

## “They Used What Discount Rate to Value That Property?”

Does your job require you to estimate the market value of oil and gas producing properties? Does the quest for the perfect discount rate keep you awake at night? Are you confused by supposedly authoritative magazine articles, SPE papers, consultant studies, and surveys that report “market” discount rates that vary significantly from each other? Are discount rates today lower or higher than they were 15-20 years ago? Are size, “quality” and other property/transaction parameters relevant to the discount rate?

The discount rate tends to engender more angst than any other component of an evaluation. One reason is the power of the discount rate in the appraisal process. The discount rate can render highly sophisticated production projections and intricate income streams nearly worthless in terms of present value; small changes in discount rate on large dollar appraisals can result in the gain or loss of millions of dollars in estimated value. At the same time, there is probably no facet of the evaluation process that is as mis-understood or which has been burdened by so many enduring myths as the discount rate. It therefore behooves the evaluation engineer to take some care in the selection and application of discount rates starting with due diligence in reviewing the source(s) of discount rate data. The task is manageable if we start from a basic premise: The best source of a “market discount rate” is from actual property transactions which represent market value. The next best source is the data from which to construct a market equivalent discount rate. Sources for both types of information are readily available.

Before beginning, some ground rules are needed.

1. In this discussion, the discount rate is the rate that would be applied to the income stream (cash flow) from a single oil and/or gas producing property in order to estimate the present value or market value of that property. This discussion does not relate to the valuation of companies or large groups of properties.
2. “Market value” refers to the value that would be assigned to a producing property by knowledgeable investors in petroleum properties, not the value that would be assigned by a specific company for whom the property may have special interest.
3. A “market value discount rate” is one obtained by calculating the internal rate of return of the purchase price of the property against the cash flow used to value the property for acquisition.
4. The before income tax (BFIT or BTAX) rate is used to avoid the complications created by income tax law and regulations and the many changes thereto over time.

## Sources of Discount Rate Data

For many evaluation engineers, the selection and application of a discount rate is not a problem since, in most major and large independent companies, the financial folks specify the evaluation criteria including discount rate. But for evaluation engineers who are not in such a position, the task is not so simple and is not made easier by the diversity of information that is available to evaluators.

A search of the SPE library of published papers using “discount rate” as the search criteria provides 78 titles including a few duplicates. Expanding the search to the Oil & Gas Journal and/or to real estate appraisal sources could add a hundred more references to the list. However, not all sources are equally useful or valid. Enquiry into discount rates for use in oil property evaluation requires that the evaluator thoroughly investigate the technical source of any data and the foundation for any conclusions/opinions presented in reference articles. Many papers and other sources are soundly based but others simply extrapolate from anecdotes and end up being trivial curiosities. Evaluators who rely on papers and reports, the authors of which fail to state and/or investigate the sources of their data, risk being mis-led. Given the importance of the discount rate in the evaluation process, it would seem obvious that the only appropriate course is to research the subject and make an informed judgement as to the correct rate, and leave the anecdotes for luncheon discussion. The decision criteria should be: Am I willing to use this information to estimate the value of a property for third-party investors or for my own company? Better yet; Is this information sufficiently reliable to support my estimate of value in court?

But how can you sort useful data from unsupported or mis-leading reporting? Rather than sift through the number of available sources, a few examples might be helpful.

An article published in the October 29, 2001, issue of the Oil and Gas Journal entitled, “They paid how much for that producing property?,” presented some interesting thoughts regarding property acquisitions in general and the discount rate used to evaluate producing properties for acquisition in particular. The article was based on a recitation of eight published and unpublished data sources which are listed as Table 1 of the October 29 article.

The October 29 article provides a microcosm of the kind of data available to evaluators and is reviewed here for the purpose of illustrating the problems that can arise from mixing data from disparate sources. Table 1 lists fifteen reports, papers or studies from eight sources which were used to form the authors’ conclusion(s) regarding discount rates. After reviewing the first column of Table 1, it should not be surprising that one of the concerns expressed by the authors was the wide spread of the discount rate data points, from 3% up to 24%, found in the table. This is a concern that would be shared by any evaluation engineer reading the article. However, the 21 point spread is explained, in large part, by the composition of the data sources listed.

Table 1  
Average BTAX Market Discount Rates, %

Average BTAX market discount rates, %	Time period	No. of transactions analyzed	Source
10-12	1983-87	40	F.J. Diggle and A. David
12.8	1992-99	41	Harold W. Bertholf
9-14	June 1999	-	Donaldson, Lufkin, Jenrette
3-7 (after tax)	April 2001	-	E.C. Capen
12-15	June 2001	-	Credit Suisse First Boston
13.6	June 1998	164 responses	SPEE
13.95 (S.D. = 4.38%)	June 1999	146 responses	“
16.2 (S.D. = 6.8%)	June 2000	141 responses	“
16.0 (S.D. = 4.9%)	June 2001	149 responses	“
24.5	1983-89	140	Richard J. Miller & Associates,
23.3	1990-99	91	Inc., WSPA Study
24.0	1983-99	231	“
20.3 (S.D. = 1.4%)	1998		Texas Comptroller of
18.9 (S.D. = 1.8%)	1999		Public Accounts - Property Tax
18.1 (S.D. = 1.0%)	2000		Division

The data points in Table 1 are listed as “Average BTAX market discount rate, (%)” This caption implies that all the data points are (a) before income tax discount rates obtained (b) from marketplace transactions. However, the discount rates reported by the eight sources offered in Table 1 include a mix of market sales data, financial market data, and information derived from surveys of evaluation professionals along with “normalized” (constructed) data and simple anecdote.

### **Research - Based Data Sources**

We begin with a review of the three research-based data sources, the SPEE Survey, the Texas PTD studies, and the Miller (WSPA) studies.

#### Context

In the quest for market value discount rates research can be done in two areas: transaction data and/or financial markets. The best approach is to access both sources. While transaction data is preferred it is also difficult to find, so we will default to financial market data. Discount rates are a function of a few fundamental economic principles. Consider the following equity, debt, and cost-

of-capital relations which form the economic/financial context of the market discount rate for oil properties:

- During the period 1968 through 2001, the annual Return-on-Equity (ROE) for a representative groups of oil and gas companies<sup>1</sup> has averaged about 13.4% After Income Tax and 20.6% Before Income Tax. While ROE has varied considerably from year to year, largely reflecting changes in oil price, the central tendency toward 13.4% AFIT (20.6% BFIT) is clear. At year end 2001, ROE is 18.2% AFIT.<sup>2</sup>
- During the period 1985 through year-end 2000, the annual Weighted Average Cost-of-Capital (WACC) for a representative group of oil and gas companies has averaged 15.0-16.1% BFIT.<sup>3,4</sup> The BFIT WACC is lower than BFIT ROE over the same period because debt comprises about 30% of industry WACC, and interest rates on debt tend to be much lower than the returns required on higher risk equity.
- During the five-year period 1996-2001, return on total capital employed (debt plus retained earnings) has averaged 10.2 % AFIT<sup>5</sup> (15.6 %BFIT).
- During the period 1977 through 2000, the interest rate on low risk 30-Year Treasury bonds has reached a peak of 14.68% BFIT in 1983 and has then declined, with periodic variations, to about 6% BFIT.<sup>6</sup>

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<sup>1</sup> Sources for this data are: (a) *Business Week*, McGraw-Hill quarterly Corporate Scoreboard 1989 through 2001, (b) "Financial Trends of Leading U.S. Oil Companies: 1968-1990," Discussion Paper No. 017R, American Petroleum Institute, October 1991, Washington, D.C. and (c) "Financial Analysis of a Group of Petroleum Companies," The Chase Manhattan Bank, N.A., New York, annual for each year 1961 through 1988.

<sup>2</sup> *Business Week*, February 25, 2002 pg. 78.

<sup>3</sup> "Determination of Discount Rate Range for Petroleum and Hard Mineral Properties." Texas Comptroller of Public Accounts, Property Tax Division, Austin, TX, August 2001 and for previous years to 1983.

<sup>4</sup> "Fair Market Value Transactions, Cost of Capital, and Risk: California Oil and Gas Property Transactions 1983 through 2001," January 16, 2002, Richard J. Miller & Associates, Inc. prepared for Western States Petroleum Association, Glendale, CA.

<sup>5</sup> *Forbes*, January 7, 2002 pg. 80.

<sup>6</sup> "Stocks, Bonds, Bills, and Inflation - Valuation Edition: 2001 Yearbook," Ibbotson Associates, Chicago IL.

- During the period 1983 through 2000 the return on long-term corporate bonds has averaged about 10% BFIT.<sup>7</sup>
- During the period 1983 through 2000, discount rates derived from actual fair market value transactions for individual discrete properties that were valued by the buyer based only on Proved Developed Producing reserves in California<sup>8</sup> and in Texas<sup>9</sup> have averaged 23.2% and 21.2 % respectively.

The discount rate is a financial function; the form, derivation and use of the discount rate is the subject of extensive discussion in financial management and in real estate appraisal texts and literature. One use of the discount rate, as the Opportunity Cost of Capital (“Opportunity Cost”), is of particular interest to this discussion. The discount rate used to value an oil property should be equal to or greater than the Opportunity Cost of the capital required to acquire the property. That is, the discount rate should equal or exceed the rate-of-return that could be earned on an investment of equal or similar risk. If the Opportunity Cost is accepted as a working definition for the market discount rate, the next step is to determine the return on an investment which has the same risk as the likelihood of obtaining the anticipated income stream from an oil and gas property.

The determination of return-on-equity, WACC, Opportunity Cost, and other financial criteria are not usually part of an evaluation engineer’s training and many appraisers of producing properties are reluctant to dive into the relatively simple but still unfamiliar areas of stock(equity) returns, bond (debt) yields, and marginal/effective income tax rates. Fortunately, unless the evaluator is consumed with curiosity for new knowledge, there is no particular need for original work.

The SPEE Survey, the Texas PTD reports and the WSPA reports identified in Table 1 provide a readily available set of compatible and consistent data sources that fit comfortably within the economic/financial context of the oil and gas industry outlined above. All three annual studies were begun in the early 1980's and have been reviewed, audited, examined and tested, individually and collectively, many times. They have, in other words, withstood the test of time. The WSPA Study alone has been picked over more times than a road-kill armadillo. All three are published on a regular basis and are publicly available either free (PTD) or at modest cost (SPEE and WSPA).

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<sup>7</sup> Ibid

<sup>8</sup> “Fair Market Value Transactions, Cost of Capital, and Risk: California Oil and Gas Property Transactions 1983 through 2001,” January 16, 2002, Richard J. Miller & Associates, Inc. prepared for Western States petroleum Association, Glendale, CA.

<sup>9</sup> “Determination of Discount Rate Range for Petroleum and Hard Mineral Properties.” Texas Comptroller of Public Accounts, Property Tax Division, Austin, TX, August 2001 and for previous years to 1983.

## Surveys of Evaluation Professionals - The SPEE Parameter Survey

The Society of Petroleum Evaluation Engineers (SPEE) “Annual Survey of Parameters Used in the Evaluation of Oil and Gas Properties,”<sup>10</sup> is conducted by a committee of SPEE members in April-May of each year and is presented at the SPEE Annual Meeting, usually in June. The survey attempts to determine forward-looking information in the form of (a) price/cost escalation rates, (b) discount rates and (c) the methods and forms of risk adjustment that are being used or would be used by knowledgeable and informed evaluators of oil and gas properties for appraisal of oil properties on the survey date.

The Parameter Survey has been done by SPEE since 1983 and has been remarkably consistent for many years in terms of structure, format and results. The largest group of data contributors are producing companies where evaluations of projects and acquisitions/sales are a common occurrence. The second largest group is consultants - most of whom are SPEE members and who are involved in evaluation work as a profession. SPEE is careful to limit data responses to one per company or firm to avoid duplication of reported data and the consequent skewing of results that could occur if scores of engineers and managers from the same company returned questionnaires. The result is a reliable set of data that would be of use to any evaluator of oil properties who either did not have access to other sources or who desires to confirm those sources. The purpose of the SPEE survey is to gather data on evaluation parameters. The Survey does not pretend to be the absolute answer, but does provide some useful and well-established guideposts. While one might quibble about various aspects of the Survey, the results provide a window into current evaluation practice.

The Survey data is most useful when viewed over a period of time to observe the trend in discount rates, price projections, etc. To wit:

- Escalation rates for prices and costs have trended downward over the years, and an increasing number of evaluations are done using flat pricing.
- Base or Minimum discount rates range from 17% to 19% with the trend moving slightly lower over time.
- An increasing number of evaluators apply risk adjustment factors to either the production projection or the cash flow to account for risk related to class of reserves. The adjustment for PDP reserves has consistently averaged 96%, while the adjustment for PUD reserves is about 58%.

In the October 29 article, the SPEE survey comes in for some puzzling criticism. There is no suggestion in the SPEE Survey that the results would apply only to “...small, low quality properties...” as claimed by the authors. Table 1 lists four SPEE Survey rates of 13.6%, 13.95%,

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<sup>10</sup> Society of Petroleum Evaluation Engineers, 1001 McKinney Ste. 801, Houston, TX 77002.

16.2% and 16.0% as “Average BFIT market discount rates.” However, the four reports show that these rates are the average cost-of-money and/or minimum rate-of-return, not discount rates derived from sales. The cited rates reflect what Campbell<sup>11</sup> refers to as “minimum return standard”; they are not necessarily the rates that would be applied to estimate market value. As such, the SPEE Survey data provides a baseline or threshold from which evaluators can apply their own perspective and judgment regarding the risk associated with a particular property and the return required as a reward for accepting that risk. Aside from being a useful source of data in its own right, the Survey provides a convenient comparison point for other data sources such as the WSPA and PTD studies.

### **Financial Market Data -Texas Property Tax Reports**

For many years, starting in the early 1980's, the Property Tax Division ( “PTD” ) of the Texas Comptroller of Public Accounts has prepared an annual study of discount rates for the appraisal of oil and gas properties for ad valorem tax in Texas. The PTD has also produced a manual<sup>12</sup> on deriving discount rates for oil and gas property evaluation for application to properties being appraised for ad valorem tax. While the report is prepared for application to ad valorem tax, the calculated rates are generic market value discount factors that are broadly applicable to acquisitions, divestitures, estate tax and other uses.

The PTD study is primarily a cost-of-capital analysis which calculates a WACC. The PTD uses basic cost-of-capital analysis of publicly traded major and independent companies using data obtained from company annual reports and/or SEC Form 10-K, Ibbotson Associates and other public data. The PTD work is thorough, documented and provides a sound basis for development of a property specific discount rate by relating basic financial management principles to the evaluation of oil and gas properties. The WACC is often considered to be a minimum return. As noted in financial management texts, (1) acceptance of a rate-of-return less than WACC could have the effect of diluting or reducing the value of the company and (2) projects with risks that are perceived to be greater than the corporate WACC should require commensurate higher returns. While circumstances may dictate otherwise, this latter point often accounts for the “hurdle rates” and other factors used by companies and individuals to establish risk-related discount rates.

The BTAX discount rates quoted in Table 1(20.3%, 18.9%, and 18.1% for 1998, 1999 and 2000 respectively) represent WACC rates adjusted upward by 4% to account for (a) a 2% hurdle rate and (b) a 2% property tax factor. Absent these adjustments the WACC rates would be 16.3%, 14.9% and 14.1% BFIT respectively which, given the lower risk measured by WACC, are consistent with the SPEE Survey minimum rates. The addition of a 2% hurdle rate by PTD is consistent with common evaluation practice.

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<sup>11</sup> Campbell, John M. “Analysis and Management of Petroleum Investments: Risk, Taxes and Time,” John M. Campbell and Co., 1987, pg. 66-71.

<sup>12</sup> “Texas Property Tax: Manual for Discounting Oil and Gas Income,” Comptroller of Public Accounts, Austin, TX 1999.

## Actual Market Data - The WSPA Study

Reliable data from actual transactions is difficult to find, however, there are a few sources of market derived discount rates. The only direct market data in Table 1 is from the annual studies by Richard J. Miller & Associates, Inc. for the Western States Petroleum Association, known as the WSPA Study. The discount rates reported in the WSPA Study and publications based on the Study<sup>13</sup> are derived from fair market value transactions in California using the acquisition evaluations done by the buyer of the property. The discount rates reported in the study are Before Income Tax and include property risk. Only acquisitions of Proved reserves are used in the analysis. The discount rates reported in Table 1 of the article are correct and, interestingly, indicate an arithmetic average BFIT discount rate of 24.0% (median = 22.6%) for 1983 through 1999 for 231 transactions involving all classes of Proved reserves. As shown in Table 1 there is no significant difference between the 1983-89 period and the 1990-99 period. Over the same (1983-99) period, 160 transactions involving only Proved Developed Producing reserves have a mean of 23.2% (median 21.65%). According to the SPEE Survey, the risk adjustment factors applied to PDP reserves in evaluations are minimal (0-5%) suggesting that the market derived PDP discount rate should be considered to be the threshold rate. The WSPA study has also consistently found that the discount rate (a) is related to the relative volume of PDP reserves (%PDP) attributed to the property and (b) increases as the percentage of PDP reserves declines.

California is not the only source of direct market sales data. PTD has some experience with market sales data for Texas properties. Several years ago, when the annual study was done by the late Mr. John Adair, PTD was able to solicit and obtain a small sample of data from market sales data occurring in 1987 through 1993. This data was obtained from property buyers and sellers and provided enough sales information to allow derivation of discount rates and other economic information. Most of this data was for Proved Developed Producing (PDP) properties, which served the purpose of identifying representative discount rates for low risk oil and gas properties that could then be used as a base against which to measure the gap with the WACC derived rates. The data set consisted of 73 sales, which is probably not statistically significant given the size of the Texas market for properties, however, the results obtained from the sales analysis showed that the derived rates were relatively consistent from year-to-year with an arithmetic mean of 21.2%.

The comparison of the PTD result to the WSPA Study result for PDP properties is important in establishing the use of the market-derived data as a base rate for PDP properties that could be compared to WACC for the same year. The PTD results compared with the WSPA derived data reasonably well demonstrating that, as logic would or should tell you, FMV discount rates are essentially the same for properties in Texas as they are for properties in California.

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<sup>13</sup> The WSPA Study has been the subject of several SPE papers which have presented discussion of the Study and the statistical data derived in the annual reports. See: SPE #71426, SPE #68596, SPE #37939, SPE # 30049.

## Does the Marketplace Conform to Financial Theory?

Comparison of all the information provided by SPEE, PTD and the WSPA studies demonstrates a rational connection of the financial market with the evaluation of producing properties. The PTD WACC analysis forms a threshold or minimum return as described in financial management literature. The SPEE survey reports the minimum returns applied/anticipated by professional evaluators. The SPEE data overlays, to a reasonable extent, the PTD WACC data, suggesting that evaluators have a rational basis for discount rate selection. Finally, the actual sales data from WSPA and PTD clearly indicate that buyers of producing properties expect or anticipate returns from property transactions that exceed the WACC related minimum returns.

- As shown in Figure 1, over the period 1985-1999, the average annual discount rate derived from property transactions with only PDP reserves has exceeded the WACC for that year in every year; the average difference is 6.8% BFIT.
- Over the same period, the discount rates derived from 90% of all transactions (Figure 2) in the WSPA Study exceed the average WACC of 16.1%.

The market-derived discount rate exceeds the WACC because it should. Producing properties are inherently higher risk investments than are public company stocks and bonds. The market derived rates reflect that additional risk. The fact that there is a difference is rational for several reasons which include the risk of a specific property, liquidity, diversity of income sources, and a requirement for a return-of-investment. For that purpose, the ROE, WACC and interest rate information provide a useful starting point. The limitations arise from the composition of ROE, WACC and interest rates.

1. All three are derived from a broad spectrum of publicly traded assets. The stocks and debt of corporations and the bonds of the federal government are highly liquid and, for the most part, low risk.
2. The corporate equity and debt returns are supported by multiple income streams from sales of crude oil at the LACT unit to Twinkies at the AM/PM on the corner.
3. ROE, WACC, and interest rates represent only a return-on-investment (debt or equity) and include no provision for the repayment of the original investment.

While PTD does not explicitly investigate these issues, the PTD approach of adding risk increments to the WACC is one way of bridging the gap. The WSPA Study does address these issues and has found that proper adjustments to the WACC result in discount rates consistent with sales derived rates.

## Other Sources

Returning to Table 1, the remaining five sources include Anecdotal information and so-called “normalized” data.

### **Anecdotal “Data”**

There are three entries in Table 1 which necessarily fall into the Anecdotal information category. The first, Donaldson, Lufkin & Jenrette (DLJ), is cited as reporting 9-14% BTAX, while the second, Credit Suisse First Boston (CSFB), is cited as reporting 12-15% BTAX. A review of both data sources indicates that there is no substantive documentation to these data points which were apparently taken from informal handouts at luncheon presentations to Houston - area groups. The recipient of this information is entitled to ask a few questions (neither firm has responded to questions regarding the data in Table 1): Are these reported rates reflective of the discount rates that would be applied to individual property acquisitions? Are these stock acquisitions or purchases of large groups of properties covering one or more states? Given the prominence of both firms, the transactions being reported by the firms are likely to be corporate acquisitions of entire companies or large groups of properties, not individual properties - one does not usually hire CSFB/DLJ to sell the XYZ lease. Both firms (since merged) are well regarded and are knowledgeable in the field of investment banking, however, both indicated that they were “sell-side” advisors in the transactions reported. How then were the discount rates derived? Is it possible that the 9-14% and 12-15% ranges represent returns based on the sale price and the seller’s evaluation? One cannot tell from the source material.

The third entry is an SPE paper<sup>14</sup> which is reported (in the October 29 article) to cite discount rates of 3-7% ATAX. This conclusion is not apparent from the paper. What is apparent is that (a) rather than being market data, the discount rate discussion relates to one of the many opinions of the author as to the returns earned by oil and gas companies rather than the returns anticipated from properties when acquisitions were made, and (b) the rates are not only after-tax but apparently also net of inflation. Since all the other data points in Table 1 are BTAX and include inflation, the 3-7% should be corrected to account for both. If we assume a 35% Federal tax rate and 4% inflation, the 3-7% range would increase to 10.8% - 16.9% BTAX, a substantial difference.

### **Normalized and/or Constructed Evaluations**

The Harold W. Bertholf, Inc. (Bertholf) entry in Table 1 is shown as an “Average BTAX market discount rate” of 12.8% for 41 transactions over the 1992-1999 period. The report is an unpublished April, 2000 analysis prepared for the Petroleum Standards Advisory Committee (PSAC) of the California Assessors Association.

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<sup>14</sup> “Property Evaluation - A Return to First Principles,” SPE #68595, Capen, E.C., SPE Hydrocarbon Economics and Evaluation Symposium, April 2001, Dallas, TX.

The problem here is that the Bertholf entry is not market data. The Bertholf report shows that the average of 12.83% is derived from property buyer's cash flows (market data) that were adjusted to fit the evaluation criteria of California property tax assessors. Buyer's evaluations which used escalated product prices were adjusted to project only real (net of inflation) product pricing; (b) buyer's evaluations which did not include a deduction for abandonment costs were adjusted by inserting an estimated abandonment cost into the cash flow; and (c) buyer's evaluations which did not deduct overhead expenses were adjusted by inserting overhead costs into the cash flow. After making these adjustments, which have the effect of reducing the income stream, the actual purchase price was used to calculate an internal rate-of-return for each transaction. The 12.83% BTAX average is the result of some degree of adjustment to the cash flows of the 41 transactions.

This procedure, often termed "Normalization," serves a purpose in some circumstances, but there are two significant caveats to the use of "Normalization" analysis. First, the user of the reported data should clearly understand the modifications that were made to the cash flow in order to produce the resulting discount rate. Second, the normalized data is not market data; it may have started out as market data but the adjustments have made the results useful only for an intended purpose. The effect of altering the market data is shown by comparing the 12.8% rate to the results of three reports published by Bertholf (Table 2) using many of the same sales but without adjustments of the data. Obviously, there is a substantial difference between 12.8% and 17.09% or 18.64%.

Table 2  
Bertholf Published Reports - Market Derived BFIT Discount Rates

<u>Report Date</u>	<u>Period</u>	<u>Mean, %</u>	<u>Median, %</u>	<u>No. of Sales</u>	<u>Range, %</u>
2002	1995-2001	17.09	14.61	63	-8.0 to 61
2000	1995-1999	17.42	14.24	52	-8.0 to 61
1999	NA	18.64	14.61	37	2.0 to 61

The fatal error in Normalization is the presumption that, after making all the cash flow alterations, the buyer would still pay the same price for the property and would be willing to accept a lower rate-of-return on his investment rather than determine that (since the income stream had been reduced) he would pay a lower price in order to maintain his anticipated rate-of-return. The alteration process removes the market aspect of the data. The 12.83% discount rate may have utility in the estimation of value by California property tax assessors, however, it provides no information regarding the market discount rate applicable to evaluating producing properties in the marketplace.

Another form of data reporting is the "Constructed Evaluation" approach. The Diggle/David paper is cited in Table 1 as reporting an average 10-12% BTAX market discount rate from 40 transactions between 1983-87. However, it seems apparent from the text of the paper (absent requested clarification from the authors) that the 10-12% rates are derived from cash flows which were constructed for the purpose of the paper, rather than from the evaluations done by the buyer in any of the 40 transactions. Here again, the results may serve the purpose of testing a premise and

may provide information in that context, but it is not market data and provides no information about discount rates applicable to the marketplace for specific property evaluations in 1983-87.

This brief review indicates that five of the eight sources are not market information useful for providing discount rate data for property evaluations. Unfortunately, these are the kind of studies and sources that permeate the information base available to evaluators and which result in confusion regarding actual market discount rates.

### **Trends in Discount Rates**

The October 29 article came to the conclusion, based on the first five data sources in Table 1, that discount rates for oil and gas properties have declined from some level 10-20 years ago to 10-12% BFIT today. If all fifteen reports and papers in Table 1 are carefully examined and considered in relation to the differing type and quality of data contained in each one, the evaluator could arrive at an entirely different conclusion and could decide that market value discount rates have not only not declined from some presumably higher level of 15-20 years ago to 10-12% BFIT today but have maintained a level of 20-25% BFIT over that period. This conclusion can be shown to be true regardless of any artificial property size or “quality” criterion that might be imposed on the analysis. Further, it is a rational result that is consistent with the financial characteristics of the oil and gas industry and with the risk inherent in the acquisition and operation of oil producing properties.

The analysis reported in the SPEE Survey, the PTD studies and the WSPA Study indicates that there has been no material decline in market discount rates during the 15-20 years since the early 1980's nor is there any particular reason to expect that there should be such a decline. Economic/financial information indicates that while the short-term may be volatile, long-term returns, which are more applicable to long-term investments in oil properties, seem to be relatively stable. Absent a substantial reduction in the risks associated with obtaining an income stream from oil and gas properties, there is no particular reason to expect that market value discount rates for oil properties should decline.

### **Just what is a “Quality” Property?**

It is not uncommon for discussions of market discount rates to become involved with issues of the size of the transaction and/or so-called property “quality”. This is one of the more enduring myths regarding discount rates. As an example, in the October 29 article, the authors infer that there should a distinction between “small, low quality properties” and other (large, high quality?) properties. However, the authors offer no definition or other means of determining what the term “low [high] quality” means or how “small” or “large” should be applied to the selection of discount rates. Such knowledge would seem to be essential if one is to know what discount rate to use for a property valuation. In truth, terms such as high or low “quality” and other distinctions based on property characteristics are entirely artificial and have no place in the evaluation process.

When the “quality” issue is pursued, a list of property and/or transaction characteristics is commonly offered as examples of “quality”. The list can usually be divided into two and possibly three categories. The first and largest category includes items such as product price, property location, volume of reserves, oil gravity, operating costs, regulatory environment, taxes, etc. All of these issues are or should be incorporated into the income projection - they are not functions of the discount rate. These evaluation components have been the subject of extensive analysis done as part of the WSPA Study which has shown no relation between the discount rate and property characteristics.

The second category contains characteristics which the buyer perceives as providing value over and above the value of the income stream. Some of these are “strategic fit”, long-life reserves, operational control, or financial (tax) advantages or corporate hubris. The perceived value conferred by these attributes may increase the price that the buyer is willing to pay BUT if carefully considered they also result, directly or indirectly, in some form of enhanced revenue or other benefit which may or may not be fully quantified. Further, these issues may be unique to a certain buyer and may not have value to the market as a whole. A discount rate derived from such a transaction should recognize and attempt to account for the additional value increment.

The third category is usually very short and consists of issues that are not property related. An example is “oil and gas price volatility”. Since prices are usually set far from the property, volatility is a risk but it is a universal one requiring no particular discount rate or value allowance.

It has been the experience of this appraiser that acquired properties are usually defined as “quality” properties only after the acquisition, primarily as a means of rationalizing the price that was paid. I have also been told that market data has no utility because only “poor properties” would be sold in the first place. It then seems fair to ask; “Why was this so-called quality property sold if it was such a quality property?”

### **Author’s Conclusion**

The discount rate is an important part of the economic evaluation of oil properties but it is probably the least understood. That lack of understanding is caused, in part, by continuing confusion about the discount rate in industry literature which often ignores rational data in favor of un-founded supposition and anecdotes. When properly employed, the discount rate is a measure of the Opportunity Cost of Capital which is, in turn, a carefully calculated extension of common sense. The Opportunity Cost can be readily defined and discount rate data can be obtained from several publicly available sources including but not necessarily limited to the SPEE Parameter Surveys, the Texas Property Tax Division reports, and WSPA Study of property transactions. The discount rate that you use to value an oil and gas property should equal or exceed the rate of return that you could earn on an investment of similar risk. Further, the discount rate should be property specific and should incorporate elements for liquidity and return-of-investment. If you believe that oil properties are similar in risk to AA corporate bonds, then low rates are the way to go and you will probably have no trouble finding smiling folks willing to sell you properties. However, if you observe that

equity returns are more on the order of 15-16% AFIT and that the cost-of-capital is in the 14-16% BFIT range, then perhaps you would use a discount rate 20-30% BFIT range for properties with various risk levels of Proved reserves.

There is no reliable evidence that (a) discount rates for producing property acquisitions have declined over the past 20 years, (b) artificial terms such as “quality” have any bearing on the discount rate.