

TEXAS UTILITIES SERVICES INC.

2001 BRYAN TOWER - DALLAS, TEXAS 75201

TX-2856

July 10, 1978

Mr. R. Naventi  
Licensing Project Manager  
Light Water Reactors Branch No. 4  
Division of Project Management  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

COMANCHE PEAK STEAM ELECTRIC STATION  
TRANSMITTAL OF H. J. GRUY REPORTS  
FILE NO. 10010

Dear Mr. Naventi:

Enclosed is one copy of a report by H. J. Gruy and Associates, Inc., dated December 21, 1977. Also enclosed is an update of that report dated June 28, 1978. The enclosures are submitted in response to question 361.10.

The last paragraph on page 4 is deleted because it is price information and contains no information relevant to mineral potential. The maps referred to in the report are not included because they are reproduced in the FSAR.

If you have any questions or comments, please contact this office.

Sincerely,

*Richard Werner*

Richard Werner

RAW:skt  
cc: J. T. Merritt lc,OE

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# H. J. GRUY AND ASSOCIATES, INC.

PETROLEUM CONSULTANTS

2501 CEDAR SPRINGS ROAD

DALLAS, TEXAS 75201

December 21, 1977

Mr. H. C. Schmidt  
Texas Utilities Service, Inc.  
2001 Bryan Tower  
Dallas, Texas 75201

Dear Mr. Schmidt:

As authorized by you, we have studied an area surrounding the Comanche Peak Steam Electric Station (S.E.S.). Our assignment included the determination of the maximum potential of a blowout condition near the plant site, the petrophysical properties of the subsurface formations, the postulated composition of the natural gas to be found in this area, the subsidence resulting from a maximum blowout, the worth of oil and gas leases and of mineral estates in the area of the Comanche Peak S.E.S. and the construction of a map to be used in the filing of the Final Safety Analysis Report (FSAR).

Using the subsurface geologic terminology established by Gulf Energy and Minerals Co.-U.S. No. 1 Otis Rollins well in the Louis Boatwright Survey A-33, Hood County, there are four formations having the potential for hydrocarbon production in the area of the Comanche Peak S.E.S. In ascending order, these are the Ellenburger formation, the Marble Falls formation, the Big Saline sandstone and the Strawn sandstones. The size of a possible blowout from the above listed formations is in the order they are listed (i.e., maximum in the Ellenburger and minimum in the Strawn sandstones). In our opinion, the probability of finding hydrocarbons is in the reverse order as listed. In the following discussion, wells which fall within a five-mile radius of the plant site are listed with a well identification number keyed to Tables 1 and 5, attached, and to our map entitled "Natural Gas and Oil Pipelines and Wells Within Five Miles of the Comanche Peak S.E.S., Hood and Somervell Counties, Texas."

A structure map on the top of the Ellenburger formation was constructed for Somervell, Erath, Hood, Johnson, Hill, Bosque and Hamilton Counties. All wells (for which there were public records) that reached the Ellenburger formation were used in this study. There is no structural high on the Ellenburger under or adjacent to the Comanche Peak S.E.S.

TEXAS UTILITIES SERVICES INC.  
COMANCHE PEAK STEAM ELE. TRG STATION

MIS-9587		12/21/77	
STATIONER		012-02	
NUCLEAR PLANTS			
PROJECT	MANAGER	ENGINEER	DATE
ENGINEER	OF FUEL	URDA	
DATE			
REVISIONS		DATE	REVISION DATE
FILE NUMBER		2254	
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589 280

H. J. GRUY AND ASSOCIATES, INC.

Mr. H. C. Schmidt  
December 21, 1977  
Page 2

Within the studied area, only two wells produced from the Ellenburger formation. The Cities Service No. 1 Foss, approximately 23.5 miles northwest of the Comanche Peak S.E.S. in northeastern Erath County, is indicated by completion card information to have an initial potential flowing of 196 barrels of oil per day from Ellenburger perforations at 5,065 to 5,076 feet. No state production records exist confirming this production. The second well is the HNG Oil Company No. 1 Ryan well in the northeastern corner of Hamilton County, approximately 25.2 miles to the southwest of the plant site. This well reported an initial potential pumping of 28 barrels of oil and 41 barrels of water per day from Ellenburger perforations located at a depth of 4,423 to 4,434 feet. The total cumulative production from state records is 1,571 barrels of oil, and the well has been shut in since June, 1976.

Electric well log analysis was performed for the Ellenburger formation in seven wells. A summary of the calculated petrophysical properties is presented in Table 3. The nearest well testing the Ellenburger formation (approximately 2.4 miles northeast of the plant) is the Dallas Production Company No. 1 Hubbard (Well L.D. No. 14) in Hood County. The No. 1 Hubbard tested salt water from the Ellenburger formation. A well approximately 5.9 miles southwest of the plant site, the Dorchester Exploration No. 1 Davis-Bonney well, calculated 45 feet of net hydrocarbon pay by electric well log analysis in the Ellenburger formation. This well was not tested nor was completion attempted in the Ellenburger formation.

In our opinion, the Ellenburger does not possess hydrocarbon potential under or adjacent to the Comanche Peak S.E.S. This is supported by the test of salt water in the closest well to the north and the location of the plant site in a structurally low position as mapped on the top of the Ellenburger formation.

The structure map on the top of the Marble Falls formation indicates no structural high under the Comanche Peak S.E.S. site. There is Marble Falls gas production reported to the west and northwest of the plant site with the nearest gas well, the Ben J. Taylor No. 1 Cravens "B" (Well L.D. No. 22), located 2.3 miles to the northwest of the plant site. Marble Falls gas production is associated with a structural high, trending from southwest to northeast, to the west of the plant site. A net hydrocarbon isopachous map has been prepared for the Marble Falls formation. An area of thick net hydrocarbon exists approximately 4.3 miles to the west of the plant site. The maximum net hydrocarbon thickness calculated from electric well log analysis is 62 feet. This net hydrocarbon isopachous map indicates a rapid thinning to the east, and we postulate that under the Comanche Peak S.E.S. there will be zero feet of net hydrocarbon porosity found in the Marble Falls formation.

The structure map on the top of the Big Saline sandstone portrays a structural high, trending from southwest to northeast, to the west of the Comanche

589 281

H. J. GRUY AND ASSOCIATES, INC.

Mr. H. C. Schmidt  
December 21, 1977  
Page 3

Peak S.E.S. The Comanche Peak site is low on the east flank of this trend and on the east flank of the regional dip into the deeper portion of the Fort Worth Basin. The nearest producing well reportedly completed in the Big Saline sandstone is the Tri-Venture II No. 1 Nelon (Well I.D. No. 18), located approximately 3.2 miles to the west-northwest of the plant site. A net hydrocarbon isopachous map of the Big Saline sandstone was prepared. Fourteen feet of net hydrocarbon-bearing porosity was calculated by electric well log analysis for this zone in a well approximately 4.4 miles to the west-northwest of the plant site. The net hydrocarbon isopachous map of the Big Saline sandstone indicates a north-northeast to south-southwest trending thick area approximately 3.8 miles to the west of the Comanche Peak S.E.S. The Big Saline sandstone zone thins and loses porosity to the east and southeast. In our opinion, this loss of porosity lessens the probability of any production from the Big Saline sandstone under the Comanche Peak S.E.S.

A structure map on the top of the Strawn Marker indicates a northwestward dip at a uniform rate interrupted by minor anomalies. An isochore map from the top of the the Strawn Marker to the top of the Big Saline sandstone indicates an eastward thickening of the Strawn formation into the deeper part of the Fort Worth Basin. As the overall zone thickens, there is a loss of both total number of sandstones and porosity. This results in a reduction in the calculated net hydrocarbon pay sand in the Strawn formation.

All sand lenses in the Strawn formation have been combined into one net hydrocarbon isopachous map because of the lenticularity and limited drainage of any individual sand within the Strawn formation. The maximum net hydrocarbon pay thickness calculated in a well from electric well log analysis was 43 feet. The net hydrocarbon isopachous map of the Strawn formation indicates a north-south trending area of hydrocarbon-bearing sandstone approximately 3.8 miles west of the plant site. The nearest well completed in the Strawn formation is the Gulf Oil No. 5 Bratten Ranch (Well I.D. No. 15), 4.4 miles to the west of the Comanche Peak S.E.S. Towards the plant site the Strawn sandstones thin, become tighter and undergo a facies change into a shaly equivalent. It is our opinion, however, that some Strawn sandstone gas production may be achieved adjacent to the boundaries of the exclusion zone and even near or under the plant site. However, it is our opinion that less than 20 feet of net hydrocarbon Strawn will exist within the exclusion zone and any gas well would be marginal to subcommercial.

A well was drilled within the boundaries of the Squaw Creek reservoir for the Comanche Peak S.E.S. The data on this well can be found under Well I.D. No. 24 listed in Table 1. Table 1 lists pertinent data for the wells within a five-mile radius of the plant site.

Eighteen wells in the Strawn sandstones, three wells in the Big Saline sandstone, eight wells in the Marble Falls formation and ten wells in the

589 282

H. J. GRUY AND ASSOCIATES, INC.

Mr. H. C. Schmidt  
December 21, 1977  
Page 4

Ellenburger formation were selected for study of petrophysical properties. The distance of the studied wells was from 2.4 to 33.3 miles from the plant site. The results are summarized in Table 2. Water saturations, porosities and net hydrocarbon thicknesses were calculated from electric well logs. The reservoir pressures, temperatures and gas gravities are known only for a few wells.

Table 3 is derived from Table 2, and is a statistical summary of reservoir properties. For each zone, the minimum, the maximum and the average values of net hydrocarbon thickness, porosity, water saturation and permeability are listed. The permeability values are obtained from radial steady-state flow calculations on tested wells.

For each possible producing zone, a maximum hypothetical well is postulated with maximum bottom-hole pressure and optimum values for net hydrocarbon feet, porosity and water saturation. The absolute open flow potential is calculated for each zone using radial steady-state gas flow calculation. The results are shown in Table 4.

The maximum absolute open flow potential for an out-of-control well (blowout) of 43,800 thousand cubic feet of gas per day is calculated for a hypothetical Ellenburger well using 1.5 times the maximum permeability. This rate is 3.21 times the rate of 13,630 thousand cubic feet of gas per day calculated for the average Ellenburger well. The maximum subsidence of 0.54 feet is calculated for the hypothetical Ellenburger well at depletion. This subsidence extends outward approximately 2,250 feet from the wellbore. In this subsidence calculation, it is assumed that the zone above the producing Ellenburger is not compressible.

The gas gravity data on six wells (Table 2) indicate a range of 0.69 to 0.70. Data were available only on these six wells within the study area.

Reservoir data on some selected wells within the five-mile radius from the plant site are shown in Table 5. Table 6 presents calculations of the gas in-place for a hypothetical well in each formation.

Four copies of the map entitled "Natural Gas and Oil Pipelines and Wells Within Five Miles of the Comanche Peak S.E.S., Hood and Somervell Counties, Texas" are being delivered with this report.



589 293

H. J. GRUY AND ASSOCIATES, INC.

Mr. H. C. Schmidt  
December 21, 1977  
Page 5

We thank you for this assignment. If we can be of further assistance,  
please feel free to call on us.

Yours very truly,

*H. J. Gruy and Associates, Inc.*

H. J. GRUY AND ASSOCIATES, INC.

FAG/WCM/YRP:dj  
Attachments



H. J. GRUY AND ASSOCIATES, INC.

APPENDIX 1

589-285

H. J. GRUY AND ASSOCIATES, INC.

TABLES

589 286



## H. J. GRUY AND ASSOCIATES, INC.

WELL DATA ON ALL WELLS WITHIN FIVE-MILE RADIUS OF  
COMANCHE PEAK S.E.S.

Well I.D. No.	County	Operator/Lease/Well Number	Status	Total Depth and Deepest Formation Reached	Depth of Perforations (ft)	Producing Formation	Initial Potential (McF/day)
1	Hood	Ben J. Taylor/Cravens No. 4	Gas well 9-30-77	5,010 ft. Marble Falls	4,740-4,750	Big Saline	2,074
2	Hood	Mid-Continent Pet./Squaw Creek Cattle Co. No. 1	Dry 5-8-50	5,576 ft. Ellenburger	none	none	none
3	Hood	Fitzgerald/Van Morrison No. 1	Dry 8-10-51	4,508 ft. Strawn	none	none	none
4	Hood	Tri-Venture II/Trotter No. 1	Gas well 11-5-77	5,218 ft. Barnett Shale*	4,770-4,780	Big Saline	378
5	Hood	Energy Fund of America/O. Coker No. 1	Electric logs run 10-7-77	5,133 ft. Marble Falls			
6	Hood	Scates Exploration/Lowdon No. 1	Temporarily suspended 8-15-77	5,275 ft. Strawn			
7	Hood	Ben J. Taylor/Cravens No. 3-A	Proposed location 1-10-77				
8	Hood	Ben J. Taylor/Cravens No. 3	Abandoned location 8-1-77	none	none	none	none
9	Hood	Gulf/Bratten Ranch No. 4	Gas well 5-16-77	5,100 ft. Barnett Shale*	4,636-4,642	Big Saline	3,650
10	Hood	Energy Fund of America/Moore No. 1	Dry 9-17-77	5,094 ft. Marble Falls	none	none	none
11	Hood	Tri-Venture II/Sullivan No. 1	Gas well 10-31-77	5,085 ft. Marble Falls	4,466-4,486	Big Saline	355
12	Hood	Ben J. Taylor/Wiggins No. 1	Temporarily suspended 3-20-77	5,170 ft. N/A			
13	Hood	The Baron Co./Randall No. 2	Proposed location 8-17-77				
14	Hood	Dallas Production/Hubbard No. 1	Dry 2-12-74	5,965 ft. Ellenburger	none	none	none
15	Hood	Gulf/Bratten Ranch No. 5	Gas well 6-20-77	5,100 ft. Barnett Shale*	2,359-2,369	Strawn	1,090
16	Hood	Gulf/Bratten Ranch No. 8	Gas well 6-16-77	4,956 ft. Marble Falls	4,696-4,776	Marble Falls	2,725
17	Hood	Gulf/Bratten Ranch No. 8	Gas well 7-18-77	5,000 ft. Barnett Shale*	4,686-4,696	Marble Falls	1,930

# H. J. GRUY AND ASSOCIATES, INC.

Well I.D. No.	County	Operator/Lease/Well Number	Status	Total Depth and Deepest Formation Reached	Depth of Perforations (ft)	Producing Formation	Initial Potential (Mc/dav)
18	Hood	Tri-Venture II/Nelon No. 1	Gas well 10-31-77	5,254 ft. Marble Falls	4,742-4,750	Big Salina	275
19	Hood	The Baron Co./Randall No. 1	Proposed location 5-2-77				
20	Hood	The Baron Co./Nelon No. 2-B	Proposed location 8-31-77				
21	Hood	The Baron Co./Nelon No. 1-B	Surface casing set 9-29-77				
22	Hood	Ben J. Taylor/Cravens "B" No. 1	Gas well 5-5-77	5,030 ft. Marble Falls	4,835-5,030	Marble Falls	1,700
23	Somervell	Pitts Oil/Kinnard Estate No. 1	Proposed location	none	none	none	none
24	Somervell	McPherson/Williams No. 1	Dry 6-29-71	800 ft.	none	none	none
25	Somervell	W. H. Price/Martin No. 1	Dry 10-26-77	5,550 ft. Ellenburger	none	none	none

\* The Barnett Shale is a non-productive unit located between the Ellenburger and Marble Falls formations.

## H. J. GRUY AND ASSOCIATES, INC.

## RESERVOIR DATA SUMMARY

Operator/Lease	County	Interval (ft)	Water Saturation (%)	Porosity (%)	Net Hydrocarbon (ft)	Bottom-Hole Temperature (°F)	Shut-In Wellhead Pressure (psig)	Shut-In Bottom-Hole Pressure (psig)	Gas Gravity (air=1.0)	Absolute Open Flow (Mcf/d)	Distance from Plant (miles)
<u>Strawn</u>											
Gulf/Melntosh No. 1	Hood	4,356-4,380	52.2	9.3	50	162	1,036	1,183	0.700	3,090	7.5
Gulf/Melntosh No. 2	Hood	2,916-2,926	---	---	10 <sup>(1)</sup>	140	488	762	0.690	14,000	7.0
Gulf/Otis Rollins No. 1	Hood	2,700-4,882	55.8	10.0	20	162	---	---	---	---	7.2
Mid Continent Pet./ Cattle Co. No. 1	Hood	---	---	---	60 <sup>(2)</sup>	---	---	---	---	---	4.3
Fitzgerald/Van Morrison No. 1	Hood	---	---	---	65 <sup>(2)</sup>	---	---	---	---	---	4.6
Gulf/Bratten Ranch No. 3	Hood	4,054-4,064	---	---	10 <sup>(1)</sup>	140	1,052	1,181	0.700	742	6.0
Gulf/Bratten Ranch No. 7	Hood	4,188-4,198	---	---	10 <sup>(1)</sup>	142	921	1,042	---	850	5.5
Gulf/Bratten Ranch No. 1-A	Hood	4,181-4,188	---	---	--	142	853	535	0.700	900	5.1
Gulf/Bratten Ranch No. 8	Hood	2,849-4,525	---	11.2	85 <sup>(2)</sup>	---	---	---	---	---	4.9
Gulf/Bratten Ranch No. 6	Hood	2,740-4,505	52.1	10.3	25	---	---	---	---	---	4.6
Tri Venture II/ Trotter No. 1	Hood	2,700-4,700	47.6	11.4	33	---	---	---	---	---	4.7
Energy Fund/ O. Coker No. 1	Hood	---	---	---	24 <sup>(2)</sup>	---	---	---	---	---	4.7
Ben J. Taylor/ Wiggins No. 1	Hood	2,780-4,740	51.6	9.9	43	---	---	---	---	---	3.2
Dallas Production/ Hubbard No. 1	Hood	2,710-4,796	42.2	10.5	15	---	---	---	---	---	2.4
Dorchester/ Davis-Bonney No. 1	Somervell	2,440-4,325	43.2	8.6	22	---	---	---	---	---	6.1
Mitchell/Ogle No. 1	Erath	---	---	---	20 <sup>(2)</sup>	---	---	---	---	---	33.3
HNG Oil/Ryan No. 1	Hamilton	3,722-3,776	49.4	11.4	5	140	---	---	---	---	25.2
Gulf/O. Gardner No. 1	Hood	4,182-4,190	---	---	--	142	856	921	---	1,025	7.2

## H. J. GRUY AND ASSOCIATES, INC.

Operator/Lease	County	Interval (ft)	Water Saturation (%)	Porosity (%)	Net Hydrocarbon (ft)	Bottom-Hole Temperature (°F)	Shut-in Wellhead Pressure (psig)	Shut-in Bottom-Hole Pressure (psig)	Gas Gravity (air=1.0)	Absolute Open Flow (Mc/d)	Distance from Plant (miles)
<u>Big Saline</u>											
Gulf/Bratten Ranch No. 5	Hood	4,605-4,636	---	6.0	14 <sup>(2)</sup>	---	---	---	---	---	4.3
Tri Venture II/ Trotter No. 1	Hood	4,756-4,772	30.8	10.4	4	---	---	---	---	---	4.7
Ben J. Taylor/ Wiggins No. 1	Hood	4,744-4,790	45.2	6.0	5	147	---	---	---	---	3.1
<u>Marble Falls</u>											
Dorchester/ Davis-Bonney No. 1	Somervell	4,472-4,684	46.6	7.7	9	---	---	---	---	---	6.1
Gulf/Otis Rollins No. 1	Hood	5,130-5,140	---	---	46 <sup>(1)</sup>	162	1,440	1,678	0.690	1,200	7.2
Gulf/Bratten Ranch No. 8	Hood	4,700-4,800	---	8.0	20 <sup>(2)</sup>	156	1,512	1,762	0.700	1,900	4.9
Gulf/Bratten Ranch No. 6	Hood	4,576-4,933	44.3	7.0	3	150	1,478	1,807	---	1,950	4.6
Gulf/Bratten Ranch No. 5	Hood	4,683-5,050	---	4.8	62 <sup>(2)</sup>	150 <sup>(1)</sup>	---	---	---	---	5.0
Tri Venture II/ Trotter No. 1	Hood	4,830-5,100	40.4	5.9	25	---	---	---	---	---	4.7
Ben J. Taylor/ Wiggins No. 1	Hood	4,834-5,110	29.5	5.0	15	150 <sup>(1)</sup>	---	---	---	---	3.2
Dallas Production/ Hubbard No. 1	Hood	4,960-5,034	57.1	10.0	6	---	---	---	---	---	2.1
<u>Ellenburger</u>											
Texas Pacific/Fee Deed No. 1 Well No. 2	Erath	3,844-3,878	34.3	9.2	8	111	---	---	---	---	46.4
Mitchell/T. G. Ogle No. 1	Erath	4,388-4,680	27.2	8.2	4	127	---	---	---	---	33.0
Dorchester/ Young No. 1-7	Erath	4,941-4,972	17.1	5.1	2	146	---	---	---	---	25.8
Dallas Production/ Hubbard No. 1	Hood	(Poor Logs)									2.3
Dorchester/ Davis-Bonney No. 1	Somervell	5,024-5,144	27.5	6.6	45	169	---	---	---	---	6.1
HNG Oil/Ryan No. 1	Hamilton	4,414-4,438	42.9	10.3	6	---	---	---	---	---	25.2

H. J. GRUY AND ASSOCIATES, INC.

Operator/Lease	County	Interval (ft)	Water Saturation (%)	Porosity (%)	Net Hydrocarbon (ft)	Bottom-Hole Temperature (°F)	Shut-In Wellhead Pressure (psig)	Shut-In Bottom-Hole Pressure (psig)	Gas Gravity (air=1.0)	Absolute Open Flow (Mc/d)	Distance from Plant (miles)
T. J. Nunley/ Maxine Brooks No. 1	Hood	5,147-5,198	100.0	7.1	0	---	---	---	---	---	21.2
Cities Service/ Allen "B" No. 1	Hood	5,173-5,501	37.6	8.3	8	128	---	---	---	---	20.9
Caliph Resources/ Millington No. 7	Hood	5,457-5,499	---	8.2	4 <sup>(2)</sup>	125	---	---	---	---	14.5
Sunray Oil/ John R. Black No. 1	Hood	5,220-5,400	---	---	34 <sup>(2)</sup>	129	---	---	---	---	13.6

(1) Estimated

(2) Porosity thickness

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589 291

## STATISTICAL SUMMARY OF RESERVOIR PROPERTIES

Sand	Number of Wells Used for Log Analysis	Net Hydrocarbon, feet			Porosity, percent			Water Saturation, percent			Permeability, millidarcies		
		Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average
Strawn	8	50.0	5.0	27.0	11.4	8.6	10.2	55.8	42.2	49.2	6.0 <sup>(1)</sup>	4.0 <sup>(1)</sup>	5.0 <sup>(1)</sup>
Big Saline	2	5.0	4.0	4.5	10.4	6.0	8.2	45.2	30.6	37.9	10.0 <sup>(3)</sup>	---	---
Marble Falls	7	25.0	3.0	11.6	10.0	5.0	7.8	57.1	29.5	43.6	17.0 <sup>(2)</sup>	1.0 <sup>(2)</sup>	7.0 <sup>(2)</sup>
Ellenburger	7	45.0	2.0	12.2	10.3	5.1	7.6	42.9	17.1	31.1	15.0 <sup>(3)</sup>	---	---

- (1) Only two wells used to calculate permeability in this zone.  
 (2) Only three wells used to calculate permeability in this zone.  
 (3) Estimated.

POOR ORIGINAL

## ABSOLUTE OPEN FLOW POTENTIAL CALCULATIONS

Sand	Maximum Bottom-Hole Pressure (psia)	Temperature (°R)	Gas Viscosity (cp)	Compress- ibility (Z)	Drainage Radius (ft)	Maximum Net Hydrocarbon (ft)	Permeability, md		Flow Rate, MMcf/d (Permeability)			Percent over Average	Subsidence (ft)
							Minimum	Average	Maximum	1.5 times Maximum	Average		
Strawn	1,200	607	0.0138	0.8673	1,053	50	6	5	5.8	8.7	4.80	181	0.26
Big Saline	1,500 <sup>(2)</sup>	610	0.0146	0.8450	1,290	5	10 <sup>(2)</sup>	5 <sup>(2)</sup>	1.4	2.1	0.71	300	0.04
Marble Falls	1,900	615	0.0159	0.8230	1,489	25	17	7	17.8	26.7	7.33	364	0.28
Ellenburger	2,000 <sup>(2)</sup>	620 <sup>(2)</sup>	0.0163	0.8189	2,106	45	15 <sup>(2)</sup>	7 <sup>(2)</sup>	29.2	43.8	13.63	321	0.54

(1) The percent that the 1.5 times maximum flow rate is over the average well flow rate.

(2) Estimated.

POOR ORIGINAL



RESERVOIR DATA ON SELECTED WELLS  
WITHIN FIVE-MILE RADIUS OF COMANCHE PEAK S.E.S. (1)

Well I.D. No.	Operator/Lease	Interval	Water Saturation (%)	Porosity (%)	Net Hydrocarbon (ft)	Bottom-Hole Temperature (F)
<u>Strawn</u>						
2	Mid-Continent Pet./Cattle Co. No. 1	--	--	--	60 <sup>(1)</sup>	--
3	Fitzgerald/Van Morrison No. 1	--	--	--	65 <sup>(1)</sup>	--
4	Tri Venture II/Trotter No. 1	2,700-4,700	47.6	11.4	33	151
5	Energy Fund/O. Coker No. 1	--	--	--	24 <sup>(1)</sup>	--
12	Ben J. Taylor/Wiggins No. 1	2,780-4,740	51.6	9.9	43	153
14	Dallas Production/Hubbard No. 1	2,710-4,798	42.2	10.5	15 <sup>(1)</sup>	--
16	Gulf/Bratten Ranch No. 8	2,849-4,525	--	--	85 <sup>(1)</sup>	143
17	Gulf/Bratten Ranch No. 6	2,740-4,505	52.1	10.3	25	150
<u>Big Saline</u>						
2	Mid-Continent Pet./Cattle Co. No. 1	--	--	--	15 <sup>(1)</sup>	--
4	Tri Venture II/Trotter No. 1	4,756-4,772	30.6	10.4	4	151
12	Ben J. Taylor/Wiggins No. 1	4,744-4,790	45.2	6.0	5 <sup>(1)</sup>	153
15	Gulf/Bratten Ranch No. 5	4,605-4,636	--	6.7	14 <sup>(1)</sup>	147
<u>Marble Falls</u>						
4	Tri Venture II/Trotter No. 1	4,830-5,100	40.4	5.9	25	151
12	Ben J. Taylor/Wiggins No. 1	4,834-5,110	29.5	5.0	15	153
14	Dallas Production/Hubbard No. 1	--	57.1	10.0	6 <sup>(1)</sup>	--
15	Gulf/Bratten Ranch No. 5	4,683-5,050	--	4.8	62 <sup>(1)</sup>	147
16	Gulf/Bratten Ranch No. 8	4,700-4,800	--	8.0	20 <sup>(1)</sup>	147 <sup>(2)</sup>
17	Gulf/Bratten Ranch No. 6	4,756-4,933	44.3	7.0	3	150
<u>Ellenburger</u>						
14	Dallas Production/Hubbard No. 1	--	--	--	18 <sup>(1)</sup>	--

(1) Wells with adequate data for calculations presented above.

(2) Indicates gross porosity thickness.

(3) Estimated.

GAS IN-PLACE ASSOCIATED WITH HYPOTHETICAL WELL

Sand	Maximum Porosity (%)	Minimum Water Saturation (%)	Temperature (°R)	Gas Deviation Factor (Z)	Maximum Net Hydrocarbon (ft)	Maximum Pressure (psia)	Drainage Area (acres)	Gas In-Place (MMcf)
Strawn	11.4	42.2	607	0.8673	50	1,200	80	929
Dig Saline	10.4	30.6	610	0.8450	5	1,500	120	195
Marble Falls	10.0	29.5	615	0.8230	25	1,900	160	1,636
Ellenburger	10.3	17.1	620	0.8189	45	2,000	320	7,488

POOR ORIGINAL