylvania where it

is presently producing hydrocarbons, see Figure 17. The Brimstone Lease is shown as a purple dot in east-central Tennessee on Figure 17. The Point Pleasant/Cathys Formation is roughly 240 feet thick under the Brimstone Lease, while it is only 120 to 140 feet thick in the eastern Ohio-western Pennsylvania area. This increase in gross thickness in the eastern Tennessee and southeastern Kentucky area appears to be due to increased subsidence in the Tanasi Sub-basin as it approaches the Taconic Foredeep, see Figure 16.

Obviously if the Cathys Formation will produce hydrocarbons at economic rates from horizontal wells on the Brimstone lease, there are 45,000 contiguous acres (MOL) that can be developed. The economic benefits to a prudent operator would be considerable.

SUMMARY

The Brimstone Lease consists of 45,205 mineral acres in a contiguous tract. Of this acreage, 38,622 acres are undeveloped in Chattanooga and shallower formations and are available for oil and gas leasing. 45,077 acres are undeveloped in formations below the base of the Chattanooga Formation and are available for oil and gas leasing.

Existing vertical Chattanooga Shale wells have an average 20-year EUR of 42,112.4 MCFG. Where the Fort Payne Formation has reservoir quality rock, co-mingling it with the Chattanooga Shale brings the average 20-year EUR up to 64,793.7 MCFG. Reserve analysis shows, however, that the Chattanooga Shale should not be co-mingled with the lower pressured Monteagle Limestone. The lack of any apparent influence of natural fracturing on the 20-year EUR of vertical wells indicates that the Chattanooga Shale is a gas factory play. The horizontal Chattanooga Shale wells have increased 20-year EUR values by a ratio of 6.4 to 1. Lack of drilling and completion costs preclude the determination of whether these wells have better economics than the vertical Chattanooga Shale wells.

A regional study of the horizontal wells drilled and completed in the Chattanooga Shale in Tennessee found that stimulating the wells with 1,000,000 SCF nitrogen and 100,000 pounds of sand yields a considerably higher EUR than stimulating with 1,000,000 SCF of nitrogen only. In additional Cougar Dome, LLC recommends that additional stages be added to wells completed in this manner.

Finally, there is a wildcat play in the Cathys Formation (Point Pleasant equivalent) on the Brimstone Lease. It is considerably thicker than the eastern Ohio-western Pennsylvania area where it is presently producing. If this formation can be successfully exploited using horizontal wells and hydraulic fracturing, a prudent operator could potentially add significant amounts of oil and gas to its reserves.

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Respectfully submitted,

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January 15, 2024