

Integrating Market Information
into
California State Board of Equalization
Regulations for the Appraisal
of
Oil and Gas Properties
for
Ad Valorem Tax

Issues in the Appraisal of Petroleum Properties

January 11, 2006

prepared for

WESTERN STATES PETROLEUM ASSOCIATION
AND
CALIFORNIA INDEPENDENT PETROLEUM ASSOCIATION

Richard J. Miller & Associates, Inc.

PETROLEUM PROPERTY EVALUATION AND APPRAISAL

January 11, 2006

Board of Directors
Western States Petroleum Association
1415 "L" Street, Ste. 600
Sacramento, CA 95814

Board of Directors
California Independent Petroleum Assn.
1112 "I" Street, Ste. 350
Sacramento, CA 95814

Re: Analysis of Oil and Gas Transactions
and Sales 1983 through 2005

Dear Sirs:

Pursuant to the request of the Western States Petroleum Association and the California Independent Association, Richard J. Miller & Associates, Inc. has completed a study of the appropriate price/cost escalation rates and discount (capitalization) rates for the determination of the fair market value of oil and gas properties in California in the current market. The study consists of two parts: an analysis of oil and gas property transactions and sales that occurred in California during calendar years 1983 through 2005; and an analysis of weighted average cost-of-capital of a representative group of companies of the years 1984-2004. The property sales analysis is based primarily upon data submitted to the firm by purchasers of oil and gas properties in the twenty-year period since the first study in 1984 and to some extent on data obtained from the public record and/or sellers of properties. The analysis of the so-called "*Band of Investment*" approach to the derivation of discount rates is based on publicly available data. The results of both studies are presented in the enclosed report.

Data for this report have been obtained from public and private sources. These data have been accepted and incorporated into this report after determination that they are the appropriate data for this study and on the assumption that the data is accurate. Richard J. Miller & Associates, Inc. reserves the right to modify this study should we become aware that the data presented are inaccurate, incomplete, or misrepresented for any reason. Further, Richard J. Miller & Associates, Inc. makes no warranty, express or implied, regarding the accuracy of the data used or of any conclusions made on those data.

Pursuant to the terms of the current and prior year contracts, and with the established policy of this firm, the data received for this study and the analysis of the individual sales as well as results obtained from that analysis have been and will remain entirely confidential to this firm. There has been and will be no transfer or exposure of data or analysis, except as presented in this report, to any entity or person not a party to the subject transaction. There has been no contact with or influence from third parties or groups representing WSPA, CIPA, or companies or organizations with regard to the content and conduct of this study except for the directions contained in the contract for service.

Neither Richard J. Miller & Associates, Inc. nor any of its Officers, Directors, Associates or staff have any corporate, personal or fiduciary interest in the parties that provided data, their affiliates or

subsidiaries, or in the properties and transactions which are the subject of this analysis. Further, Richard J. Miller & Associates, Inc. does not engage in any business which makes use of the data or invades the confidentiality of the data provided for this study.

It may be of interest to the Board to know that the WSPA/CIPA Property Sales Study, as it is generally known, has been accepted as a source of relevant and useful information by a wide range of industry, government and academic consumers. The WSPA/CIPA study is used and referenced by industry companies and consulting firms as well as the financial institutions that serve the oil and gas industry. This firm receives a considerable amount of responsive discussion from property tax representatives, acquisitions managers, evaluation engineers, and tax and finance experts regarding aspects of the study and with suggestions for expansion and improvement. Many consulting firms and financial institutions use the study to assist them in their own evaluation work. The WSPA study and several professional papers based on the study have been presented in number of forums, including the American Society of Appraisers and Society of Petroleum Evaluation Engineers, and have been published by professional journals as a part of professional meeting proceedings. The study has been referenced by several authors of evaluation papers and publications.

The WSPA/CIPA study is cited as a reference by several government authorities, including the California State Board of Equalization, the Property Tax Division of the Comptroller's Office of the State of Texas, and by the Internal Revenue Service. The study and attributive papers are used as teaching aids in the petroleum engineering departments of several major universities, including USC, Stanford, Colorado School of Mines, Louisiana State University, University of Texas and Texas A & M.

It is the intent of this firm to continue to attempt to improve the WSPA/CIPA study and to render the information presented in the study in the most understandable and useful form possible. We welcome the suggestions of WSPA and CIPA for any further advance toward that goal.

We appreciate this opportunity to be of service to the Western States Petroleum Association and to the California Independent Petroleum Association. Should there be any questions regarding this report, we would be pleased to discuss them with you at your convenience.

RICHARD J. MILLER & ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read "Richard J. Miller", is written over a faint, circular embossed seal or watermark.

Richard J. Miller, ASA
President

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Summary and Conclusions

The practice of property tax appraisal and assessment in California is the product of an evolving process that has at once created a system of rules and regulations to guide the procedures employed and the same time has enacted laws that are designed and intended to render every assistance to the appraiser/assessor to ensure timely and equitable rendition of ad valorem tax assessments to property owners. The law embodied in the Constitution and R&T Code is translated into the various Rules established by SBE of which Rule 2, 8, and 468 are of interest to this discussion. There is also the Assessors' Handbook issued by SBE which provides an excellent and useful resource to appraisers and assessors by describing, in considerable detail, the requirements for appraisal/assessment practice governed by the various SBE rules. The Assessors' Handbook also places the recommended practices of the SBE securely within the broader contexts of both (1) generally accepted appraisal practice and (2) the marketplace for real estate investment. While it is possible to find contradictory or confusing elements in the SBE rules and in the Assessors' Handbook, there can be no question that, as required by California law, the primary and overriding intention of the SBE rules and the practices enumerated in the Assessors' Handbook is that property tax appraisal should reflect the functioning of the market and emulate the actions of participants in the market while at the same time observing good appraisal practice. The fact that California law requires valuation for property tax to be based on the fair market value of the individual property should be sufficient direction but the SBE rules and instructions serve to underscore that requirement.

The requirement to emulate the market place is often an empty one when market data is not available. Appraisers may often rely upon indirect sources of information for analysis of the market for some classes of property but for other classes, such as oil, gas, and other mineral properties there is no publically available data source. California provides a solution to the market data issue by requiring that purchasers of real estate, including mineral rights, submit a report of that transaction, known as the Change in Ownership Statement (COS), to the assessor in the county where the property is located. This COS filing is essentially an open-ended request for information that allows an assessor access to a wide range of transaction data. For oil and gas properties, the COS requires submission of extensive transaction data such as Purchase and Sale Agreements and financing documentation but also requires submission of the geologic, engineering, and economic evaluation/appraisal information used to define the purchase price determination. This type of information is not available to assessors and appraisers outside the California tax system.

This study includes an extensive review of SBE Rules 2, 8, and 468 as they apply to oil and gas properties along with relevant sections of the Assessors' Handbook to determine how the rules and Assessors' Handbook provisions relate to appraisal practice and particularly, to oil and gas property appraisal practices. The study then examines (1) the data made available to appraisers of oil properties through access to the transaction information provided by the COS and (2) the information publically available in the financial markets. The study then explores the integration of the available market data, from transaction and financial sources, into the SBE rules for ad valorem tax appraisal. Finally, the study examines several issues regarding the appraisal of oil properties and records some approaches to resolution of those issues.

This study makes use of the transactional and financial market data accumulated by RJM&A since 1983 for use in the WSPA/CIPA Property Sales Study. This database and the interpretations include an prior study reports have been found to be a valid source of market data. This database is supplemented by information from other reliable sources.

The results of the study are presented in the enclosed four part report with Exhibits and Appendices.

Conclusions

1. California State Board of Equalization “Rules” for appraisal practice and the expanded instructions in the Assessors’ Handbook provide a sound foundation for ad valorem tax appraisal of oil and gas properties that is fully integrated with generally accepted appraisal practice and oil industry practice.
 - (a) **SBE Rule 2** defines a fair market value appraisal standard that is identical to and interchangeable with commonly accepted real estate usage and with standards in use by the petroleum industry.
 - (b) **SBE Rule 8** describes an Income Approach to value procedure that is fully compatible with established practices of property valuation used by investors in oil and gas properties and projects. Two aspects of the Rule 8 instructions bear specific review:
 - (1) Rule 8 (c) describes the construction of an income stream that does not allow deductions for (i) debt repayment and interest, (ii) income tax and related items, and (iii) anticipated property tax, thereby creating an income stream that is before income tax (BFIT) and is derived from investment of equity capital. These conditions can be found to conflict with data from transactions, however, the resolution of the conflicts is relatively simple within the language and intent of the rule.
 - (2) Rule 8 (g) defines two sources for discount rates, market sales of properties and the cost of investment capital. It is clear from the language of the rules and from interpretations contained in the Assessors’ Handbook, as well as in GAAP and industry practice, that while the market transactions source is preferred the two sources shall have parity of results when property applied.
 - (c) **SBE Rule 468** provides specific instructions for the appraisal of oil and gas properties which are fully compatible in both definition and function with petroleum industry practices.
2. After extensive review of SBE rules and recommended practices and comparison of generally accepted appraisal practice and oil industry valuation methods it is very clear that when the requirements of the rules and the practices described in the Assessors’ Handbook are taken as an whole, information from market transactions and financial markets can be integrated directly into California ad valorem tax practice.

3. SBE Rules and recommended practices do not establish unique appraisal requirements for oil and gas properties.
4. Market Sales Returns
 - (a) Based on the analysis of over 250 fair market value transactions during the 1983 through 2005 period, it is apparent that the appropriate discount for oil and gas properties with 100% Proved Developed Producing (PDP) reserves is 19-20% BFIT.
 - (b) The discount rate is not a function of purchase price, size of reserves, or any other component of the property of economic conditions. The discount rate is a function of the risk of actually attaining the projected production. The appraisal of properties with 100% Proved Undeveloped (PUD) reserves or a mix of PDP and PUD reserves would have a discount rate greater than the 100% PDP rate.
 - (c) The number of fair market value transactions in California has declined since the mid-1990's due primarily to the consolidation of properties and companies into large asset combinations.
 - (d) Examination of 433 transactions with sufficient data indicate that more than 90% of transactions, by number of transactions and by purchase price, are funded with 100% equity in the form of retained earnings.
 - (e) The strength of the Income Approach in allowing a large number of physical, operational, and economic variables to be combined to produce an income stream and a return-of and -on-investment also means that, when aggregated from a sufficiently large and representative sample discount rates derived under Rule 8 (g)(1) are applicable in all appraisals of oil and gas income producing properties that generally comply with Rule 8(c).
5. The requirement of Rule 2 to appraise properties to a fair market value standard also applies to transactions used as a source for derived discount rates. That is, a market value discount rate cannot be derived from a transaction that is not itself fair market value. This condition would preclude transactions resulting from (a) insider, intra-family, or intra-company deals, (b) eminent domain actions, (c) legal actions, and/or (d) transactions that are influenced by purposes unique to the buyer but not to "*persons generally*" or to the market as a whole.
6. The conditions defined in SBE Rule 8 (g)(2) for derivation of a cost-of-capital discount rate, and further defined and expanded in Assessors' Handbook sections 502 and 566, describe a textbook financial WACC. The WACC in various forms is known to be a common basis for evaluation discount rates.
 - (a) Analysis of Rule 8 (g)(2) discount rates for the WSPA/CIPA study over the period from 1985-2004 indicate that the financial markets provide sufficient reliable and readily available data to allow calculation of Rule 8 (g)(2) discount rates that are fully compatible with, and can be substituted for, transactional market discount rates.
 - (b) Discount rates derived as BFIT WACC from a representative sample of prospective purchasers of oil and gas properties have maintained a relatively stable level of 14-16%

over the past 20 years. The analysis contained in the WSPA/CIPA Property Sales Study is confirmed by third-party studies.

- (c) Rule 8 (g)(2) calls for the discount rate to be calculated using the proportions of debt and equity that would be used by prospective purchasers in the market place. The common approach is to use the corporate ratio of equity (- 70%) and debt (- 30%). However, as previously noted, examination of the financing of the actual transactions which report such information (433) reveals that over 90% of funding is from equity as retained earnings. It is therefore concluded that the correct approach, at least for oil and gas properties, is to use the cost-of-equity alone as the Rule 8 (g)(2) source of discount rates. Results presented in the attached study demonstrate that estimated cost-of-equity calculated using standard methods is fully compatible with (i) historic returns-of-equity for the petroleum industry and (ii) transaction derived discount rates for 100% PDP properties.
- (d) The discount rate derived for Rule 8 (g)(2), whether as corporate WACC or cost-of-equity alone, must be adjusted to account for three elements that are not included in either WACC or COE but which are necessary to provide full parity with transaction derived discount rates. These elements are:
 - (1) Return-of-Investment
 - (2) Liquidity
 - (3) Property Specific Risk or Portfolio Effect

The adjustment for Return-of-Investment is relatively simple and requires only the addition of a safe rate of return factor (the Hoskold Method) to provide a satisfactory reconciliation.

The reconciliation of the discount rate for liquidity is more difficult but is nonetheless necessary and can be accomplished through the use of studies of closely held companies.

The adjustment for Specific Property risk is the most difficult and to some extent, overlaps the liquidity concern. One approach to this adjustment is the use of a Pure-Play analysis based on petroleum industry stock market returns.

- 7. Based on (a) data from 288 fair market value transactions, (b) extensive statistical analysis of that data, and (c) derivation of financial markets data over a 20 year period (1985-2004) two primary conclusions can be made regarding the Rule 8 (g) discount rate.
 - (1) The base discount rate for oil and gas properties with 100% PDP reserves is 19-20% BFIT.
 - (2) The only factor which should be used to modify the discount rate is the risk of attaining the expected production income stream.

8. Analysis of the sales data in the WSPA/CIPA data base indicates that virtually all the evaluations differ from one to another over a wide range of the component variables used in the evaluations including but not limited to: location, transaction data, production projection, products, product prices, operator, royalty interest, operating costs, anticipated future investment, and life of production. When reserves class is removed as a variable the transactions demonstrate a remarkably compact range of derived discount rates. Further, statistical analysis indicates that there is virtually no relation between discount rate and any component variable. Therefore there is no factual or theoretical foundation for making any adjustments to transactions derived discount rate for use in a Rule 8 (g)(2) application.
9. Abandonment, Restoration, and Remediation (AR&R) - One of the more contentious issues in the appraisal of oil and gas properties for ad valorem tax is the treatment of AR&R costs in the appraisal of an individual property. Two facts are indisputable. First, AR&R costs are a certain and potentially large liability that attaches to every oil and gas property. Second, public companies, private companies, and individuals (to a lesser extent) are required by law, accounting practices, and contractual agreements to accumulate funds and otherwise be prepared to meet AR&R liabilities. It is argued that the total amount of anticipated AR&R costs can be placed as a cost in the last year of the income stream before discounting to present value with no accumulation of the necessary funds from cash flow. The presumption is that the operator or some other party will provide the necessary funds. This approach confuses the valuation of the property with valuation of the owner/operator.

There are three ways to account for AR&R costs in ad valorem tax (or any other purpose) appraisal.

- (a) The SBE/Assessors' Handbook method of deduction a sufficient amount, by some rational method, from current income to accumulate the necessary funds before reaching economic limit and/or the planned abandonment date. The appraiser has the option of deducting the full cash amount or of using a sinking fund approach where interest on deducted funds provides a portion of the total.
- (b) Present Value - The SBE method if properly used, requires (a) an estimate of AR&R costs based on current conditions and costs, (b) an escalation of those costs to account for future costs inflation and reasonably anticipated changes in regulatory requirements, and (c) a discounting back to present value using a risk-less rate. In fact, one of the few evaluation parameters that can be estimated with reasonably good certainty is abandonment and restoration costs - environmental remediation is more difficult. Since these costs must be determined for each property in order to apply the SBE method it would be far more efficient and cause less debate if the current estimated cost, which is already present value, is simply deducted from the present value of the estimated property income stream.

- (c) Since estimated AR&R costs are already being accounted for (and spent) by oil and gas operators, particularly public companies, the issue of adjustment of discount rates to account for arbitrary AR&R adjustments can be avoided by using the BFIT cost-of-equity as the base discount rate subject the adjustments noted above.

Introduction

In California appraisal of property for property tax assessment is governed by the Revenue and Taxation Code ("R&T Code") and by the rules promulgated by the State Board of Equalization ("SBE"), which effectively translate the R&T Code into practical application. The primary requirement is that the tax to be based on "**fair market value.**" The California Constitution establishes the foundation for the fair market value standard. Unless otherwise provided... *(a) All property is taxable and shall be assessed at the same percentage of fair market value.*"¹ The R&T Code and SBE rules place overarching importance on the use of market-based information for the appraisal of property for ad valorem tax. The appraisal of property for ad valorem tax purposes requires that the "...*economic concept of value must be reconciled with value as defined in property tax law. The value standard for property taxes is market value...*"² This reliance on market data is a necessary and proper extension of generally accepted appraisal practice and gives undeniable primacy to the judgement of the market over that of the appraiser/assessor.

Fair Market Value has been defined in several court decisions^{3,4} and by the Legislature.⁵ These definitions are fully consistent with definitions used in the real estate market place.⁶ The foundation established for property tax applies to all property including oil and gas properties. No distinction is offered by state law or SBE regulations that suggests that petroleum properties are appraised to any different standard than market value. The definition of market value employed for California property tax is, with some semantic nuances, identical to definitions used in oil and gas evaluation practice. This is as it must be if the market is to be the standard of measure and the source of information. It remains only to access and analyze "market data" to obtain the information necessary to appraise oil and gas properties for ad valorem tax. One or more court decisions⁷ have created the means for appraisers, assessors, and others to obtain a wide range of information from buyers and sellers of individual and specific petroleum properties, including transaction documents, terms of financing, and engineering/economic evaluations of the acquired properties. This data has been accumulated, in a more of less standardized form, for over 20 years covering virtually every oil and gas property transaction in

¹ Article XIII, Section 1, Constitution of the State of California

² Assessors' Handbook Section 501, Basic Appraisal, California State Board of Equalization, pg. 8

³ Sacramento Southern R.R Co. v. Heilbron 156 Cal. 408, 104 p.979 (1909)

⁴ DeLuz Homes, Inc. v. County of San Diego, 45 Cal. 2d 546, 561-62

⁵ Revenue & Taxation Code, Sections 110 & 110.1

⁶ "*The Appraisal of Real Estate,*" Eleventh Edition, 1996, The Appraisal Institute, Chicago, IL, pg. 20

⁷ Roberts v. Gulf Oil Corporation (1983), 147 Cal. App. 3d 770, 796

California. These data collections make possible the determination not only of the method of appraisal most commonly used to value petroleum properties (the Income Approach) but also the economic and financial evaluation parameters applicable to the appraisal of all types of oil and gas properties. The extraction and assimilation of the appropriate data from market sales should create the precedent conditions for simple, timely, and equitable appraisal of California oil and gas properties for ad valorem tax.

Nevertheless, significant questions and debate persist involving the extraction and application of market data in ad valorem tax practice particularly as to the relation of market derived evaluation methods and parameters to the rules and regulations established by the SBE for ad valorem tax appraisal. Discussion of these issues has continued in formal and informal venues for over 20 years. In an attempt to further the discussion of these issues toward a rational conclusion, the following report will (a) review a number of the more obstreperous questions and issues and (b) seek to resolve them by examining the integration of the accumulated market data in the WSPA/CIPA Property Sales Study⁸, as well as market data from other studies, as appropriate, into the ad valorem appraisal process as defined by SBE Rules 2, 8 and 468. This study considers only the appraisal perspective of the subject rules and their functional application and does not attempt to invoke a legal or regulatory perspective on the interpretation of the rules and/or the use of market data. The only exceptions to the latter condition occur where legal statements intrude into appraisal practice.

In order to accomplish this task, the following discussion is presented in four parts:

- Part I - A review of the appraisal aspects of SBE Rules 2, 8 and 468

Part I reviews the language of the three rules, the requirements imposed on the appraiser by the rules, and the relation of those requirements to generally accepted appraisal practice as well as the practice of oil and gas property evaluation as employed in the petroleum industry. In this review, appraisal practice is defined by The Appraisal Institute ("AI") and/or the American Society of Appraisers ("ASA") and is related to the Uniform Code of Professional Appraisal Practice ("USPAP").

- Part II - A synopsis of accumulated transactional and financial market data

Part II presents a synopsis of the market data collected and analyzed by the WSPA/CIPA Property Sales Study with sales and other market data sources covering the period 1983-2005. To the extent that they are applicable, data from other market studies are included.

⁸ The Western States Petroleum Association ("WSPA") and the California Independent Petroleum Association ("CIPA") co-sponsor the annual Property Sales Study conducted by Richard J. Miller & Associates, Inc.

- Part III - An examination of the integration of transactional and financial market data with the SBE rules.

Part III will investigate the degree to which market data from property transactions and from financial sources can be integrated into an appraisal of an oil and/or gas property for ad valorem tax under SBE Rules 2, 8 and 468.

- Part IV - Issues in the Appraisal of Petroleum Properties

Part IV will encompass a review and short discussion of (a) areas where market data integration problems appear to exist, and (b) suggested reconciliation of those problems. Issues addressed include the following:

- The proper methods of discount rate derivation.
- The influence of time, location, and property type on discount rate.
- The relationship of discount rates derived from market sales derived [Rule 8(g)(1)] and from financial market [Rule 8(g)(2)].
- The influence of acquisition financing upon the derivation of market sales returns.
- The relationship of the broader financial markets to the analysis of discount rates and other evaluation parameters.
- Determination of a rational threshold for discount rates applicable to oil and gas properties.
- The treatment of abandonment, restoration and remediation costs in the appraisal of oil and gas properties for ad valorem tax.
- The distorting effect on market data of arbitrary adjustments to the evaluations of acquired properties.

The analytical foundation for Parts II, III, and IV is the market sales and financial data accumulated over the period from 1983 to 2005 as part of the WSPA/CIPA Property Sales Study (“the WSPA/CIPA Study”). The WSPA/CIPA study database used for this purpose because it is the only significant data accumulation available. The WSPA/CIPA study has been reported annually since 1985 with full disclosure of analysis methods and results. The study has been subjected to rigorous scrutiny and testing by interested and dis-interested third-parties on several occasions, including legal proceedings, and has been found to be a valid and applicable source of transactional and financial market data. The WSPA/CIPA database and the analysis presented in the annual reports has been shown to be a valid and essentially unique source of oil and gas property market information and is particularly useful for the purpose of this report.

Part I - The Appraisal Aspects of SBE Rules

Appraisal for ad valorem tax, out of necessity and common practice, conforms to generally accepted appraisal practice. Where generally accepted practice has not been deemed to be sufficiently specific for the purpose, the California State Board of Equalization (SBE) has imposed rules that define the procedures and processes to be used by appraisers to estimate fair market value for each property. The various rules and interpretative statements issued by the SBE are understood to serve as instructions for all parties engaged in appraisal of properties for ad valorem tax assessment. While the provenance of the various rules are not necessarily pertinent to the instant discussion, the overall objective of the rules is to ensure compliance by appraisers and assessors with the constitutional requirement that each property be equitably assessed based on the fair market value of the property. The formal rules have been supplemented by the publication of an *Assessors' Handbook*, which describes the methods and procedures which should be used to comply with the SBE rules and regulations. The *Assessors' Handbook* (AH) is divided into sections covering various aspects of ad valorem tax appraisal; sections 501⁹ and 502¹⁰ cover Basic Appraisal and Advanced Appraisal respectively; section 566 covers the appraisal of oil and gas properties.¹¹ One of the salient points of the Assessors' Handbook, as expressed indirectly in the text, is the reliance of California property tax practice on generally accepted evaluation practices. There is no suggestion that appraisal/assessment of petroleum properties is a unique process divorced from the evaluation/appraisal practices of the petroleum industry. An examination of the SBE rules, the requirements of those rules, and the application of the rules to property appraisal is necessary to further discussion of integrating market data.

SBE Rule 2: The Value Concept

From an appraisal perspective SBE, Rule 2¹² is relatively straightforward and succinct. The Rule simply requires that, for ad valorem purposes, a property be valued at "fair market value". In the Rule, *fair market value* is stated to be synonymous with "full value," "full cash value," "cash value," and "actual value."

⁹ Assessors' Handbook, Section 501 - Basic Appraisal, California State Board of Equalization, September, 1997

¹⁰ Assessors' Handbook, Section 502 - Advanced Appraisal, California State Board of Equalization December, 1998

¹¹ Assessors' Handbook, Section 566 - Assessment of Petroleum Properties, California State Board of Equalization, August, 1996 (Revised January, 1999)

¹² Title 18, CCR, Section 2

Rule 2 is derived from Section 110 of the California Revenue and Taxation Code, which defines *fair market value* as:

*"...the amount of cash or its equivalent which property would bring if exposed for sale in the open market under conditions in which neither buyer nor seller could take advantage of the exigencies of the other and both with knowledge of all of the uses and purposes to which the property is adapted and for which it is capable of being used and of the enforceable restrictions upon those uses and purposes."*¹³

Rule 2 rephrases the definition as follows:

*"... the price at which a property, if exposed for sale in the open market with a reasonable time for the seller to find a purchaser, would transfer for cash or its equivalent under prevailing market conditions between parties who have knowledge of the uses to which the property may be put, both seeking to maximize their gains and neither being in a position to take advantage of the exigencies of the other."*¹⁴

In this respect, SBE Rule 2 is functionally identical¹⁵ to commonly accepted appraisal practice regardless of the type of property. There is no distinction to petroleum properties. The language regarding **fair market value** rests on at least two California Supreme Court decisions.

*"...the highest price estimated in terms of money which the land would bring if exposed for sale in the open market, with reasonable time allowed in which to find a purchaser, buying with knowledge of all of the uses and purposes to which it was adapted and for which it was capable of being used...the highest sum which the property is worth to persons generally..."*¹⁶ [Emphasis Added]

The Heilbron language remains a standard and is probably the antecedent of many of the definitions in use today. It is succinct yet descriptive, with a relative economy of words but enough elasticity in the terms and phrases to allow broad application. The reference to "persons generally" is often overlooked but it is essential to a clear understanding of market value.

In 1955 the California Supreme Court amplified the statutory definition of market value (Heilbron) as follows:

¹³ R&T Code Sec. 110

¹⁴ Title 18, CCR, Section 2

¹⁵ The re-phrasing of the FMV definition in Rule 2 from the R&T Code provides an interesting sidelight to arguments often raised by appraisers for assessors regarding semantic nuances and other differences in language between petroleum industry definitions proved reserves and the corresponding definitions offered in California property tax practice.

¹⁶ Sacramento Southern R.R. Co. v. Heilbron 156 Cal. 408, 104 p. 979 (1909)

"... the price that property would bring to its owner if it were offered for sale on an open market under conditions which neither buyer nor seller could take advantage of the exigencies of the other. It is a measure of desirability translated into money amounts...and might be called the market value of property for use in its present condition."¹⁷

The definition of (Fair) Market Value found in the *The Dictionary of Real Estate Appraisal*(DREA) is apparently rooted in Heilbron, but differs in some interesting ways:

"The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale, with buyer and seller each acting prudently, knowledgeably and for self-interest, and assuming that neither is under undue duress."

In 1990, the federal government required the creation of appraisal standards that came to be known as the Uniform Standards of Professional Appraisal Practice (USPAP).¹⁹ The creation of the standards resulted in a definition of market value that would be and is now used by agencies that regulate federal financial institutions in the United States.²⁰ The federal standard, adopted by USPAP, states:

"The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus."

Definitions of market value in petroleum industry literature are sparse at best. Perhaps this reflects the concentration within industry on valuation for internal purposes. Estimation of market value within industry is generally limited to the relatively small segment comprised of consultants, bank engineers, and tax appraisers who practice in specific areas and adopt the definitions applicable to their specialty and jurisdiction. A definition commonly used in the oil industry, is as follows:

¹⁷ DeLuz Homes, Inc. v. County of San Diego, 45 Cal. 2d 546, 561-62

¹⁸ *"The Dictionary of Real Estate Appraisal,"* Second Edition, American Institute of Real Estate Appraisers, Chicago, Il., 1993, pg. 192

¹⁹ *"Uniform Standards of Professional Appraisal Practice,"* 2003 Edition, Appraisal Standards Board, Washington, D.C., 2003

²⁰ USPAP contains an entire section, *Standard 6: Mass Appraisal, Development and Reporting*, that is ignored in California tax practice.

"...the amount a willing buyer will pay a willing seller, with the property or interest exposed to market for a reasonable period, neither the buyer nor the seller under any compulsion to buy or sell, both being competent and having reasonable knowledge of the facts."²¹

This quote is not attributed but is essentially the same language as the definition offered by other writers that occur throughout industry literature. Arps,²² in writing about oil property valuation and determination of Fair Market Value, states:

"...Fair market value of an oil- or gas-productive property, as commonly understood, is 'the price at which a property would be sold by a willing seller to a willing buyer, neither being under compulsion to buy or to sell, and both being competent and having reasonable knowledge of the facts.'

" The Arps quote is not attributed to a prior author.

Comparisons of these definitions reveal some semantic but no functional differences from each other or from Rule 2. This would suggest that the concept of market value for ad valorem tax appraisal in California is coincident with the existing legal, real estate, and petroleum industry concepts of market value. The language of Rule 2 would necessarily preclude the valuation of a property under any conditions that are not extant in the marketplace at the time of the appraisal. For ad valorem tax purposes, the date of appraisal is the annual lien date, currently January 1 of each year. By definition, this condition would require that the appraiser not only have access to and knowledge of prevailing market conditions, but the appraiser must also be able to emulate those market conditions in valuing the subject property. This is true of all appraisal practice.

Through the language of Rule 2 and the reliance of the rule on Heilbron, DeLuz, and other related decisions, two important conditions are imposed on the appraiser.

First, properties are to be valued individually. While mass appraisal techniques may be employed, each property is to be valued based on the characteristics of that property. The requirement is recognized by the assignment of an Assessor Parcel Number (APN) to individual properties and is elaborated in SBE publications by reference to the appraisal unit as the property unit most likely to be traded in the market.²³

²¹ "Which Fair-Market-Value Method Should You Use?," Garb, Forrest A., Journal of Petroleum Technology, January, 1990, pg. 8

²² "Valuation of Oil and Gas Reserves," Arps, Jan J., in Petroleum Production Handbook, Vol. II, Thomas C. Frick, Editor in Chief, McGraw Hill, 1962, pg. 38-5. **See also;** "Valuation of Oil and Gas Reserves," Garb, Forrest A., and Larson, Timothy A., in Petroleum Production Handbook, Chapter 41, Howard B. Bradley, Editor-in-Chief, Society of Petroleum Engineers, Richardson, TX, 1987, pg. 41-2

²³ Assessors' Handbook, Section 502 - Advanced Appraisal, California State Board of Equalization December, 1998, pg. 1-3

Second, the fair market value of the appraised property is the value to "*persons generally*." It is not the value of the property to specific persons, whether individuals or corporations, for purposes that are not common to other persons in the marketplace for that property. Further, the value is the value to the market, not the value to the current owner or interest holder.

These two conditions are fully consistent with generally accepted appraisal practice and would be incorporated into any appraisal of oil and gas property conducted by a knowledgeable and experienced appraiser. Court opinions that refer to Rule 2 or the underlying California laws have reinforced the validity of the value concept expressed in Rule 2 and, thereby, in appraisal practice.

There is an additional caveat imposed by the definitions of market value, whether from SBE rules or appraisal practice, which directly affects the collection and use of market data in the appraisal process. That caveat is that not every transaction is necessarily representative of the market for, in this case, petroleum properties. There are clear conditions in the definitions that would preclude the use of some transactions from a study of market sales. As noted by Walton:²⁴

".... market value is the value in exchange under certain conditions. Each selling price an appraiser uses as an indication of market value should be investigated and studied to determine whether or not the required market value conditions are met. The absence of any of the conditions stipulated in the market value definition does not necessarily mean the sale is not indicative of market value. It merely means that the appraiser must determine whether or not the lack of this condition influenced the selling price. For example, investigation might disclose that the sale price agreed upon by relatives may not have been affected by the fact that the parties are related."

By the same reasoning, transactions in which the conditions are at variance with the requirements of market value may not be good sources of market data. There is room for discretion here but that discretion is bounded by reference to other market benchmarks and to common sense.

SBE Rule 8: The Income Approach to Value

SBE Rule 8 is the only one of the three SBE valuation rules (Rules 4, 6 and 8) that has application to the appraisal of oil and gas properties. The overriding reason is that, in the marketplace, oil properties are valued by the income approach, virtually to the exclusion of other methods.²⁵ Rule 8 describes the use of the Income Approach to value, which consists of two elements: (1) an estimate of future income from the property being appraised and (2) the reduction of that income stream to a cash equivalent present value through the use of a yield rate.

²⁴ Assessors' Handbook, Section 501 - General Appraisal Manual, California State Board of Equalization, March, 1975 (Revised September, 1982) pg. 8

²⁵ Assessors' Handbook, Section 566 - Assessment of Petroleum Properties, California State Board of Equalization, August, 1996 (Revised January, 1999), pg. 8-1 Chapter 8: Petroleum Property Appraisal Methods. This section refers only to discounted cash flow.

The text of Rule 8 is divided into nine paragraphs [(a) through (i)], which describe various components of the estimated income stream [paragraphs (c), (d) and (e)] and the capitalization rate [paragraph (g)].

Components of the Income Stream

Paragraph (c) describes the income stream as follows:

*“The amount to be capitalized is the **net return** which a reasonably well informed owner and reasonably well informed buyer may anticipate on the valuation date that the taxable property existing on that date will yield under prudent management and subject to such legally enforceable restrictions as such persons may foresee as of that date.”* [emphasis added]

The conspicuous term is *net return*, which is defined in the paragraph as:

*“**Net return**, in this context, is the difference between gross return and gross outgo.”* [emphasis added]

Where **gross return** is: *“Gross return means any money or money's worth which the property will yield over and above vacancy and collection losses, including ordinary income, return of capital, and the total proceeds from sales of all or part of the property.”* [emphasis added]

and where **gross outgo** *“...means any outlay of money or money's worth, including current expenses and capital expenditures (or annual allowances therefor) required to develop and maintain the estimated income. Gross outgo does not include amortization, depreciation, or depletion charges, debt retirement, interest on funds invested in the property, or rents and royalties payable by the assessor for use of the property. Property taxes, corporation net income taxes and corporation franchise taxes measured by net income are also excluded from gross outgo.”*[emphasis added]

In oil²⁶ property appraisal, Gross Return is the anticipated gross income from the sale of crude oil, natural gas, and any other products obtained from the property. While the construction of this component can be debated by knowledgeable appraisers, that debate would occur irrespective of the language of Rule 8(c) and should reflect the prevailing views held by appraisers of (a) expected production, (b) available markets for the sale of oil, gas and/or other products, and (c) the market pricing of those products.

²⁶ Hereinafter, the term oil shall be considered to include crude oil, natural gas, and any other product subject to valuation unless reference to a specific product is necessary.

The Gross Outgo component requires deliberate consideration. That is best done by examining each element. Gross Outgo includes "...any *outlay of money... including current expenses and capital expenditures required to develop and maintain the estimated income.*" In terms of oil property appraisal, these terms are understood to be (i) the ongoing operating costs for the property including the costs of production, royalties, taxes, recurring liabilities, and a certain amount of overhead, and (ii) the capital expenditures necessary to (a) drill and complete new wells, (b) repair and maintain existing wells, and (c) repair, maintain and, as necessary, replace surface equipment. If this statement were the entirety of Rule 8(c) regarding Gross Outgo, Rule 8 would not differ from general appraisal practice.

Of more particular interest and importance are the items that are not to be included in Gross Outgo, which are listed as:

- Amortization
- Depletion and Depreciation
- Debt Retirement
- Interest on funds invested in the property
- Rents and/or royalties paid for the use of the property
- Property Taxes
- Corporate Income Taxes
- Franchise taxes measured by net income

Amortization - While normally thought of an income tax context, along with depletion and depreciation, amortization does have a pre-tax connotation related to the repayment of debt and/or equity contributions to the investment in the property. In combination with the prohibition of debt retirement, the restriction against amortization means that the principal amount of any investment, whether from debt or equity, cannot be deducted as a cost or as "outgo" from the Gross Return.

Depletion and Depreciation - In an Income Approach evaluation, these are accounting devices that pertain primarily to income tax calculation. Since income taxes are not allowed as a deduction, the prohibition against Depletion and Depreciation reinforces that issue.

Debt Retirement - Repayment of debt, whether incurred for the property or some other purpose, cannot be deducted as Outgo from the income stream. This means that the appraiser/assessor cannot assume that all or a portion of the income stream is used to repay debt; i.e. the principal payments to the lender cannot be deducted from the income stream. The rationale is obvious in that the ability to borrow funds for investment and the terms of that borrowing are not a function of the property but rely largely on the credit-worthiness of the borrower. In order to allow debt retirement to be a deductible cost for valuing properties for property tax, the appraiser would have to impose uniform financing terms on all properties. While possible, such an effort would present a complication that is not necessary and a process that may not be reflected in the marketplace, particularly for types of

properties that are not commonly financed.

Interest on Invested Funds - If debt is not allowed as a deduction, it follows that interest payments would not be allowed as a deduction from income.

Rents and Royalties - Paragraph (c) attaches a small caveat to the prohibition regarding rents and royalties by referring to their payment “*for the use of the property.*” It could be argued, at least in the abstract, that royalties on oil and gas properties are not paid for the use of the land, but are instead paid as compensation for a lease of the right to produce and sell hydrocarbons where the use of the land may be necessary but is not the subject of the lease nor the purpose of the royalty. Further, the common construction of oil and gas leases is that the lease, and therefore the right to produce, is terminated if there is a failure to pay the royalty, which in turn suggests that the royalty is “*required...to maintain the estimated income.*” The issue is made moot by the practice of valuing the 100% mineral interest irrespective of royalty and leaving the allocation to the taxpayer.

The important effect of the prohibition against deduction of royalty is that it lengthens the economic life of a property by reducing the economic limit of production. Since the economic limit is the point at which Outgo exceeds Income, any production after that time would have no value in the Income Approach. The removal of royalty as a cost element artificially extends the economic life of the property and has the effect of adding value to a property which value may not be recognized by the market. While this incremental value may be small in comparison to the value of the preceding income stream, it may also have the effect of artificially extending the point where abandonment and other liabilities would become significant impacts on value.

Property Taxes - The prohibition against deducting property taxes from a projected income stream should be obvious, since the objective of the assessment appraisal process is to estimate the value on which the tax is assessed. The tax, in theory, is based on the appraised value, so that deduction of estimated annual property tax from the income stream presupposes that a value has already been established. In current practice, assessors theoretically recapture the estimated tax deduction by adding 1% to the discount rate. It could be argued that property tax is a predictable expense that is required to maintain the estimated income, but even if this is accepted as an argument, the property tax expenditures are not in the class of other operating costs. It has also been argued that the 1% factor is insufficient to reflect market estimates of property tax.

Corporate Income Taxes and Franchise Taxes - In the appraisal of oil properties for ad valorem tax, the assessor is not allowed to deduct from the income stream any taxes related to the income produced. There is considerable logic to this requirement. First, income taxes, whether at the Federal, state, or local level, are paid by corporations and/or individuals - not by properties. Thus, even though XYZ Oil Company may receive revenue from 10

different oil properties, it is the aggregated income of the corporation, subject to numerous deductions and adjustments, that is the basis for the income tax - not the income from the individual properties. While some states may tax income produced in their own jurisdiction, the state tax is usually a derivation of the federal tax.

Second, corporate income taxes, including franchise taxes, are not uniform but vary from corporation to corporation, state to state, and year to year. This occurs because (1) tax rates are progressive, (2) allowed deductions and credits vary from company to company, and (3) tax laws that prescribe certain tax treatments in one year may be changed the next year. These circumstances would preclude construction of a method of estimating and deducting income taxes at the level of property income.

The result is that the income stream to be used for property tax assessment must be a “*before-income tax*” or “*pre-tax*” income stream.

Discount Rates

Paragraph (g) of Rule 8 begins with the statement: “*The capitalization rate may be developed by either of two means:.....*”

In real estate appraisal, the term “*capitalization rate*” is usually defined to refer to the Direct Capitalization process. However, it has become established through common usage, and by publications of the SBE, that Rule 8(g) also collectively includes “*yield rates*” and, since oil and gas properties are characterized by Yield Rates rather than Direct Capitalization rates, Rule 8(g) is always interpreted in terms of Yield Rates for the appraisal of oil and gas properties.

The salient and operative premise of Rule 8(g) is that the appraiser is directed to go to the marketplace to **develop** the capitalization rates that are used to discount expected future income. While the appraiser may have leeway in the preceding paragraphs to construct an income stream based on the characteristics of the property, mixed with the professional judgement of the appraiser, paragraph (g) is unequivocal in requiring that discount rates be obtained solely from market sources.

In general terms, the two methods referred to in Rule 8(g) are the *Market Derived* method and the *Cost-of-Capital* method. Sub-paragraph (1) refers to the **Market Derived** method:

“By comparing the net incomes that could reasonably have been anticipated from recently sold comparable properties with their sales prices, adjusted, if necessary, to cash equivalents (the market-derived rate). This method of deriving a capitalization rate is preferred when the required sales prices and incomes are available. When the comparable properties have similar capital gains prospects, the derived rate already includes a capital gain (or loss) allowance and the income to be capitalized should not include such a gain (or loss) at the terminus of the income estimate.”

This paragraph is rather complex and is easily misunderstood unless the conditions specified in the paragraph are parsed into the important operable terms. Rule 8(g)(1) requires that discount rates used for ad valorem tax appraisal, and derived from market transactions, meet certain conditions. The important part of the paragraph is the first sentence, which can be broken down into five parts:

- Reasonably anticipated net incomes
- Sales Prices (for the property)
- Adjusted to Cash Equivalents
- Recently sold
- Comparable properties

The first three parts are basic appraisal analysis of market sales and contemplate the calculation of a yield rate from the sales price and the projected income stream.

Reasonably anticipated net incomes - In common practice, an appraiser may have access to the sales price of a particular property, but quite often, in the case of income producing properties, he or she may not be able to obtain information about the projected income stream. In such cases, the appraiser would have to use experience and judgement along with such data as is available to construct a reasonably anticipated income stream. This is a difficult process for any income approach evaluation but is particularly difficult for oil and gas properties with the large number of variables that must be considered. In California, however, buyers of oil and gas properties must submit information to the assessor regarding every transaction. The standard Change of Ownership Statement (COS) requires the submission of the income projection (evaluation) used to determine the purchase price of the property, assuming that an evaluation was conducted. This information includes the projection of net income anticipated by the buyer for the acquired property. This reporting removes the necessity for the appraiser to create artificial income projections, which, no matter how well constructed, could not be the same as the income stream projected by the buyer.

Observation of income projections obtained from the market indicates that, in some respects, the projections do not comply in all particulars with Rule 8 paragraphs (c), (d) and (e). In many cases the buyers' evaluations are done with deductions of royalties, property tax, and income tax, while others may include deductions for loan repayments and interest. For the most part, the deviations from paragraphs (c-e) do not create an impasse. Virtually all the after-income tax projections also include a pre-tax income projection, which can be used for comparison to the sales price. Projections that deduct royalties and property tax can also be used to derive discount rates based on the recognition that the evaluations were not done for property tax appraisal purposes but for the business investment purposes of the buyer.

While there is no question that inconsistencies between market projections and the Rule 8 requirement exist and result in some concerns about application of the derived discount rates,

the fact is that valuations done in the market are not uniform, and comparison of one property to another often shows large differences in product prices and operating costs that are of greater impact on value than the Rule 8(c-e) inconsistencies would produce. Further, the objective of the exercise is to derive the discount rate or the return that is (was) acceptable to the buyer based on his, not the Rule 8, perception of the property and income stream.

Sales Price - The price for which the property sold is usually established rather easily. Assuming that the transaction meets the conditions of fair market value, the use of the purchase price reported on the COS is justified.

Adjusted to Cash Equivalents - Common appraisal practice requires that all purchase prices be made equivalent to cash at the date of the transaction. This is very simple if the transaction is done for cash. If other components are included in the price, then the cash equivalent value must be determined. Some oil property transactions include provisions for payment of additional amounts based on future production and/or product price changes or require specified expenditures for liability reduction. The requirement in Rule 8(g)(1) for cash equivalence means that the appraiser must determine how to treat these components given the information available. Current SBE instructions are consistent with accepted appraisal practice and provide methods for equating stock, incremental payments and other components to cash.²⁷

Recently Sold - Generally accepted appraisal practice assumes that property value and indicators of value change with time and that, when extracting data from market transactions for use in an appraisal, the data obtained from the transaction closest in time to the appraisal date would be more relevant than derived data more distant in time. It is also apparent that *recent* is a relative term. Rule 8(g)(1) makes no effort to define *recent* in terms of days, months, or years. Neither does appraisal practice. This is a rational consideration when defining discount rates for an income approach appraisal since the discount rate may or may not be time or date-of-sale dependent. While *recent* implies a transaction occurring at approximately the same time as the intended appraisal, the lack of definition suggests that the application of the term may depend on the type of transactions being studied and that some judgement by the appraiser is necessary. The term *sold* precludes use of transactions occurring after the appraisal data.

Comparable Properties - In the context of Rule 8, this term can only be interpreted to mean properties of the same type as that being appraised. That is, one would not derive discount rates from transactions involving office buildings, dairy farms, or electric power plants for application to oil and gas properties. While each of these types of properties share some

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Assessors' Handbook, Section 503 - Cash Equivalent Analysis, California State Board of Equalization, March, 1985

common aspects, such as dependence on future income, the components and structure of those income streams may, and generally do, differ considerably.

In the application to oil property appraisal, the *comparable properties* aspect has been the subject of considerable speculation and discussion.²⁸ It is entirely possible that in the context of oil properties, *comparable properties* could be defined as those that share certain characteristics, so long as a clear relation can be drawn between the characteristics and the derived discount rate(s).²⁹

The second sentence of (g)(1) indicates that the Market Derived source is the preferred method when data is available. Rule 8(g)(1) is a comprehensive articulation of common appraisal practice that only requires that the appraiser obtain from the marketplace information that allows the derivation of capitalization or discount rates that are representative of the economic and financial rates of return anticipated by buyers of oil properties in the marketplace. It is not unreasonable to presume that Rule 8(g)(1) recognizes that the reasonably anticipated income streams obtained from the market would differ by degrees from (a) each other, and (b) from the conditions imposed by Rule 8(c-e). Nonetheless, there is no suggestion in Rule 8(g) that the data derived from the marketplace should be altered or adjusted in any way.³⁰

Sub-paragraph (2) refers to the **Cost-of-Capital** method of deriving discount rates:

(g)(2) *“By deriving a weighted average of the capitalization rates for debt and for equity capital appropriate to the California money markets (the band-of-investment method) and adding increments for expenses that are excluded from outgo because they are based on the value that is being sought or the income that*

²⁸ Some evaluators have attempted to apply the Comparable Sales approach to the valuation of oil and gas properties, generally without success. These attempts have usually been based upon the ratio of the cash equivalent purchase price to the volume of reserves purchased with adjustments to be applied related to the physical and economic conditions among the so-called comparables. Only one of these attempts achieved any recognition and that was a methodology explained in, *“Valuation of Oil and Gas Reserves by the Comparative Method,”* SPE 18907, Strevig, William E., March 30, 1993, Dallas, TX. Two issues arise in these attempts to use Comparable Sales. First, the data for the basic ratio and the necessary adjustments is rarely available. Second, if available, it is drawn from Income Approach appraisals which, in itself, illustrates the futility of the Comparable Sales method. In *Texaco Producing v. County of Kern*, consultants for the assessor put forward a comparable sales methodology for the assignment of discount rates but it was rejected by the Assessment Appeals Board.

²⁹ Statistical analysis has revealed that there is no relation between the individual and/or collective (1) physical characteristics of a property and/or (2) the economic parameters of the appraisal and the discount rate except the perceived risk of attaining the projected production. See *“Statistical Analysis of California Oil and Gas Property Transactions,”* September 28, 2001 prepared for WSPA/CIPA by Richard J. Miller & Associates, Inc.

³⁰ In fact, reliable opinion suggests that “adjustments” are prohibited. See communication: Johnson, Richard C., Deputy Director, Property Tax Department, SBE to Davis, C. Stephen, dated November 29, 1999.

*is being capitalized. The appraiser shall weight the rates for debt and equity capital by the respective amounts of such capital he deems most likely to be employed by prospective purchasers.”*³¹

There are several operative phrases that must be considered in this paragraph. The method calls for the derivation of a discount rate based on (1) a weighted average of the capitalization rates for (a) debt and (b) equity; and (2) weighting of the rates based on the “...*respective amounts of such [debt and/or equity] capital... most likely to be employed by prospective purchasers.*”

There is a reference to “*California money markets,*” but there is no such thing. In 1982 when Rule 8 was last amended, it may have been possible to delineate mortgage interest rates for homes or other investments as unique to California, but debt and equity markets are now national, if not international, so the California reference is anachronistic.

As in Rule 8(g)(1), the language refers to *capitalization rates*. The term would be appropriate only for valuation of a fixed income stream. As noted above, the use of Yield Rates for valuation of oil properties is recognized as the correct approach. As a Yield Rate is used to reduce future income to a present value, the rate is not historical but must be forward looking.

Capitalization Rate for Debt - Ordinarily, the Yield Rate for debt is the prevailing and expected interest rate on debt used for oil property investment. The interest rate on such debt normally depends upon the source of funds and the intended use. Appraisal practice usually assumes that the debt is mortgage financing, institutional financing from banks or other sources, for investment in a specific property. The specific property condition is necessary because appraisal practice treats each property on a stand-alone basis. However, Rule 8(g)(2) does not explicitly make that assumption but simply refers to rates for debt.

Capitalization Rate for Equity - Real estate appraisal practice assumes that debt rates can be readily determined but that equity returns must be derived primarily through elaborate calculation procedures. Rule 8(g)(2) provides no guidance regarding the derivation of equity returns. SBE has provided guidance in this area through AH 502³² and AH 566,³³ which recognize the derivation of equity yield rates from calculation methods commonly used in financial analysis.

³¹ Title 18, CCR, Section 8(g)

³² Assessors’ Handbook, Section 502 - Advanced Appraisal, California State Board of Equalization December, 1998, pg. 96

³³ Assessors’ Handbook Section 566 - Assessment of Petroleum Properties, California State Board of Equalization, August, 1996 (Revised January, 1999), pg. C-1

Weighting of Debt and Equity Rates - While the first sentence of (g)(2) is very general in its direction to use appropriate debt and equity rates, it is left to the second sentence to provide a context for those rates. In the second sentence, the appraiser determines the respective amounts of debt and equity capital that would be most likely to be employed by prospective purchasers of the type of properties being appraised. The partial phrase “*type of properties being appraised*” is not in the text of (g)(2) quite possibly because it was not considered necessary from an appraisal perspective. One would not extract information regarding the financing of oil properties from market data for financing apartment buildings and, as written, (g)(2) is reflective of that condition. It may also be that in writing (g)(2), the assumption continued to be that all acquisitions were financed by mortgage debt and investor’s equity and that either (a) appraisers would recognize the differences in financing of differing types of properties and would use data appropriate to the property being appraised, or (b) that no significant difference was expected, so a requirement to refer to the form of financing of particular types of properties was judged unnecessary. The latter condition may be a safe assumption for common forms of real estate, which are often financed with a large debt component, however, it seems to ignore the potential disparity among the perspectives of equity investors in differing types of properties, particularly those for which debt financing is not the dominant source of investment capital. Bringing the argument full circle, it is incumbent upon the appraiser to use good judgement to ascertain whether financing might differ for different types of properties and then to collect data from the market regarding financing of those properties.

First, who are *prospective purchasers*? A review of historical transactions shows that the prospective purchasers of oil properties are companies and/or individuals who are in the business of operating oil and gas properties. Rule 8(g)(2) requires that the appraiser gather data regarding property acquisition financing from prospective purchasers; in other words, from those entities who by previous actions or predilection are most likely to represent the market for oil and gas properties. In order for these “*prospective purchasers*” to be useful sources of data, they must be companies and individuals whose purpose in acquiring the property is to benefit from the future income from the property and who value the property based on that future income. This would preclude certain types of transactions from being considered.

Second, the respective amounts of debt and equity “*most likely to be employed*” could reasonably be expected to be the relative proportions of each used in previous transactions for similar properties. The phrasing here seems to give leeway to the appraiser to select the amounts of debt and equity capital through the use of experience and judgement. While both these attributes should always be a part of appraisal practice the “*prospective purchasers*” condition specifically limits the freedom on the appraiser.

Fortunately, the appraiser is aided substantially by the information collected by most county assessors as part of the Change in Ownership Statement (COS) filing, which requires the buyer to summarize the financing of the transaction being reported, including but not limited to, (a) the amount and source of any debt financing, (b) the term of the financing and interest rates, and

(c) any other relevant data that is requested. This information provides a convenient source for determining the amounts of debt and equity financing used to acquire oil and gas properties. That information may then be used to derive a discount rate under Rule 8(g)(2) for use in an income approach appraisal.

In those circumstances where there is no specific financing and the investment capital comes from internal company sources, it may be necessary for the appraiser to satisfy the requirements of (g)(2) through the use of methods developed for financial management. Fortunately, these methods have been adapted to real estate appraisal as described by SBE in several sections of the Assessors' Handbook and other sources.^{34, 35, 36,37}

Third, weighting based on respective amounts of debt and equity then becomes relatively simple. Once the amounts of debt and equity used by prospective purchasers of oil and gas properties have been determined, it remains only for the appraiser to calculate the percentage of debt and equity most likely to be used and to then use the proportion of debt and equity to weight the respective rates. This is a textbook weighted average cost-of-capital approach to estimating discount rates.

The Rule 8(g)(2) approach is fully consistent with accepted appraisal practice and is also identical to financial management methods of calculating the weighted average cost-of-capital for corporate investments. The confluence of appraisal and financial methodology in (g)(2) should be expected, but it is particularly important for use in oil property appraisal. While the language of the Rule is not specific, interpretation of Rule 8 by SBE establishes that corporate financing is the source of investment funds in the oil and gas industry and that financial management methods of estimating debt and equity returns are appropriate to satisfying the requirements of Rule 8(g)(2).

Comparability of Discount Rates

Rule 8(g) describes two methods of estimating discount rates for use in an Income Approach. The *market derived* method is preferred when data is available. This is appropriate and reflects generally accepted appraisal practice. However, while preference is given to direct market data, there is no suggestion that (1) the appraiser should not attempt to derive discount rates from both sources, or

³⁴ Assessors' Handbook, Section 502 - Advanced Appraisal, California State Board of Equalization December, 1998, pg. 95

³⁵ Assessors' Handbook Section 566 - Assessment of Petroleum Properties, California State Board of Equalization, August, 1996 (Revised January, 1999), pg. C-1

³⁶ "Deriving Discount Rates Using the Board of Investment or the Weighted Average Cost of Capital," Remsha, Michael J., American Appraisal Associates, Inc. January, 1998, also

³⁷ "Manual for Discounting Oil and Gas Income," Texas Comptroller of Public Accounts, Property Tax Division, 1999, Austin, TX.

(2) that the two sources should not produce similar results. The language of Rule 8(g) does not suggest that the use of (g)(2) should be expected to produce a lower or higher discount rate than (g)(1). It must be assumed that the instructions in (g)(1) and (g)(2) are intended to produce consistent results. Given the power of the discount rate in the income approach to value, it would not be reasonable to encourage estimation of two different rates that might produce significantly disparate appraisal values. This is also consistent with appraisal practice. Further, it should be expected that, for property tax appraisal, the discount rate should represent market value. With that as the goal, the tax appraiser should anticipate that correctly derived rates from either method should be, if not identical, at least reasonably close. It would not be rational to employ a system that would encourage estimation of rates that are significantly different and then allow the appraiser to apply one rate or the other for property tax assessment.

A review of financial management and appraisal literature indicates that individual property valuations should be expected to reflect higher risk than would a discount rate defined from a cost-of-capital approach. It also seems apparent that, since debt providers are inherently risk averse, the difference in risk is generally accumulated in the equity rate-of-return. The appraiser recognizes this relation by adjusting the equity portions of the cost-of-capital accordingly.

Conclusions regarding Rule 8

From an appraisal perspective, Rule 8 is relatively straightforward in defining the Income Approach to value in a manner that is consistent with appraisal practice. The caveats in Paragraphs (c), (d) and (e) require some discretion on the part of the appraiser in building the projected income stream for the property. There may be some concern that the income stream as constructed may not perfectly reflect the evaluation practices of the marketplace, but the differences, such as not allowing deduction of property taxes or income tax, are not insurmountable. A more significant issue occurs with regard to discount rate derivation using paragraph (g).

Rule 468 - Oil and Gas Producing Properties

Rule 8 is a general rule that defines the Income Approach and its application to the appraisal all appropriate properties. Rule 468³⁸ is a specific instruction that recognizes the particular and somewhat unique issues associated with the appraisal of oil and gas properties. Rule 468 is composed of three paragraphs; (a), (b) and (c). Paragraph (c) has reference to the management of property values relative to Propositions 13 and 8 and is not further discussed here. Paragraphs (a) and (b) are of significant importance for understanding the appraisal aspects of the rule.

"(a) The right to remove petroleum and natural gas from the earth is a taxable real property interest. Increases in recoverable amounts of such minerals caused by changed physical or economic conditions constitute additions to such a property interest. Reduction in recoverable amounts of minerals caused by production or changes in the expectation of future production capabilities constitute

³⁸ Title 18, CCR, Section 468

a reduction in the interest. Whether or not physical changes to the system employed in recovering such minerals qualify as new construction shall be determined by reference to Section 463(a).

(b) The market value of an oil and gas mineral property interest is determined by estimating the value of the volumes of proved reserves. Proved reserves are those reserves which geological and engineering information indicate with reasonable certainty to be recoverable in the future, taking into account reasonably projected physical and economic operating conditions. Present and projected economic conditions shall be determined by reference to all economic factors considered by knowledgeable and informed persons engaged in the operation and buying or selling of such properties, e.g., capitalization rates, product prices and operation expenses."

Paragraph (a) asserts that it is the right to remove oil and gas, presumably by production, that is the taxable interest. It is clearly established that the value of the property is based on the recoverable amounts of oil and gas and that changes in value are based on variations in the recoverable volumes due to "*changed physical or economic conditions.*" The line should probably read "...and/or..." rather than just "...or..." since a variety of physical and economic changes can occur simultaneously.

It is paragraph (b) that provides the direction to the appraiser for valuing an oil property. There are four major points to be considered:

First, the value of the property mineral interest is based on the estimated value of the volumes of *proved reserves*.

Second, the value of the *proved reserves* is determined by projecting future production and economic conditions to create an income approach valuation of the future recovery. The value of the future income stream is the value of the proved reserves.

Third, the volume of *proved reserves* and the estimate of future production are to be based on reasonably projected physical and economic operating conditions.

Fourth, the projected economic conditions are to be determined by accessing the marketplace for oil properties to determine how buyers and sellers value properties.

The premises of Rule 468(b) are entirely consistent with marketplace appraisal practice for oil and gas properties that define the value of the property by projecting an income stream to be received from development, production, and sale of the crude oil and/or natural gas from the property.

It is useful to review the language of Rule 468(b) to fully understand the process to be followed by the appraiser. There are several important conditions to be examined:

- Market Value
- Proved Reserves
- Reasonably projected physical and economic operating conditions

- Present and projected economic conditions
- Economic factors considered by knowledgeable and informed persons
 - (a) capitalization rates
 - (b) product prices
 - (c) operation expenses

Market Value - The bedrock concept on which all appraisal practice and ad valorem tax valuation is built is that each individual property be appraised at the value that the property would bring in the marketplace. While the words used in the various definitions of market value discussed above may differ, the concept remains the same. This requirement is necessary to provide a sound basis for property tax assessments and to prevent the assignment of arbitrary values to properties.

Further, the requirement to estimate market value requires that the appraiser (1) be familiar with evaluation practices used by buyers and sellers in the marketplace, and (2) be able to apply those practices to appraisal for property tax. This means that the tax appraiser should adopt the methods and parameters extant in the marketplace as the foundation for valuing a property for tax purposes. To do otherwise would remove the “*market value*” aspect of the appraisal.

Proved Reserves - The term *proved reserves* is not capitalized in Rule 468(b). This is perhaps appropriate since to do so might imply that “*proved*” referred to a specific definition or had a particular connotation. Rule 468(b) defines proved reserves as:

“Those reserves which geological and engineering information indicate with reasonable certainty to be recoverable in the future, taking into account reasonably projected physical and economic operation conditions.”

This definition is fully consistent with both formal and informal marketplace usage. There has been an ongoing controversy among appraisers and others, representing taxpayers and assessors respectively, as to whether the definition contained in Rule 468(b) differs from the commonly accepted industry definition(s). This debate has produced numerous exchanges of opinion, written and otherwise, based solely on nuances and semantic differences between the industry and Rule 468 definitions. In these discussions, the Society of Petroleum Engineers (SPE)³⁹ definition is normally offered as the industry standard for comparison to Rule 468(b). While interesting, the debate is of academic rather than practical value.

The fact remains that, in order to estimate the market value of proved reserves for ad valorem tax, the appraiser must rely upon the definition of proved reserves used in the marketplace and then must adopt the terms and conditions that meet that definition. Further, the appraiser must conform to all the

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In the 1997 SPE definition: “Proved reserves are those quantities of petroleum, which by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under currently economic conditions, operating methods and government regulations.” Society of Petroleum Engineers, Richardson, TX 1997

parts of the market definition. He cannot substitute arbitrarily defined conditions for market conditions. The one fixed criteria governing the appraiser is to estimate the market value of the proved reserves. The only way to do that is to emulate the same criteria used in the market place, which includes the prevailing market definition of reserves.

Reasonably Projected Physical and Economic Operating Conditions - In the debate over Rule 468, the use of the term “*projected*” in the definition of proved reserves is often cited as a condition that sets the Rule 468 definition apart from the market or “*industry*” definition. From the appraisal perspective, this debate is a non sequitur. The use of the Income Approach to value requires that the appraiser make a projection of future production, prices, costs, capital expenditures, and any other physical or economic condition that may be relevant to estimating value. One cannot construct an income approach appraisal without making a “projection” of every component of the appraisal.

The important criteria is not that the physical and economic operating criteria are “*projected*,” but that they are “*reasonably projected*” based upon “*economic factors considered by knowledgeable and informed persons...*” This criteria is intended to prevent the imposition of production and economic criteria that would significantly alter the value of the property from the market valuation. By tying the projected conditions directly to the marketplace, Rule 468, as written, prevents the imposition of conditions not extant in the marketplace and, further, precludes interpretations that wander from the accepted market usage of terms such as *proved reserves*.

“Physical conditions” are (i) the future production rates for oil, gas and any other products, (ii) the methods of production necessary to achieve that production, (iii) any new drilling, maintenance, or other issues that are reflected in the production, (iv) the characteristics of the sources of the production (reservoirs) to the extent that those characteristics would relate to the size, shape and duration of the income stream, and finally, (v) any regulatory or other controls on the production and/or operation of the property that might alter the production performance of the property. While requiring some technical expertise to make the projections and to integrate reservoir characteristics into the evaluation, this problem is mitigated to a large extent by the consideration of proved reserves only. For the most part, proved reserves can be measured by extrapolation of existing production and/or by adding increments of production from the other proved reserves, subject to appropriate capital expenditures. Since the appraiser is not required to value income from Unproved reserves, the degree of technical expertise required is minimized.

Present and Projected Economic Conditions - The third sentence of 468(b) attempts to define present and projected economic conditions. The language and purpose is fully consistent with the use of the income approach and with common appraisal practice. Any estimate of future production, revenue, expense, or net income must start with a present condition and incorporate a projected condition. A distinction is often drawn here between the use of “*present and projected*” in Rule 468 and the use of “*current*” in the industry definition. From an appraisal perspective, the postulated difference is irrelevant since the governing criteria is the prevailing usage in the marketplace. Since market place appraisals of the income from proved reserves use all manner of present and projected economic conditions, the appraiser seeking market data must interpret that data in the context of the market place

not according to a unique interpretation of the SBE Rules.

Economic Factors Considered by Knowledgeable and Informed Persons - This is a direct referral of the appraiser back to the marketplace and serves as a connector to Rule 8(g), which also references “*knowledgeable and informed*” buyers and sellers in regard to discount rates. The terms are also a part of the definition of market value, so there is no question here that the control is the marketplace, not arbitrary economic or physical conditions.

The text then lists three examples of data to be obtained from the market. These are:

- Capitalization Rates
- Product Prices
- Operating Expenses

Capitalization Rates or Discount Rates are specifically covered in Rule 8(g) where the appraiser is required to obtain discount rates from the marketplace. The references to product prices and operating costs are necessary to protect against the use of arbitrary prices and costs. These three evaluation components are listed in Rule 468(b) as examples and should not be construed as the only parameters that should be obtained from the marketplace.

Combining Rule 8 and Rule 468

When the provisions of Rule 8 and Rule 468 are considered together, the general income approach application is coupled with specific rules for valuing oil and gas properties. The resulting appraisal methodology is fully consistent with (a) generally accepted appraisal practice, and (b) the common practices of (i) petroleum industry evaluators of properties and (ii) the operators, buyers and sellers of oil and gas properties. This must be so because, as noted previously, the primary requirement in ad valorem tax appraisal is to value each individual property at fair market value so that the tax may be assessed equitably.

The combination of the conditions imposed by Rules 8 and 468 provide a clear path for the evaluation of oil and gas properties. The criteria for developing an income stream in Rule 8(c-e) are amplified in Rule 468(b). Where Rule 8(c) defines “*gross return*” as including ordinary income, Rule 468(b) amplifies that definition by referring to “*...reasonably projected physical and economic operating conditions.*”

In Rule 8(c), as discussed previously, Gross Outgo is simply defined as the money outlay for current expenses and capital expenditures required to develop and maintain the estimated income. These are the operation expenses referred to in Rule 468(b). These expenses are not enumerated by Rule 8(c). To do so in a general rule would invite either a lengthy list or one which was incomplete for one type of property or another. Instead, the language depends upon the qualifying phrase, “*...required to develop and maintain the estimated income.*”

Rule 468(b) provides the detail indirectly by referring to operation expenses considered by (1) property operators, and (2) buyers and sellers of properties. By referring to expenses as defined by industry appraisal practice, the requirement of Rule 8(c) is met, as is Rule 468(b). Both are fully consistent with appraisal practice and, by definition, with market (industry) appraisal practice. It should be noted here that, in the context of property tax appraisal, operation expenses include (a) day-to-day lifting costs, (b) future development expenses, if any, and (c) costs of regulatory compliance, including abandonment, restoration & remediation (AR&R) liability coverage. The latter is made a part of the costs by the requirement in the DeLuz definition that market value is subject to “*regulatory restrictions*” and by the determination in Rule 8(c) that “*net return*” is “*subject to such legally enforceable restrictions as such persons may foresee as of that date.*”

In regard to the reasonably projected economic conditions, Rule 468(b) is even more explicit by defining “*present and projected economic conditions*” as being subject to those “*factors*” that would be considered by “*knowledgeable and informed persons*” who are “*engaged in the operation and buying and selling of such [oil] properties.*” These factors include, but are not limited to, “*...product prices and operation expenses.*” The specific reference to prices and expenses (along with capitalization rates) is reflective of the importance of those factors in the evaluation process.

Similarly, Rule 8(g) and Rule 468(b) are closely related, particularly through the preference in Rule 8(g)(1) for the market derived discount rate from actual transactions. This is echoed in Rule 468(b) by again referring to capitalization rates used in the marketplace by “*knowledgeable and informed*” persons. The preference for direct market data is, as noted previously, perfectly rational when the goal is to derive values for properties that reflect the market value of those properties. The approach taken in Rules 8 and 468(b) is entirely consistent with appraisal practice. It should be understood, however, that from the appraisal perspective, the use of market data from *knowledgeable and informed persons* is just as applicable to Rule 8(g)(2) as to (g)(1). The procedure in (g)(2) provides the financial foundation and rationale for the (g)(1) rates. Therefore, even if there were no data available to comply with (g)(1) as the preferred source, Rule 468(b) would still require the appraiser to examine the methodology used by knowledgeable and informed people to develop the discount rates used for valuing oil properties and to then extract appropriate discount rates. It is apparent that Rule 8(g) expects the two methods to yield the same result. This equality of outcome is assumed in Rule 8(g) through the recognition that cost-of-capital is the financial equivalent of a minimum return and that common financial practice would incorporate adjustment of expected returns to account for any risk in the income stream, with that risk to be reflected in an adjustment to cost-of-capital.

The continual referral in Rules 8 and 468 to extraction of data from market sources leaves no room in property tax appraisal for arbitrary or non-market components in an appraisal. There will always be minor issues to be considered, such as the proscriptions against deduction of property taxes from revenue, but these are generally compensated by other factors.

Conclusions

The foregoing reviews of SBE Rules 2, 8 and 468 leave no doubt that appraisal of oil and gas properties for ad valorem tax is entirely dependent upon (a) obtaining critical data from the marketplace for use in the appraisal and (b) emulation of the process of valuation employed in the marketplace. The use of Rules 8 and 468 to comply with Rule 2, and the requirement for valuation at fair market value, means that the appraiser must not only collect and extract evaluation parameters, such as discount rates, price projections, cost projections, etc, but must also then apply that market derived data to appraisals being done for tax assessments. This insertion of market data into the appraisal process must be done carefully to insure that the extracted data is applied in the same manner as it would be employed in the market. In this instance, some knowledge of and experience in the industry methods of property evaluation is essential to forming a proper framework for the emulation process. Further guidance in this process is provided by adherence to generally accepted appraisal practice and other sources.

When the objective of achieving market value is kept in focus, any attempt to introduce non-market data must be avoided. This is particularly true where actual market data is the primary source of information. In an actual transaction, the buyer and seller have come to a mutual determination of property value, by different paths and with differing motivations. The price determined by a transaction is the product of the components of the evaluations done by the buyer and by the seller. As noted in 468(b), these components consist, in general, of projections of production, prices, operating expenses (including capital expenditures) and capitalization rates. It must be assumed that these components are used for a reason by the buyer and that each is constructed and applied after consideration. That being the case, it follows that if any of the components are changed in any material manner, then the value that is estimated from those components must also change. Substitution of a different production projection or discount rate could significantly alter the value of the property.

Fortunately, the task of adhering to market conditions is facilitated by the reporting requirements under California law that are imposed on purchasers of real estate, including oil and gas properties. The data filing requirements include a summary of relevant information on the Change in Ownership Statement, which information consists of purchase price, property location, buyer and seller, brief property and production description and financing data. Of even greater importance, in many instances, are the supplementary documents that must also be filed including, but not limited to, (1) any engineering and economic evaluations done to aid in establishing the property value, and (2) the purchase and sale agreement. The COS and supporting files provide a view into the functioning of the oil property marketplace that cannot be gained elsewhere. The data collected over time from COS filings provide both a current assessment of market conditions and evaluation criteria, but also provide a means of comparing those criteria to general economic conditions over a period of several years. In those oil property transactions where engineering/economic evaluations have been conducted, direct information is available regarding price projections, treatments of operating costs and discount rates.

Part II - Transaction and Financial Market Information

A review of Rules 8 and 468, particularly paragraph (g) in the former and paragraph (b) in the latter, indicates the strong dependence of the appraisal process on data from the marketplace. Rule 8(g) divides the market into two parts, actual transactions for comparable properties and financial markets, while Rule 468(b) makes no distinction but simply refers to "*reference to all economic factors*" considered by "*knowledgeable and informed persons,*" etc. While market transactions are usually the best information, these transactions do not occur in a vacuum but are inextricably tied to, and are reflective of, the larger economy and particularly the capital markets. In that context, it is good appraisal practice to access both sources of data and to compare and integrate the results from each approach.

Extracting data from actual transactions is difficult under any circumstances, but is particularly so when the property has been evaluated by an engineering/economic projection using parameters that are not necessarily apparent to an observer. In many cases, even the purchase price is obscure. For California property tax purposes, this problem was at least partially resolved by a law requiring disclosure upon change of ownership. This was reinforced for oil properties by the decision in *Gulf v. Roberts*.⁴⁰ The Change in Ownership Statement (COS) filing requires that a buyer report an extraordinary amount of information about every transaction, regardless of size, to the appropriate county assessor. Many transactions occur without benefit of an engineering/economic evaluation, but those that do provide a useful window into the valuation of oil property in the marketplace. Unfortunately, this is a limited database, both in terms of numbers of transactions and access to the information.

On the other hand, data from capital markets is virtually unlimited and sometimes exceeds the ability of the appraiser to assimilate and use to advantage. Information regarding debt and equity markets, both raw and interpretative, is available in dozens of publications from local newspapers to analytical studies and reports. The advent of Internet-accessible data services and analytical software has made it possible for appraisers to accumulate and evaluate the capital market data necessary to develop discount rates that comply with Rule 8(g)(2).

Developing cost-of-capital information from appropriate money markets, while at the same time deriving information from actual transactions, allows the appraiser to compare the results and identify any differences between the discount rates obtained from the two sources. In this regard, it is useful to examine the results that have been obtained from actual transactions and from the money markets over the past 15-20 years. The primary source of information about transactions and money markets is the annual WSPA/CIPA Property Sales Study. Additional information is obtained from other reports and studies as noted.

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Roberts v. Gulf Oil Corporation (1983) 147 Cal. App. 3d 770, 796

The WSPA/CIPA Property Sales Study

Over the past 30+ years the Western States Petroleum Association ("WSPA", formerly the Western Oil & Gas Association) and the California Independent Petroleum Association ("CIPA") have sponsored an annual study of transactions involving the purchase and sale of oil and gas producing properties in California. The intended purpose and governing objective of the study has been, and remains, the collection and analysis of market transaction information that could be used to assist in the derivation of methodologies and parameters for use in the appraisal of oil and gas property for any market application. The transaction analysis and data derivation has not been controlled by any constraints imposed by regulatory requirements nor have the results been specifically constructed for use in any particular appraisal application.

The general procedure used for the study has been to (1) identify transactions involving the purchase and sale of oil properties in California, (2) to determine whether the transaction meets the accepted criteria for fair market value, and (3) to obtain from the buyer and the seller (as necessary) all relevant information regarding (a) the terms and conditions of the transaction, (b) the engineering and economic evaluation used by the buyer to estimate the purchase price of the property, and (c) such other data as may have utility in understanding the motivations and expectations of the buyer in acquiring the property. The results of this work have been published in an annual report and in various ancillary reports and professional papers based on or extracted from the annual study. The annual study has, over time, become known as the WSPA/CIPA Property Sales Study.⁴¹

The study is intended to be a true reflection of the marketplace for oil properties. This goal requires that certain protocols be observed in the collecting and processing data:

- All transactions used in the study must meet the criteria for "*fair market value*" as commonly accepted in the (real estate) appraisal profession and in the legal statements that form the basis for the accepted "*fair market value*" criteria
- Only those transactions for which the purpose is to acquire oil producing properties, with the intent of continuing to operate those properties, are included in the study.
- Transactions that occur as the result of eminent domain, financial distress, or which appear to be transfers among related parties are not included in the study.
- The primary data of interest is the perspective of the buyer of the property. In order to retain that perspective, the engineering and economic evaluation(s) done by the buyer, or done for his use,

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The WSPA/CIPA study is cited as a reference by several government authorities, including the California State Board of Equalization, the Property Tax Division of the Comptroller's Office of the State of Texas, and by the Internal Revenue Service. The study and attributive papers are used as teaching aids in the petroleum engineering departments of several major universities, including USC, Stanford, Colorado School of Mines, Louisiana State University, University of Texas, and Texas A & M.

are not altered in any way. The only exception would be to include or expand the data based solely on additional information provided by the same buyer. Interpretational analysis of sales data done to test alternative criteria are documented as such and are not considered to be, and are not reported as, market data.

- The evaluation of the engineering and economic data to derive appraisal criteria is done as of the effective date of the transaction and incorporates all relevant and quantifiable elements of the terms and conditions of the transaction.
- The cost-of-capital analysis that has been made a part of the study starting in 1988 is directed toward estimating the prevailing costs of investment capital for use in the oil and gas industry for purposes including, but not limited to, property acquisition.

Analysis of Market Data from Property Transactions

The purpose of the property sales study is to review and analyze fair market value sales of oil and gas properties in the marketplace and attempt to define: (1) the state of the current market for oil and gas properties in California relative to the type of property, location of properties, and the historical market for similar properties; (2) the purpose for property transactions; (3) the form and characteristics of market transactions; and (4) to determine the parameters used in the evaluation/appraisal of petroleum properties including (a) the effective fair market value discount rate used in the marketplace to equate the value of the property to (i) the anticipated future income stream from the property and to (ii) the risk inherent in the property, and (b) initial, and projections of future, product prices, operating costs, and capital investment relied upon by buyers of oil and gas properties.

The database used for the property sales study consists of transactions in which ownership in oil and/gas producing properties in California was transferred from one entity to another during the years calendar 1983 through 2005. Details of the identification of transfers of property, subsequent collection of sales data, and procedural methods, are discussed below.

While designed as a generic market data study, the initial and primary consumers of the information provided by the WSPA/CIPA Property Sales Study have been persons and institutions involved in ad valorem tax appraisal and assessment. For that reason, the Study has often been conducted, and the text of the report written, to address issues of concern to property tax appraisal.

Defining Market Information

Market data is defined as information derived from transactions which meet the criteria for fair market value established by common usage and by California state law and which is provided by the buyer and/or seller of the property or properties. Engineering and/or economic evaluations of the subject property provided as part of the Buyer/Seller information must represent the evaluations used as the foundation for the purchase price decision. The data must be only that attributable to the

Buyer/Seller with no adulteration by parties not related to the transaction.

Data Sources and Access

The primary and preferred sources of data for use in the WSPA/CIPA Study are the buyers and sellers of California oil and gas properties. These may include individuals, public and/or private companies, or other organizations domiciled either in California or outside the state. Additional sources of data include third-party agents for buyers such as consultants and tax agents. In certain instances data is augmented by supporting information from public records related to the transaction and/or to the buyer or seller, such as reports and recordings filed with local or state authorities or with federal agencies such as the Securities and Exchange Commission. ("SEC")

Primary Data Sources

Several sources were used to obtain information regarding the occurrence of property transfers. The primary source of data is the California Division of Oil, Gas and Geothermal Resources (DOGGR) Form 156 "**Report of Property and Well Transfer,**" which is required to be filed with the DOGGR by the parties involved in any transfer of oil, gas or geothermal properties. Form 156 reports the names of the parties involved in the transfer; the date of transfer; and the property description including well name(s), location(s), field name, and county. A second source of information are lists provided by sellers of properties. A third source of data is private communications, news articles, or other published sources. Data from all three sources comprise a list of over 2,500 transfers that occurred in the 1983 - 2005 period.

The preferred source of transaction data is the Change in Ownership Statement ("COS"), or similar form, which must be provided to the tax assessor in the county in which the acquired property is located. Additional information is often obtained through communication with the buyer and/or seller. These submissions are used for several reasons. COS filings tend to be "packages" which consist of specific information about a particular transaction including (a) basic data such as name of property, location, purchase price, and financing but also (b) terms and conditions of the transaction, and (c) the engineering and economic evaluation done by the Buyer and/or a consultant to the Buyer. The COS is filed under penalty of perjury which lends credibility to the data. While there has been some standardization of the COS form and data requirements among the various counties, the amount of detail and aggressiveness in collection varies from county to county.

Supplementary Data Sources

Supplementary or supporting data sources include information obtained from public sources such as filings with the county recorder, state agencies such as DOGGR, and reports to federal agencies such as SEC and the Energy Information Administration (EIA).

Historical Development

The construction of the WSPA/CIPA database was begun in 1985 based on transactions which had taken place in 1983 and 1984. Data collection for the first two years of the study (1) relied upon knowledge of transfers obtained through sellers and DOGGR reports and (2) employed a collection form developed by RJM&A. Data collection improved as (a) better access to DOGGR reports was obtained; (b) as the COS form came into wide-spread use; and (c) as more buyers became willing to participate in the study by providing data. In 1987, data from the 1960-1982 period was obtained from three previous consultants to WSPA/CIPA; DeGolyer MacNaughton (1960-1969), H.J. Gruy (1970-1978), and Babson & Shepard (1978-1982). This data was not added to the database but did prove to be useful and instructive by providing a framework for market transactions over the previous 20+ years.

Authentication and Verification of the Transaction Database

Over the 20+ years during which the WSPA/CIPA Property Sales Study has been conducted there have been numerous opportunities for individuals and groups to review the (1) database of market sales and financial information amassed for the study and (2) analyze the methodology used to derive discount rates and other information presented in the Study report, and (3) to criticize the factual results and interpretive conclusions of the WSPA/CIPA report. These opportunities have included legal proceedings such as assessment appeal hearings, review by third-party consultants, and scrutiny by regulatory bodies in several states. The review of the database and study results has been particularly diligent in the assessment appeals arena. A synopsis of those reviews is presented in Appendix B to this report.

In at least four instances, the original database of transaction information has been provided to the opposing counsel and consultants for months at a time for their critique. Further, the methodologies used to accumulate and derive market information used in the study has been examined by faculty members at several universities, staff members for state regulatory bodies, and consultants employed by (a) petroleum companies, (b) financial institutions, and (c) economic and financial management firms. Finally, the results of the annual WSPA/CIPA studies have been made available to the petroleum and financial communities through copies of the reports, through publication of professional papers, by inclusion in petroleum industry and academic forums, and through use of the study report as teaching materials in classrooms and workshops.

The scrutiny afforded to the WSPA/CIPA study from all these sources has provided opportunities to improve the study and has also produced the following results and conclusions:

1. No part of the study analysis or presentation has been found to be in material error.
2. The WSPA/CIPA Property Sales Study is accepted by industry and academia as a valid source of market data. The study is cited in numerous third-party publications and is cited as a data source in third-party legal proceedings.

3. The WSPA/CIPA Study is the only market data study cited as a data source and reference by (a) the California State Board of Equalization, (b) the Texas Comptroller of Public Accounts, and (c) the Internal Revenue Service.

Composition and Characteristics of the Sales Database

To date, RJM&A has received about 2,500 reports of property transfers either as the DOGGR form or as other information provided by buyers, sellers, or their agents covering the period 1983 through 2005. RJM&A has received sufficient information to be able to classify about 1,500 of these transfers or about 60 % of the total number of transfers. The large majority of those transfers are not purchase/sale transactions but consist of changes of operator or owner/operator name changes. The remaining transfers can be further sub-divided into market and non-market transactions. The non-market transactions consist largely of properties taken for (1) real estate development, (2) assumption of abandonment liability, (3) forced transfers such as eminent domain or legal action, and (4) intra-company or intra-family transfers. The transactions classified as market value can be subdivided into three classes; (a) apparent arms-length transaction but no evaluation, (b) transactions with incomplete evaluation data, and (c) sales with complete evaluation and other data. Using the 2,500+ transfers in the WSPA/CIPA database yields the breakdown shown in Appendix C.

The Market Sales Database

As of December, 2005 the WSPA/CIPA database has 288 transactions which are considered to be fair market value and which have sufficient data to allow derivation of discount rates and other information. Of these, 258 sales are included in the Working (Analytical) Database. The 288 transactions that comprise the WSPA database can be characterized as follows:

1. All transactions are considered to be fair market value under one or more definitions of fair market value.
2. The large majority of the transactions are for individual producing properties. Multiple property transactions are included where evaluation of the individual properties was done and where the properties are closely related.
3. Only those transactions that are based on Proved reserves (as designated by the Buyer) are used in the database. As of 2005, only six transactions were included in the database that are known to have any UnProved reserves, and in those cases the UnProved reserves account for less than 10% of total reserves. For those transactions in which the buyer/evaluator allocated value to Proved and UnProved reserves, only the Proved portion was assimilated into the database.
4. The vast majority of the transactions received by, or reported to, the WSPA/CIPA database are for the acquisition of mineral rights leases or ownership interests in mineral rights. In those transactions where (a) the surface rights or (b) other ownership interests in surplus

equipment or facilities and fixtures may be involved, these are valued separately from the mineral rights and are accounted for separately in the transaction.

Information Derived from Market Sales

The WSPA/CIPA database serves many instructional purposes by providing general insight into the market for California oil properties, the changes in that market overtime, and the view of operators, buyers, and sellers regarding the future of petroleum development in the state. While this perspective is very useful, the primary function of the WSPA/CIPA study is to derive certain information from the transaction data which can then be applied to the appraisal of petroleum properties throughout California for fair market value appraisal purposes including but limited to, ad valorem tax assessment. The derived information can be segregated into five categories:

Structure of Transactions

This data attempts to examine the components of property transactions such as the changing terms of purchase and sale, the relationship of buyer and seller, and the motivations of buyers and sellers within the context of petroleum industry financial and economic conditions at the time of the transaction.

Product Price/Operating Cost Projections

One of the objectives of the WSPA/CIPA study is to examine property evaluations to determine (a) the initial prices for oil, natural gas, or other products, (b) the source of the initial price, (c) the form of product price projection, and (d) the rate of change of product prices, if any, over the life of the income stream. Similar analysis is done, where possible, of projected operating costs and capital investments. The emphasis on this part of the study has diminished as the numbers of transactions with evaluations has declined and as other data sources have been constructed and used for establishing price and cost projections.

Discount Rates

The primary objective of the data derivation part of the WSPA/CIPA study has always been, and remains, the market discount rate.

Transaction Financing

Each transaction, whether contained in the WSPA/CIPA database of sales or excluded for one or more reasons, is examined to determine (a) the form and extent of financing used in the acquisition of the subject property and (b) the effect of that financing, if any, on either the purchase price decision or the anticipated return on the acquisition investment. For the purpose of this study "Transaction Financing" is defined as (1) any non-cash payment to the seller by the buyer as part of the purchase price for the property or (2) third-party financial assistance to the

buyer of the property.

Statistical Analysis

The use of statistical analysis within the WSPA/CIPA Study has grown over the history of the study as the size of the database has grown and as issues have arisen that could be analyzed using statistical methods. The study employs statistical analysis at three levels related primarily to discount rates. First, a basic level of averages and standard deviation over certain time periods or other groupings of data. Second, a more detailed analysis employing regression techniques to test the relation of the discount rate to property and transaction attributes. Finally, a third level which examines issues arising from outside sources, such as methods for selecting discount rates for assessment appraisal.

Structure of Transactions

One of the goals of the study of property transactions is to understand the motivations and investment attitudes of buyers and sellers in those transactions and to gain some insight into changes, if any, in evaluation criteria. While observation of markets overtime shows that business and financial management models, in the broad sense, tend to change very little (absent severe political and/or economic dislocations) it is also true that such long-term models are composed of short-term variations. These short-term variations in business practice can be caused by any number of stimuli, often from competing sources. In the petroleum industry, such stimuli have included the boom-and-bust cycles of exploration, product price variations, tax policy, import policy, proration along with other forms of regulation, and competitive pressure. Understanding, or at least recognizing, that changes in investment attitudes do occur is necessary if market derived information is to be properly interpreted for appraisal purposes.

At the risk of over-simplification, the following discussion is broken into three periods; the 1980's, 1990-2002, and the current period. There is no particular reason for this division aside from convenience.

The Market in the 1980's

The market for California oil and gas properties in the 1980's was characterized by several complementary regulatory and economic conditions which changed significantly during the period from 1980-1989. In the first half of the decade a combination of high oil prices, federal tax incentives, and competition for crude oil led to a series of property acquisitions by major oil companies primarily for the development of enhanced oil recovery projects. The sellers were predominantly small independent companies. Another factor in the market was the investment vehicle known as the "income fund" of which Petro-Lewis was the model. These companies had a mandate to make acquisitions and appear to have had the effect of driving up property values. With this combination of circumstances a large number of transactions occurred which could be used as an information base for property appraisal.

One of the more vexing issues in these transactions was (and is) the effect on the acquisition decision of the significant tax incentives that were available to subsidize capital investments in equipment and development. This incentive system changed in 1986-87 due to (a) the sharp decline in crude oil prices in 1986 and (b) the repeal of the various tax incentives that had stimulated the purchase of properties for EOR purposes. In addition, the collapse of the income fund companies which began in the 1984-85 period accelerated with the price decline. In this environment, the major companies became a lesser market force while smaller, California - based, independent companies began to acquire operating properties, primarily from the dissolving fund companies, at prices significantly less than earlier acquisitions. In addition, as the decline in prices made many properties uneconomic, or nearly so, real estate development, particularly in urban areas, became a higher use than oil production and took many properties off the market.

The Market in the 1990's

The general trend in the oil property market established in the late 1980's continued into the 1990's but with several differences. Oil price volatility became a concern for evaluation purposes but, as the decade progressed, mitigation of that problem by price hedging became more common. Major companies went through a couple of cycles of selling off fringe or non-core properties most of which were acquired by small operators, however, a significant market entry in the mid-1990's came from new or non-California based independent companies such as Vintage, Torch (Nuevo), Venoco, and Plains who acquired properties primarily from major companies. As the decade progressed the rate of industry consolidation in California increased with the formation of AERA and as the corporate acquisitions of McFarland, Santa Fe/Monterey, etc. occurred leading to the consolidations of Chevron/Texaco, Exxon/Mobil, Occidental/Vintage, and Plains/Nuevo.

In addition to changes in the market participants, the form of the transactions also changed to some degree. Review of the sales occurring in recent years indicates that they meet the criteria for fair market value transactions and, in most cases, were evaluated using reasonably sophisticated methods of discounted cash flow appraisal. These transactions indicate several characteristics that were not common or obvious in evaluations and transactions done in prior years. These include:

- Small transactions involving 1-10 wells among small operators based on agreed dollar amounts, acceptance of abandonment liability, or an intention to use the property for some purpose other than oil production. These types of transactions rarely include any economic evaluation and are thus not particularly useful for this study.
- An increase, or at least a more obvious expression, of the use of risk adjustment and/or probabilistic methods of evaluation wherein specific risk adjustment factors are applied to the production projection and/or cash flow components of the income stream prior to discounting. The growth of this form of evaluation stems from the spread of sophisticated evaluation software to all levels of engineering and management.

- Reduction of the offered purchase price by an amount sufficient to compensate for anticipated abandonment and clean-up liability.
- Inclusion in the cash flow of expenses and/or set-asides for abandonment and environmental cleanup of the property.
- Requirements by the seller for escrow accounts, letters-of-credit, or cash set-asides to provide funds for abandonment and cleanup.
- Inclusion of production payments, overriding royalties, or other revenue-sharing approach, in the event that certain conditions, such as changes in oil price, occur.
- Increased costs for regulatory compliance as part of normal operating expense as well as capital budgeting.

These considerations directly and indirectly affect the cash flow, purchase price, and derived discount rate for a given transaction. The increasing frequency of these conditions in the transactions reported for the study and/or in the deliberations of buyers and sellers requires that full consideration be given to the impact of these conditions on property valuation.

Current Market

Most of the conditions that existed in the California oil property market in the late 1990's continued into 2000-2001. Two conditions set the stage for an apparent change in market attitude during this short period. The volatility of crude oil prices experienced in the 1996-1999 period cycled into an increase in oil and gas prices in 2001-2002 that has waxed and waned but generally resulted in prices 2-3 times the average of the 1990's. The recent (2005) prices for Kern River and Midway-Sunset crude are the highest ever in nominal terms. Further, the continued consolidation of companies and properties has accelerated and has taken a large portion of California oil and gas properties off the market. The relatively long period of high prices, peaking (thus far) in 2005, has left operators with large cash balances with appear to have encouraged a new round of acquisition (consolidation) by existing companies. These acquisitions, for the most part, do not fit into the business model that seemed to exist in the previous 15-20, years, at least based on the information available.

Looking Forward

It seems apparent from the observations allowed through available data that two conditions will drive the market for oil properties in the near future. The first is the confluence of record amounts of available capital and limited opportunities for efficient investment coupled with the apparent desire to enlarge and consolidate assets, particularly in core operating areas. Second, there seems to be a growing segment of the market, primarily among small private companies, that (for lack of a better term) in a musical chairs mode of acquiring, operating, and passing on properties with large end-of-life liabilities. These latter transactions are often difficult to evaluate as real market sales.

Product Price and Operating Cost Projections

The oil and gas price projections used in the buyers' cash flows are evaluated to determine expected future annual changes in oil and gas prices and operating costs. The methodology used in prior studies to analyze price/cost expectations by purchasers has been retained to allow results from one study to be compared to results from other studies in terms of (1) the apparent escalation rates for each year, and (2) of the historical context of current price/cost relationships. The annual percentage change, if any, in oil price, gas price and/or operating costs for each transaction is obtained directly from data provided by the buyer or was calculated from the buyer's cash flow.

As used in this study:

- **Escalated** transactions are those evaluations where any change occurred in product prices or operating costs during the life of the cash flow. The base, or initial price, was taken as the first price used in the evaluation. Any change in price from the initial price, positive or negative, at any time, is considered to be escalation. The same criteria are applied to operating costs. Any change in either prices or costs can cause the transaction to be put in the Escalated sub-group.
- **Non-Escalated** transactions are those in which the initial prices and costs are projected flat at the initial values. These are also referred as "*flat projection*" evaluations.⁴²

Of the 258 transactions in the Working Database for the current WSPA/CIPA Study, 145 transactions (56.2%) were escalated, and 113 transactions (43.8%) were done using flat price/cost projections. These changes, or the volatility of prices, have occurred for a wide range of economic and political reasons.

As noted above, 56.2% of transactions over the period from 1983-2005 used escalated prices and/or costs in the cash flow. However, as shown in the table below, the number of sales using escalation has been declining over that same period.

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Over the past several years it has been noted and reported that an increasingly large percentage of purchase appraisals are done in nominal terms, but with no escalation of prices or costs. These have been termed "*non-escalated*" or "*flat projection*" cases. These flat projection cases should not be confused with "*real*" price/cost projections, which explicitly remove anticipated inflation as a component of the price/cost projection. Flat projections simply assume that over the life of the projection, increases and declines in prices and costs will balance. Flat projection cases make up a significant percentage of sales (50-60%), depending on time period, and have often been more correct in predicting future prices than have the escalated cases. To not include these projections would be to ignore information from a large segment of the marketplace for oil properties.

	<u>Total</u>	<u>Escalated</u>	<u>Not- Escalated</u>
1983-1989	140	93	47
1990-2004	118	52	66
1990-1998	93	37	56
1998-2000	16	9	7
2000-2005	17	10	7

Furthermore, even in those evaluations that included escalation the *expected rate of increase* in oil price has declined over time as shown by the studies by Glanville⁴³ and Evans⁴⁴ and by survey data such as the SPEE Parameter Survey.⁴⁵ However, an increasing number of transactions report or imply a reliance on price projections based on the NYMEX and other commodity markets as indicators of future oil prices.

Fair Market Value Discount Rate

The determination of discount rates from market sales is based on detailed analysis of buyers' income projection data. The data analyzed for each transaction are obtained from (a) the Change of Ownership statement or equivalent data, (b) the buyer's cash flow and supporting documentation, and (c) conversations with the buyer and seller to clarify and augment data. In a few cases, sales in the database include information provided by the buyer that is not part of the cash flow but was considered by the buyer in determining a purchase price, such as anticipated abandonment cost. Some cash flows are constructed from input data provided by buyers and sellers with confirmation of the cash flow by the buyer. In these cases, only buyer-supplied data is used.

Definition of Discount Rates

As noted by the State Board of Equalization, *"In a cashflow analysis, the discount rate represents the required return investors need to accept a project."*⁴⁶ This definition is, in turn, drawn from a definition of discount rate offered by The Appraisal Institute, as; *"...a yield rate used to convert future payments or receipt into present value."* where a yield rate is defined as; *"A rate of return on capital.... expressed as compounded annual percentage rate. The yield rate considers all expected*

⁴³ "Oil Price, Gas Price and Operating Cost Escalation Data," Glanville, Roger S, prepared for Western States Petroleum Association, January, 1997

⁴⁴ "Oil Price, Gas Price and Operating Cost Escalation Data Survey Results," B. L. Evans & Associates, Inc., prepared for Western States Petroleum Association, January, 2005

⁴⁵ Twenty-Fourth Annual, "Survey of Economic Parameters Used in Economic Evaluation," Society of Petroleum Evaluation Engineers, June 2005, Houston, TX

⁴⁶ Assessors' Handbook Section 566 - Assessment of Petroleum Properties, California State Board of Equalization, August, 1996 (Revised January, 1999), pg. 8-7

property benefits, including the proceeds from sale at the termination of the investment."⁴⁷

Two forms of the yield rate are the Overall Yield Rate and the Internal Rate of Return (IRR).

"An overall yield rate (Y_o) is a rate of return on the total capital invested. It takes into consideration changes in income over the investment holding period as well as the reversion at the end of the holding period. It does not, however consider the effect of debt financing; it is calculated as if the property were purchased with no debt capital. The overall yield rate can be viewed as the combined yield rate, which is discussed below, and the mortgage yield interest, rate."⁴⁸

"Internal rate of return (IRR), refers to the yield rate that is earned for a given capital investment over the period of ownership. The internal rate of return for an investment is the yield rate that equates the present value of the future benefits of the investment to the amount of capital invested. The internal rate of return applies to all expected benefits, including the proceeds from resale at the termination of the investment. It can be used to measure the return on any capital investment, before or after income taxes."⁴⁹

Derivation of Fair Market Value Discount Rates

The objective of the sales data analysis is to derive risk-inclusive, before income tax (BFIT) discount rates from actual market sales. In the WSPA/CIPA Study, discount rates are derived from transaction evaluations as the Internal Rate-of-Return on the acquisition investment over the projected life of the income stream from the property. The approach used is to take the full cash value purchase price of the property and calculate the internal rate-of-return on the purchase price using the BFIT cash flow (after investment and before income taxes). This process requires the conversion of non-cash payments such as stock and/or production payments into cash equivalent amounts. In those cases where the buyer explicitly considered other non-cash items, such as abandonment liability as an addition to (or deduction from) the purchase price or investment incentives, those items are also taken into account. The analysis of the buyers evaluation(s) of individual transactions is done as follows:

1. The information obtained from the Buyer and Seller are used to determine if the transaction can be considered to meet the accepted criteria for a fair market value transaction.
2. The Change in Ownership Statement is used to define the general parameters of the transaction, such as property description, purchase price, date of transfer and names of Buyer and Seller.

⁴⁷ "The Appraisal of Real Estate", Eleventh Edition, The Appraisal Institute, 1996, Chicago, IL pg. 456-457

⁴⁸ Ibid, pg. 457

⁴⁹ Ibid, pg. 457

3. The evaluation data provided by the Buyer is examined and tested for completeness, accuracy and rationality in relation to the transaction.

Annual and Composite Discount Rates

The entire WSPA database contains 288 sales which are defined as fair market value and which have sufficient data to allow determination of a discount rate. The discount rate distributions of these sales is shown as Exhibit 1. It is apparent that the large percentage of sales occur in a grouping near the lower end of the scale. For statistical purposes, all sales with discount rate greater than 42% were excluded from analysis. This truncated database is termed the "Working(or Analytical) Database" and includes both Risk-adjusted and Risk-inclusive transactions. The discount rate distribution (Exhibit 2) for the combined twenty-two study years, and for selected sub-groups are presented in summary form below and in graphical form for (a) the years 1983 through 1989 (Exhibit 3), and (b) the years 1990 through 2004 (Exhibit 4) have been combined in the table. Data for 17 sales that occurred in 2000 through 2005 are also included in this study.⁵⁰

Employing only the Working Database, the derived discount rate for the total of 258 fair market value transactions has an arithmetic mean of 23.8% and has an absolute range between 8.0% and 42.0%. No market value sales were found that had a discount rate below 8.0%.⁵¹ The 258 data points have a standard deviation of 7.1 percentage points above and below the mean, ranging from 16.7% to 30.9% and containing 177 (68.6%) of the 258 sales. Arithmetic averaging is used in preference to a weighted average discount rate because, as discussed below, there is no statistically significant correlation between discount rate and such factors as the magnitude of reserves, purchase price, date of-transfer, or any other factor. Therefore, there is no reason to weight a discount rate obtained from one sale as more influential than another.

⁵⁰ Data for several transactions that occurred in 2004 and 2005 were received for the study but could not be fully processed in time to be included in the report.

⁵¹ While there are certain transactions from which a discount rate of 10% or less can be derived, there is a serious question regarding the degree to which these sales represent the market value of the oil producing asset. In many cases, it would appear that (a) the purchase price and derived discount rate reflect a different objective, such as removing impediments to surface real estate development, or (b) reflect corporate objectives that go beyond the value of the property itself.

**Fair Market Value Equivalent Discount Rate (0-42%)
Before Income Tax**

	1983-89	1990-2005	1990-98	1996-1998	1998-2000	2000-2005	All Sales Combined
No. of Sales	140	118	93	18	16	17	258
Mean, %	24.5	23	23.6	23.6	22.9	21.3	23.8
Median, %	22.9	21.9	22	20.9	20.5	19.5	22.6

It is of interest to note that (a) the average discount rate for the entire 22-year period (23.8%), and the average discount rates for the 1983-89 period (24.5%) and for the 1990-2005 period (23.0%), are very close and (b) the year-to-year data, while showing variation from a high of 26.3% in 1998 to a low of 17.1% which occurs in 1999, vary about the longer-term mean. This year-to-year fluctuation in the effective discount rate around a relatively consistent average is in contrast to (1) the financial changes in the industry caused by changing prices, excess production, significant changes in the natural gas market, restructuring of companies, and general financial strain in the same period, and (2) the significant changes in the capital markets over the same time period. The level of the discount rate during the period is reflective of the uncertainty felt by purchasers and is manifested in the assignment of risk premiums over and above the Cost-of-Capital alone. This explains the continuum of relatively high discount rates despite a general reduction in interest rates and inflation over the period.⁵²

A separate analysis of the 118 sales occurring in the 1990-2005 period indicates overall results very similar to those obtained from the entire Working Database of 258 sales. Only 35 sales (29.9%) out of 118 occurred at discount rates of less than 20%, and only 13 sales occur below 16% (Exhibit 5). This is essentially the same as the pre-1990 period when 30.7% of sales occurred at discount rates below 20% and represents an apparent ongoing decline in discount rates due to (a) declining costs of debt capital, (b) increased use of risk adjustment approaches to evaluation, and (c) an implied tendency toward giving value to identified but not necessarily valued assets of a property.

The use of a calendar year grouping based on date-of-transfer is artificial and differing results might be obtained using fiscal year or other time period. The date-of-transfer does not, however, appear to be important in defining the appropriate market discount rate. An analysis of discount rate as a function of the date-of-transfer of the property indicates a virtually flat trend of discount rate over the twenty-two years at about 23%. Linear regression of discount rate against the date-of-transfer indicates essentially no relationship between discount rate and transfer date.

⁵²

On the other hand, annual fluctuations in average discount rate should not be given undue weight since the assignment of a sale or rate to a particular year is done on the basis of the date of transfer of the property and is a function of the agreed-upon purchase price. Further, in some years there are only a few sales so that one sale may have a disproportionate impact on the combined rate for that year.

Analysis of Properties with 100% Proved Developed Producing Reserves

The discount rate data for the 100% PDP sales is more stable than is the data from the total database, which contains properties with Proved Undeveloped and other categories of Proved reserves in addition to PDP. This should be expected. Concentration on the 100% PDP reserves sub-group removes the increased risk component which is associated with other categories of Proved reserves. Proved Developed Producing reserves are low risk; discount rates obtained from this group should be more stable and consistent than for other categories of reserves (Exhibit 6).

Fair Market Value Equivalent Discount Rates (0-42% BFIT) 100% Proved Developed Producing Only

	1983-89	1990-2005	Combined 1983-2005
No. of Sales	94	78	172
Mean Discount Rate, %	24	22.1	23.1
Median Discount Rate, %	22.1	21.6	21.6
Maximum Discount Rate, %	39	41.38	41.38
Minimum Discount Rate, %	11.15	11.18	11.15
Standard Deviation, ± %	6.7	5.9	6.4

Market Level Discount Rates

The mean discount rate for a group of transfers, whether of an annual or multi-year sample, is only a measure of the *level* of discount rate required in the market. This Market Level discount rate is not a discount rate that could be applied to every property in every economic situation. It does, however, describe the average discount rate that would be expected to occur from a large group of sales of properties with characteristics similar to the sample database.

The Role of the Management Decision Process

As previously noted, the discount rate values used in the Market Sales study are derived values obtained by comparing a post-sale cash equivalent purchase price with a pre-sale BFIT cash flow. They are not necessarily the discount rates used by the appraiser or buyer in the evaluation or, necessarily the returns targeted by the buyer. They are, however, a direct measure of the returns accepted by the buyers and sellers in the marketplace. Given the sophistication of many of the buyers and sellers represented in the database, it is reasonable to assume that the purchase price and, therefore, the discount rate, contains certain deliberate considerations of the buyer such as:

- Cost-of-Capital
- Specific Project/Property Risk

- Corporate Requirements
- Income Tax and Other Financial Considerations

Some of these factors may be definable and quantified so that the discount rate can be dissected into a semblance of its component parts. However, it is likely that these components, and others not identified, overlap or influence each other, and cannot be explicitly extracted. The discussion in Part III of income tax considerations and the relation of discount rate to Reserves Risk and other factors indicates that some components can be identified, quantified and related to the market as a whole. Taken together, these components result in the sometimes wide absolute range of discount rate values obtained from the sales database.

Relation of Market Sample to Sales of All Properties

The number of actual fair market value sales in any one year is a small percentage of the number of properties in production. This may lead to the question of whether a discount rate derived from a small sample of sales could be expected to represent the fair market value discount rate if all the properties in the "population" of properties were to be sold. This question in turn has two parts:

- A. Are the properties for which data is obtained representative of California producing properties?
- B. Are the discount rates derived from those sales representative of the rates that would be obtained if all producing properties were sold?

The starting point for the statistical study was to recognize both the content and the limitations of the WSPA database of sales information. It is a sample of the large market that spans 22 years of sales (1983-2005 inclusive) consisting of an average of about 13 sales per year. In this time period, data has been obtained for 433 market value transfers of oil properties in California including (a) property exchanges, and (b) numerous transactions where no evaluation or appraisal was done. In addition, there are about 25-30 transactions which are likely to be fair market value transactions but for which no documentation has been provided. The sales database has categorized virtually all these transfers and has collected and reported data for 288 transactions in which the Buyer prepared an evaluation of the property. This number accounts for about 61% of all fair market value transfers and a much larger percentage of those for which an appraisal or economic evaluation is thought to have been done.

The database contains a mix of data from a broad range of buyers and sellers where (1) acquisitions were valued by a variety of individuals using differing methods, (2) the acquired properties differed substantially, and (3) the transactions ranged from the very simple to the extremely sophisticated. The property transactions in the WSPA/CIPA database include producing properties from all the major fields in California and include old depleting properties, enhanced recovery projects, and relatively new development.

The large majority of transactions were evaluated solely on a BFIT basis, however, many evaluations are based on AFIT cash flows that also calculate state and federal taxes. Some evaluations include specific risk adjustments, while others include all risk in the purchase price or discount rate. The largest number of the transactions are for properties with 100% Proved Developed Producing (PDP) reserves, but there are a substantial number that include reserves that are Proved Undeveloped (PUD) or other Proved reserve class(es).

In order to test the validity of the discount rate sample represented by the database, the statistical Mean, Median, Standard Deviation and other criteria were calculated, as shown in the table below. In analyzing this issue, it is important to note that the Mean and Median value for the combined data set, and most of the annual data sets, show only relatively small differences indicating that the data may be assumed to be a Normal distribution (bell-shaped curve) with no substantial bias or skewing to either the high or low ends. It is also important to note that the range of one standard deviation contains a number of cases equal to or larger than would be expected for a statistically Normal distribution. This result indicates that the market level discount rate is not due simply to one or two high values that pull up the average, or to sales of properties which could be considered to be "marginal" or exceptionally risky, but is a trend within the market demonstrated by two-thirds or more of the acquisitions reported. The close fit of Mean and Median, the apparent Normal distribution, and the relative compactness of the discount rate values about the Mean indicate that the database is a valid sample representing all potential sales.

In order to further explore the ability of the observed discount rates to represent the market, the observed data was compared to a model Normal distribution derived from the observed mean and standard deviation. While not perfect, the observed data fits the model distribution reasonably well. This result indicates that the sample data are normally distributed and can be further analyzed using generalized statistical and decision-making techniques that have been developed for normally distributed variables.

Analysis of the combined and annual data sets using small sample methods (Student's-t) indicates that the mean market values for each year can be expected to be within a few percentage points of the calculated mean value. Analysis of the market sample of 258 sales using the Student's t-method indicates that, if all oil and gas properties had been sold during the 1983-2005 period, there is a 95% certainty that the mean discount rate for all those sales would be between 22.9% and 24.7%. A similar analysis for (a) the 118 sales in the 1990-2005 period indicates a 95% certainty range of 21.8% to 24.2% and (b) the 33 sales in the 1998-2005 period indicates a 95% certainty range of 19.0% to 25.2%. Since discount rate has no statistical relation to the chronology of the sale, the range for any one year could reasonably be expected to be the same 22-24% range, even for those years where the data sample is very small. Experience with the study indicates that the accumulation of data over time tends to focus the distribution of discount rate toward the mean of the larger data set rather than disperse the values over the range.

**Fair Market Value Equivalent Discount Rates (0-42%)
Before Income Tax**

	1983-89	1990-04	1990-98	1996-98	1998-00	2000-05	Combined 1983-2005
No. of Sales	140	118	93	18	16	17	258
Mean Discount Rate, %	24.5	23	23.6	23.6	22.9	21.3	23.8
Median Discount Rate, %	22.9	21.9	22	20.9	20.5	19.5	22.6
Maximum Discount Rate, %	41	42	42	42	42	39.3	42
Minimum Discount Rate, %	10	8	11.2	11.2	8	11.4	8
Standard Deviation (SD), ±	7.5	6.6	6.2	8.1	9.6	7.9	7.1
Sales in One SD, %	64.6	72.9	75.3	83.3	75	70.5	70.5

Statistical analysis of the data indicates that the sales included in the study are representative of the market as a whole and would reflect the outcome of a market in which all properties were for sale at a given time, such as lien date 2005. The results lead to a high level of confidence that the discount rates and other parameters derived in this study are an accurate and functional representation of the marketplace and can be used in the mass appraisal of oil properties for ad valorem tax or any other fair market value purpose.

Interpretation of Results of Discount Rate Analysis

While the annual Mean discount rate values fluctuate, a market level (mean) discount rate of about 23.0-24.0% for the evaluation of producing properties with Proved reserves of all kinds seems to be well-established. Even though most of the evaluations included in the study trend toward more conservative price/cost projections, it is apparent that the discount rate is being maintained at an established market level to account for an assortment of risks and to attempt to ensure a market level return on the investment of capital. The discount rate used or resulting from any particular acquisition appears to be related to the risk associated with the property.

Despite the testing of numerous other independent and contingent factors, none have been found that could be reasonably related to the discount rate and which could be described as a source for adjusting the discount rate above either (a) a minimum rate such as Cost-of-Capital, or (b) a low-risk discount rate such as for 100% Proved Developed Producing reserves. The stability of the discount rates obtained from the 100% PDP sub-group allows the group to be used to establish a firm floor for selection and assigning discount rates for 100% PDP properties and for properties with reserves in the greater risk categories.

The apparently strong relation between Reserves Risk and discount rate would appear to provide a sound basis for discount rate selection. This relation of discount rate to reserves risk can be used to (a) establish a base or minimum discount rate for properties with 100% Proved Producing reserves at about 22%, and (b) indicate a range of discount rate that can be applied to reserves of increasing risk. The analysis suggests that properties with 100% Proved Undeveloped reserves would require a discount rate of 29-31%. Properties with Proved Non-Producing and Proved Behind-Pipe reserves would have discount rates greater than 22% and less than 31%. Other factors such as the ratio of (Oil) Reserves to (Oil) Production and Remaining Economic Life may be useful in selecting a discount rate from *within* the 22% to 31 % range.⁵³

Many buyers estimate future ad valorem tax and deduct the tax from revenue as a cost. This deduction is not allowed for property tax appraisal. However, for this study, no adjustment is made to allow the cash flow to conform to property tax rules. Another significant simplification is to ignore the effect of prevailing state and federal income tax regulations on investment decision making. The calculation assumes that a buyer who values properties AFIT would have paid the same price for the property if he had valued it on a BFIT basis. The approach accepts the purchase price, which may have been determined on an after-tax basis, but ignores the effect of income taxes on the buyer's cash flow. This is particularly true of those income tax deductions which are designed to effectively reduce the amount of future BFIT investment. The calculation method can, of course, be modified to produce BFIT discount rates that (1) account for the impact of income tax on the purchase price, and (2) conform to the requirements of specific rules and regulations for appraisal of oil properties as they may occur in various jurisdictions.

Analysis of Transaction Financing

The best source of information about the mix of debt and equity most likely to be used by prospective purchasers of oil properties is the information obtained from actual transactions. The importance of the debt/equity relation is shown by the presence on the COS form of several questions regarding the (a) total purchase price, (b) amount of cash paid to the seller, (c) the sources and amounts of any loans used to make the purchase, (d) the interest rate on any loans, and (e) the type of loan. As part of the accumulation of market sales data, the WSPA/CIPA Study has extracted financing data from 433 transactions. This number includes all the transactions reported in the WSPA/CIPA Study report (288) plus 145 other transactions for which data was provided through the COS but which are not included in the study database of sales.⁵⁴

⁵³ “Fair Market Value Transactions, Cost of Capital, and Risk: California Oil and Gas Property Transactions 1983 through 2000,” February 2, 2001, prepared for Western States Petroleum Association by Richard J. Miller & Associates, Inc., pg. 35

⁵⁴ The primary reason for not including these transactions is that there was no evaluation reported and/or provided by the buyer. The WSPA/CIPA study only uses transactions which have sufficient data to allow discount rate derivation.

The Change of Ownership statement forms for most oil producing counties require the buyer to provide information regarding any financing of the acquisition being reported. Historically, the acquisition of producing properties in California has been done with equity capital. Data from California oil property sales indicate that the vast majority of oil and gas properties are purchased by the payment of cash to the seller where funds are apparently taken from the pool of investment capital available to the buyer.

Exhibit 7 to this report includes a list of 36 transactions (through year-end 2005) that had some form of financing other than all equity cash.⁵⁵ The forms of payment include cash plus the proceeds of specific loans, but also include cash plus stock, warrants, other property, and production payments (often conditional). These 36 transactions account for less than 10% of the 433 transactions for which financing data is available. These data suggest that very few oil property transactions are financed using mortgage or similar debt. The total combined purchase price for the 36 “financed” transactions is \$401,859,638. The total purchase price for all 433 fair market value transactions is \$5,579,679,414. This suggests that debt financing accounts for only a small fraction (7.2%) of the acquisition costs of oil properties. In many of the financed cases the acquisition evaluation included capital investment for new wells or other development. It is reasonable to assume that all or part of the financing may have been directed to capital investment rather than purchase price. In that circumstance the total acquisition investment for the 433 transactions would be \$8,129,946,686 of which the 36 transactions would represent only 4.94% of the total. The vast majority of oil property acquisitions, in terms of both number of transactions and purchase price, are financed with 100% equity in the form of retained earnings.

Further, a review of the forms of payment in the 36 transactions indicate that equity cash and stock account for \$219,998,024 or 54.7% of the total while bank loans account for 44.1%. Production payments are defined here to be payments made directly to the seller on a time or production related schedule. These are essentially seller financed transactions, in whole or part. In recent years, several of these payments have been contingent on changes in crude oil prices.

Statistical Analysis of Discount Rate Data

The determination of a market level discount rate is a highly useful result and, combined with a modicum of judgment on the part of the appraiser, would be sufficient to satisfy the discount rate requirements of most appraisal uses. Under ordinary market circumstances, this basic analysis would be as far as one could be expected to go with the data available. However, the amount of data obtained by assessors and appraisers under California disclosure regulations is far more informative than would be available to participants in the market place and allows a detailed and far-reaching analysis of the

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Financing, as used in this analysis, is a broad term that includes any payment other than cash. The forms of “*financing*” include bank loans, transfers of stock and production payments of one form or another. In most cases, but not all, there was also some cash. Short-term corporate borrowing, whether from institutional credit facilities and/or short term capital markets such as commercial paper, were considered to be for corporate convenience and were not included as indicators of debt financing of a transaction.

relation of discount rate to the market and the properties evaluated.

Statistical Methods

As part of the study of market sales of oil and gas properties a statistical analysis has been done in an effort to determine (1) the degree of relationship between factors such as discount rate, Reserves, and Purchase Price; (2) the degree of causation between one factor or another; (3) whether any readily applicable relationship for "scaling" the capitalization rate can be derived from sales data; and (4) whether weighting of the discount rate is justified by the sales data. The statistical study uses data for transactions occurring from January, 1983 through December, 2001.

Except where otherwise stated, the information used for statistical analysis is taken from the Working Database. The purposes of statistical analysis of market sales data are:

- A. To determine whether the sales that occur in the marketplace from time to time are representative of the wider population of oil producing properties.
- B. To determine if the discount rates derived from the sales are representative of discount rates that could be applied to all properties.
- C. To aid in defining the relationship between discount rate, the marketplace, and the physical and economic characteristics of the properties evaluated.
- D. To determine the factors which (a) influence the discount rate, and (b) can be used to aid in the selection of a proper fair market value discount rate for a specific oil and gas property appraisal.

The use of statistical analysis of market sales produces the most important result - the ability of the appraiser to make informed, supportable judgments about the selection and use of the fair market value discount rates. In order to determine the reliability of the discount rates derived in this and previous studies, basic statistical methods⁵⁶ were used in a four-step procedure:

- 1. Descriptive statistical analysis was done to determine if the sales data obtained for the study could be considered a representative sample of the market for oil properties. This results of this step are discussed above.
- 2. Correlation analysis was done to determine the relationship of the discount rate to the individual components of the property evaluation.

⁵⁶ For this study, statistical analysis was done using the internal functions in the Microsoft Excel™ spreadsheet.

3. Multiple regression analysis was done in order to define combinations of evaluation components which influence the discount rate.
4. Additional multiple regression analysis were done on sub-sets of the data base in order to define relations which may be apparent in one group of sales but not in another.

Several WSPA/CIPA Study reports published in prior years have contained extensive discussions of the statistical analysis. The comprehensive statistical study, done in 2001⁵⁷ examined 22 individual evaluation parameters in four function groups to test the relation of the individual parameters to the discount rates derived from market sales. Despite the testing of numerous factors related to the physical and economic aspects of the sales evaluations, in the 2001 Study and in all previous analysis of discount rate relations, the only factor that has been shown to bear a rational and measurable relationship to the discount rate has been the percentage of PDP reserves that were included in the evaluation. The % PDP is referred to in this study as Reserves Risk. This relation is drawn from a single linear regression analysis of the sales included in the Risk-Inclusive database. Using 146 sales data points through 2002⁵⁸ the regression found a positive correlation of discount rate to %PDP reserves. The R^2 for the relation is 0.3178, which suggests that %PDP, or Reserves Risk, accounts for just over 30% of the variation in the discount rates observed from sales. Somewhat higher values of R^2 are achieved with second, third and fourth order polynomial equations, however, the improvement in R^2 is obtained as a result of better data point curve fits which are not rational for real properties.

Reserves risk accounts for only about 32% of the data dispersion in the Risk Inclusive Database. The removal of the most significant factor relative to discount rate should allow the influences of other factors to be more readily measurable where risk is essential uniform. The reserves risk variable was eliminated by taking out all data points that were not 100%PDP.

An analysis of the 97 sales in the Risk Inclusive Database (through 2002) that have 100% Proved Developed Producing (PDP) reserves and which anchor the 100% end of the plot of discount rate as a function of reserves risk provides some very useful and interesting information. The 100% PDP data set exhibits a central tendency toward a Mean of 21.8% with a relatively small standard deviation of 4.15 for all 97 sales. A breakdown into (a) sub-groups covering multiple years, and (b) annual groups for most years, reveals only modest changes from year to year: the results of the sub-group analysis for 49 sales occurring in the 1983-89 period is virtually identical to the results obtained for 48 sales from the 1990-2003 period. While the annual averages change somewhat, the difference in Mean from year to year is modest. The demonstrated lack of relationship between the tested parameters indicates that (1) there is no need to consider any form of adjustment to discount rates to account for any of the tested factors and (2) selection of discount rates using one or more of the tested parameters has no rational

⁵⁷ "Statistical Analysis of California Oil and Gas Property Transactions," September 28, 2001 prepared for WSPA/CIPA by Richard J. Miller & Associates, Inc.

⁵⁸ Most of the recent transactions have reported that only PDP reserves were valued for transaction purposes. The analysis is done in 2002 has not been updated for this study.

foundation.

Analysis of Cost-of-Capital Data

Since 1988, the WSPA/CIPA Study has incorporated a cost-of-capital component which is used to (1) define the sources and (2) estimate the costs of the investment capital used in petroleum property acquisitions. The Cost-of-Capital analysis has been accorded increased importance as the quantity, quality and reliability of the market sales source of discount rate information has declined. In financial markets and in appraisal practice outside the California property tax system, where there is not access to market sales data, the cost-of-capital and variants thereon are the primary, and sometimes the only, source(s) of discount rate data.

Purpose of the Cost-of-Capital Study

The selection of a discount rate for use in the appraisal of oil producing properties using the Income Approach has often been a point of some difficulty. The preferred source for discount rates is, and should be, the marketplace for producing properties. This preference is suggested in appraisal literature and is stated in regulations such as California SBE Rule 8(g), which accords primacy to market derived rates.⁵⁹ In California, the regulatory requirement for full disclosure of property transactions⁶⁰ provides assessors with a body of market data for use in deriving evaluation parameters. However, reliable market sales data is difficult to obtain even with full disclosure. The limited available of market data has led to the use of financial methods, such as the Weighted Average Cost-of-Capital, as the basis for deriving a "*capitalization rate*" for use in the Income Approach to property valuation.

The Cost-of-Capital is defined to serve two similar but distinct roles. First, academic and empirical research indicates that Cost-of-Capital is the foundation for investment decision methodologies used by individual and corporate investors where the Cost-of-Capital performs as the base rate for a minimum required return. Second, the Cost-of-Capital assumes the role of "*opportunity cost*" and performs as the lower risk alternative to individual property investment.

The Cost-of-Capital is a financial function, not an appraisal function. The discount rate derived from the Cost-of-Capital is not necessarily the same as the discount rate that would be applied to the income stream from a oil producing property in order to determine value. There are three primary differences. A major and endemic difference is that the Cost-of-Capital assumes *recapture* or return of the original investment through *reversion* and, therefore, contains no component for return-of-investment. In contrast, an oil property is produced to depletion of the reserves and/or the economic limit of production.

⁵⁹ Title 18, CCR, Section 8(g)(2)

⁶⁰ California law requires that whenever a real property interest is transferred, the recipient or "Buyer" must file a Change of Ownership Statement with the assessor of the county in which the property is located. This statement requires a substantial amount of information about the transfer including, in the case of oil and gas properties, the buyer's engineering and economic evaluation of the property and supporting documentation.

In either circumstance, the property has no reversion value; therefore, the required return must contain both a return-**of**-investment and a return-**on**-investment component. Further, the Cost-of-Capital is a generalized return based on the expectation of income from a portfolio of investments rather than from individual property income streams and, therefore, the Cost-of-Capital does not include the risk inherent in the reliance for a return on a unique income stream from a single property. Finally, the Cost-of-Capital is derived from the expectation of returns on marketable debt and publically traded equity assets, which have considerably greater liquidity than do oil properties.

The Traditional or Real Estate Band-of-Investment

The Cost-of-Capital, as used in this study, is not the same as the Band of Investment, which is the common term in real estate appraisal. The Band of Investment is a term (1) associated with direct capitalization of income streams, and (2) refers primarily to the debt and equity returns related to specific property mortgage financing. In oil property appraisal, income is variable, not constant, so that yield capitalization rather than direct capitalization is the appropriate method. Yield capitalization rates are obtained through methods which are based on yield returns over a prospective period consistent with the term of the investment. These methods are captured in the Cost-of-Capital approach as discussed in this study.

Concept of the Cost-of-Capital

The Cost-of-Capital and the Weighted Average Cost-of-Capital ("WACC") are concepts common in financial management and are discussed in detail in numerous books,⁶¹ journals and regulatory manuals.^{62, 63, 64} The methodology chosen by the SBE in AH502 and AH 566 is entirely consistent with basic financial practice. In general terms, the Cost-of-Capital is the cost to an individual, company, or other business entity of obtaining the capital necessary for new investment and for the maintenance of corporate growth. The "*cost*" is generally calculated as the "*return*" or interest rate associated with the particular form of capital obtained and the capital structure of the firm. It is the rate-of-return that must be earned on all investments in order to maintain the value of the company as represented by the stock price. If the rate-of-return on investment and, by extension, the return-on-equity declines, the stock price would be expected to decline. The same principle applies to individuals and unincorporated entities. This study assumes a corporate investor.

⁶¹ The reference text for this report is Brealey, Richard A. and Myers, Stewart C., "*Principles of Corporate Finance*," Fourth Edition, 1991 McGraw-Hill

⁶² "*Texas Property Tax: Manual for Discounting Oil and Gas Income*," Comptroller of Public Accounts, Austin, TX, 1999

⁶³ "*Assessors' Handbook, Section 502 - Advanced Appraisal*," California State Board of Equalization, December 1998, Sacramento, CA

⁶⁴ "*Assessors' Handbook, Section 566 - Assessment of Petroleum Properties*," California State Board of Equalization, August 1996 (Amended 1999), Sacramento, CA

In traditional financial management, the Cost-of-Capital serves three primary functions. First, it is a measure of the required return on an investment. Second, it is a measure of the risk of some investments and of the risk to the investors in the company. Third, it is a component of the discount rate. While these distinctions are very narrow, each characterization offers a different perspective on the Cost-of-Capital and its application in oil property valuation.

When viewed as a measure of **required return**, the Cost-of-Capital becomes the minimum acceptable rate-of-return on invested capital. Since the Cost-of-Capital is, by definition, the rate-of-return expected by equity investors and by debt holders of a company, the investments made with that capital must return a rate sufficient to satisfy those investors. If a company has numerous investment options such as drilling new wells, starting enhanced recovery projects, or building a new processing plant, it must ensure that each investment will provide a return sufficient to satisfy all capital providers. While certain projects may be allowed a lower return, there are usually offsetting intangible benefits such as environmental compliance or an indirect benefit to another project. However, such investments are necessarily limited in number; otherwise, the composite return from all projects would be diluted. The company cannot make a practice of investing at less than Cost-of-Capital returns. If it does, investors will find other places to put their money that are perceived to be more reliable.

The Cost-of-Capital can also be viewed as a **measure of risk**. While the difference may be difficult to discern, companies in high risk industries such as oil and gas production and development could be expected to have higher Cost-of-Capital due to a higher perceived risk of attaining the required return. This would be particularly true for small production companies with limited capitalization. The perceived risk is measured in the return required for equity investments and the interest rate on debt.

The Cost-of-Capital is a **component of the discount rate** used for valuing potential investments. While it may be the largest component, it is not the only component. When used to estimate the value of the income stream from an investment, the discount rate must include components for (1) return-of-investment, (2) differences in liquidity, and (3) the risk of the specific project/investment relative to the opportunity Cost-of-Capital. The result is a discount rate which may be different for each project or income source.

Corporate Capital vs. Specific Project Financing

Traditional Cost-of-Capital methods are based on corporate capitalization rather than the financing that may be attributed to a specific project or acquisition. As noted previously, fewer than 10% of all property acquisitions in the WSPA database were "financed" in any fashion. Over 90% of the transactions were concluded using corporate equity in the form of cash for 100% of the purchase price.⁶⁵ This equity comes primarily from retained earnings. Corporate financial management would, over time, require that internal funding be optimized between debt and equity so that all corporate investments that

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The California Change of Ownership form requires that the buyer indicate the form and structure of the financing, if any, used for the acquisition.

are not specifically financed can be viewed as drawing on a mix of debt and equity (the corporate capital structure) rather than equity alone. While not all purchasers of oil properties are publically traded corporations, the corporate model is still valid and is theoretically sound.

The Financial Cost-of-Capital

Many oil and gas companies routinely define a discount rate or range of discount rates for use in project evaluation and capital budgeting. This discount rate is a derivative of company policy and, as shown by Boyle and Schenck⁶⁶, and also by Dougherty and Sarkar,⁶⁷ is generally based on an estimate by management of the company's weighted average cost-of-capital. Finance-based discount rates are applied to the estimate of income from new projects, capital investments and acquisitions/sales and are structured to allow comparison of those projects, etc. usually as part of the Net Present Value (NPV) method of capital budgeting.

According to financial theory,^{68, 69, 70, 71} a company or other investor should attempt to make investments of capital only in projects that will provide a rate-of-return at least equal to the cost of the capital, measured as required returns, used to make the investment. This is known as a *Minimum Required Return*, ("MRR"), "hurdle" rate, or other term connoting a threshold rate. Campbell refers to the *Minimum Return Standard* ("MRS") and notes, "*Every project is compared against a threshold to determine if it meets corporate objectives. Companies arrive at threshold value differently and, regardless of the company, a certain arbitrariness occurs in defining the standard.*"⁷²

In practice, the MRR or MRS may exceed the actual cost-of-capital by a few percentage points in order to provide a margin of return over the minimum. For use in valuing the potential acquisition of a producing property, for example, the minimum return might be cost-of-capital plus 3-4%. The

⁶⁶ "Investment Analysis: U.S. Oil and Gas Producers Score High in University Survey," Boyle, Hugh F., and Schenck, George K., "Journal of Petroleum Technology," Vol 37, April 1985, pg. 680

⁶⁷ SPE #25824: "Current Investment Practices and Procedures: Results of a Survey of U.S. Oil and Gas Producers and Petroleum Consultants," Dougherty, E. L. and Sarkar, Jayati, University of Southern California, presented at SPE Hydrocarbon Economics and Evaluation Symposium, March 1993, Dallas, TX

⁶⁸ "Principles of Corporate Finance," Brealey, Richard A., and Myers, Stewart C., 4th Edition, 1991, McGraw Hill, New York, pg. 181

⁶⁹ "Managerial Finance," Weston, J. Fred and Copeland, Thomas E., 8th Edition, 1986, Dryden Press, New York, pg. 99

⁷⁰ "Financial Management for Decision Making," Bierman, Harold and Smidt, Seymour, 1986, MacMillan Publishing Company, New York, pg. 139

⁷¹ "Cost of Capital: Estimation and Application," Pratt, Shannon P., 1998, John Wiley & Sons, Inc., New York

⁷² "Analysis and Management of Petroleum Investments: Risk, Taxes, and Time," Campbell, John M., Jr., 1987, John M. Campbell and Co., pg. 67

purchase price, however, may be based on other considerations of risk and, further, is the result of a negotiation with a seller which, if successful, may yield a total return of COC plus 5% or 6%, or greater. This latter is the *Market Value discount rate*.

The WSPA/CIPA study uses the standard form of the Weighted Average Cost-of-Capital ("WACC") as the starting point for development of a market level discount rate that could be applied to property appraisal. Determination of the WACC for a single company or a group of companies requires analysis and consideration of the three basic components of the total WACC. The analysis done for the WSPA/CIPA study follows the procedures contained in Assessors' Handbook, Section 502⁷³ and, further, conforms to evolving financial industry methodologies.

- Capital Structures
- Cost-of-Debt
- Cost-of-Equity

Sources of Data

Historical capital structure, debt/equity ratios, and effective tax rates were obtained primarily from Standard & Poor's (S&P) reports.⁷⁴ Total debt, total bond debt, and total institutional debt were obtained from S&P and Moody's,⁷⁵ along with company annual reports and/or SEC Form 10-K. Bond, debenture and preferred stock yield-to-maturity (YTM) was obtained from Moody's reports. Institutional debt costs were obtained from corporate annual reports and/or SEC Form 10-K. Information was obtained from the following sources:

Price/Earnings Ratio - S&P, Value Line
Dividend Yield - S&P, Value Line
Beta Factor - Value Line
Preferred Stock Yield - S&P, Moody's
Total Equity - Company Annual Reports, S&P
Preferred Equity - Company Annual Reports
Effective Tax Rate - S&P

⁷³ Assessors' Handbook, Section 502 - Advanced Appraisal, California State Board of Equalization December, 1998, pg. 95

⁷⁴ Standards & Poor's publishes analyses of several hundred companies in all industries on a quarterly cycle. The results are published in print form and are available on the Internet from several sources.

⁷⁵ Moody's Bond Record is a monthly publication that rates debt instruments issued by corporations and other entities.

Capital Structure

Capital is generally obtained in three forms: debt, preferred stock, and common stock. A few companies use all three forms while most others use only two. Regardless of construction, each is a component of the capital structure and each component has a cost. The composition of the "*capital structure*" of the company must be determined as of the date of the analysis.

In general terms, the capital structure of a company is the mix of all forms of long-term debt and equity that constitute the capital base of the firm and can be expressed as a percentage of debt and percentage of equity. The capital structure of a firm can, and often does, change with time and, to some degree, the structure can influence the cost of the various components of the WACC. Most companies with good financial management seek to achieve a debt/equity balance that optimizes available capital and minimizes the cost-of-capital. There is an income tax aspect to debt in that interest is deductible which would encourage borrowing (increasing debt), however, there can be a threshold where an increase in debt as a share of total capital begins to cause an increase in risk to equity holders. Capital structure data for this study is calculated using the (1) amount to long-term debt of the company at year-end, as stated in company financial reports, and (2) the market value of the companies outstanding equity (stock) on the last trading day of the year.

Cost-of-Debt

The Cost-of-Debt (COD) is equal to the rate-of-return earned by investors or the interest rate paid by the borrower on long-term debt. Long-term debt is generally composed of (a) institutional debt to banks, insurance companies, and others with maturities of 1-10 years; and (b) bond debt with maturities of 5-30 years. In the context of the oil and gas industry and the acquisition of producing properties, institutional debt is often incurred as production or project financing.⁷⁶

The Cost-of-Debt is equal to (1) the rate-of-return earned by investors on corporate bonds and debentures, and (2) the effective interest rate paid on all forms of institutional debt weighted by the proportion of each type of debt in the total amount of long-term debt. The cost-of-debt is managed in order to maintain a rate-of-return or interest rate such that the earnings available to common shareholders remain unchanged. The "cost" of bond debt (used here to include all non-institutional forms including bonds, debentures, subordinated debentures) is the investors' yield- to-maturity (YTM) on the instrument. The YTM represents the expectation of the investor and would have to be matched by any new bond issue. The "cost" of institutional debt is the fixed or variable interest rate(s) charged for the use of funds over the term of the financing. The cost of debt is not the so-called prime rate or other single interest rate. The prime rate is a relatively short-term rate more appropriate to line-of-credit borrowing than to long-term capital financing.

⁷⁶ Contrary to popular belief, there is no such thing as "non-recourse financing"

For this study the total debt, bond debt, and institutional debt at year-end was obtained primarily from company financial reports to the SEC (10-K) and/or the company's annual report to shareholders. Bond and debenture YTM is obtained from Moody's Bond Record for each outstanding issue.⁷⁷ Data includes Eurobond and other issues. Interest rates on institutional debt are obtained from corporate annual reports, Form 10-K, and from other documents. Variable interest rates based on prime rate, LIBOR, or CD rates were calculated using the appropriate rate on December 31 of each year.

Cost-of-Equity

The cost of all forms of equity must be determined along with the composition of the equity portion. The cost-of-equity is the return required by investors in equity instruments - primarily common and preferred stock. For this study, the cost-of-equity on the analysis date for each company is calculated using the (1) a cost-of-equity calculated from the Capital Asset Pricing Model ("*CAPM*") and (2) total return (dividend payment plus equity growth) obtained from the Value Line Investment SurveyTM ("*Value Line*"). For those companies not reported by Value Line, only the Capital Asset Pricing Model result is used.⁷⁸

Common Stock - Common stock is the major component of the capital mix of most oil and gas companies. The cost of common equity is the rate-of-return that stockholders, as investors, expect to earn on the firm's common stock. The cost of common equity is based in large part on the maintenance of the investors' expectations regarding the rate-of-return on the equity capital of the firm. If the firm retains or obtains funds and invests them such that it earns more than the cost of the funds, the rate-of-return and, therefore, the stock price would increase. On the other hand, if investment is made at less than the cost of equity capital, the price of the stock will decline thereby reducing the value of the company. The cost of common equity can be determined by several methods using published data.

Preferred Stock - Preferred Stock is a hybrid between debt and common stock which carries a fixed dividend payment. The cost of preferred equity is the yield to the investor on the preferred stock and can be obtained from published tables or can be calculated from published data. The proportion of preferred stock that is included in the total capital structure can be obtained from published data.

Capital Asset Pricing Model

There are several methods that can be used to estimate the cost-of-equity, however, the most widely used method is the Capital Asset Pricing Model ("*CAPM*") and variants of *CAPM*. The *CAPM* attempts to estimate the cost-of-equity by calculating the return-on-investment that should apply to a company or industry when various risk elements are considered. In this model, total equity return (K_s) equals a risk free return (R_f) plus an adjustment for the risk associated with an equity investment in common stock ($R_m - R_f$) where R_m is stock market or equity risk. The equity risk element is further enhanced by

⁷⁷ As of December of the analysis year; published in the Moody's edition for the following January

⁷⁸ As part of the analysis for this study, the results obtained using only Value Line companies were compared to the results from the larger group. No material difference was found among the two groups.

including a factor to account for the difference in volatility between an individual stock or an industry group and the market as a whole. In this usage β is the "beta" factor of the stock and measures the volatility of a stock, or group of stocks, relative to the market as a whole.⁷⁹

In using this model the risk free rate (R_f) is obtained from expected rates (YTM) on Treasury bills and bonds. For short-term analysis the T-bill rate is generally used with sufficient notice taken of its volatility from time to time. For use in this study a risk-free rate more equivalent to the term of the risk is appropriate, therefore, the 20-year Treasury bond rate is useful. Treasury bond and bill interest rates and anticipated yields are published daily and data is available on the Internet from a large number of sources.

The beta for an individual stock or an industry group can be determined from published data compiled by S&P and various investor services or it can be calculated. While beta is often based on historical performance of stocks and markets, beta itself can be volatile due to non-systematic risk that effects an industry or a company. For this study, beta is calculated for each company in the sample set as of the last trading day of the year using a five-year daily stock price change regressed⁸⁰ against (a) the daily S&P 500 stock composite and (b) the daily NYSE composite. The beta used for calculation of the cost-of-equity is an average of the betas calculated from S&P and from NYSE combined with the Value Line beta where available.

Derivation of After Income Tax Cost-of-Equity using CAPM

The cost-of-equity is calculated as the average of the CAPM derived cost-of-equity with the Value line estimated average annual total expected return as reported by Value Line⁸¹ for about half the sample group of companies. The results of the analysis for year-end 2004 is an after tax COE of 12.784% for the integrated companies and 9.659% for the non-integrated companies with an (unweighted) average of 10.284% for the combined group.

Conversion of Cost-of-Equity to Before Income Tax

The cost-of-equity estimated from both the Value Line survey and the CAPM calculation is an After Federal Income Tax (AFIT) value which must be converted to a Before Federal Income Tax (BFIT) value. The BFIT Cost-of-Capital is calculated as the AFIT cost-of-equity divided by a factor of (1

⁷⁹ $K_s = R_f + (R_m - R_f)\beta$ This is a relatively simple model which describes a straight line function.

⁸⁰ Calculated using the internal functions of Microsoft Excel™

⁸¹ Reports for the industry companies covered by Value Line are issued in December and are considered timely. The Total Expected Return is a combination of anticipated dividend return and stock price growth over the following five years. While the Value line methodology is proprietary, and is as subject to error as any other estimation method, Value Line is a respected source and the methodology has been tested in peer review studies. The Value Line estimate of Total Expected Return tends to be more optimistic than the CAPM calculation.

minus T) where T is the statutory Federal Tax Rate.⁸² Some assessors have advocated the use of the effective tax rate, however, the textbook approach, the SBE approach, and the procedure recommended by other financial sources, is to use the marginal statutory tax rate.

There are several reasons why the use of the marginal rate is correct. First, the effective tax rate is calculated as the total U.S. Income Tax paid divided by the Net Income Before Tax. It is not uncommon for the effective tax rate to differ from the statutory tax rate for a given reporting period. For example, at year-end 2004, the average effective tax rate for the WSPA group of seven integrated companies was 38.77%. A review of the financial statements of those companies reveals that each calculated income tax at the marginal corporate rate (35%), but then also made adjustments to those taxes for tax credits, foreign taxes and all the other credits and adjustments that the tax code allows. Further, the taxpayer has substantial latitude regarding the use of such tax adjustments, so it is not unusual to have an above-marginal effective tax rate one year and a sub-marginal effective rate the next. Second, the effective tax rate is highly individualized to the company due to the possible mix of credits and exemptions that may apply. Third, the effective tax rate is historical and applies to a specific reporting period. The WACC is a forward looking rate-of-return. The only application of the effective tax rate that would be valid would be if the taxpayer anticipated that all the conditions that occurred to create the effective tax rate would continue forward without change.

Calculation of Standard Weighted Average Cost-of-Capital (WACC)

The BFIT WACC is determined from the combination of capital structure, BFIT cost-of-debt and BFIT cost-of-equity. For year-end 2004, an analysis was done of the WACC for a group of 38 oil and gas companies including 7 major integrated companies and 31 non-integrated producing companies using year-end financial data (Exhibit 9). The composition of the study group(s) is derived from the list of companies reported by Standard & Poor's with some additions selected from reports issued by the Value Line Investment Survey. The selection of the additional companies was based on (1) availability of data such as dividends, earnings, and calculated beta factors, (2) activity of the company in acquisitions, and (3) California location. The number of companies included in the data set has declined from prior years due to mergers, acquisitions, and business failures.⁸³

⁸² This study uses only the Federal rate. There is some debate as to whether the California state income tax should also be included. The inclusion of the state corporate rate is appropriate when attempting to conform to California markets, and, considering that California has invoked a unitary tax rule in the past, there is an argument for applying the California rate to derive a BFIT Cost-of-Capital even though the vast majority of income for the companies in the sample is earned outside California.

⁸³ The composition of the study group of companies and the analysis of financial data is made more complicated for year-end 2004 because of the continuing merger and corporate acquisition activity of recent years, resulting in the creation of new entities that may not be recognized from prior years. These include Exxon Mobil and BP Amoco (plus ARCO), Santa Fe/Snyder/Maynard, and the combination of several companies into Range Resources, Remington Oil & Gas, and Pioneer Natural Resources. In 2002-2003 Devon acquired Ocean Energy. Several companies including Callon Petroleum, Calpine Corp., Carrizo Oil & Gas, Houston Exploration, Penn Virginia, and XTO Energy have been added to the list since 2001. In 2003-2004 Wilshire Oil Company of TX and North Coast have sold their oil and gas interests. Wiser Oil was acquired by Forest Oil. Plains acquired by Nuevo. Equity Oil was acquired by Whiting Petroleum. In 2005, Occidental acquired Vintage and Calpine was dropped due to uncertainty surrounding the company's

Most of the companies in the study are publicly traded on the New York Stock Exchange (NYSE). Several of the companies included in the study group were active in property acquisitions. All the companies were considered to be going concerns. The companies are considered representative of the prospective property purchasers in the market, even though they may not necessarily be active purchasers in the current year. The cost-of-capital and the required rates-of-return for these firms essentially define the competitive market for investment capital and for investors for public and non-public companies. If there is any differential between public and non-public companies, the Cost-of-Capital and required rates-of-return for non-public companies would be expected to be higher than for public companies because they lack the risk reduction that comes from public review, regulatory control, and liquidity.

The following paragraphs present a brief discussion of the results of the WACC analysis done for this study. The BFIT Cost-of-Capital is artificial and does not exist in real financial analysis. It is calculated here only to provide an alternative for, and a comparison to, market-sales-derived BFIT discount rates. Results of analysis for year-end 1995 - 2004 are summarized below.

WEIGHTED AVERAGE COST-OF-CAPITAL (BFIT)

@ December 31

	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>
Integrated, %	15.5	16.1	14.2	16.6	15.1	15.7	14.9	14.9	12.9	15.5
Independent, %	14.5	15.9	14.0	16.1	15.8	15.6	15.3	12.5	11.8	13.0
Combined, %	14.8	16.0	14.1	16.2	15.6	15.6	15.2	12.9	12.0	13.5

The WACC calculated in this study is the current or marginal Cost-of-Capital, not a simple historical Cost-of-Capital. As a marginal value, the WACC is more closely resembles the minimum return standard applied to individual evaluations by buyers and is, therefore, more closely related to the market discount rate than a historical WACC. This is true even though the companies that are used in the WACC analysis are not necessarily the same as those occurring in the market sales database as Buyers or Sellers. Further, the results obtained from the standard Cost-of-Capital analysis are considered to be conservative. The companies used for the sample groups are primarily large, stable, publicly-traded companies with relatively long performance histories. The Value Line estimates in particular are based on thorough research of accumulated company and industry performance. These results are seen as having relatively less risk than other companies with smaller capitalization and greater risk. As will be discussed below, there is a significant amount of research from securities analysis indicating that the risk associated with small capitalization as compared to large capitalization is commensurately expressed in actual and/or expected returns.

An AFIT WACC is also calculated in order to provide a comparison to historical market return and to the reports of several companies regarding returns. The average AFIT WACC for all 38 companies is 9.228 % as compared to the 13.497 % BFIT WACC. It should be noted that, for most companies,

financial condition.

internal discount rate guidelines are defined in AFIT, not BFIT, terms.

The results presented above are determined using the mean of individual company values of WACC. This is probably the most direct and valid approach since the market is made up of individual companies making investment decisions which are expected to increase the value of the company. One difficulty with the approach however, is that (a) in the case of the Independent/Non-integrated group and (b) in the time progression from 1984 to 1994, there is sometimes a lack of necessary data or the data for individual companies becomes non-representative or not useful. As a general rule COD data was much more complete than COE data primarily because determination of the latter makes use of earnings and dividend data which was not always meaningful or available. In order to be sure that the results of the study were not skewed by a decreasing number of complete cases a calculation of WACC for each year was done using industry average values for each component of the calculation. This approach allowed a much larger part of the total data to be used in the analysis and also provided a check against the individual company average. The results of the industry average approach are summarized below in Exhibit 13. The two approaches give similar results which should be expected. Using the Individual Company approach, a standard deviation about the mean WACC can be derived for each year which gives a range of values for use in a Cost-of-Capital discount rate.

Pure-Play Analysis for Cost-of-Capital Estimation

The WACC analysis reported for this study is a traditional calculation of an average WACC for each of the companies in the study group. As noted earlier, this WACC is not necessarily, and is rarely likely to be, the rate that would be used to value a specific property.

A 1997 study by Ibbotson Associates for WSPA⁸⁴ suggests an approach to estimating a WACC that more closely fits the requirements of specific property appraisal. In this work, Ibbotson calculated WACC for a "Pure-Play" oil and gas production company, where 100% of revenue would come from producing operations. The Pure-Play company simulates the return from a producing property, but the return is estimated from capital market methods and data. The result obtained by Ibbotson was a BFIT WACC of 20.15% for a pure-play oil producing company. This result is significant in providing some indication of a minimum discount rate that could be applied to low risk properties. While Ibbotson made adjustments for liquidity, there is no consideration or adjustment for the risk inherent in the income stream for a specific property.

Derivation of Cost-of-Equity using Expanded CAPM

The BFIT and AFIT WACC discussed above is calculated using the standard textbook approach where the three basic components are the cost-of-debt, the cost-of-equity, and the proportion of each in the capital structure. Of these three, the cost-of-equity has always been at once the more difficult and the most controversial component. The Capital Asset Pricing Model is the primary source for estimating

⁸⁴ "WACC for Pure-Play Oil and Gas Extraction and Refining Entities," Ibbotson Associates, presented by Roger G. Ibbotson, President and Chairman, at Ventura, CA, January 15, 1997.

expected return-on-equity, with a lineage going back to the early 1960's. Continuing research into the methods of estimating cost-of-equity has resulted in two major and relatively new approaches which augment the CAPM. These are the *Market Capitalization Effect* and the *Fama-French, or Three-Factor, Model*.

Cost-of-Capital With Market Capitalization Effects

The Market Capitalization Effect refers to the observation that anticipated and/or actual return-on-equity is inversely related to the market capitalization ("*market cap*") of companies.⁸⁵ In this concept, market capitalization is a surrogate for one form of investment risk.

"One of the most remarkable discoveries of modern finance is the finding of a relationship between firm size and return."^{86, 87} There is a clearly defined relationship between the market capitalization of companies and the returns obtained by, and expected of, those companies. Statistical analysis of the equity marketplace indicates that equity returns for groups of companies (compiled as decile groups of NYSE companies based on market capitalization) inversely related to the market capitalization. That is, small capitalization companies, as a group, have higher returns than do large capitalization companies, as a group. The results of this analysis suggest that a market capitalization size premium can be added to the return calculated using the CAPM formula to account for the return in excess of the risk measured by CAPM. As reported by Ibbotson,⁸⁸ the size premium is significant for companies in the smallest group:

⁸⁵ The market capitalization of a company at a point in time is the current market value (price) of the equity (stock) shares issued by the company times the number of shares outstanding.

⁸⁶ "*Stocks, Bonds, Bills, and Inflation - Valuation Edition 2005 Yearbook*," Ibbotson Associates, 2005, Chicago, IL, pg. 127

⁸⁷ Banz, Rolf W., "*The Relationship between Returns and Market Value of Common Stocks*," *Journal of Financial Economics*, Vol. 9 (1981) pp. 3-18

⁸⁸ "*Stocks, Bonds, Bills, and Inflation - Valuation Edition 2005 Yearbook*," Ibbotson Associates, 2005, Chicago, IL, pg. 121-152

Decile	Historical Average Percentage of Total Capitalization	Recent Decile Market Capitalization (\$Millions)	Average Decile Capitalization (\$ Millions)	Arithmetic Mean Return, %	Size Premium (Return in Excess of CAPM) %
1-Largest	63.31	8,214,688.366	47,759.816	11.39	-0.37
2	13.97	1,722,153.325	9,729.680	13.24	0.60
3	7.58	894,917.914	4,497.075	13.84	0.75
4	4.74	548,389.454	2,623.873	14.38	1.07
5	3.24	400,381.543	1,828.226	14.96	1.44
6	2.37	325,662.936	1,267.171	15.46	1.75
7	1.73	264,131.617	880.439	15.67	1.61
8	1.28	219,976.996	591.336	16.74	2.36
9	0.98	230,476.080	391.301	17.71	2.86
10-Smallest	0.8	185,850.318	104.276	21.77	6.41
Mid - Cap 3-5	15.56	1,843,688.910	2,940.493	14.19	0.95
Low - Cap 6-8	5.38	809,771.549	871.659	15.76	1.81
Micro - Cap 9-10	1.79	416,296.398	175.578	18.97	4.02

The market capitalization size effect would suggest that, for companies in the 6 lowest deciles, premiums ranging from 1.44% up to 6.41% should be added to the return derived from the CAPM calculation. The average capitalization of companies in Decile 6 is \$1,267.171 million while the average in Decile 10 is \$104.276 million.

The sample group of 38 companies used in this study have a total market equity capitalization at December 31, 2004 of \$825,808.729 million and range from ExxonMobil at \$407,967.75 million to Royale Energy at \$62.49 million. The average market capitalization of the 38 companies is \$21,731.809 million.

The Market Capitalization Effect contributes a premium⁸⁹ ranging from -0.37 % up to 6.41%, which is additive to the equity return calculated by the CAPM. Based on an average market cap of \$81,964 million, the integrated companies in the sample set would qualify for an average premium on the CAPM of -0.37 percentage points, while companies within the larger group of non-integrated companies would have the CAPM return increased by of -0.37 to 6.41 percentage points. These adjustments to the cost of equity would produce a material change in the calculated WACC, particularly since equity forms the largest portion of total capital. The available data does not allow a completely rigorous application of the Market Capitalization Effect to the Cost-of-Capital for this study, however, as shown in Exhibit 10, for many oil and gas companies, the adjustment recognized for the Market Capitalization Effect would result in a measurable increase in AFIT Cost-of-Equity and therefore in BFIT COE and WACC. Based on the average capitalization of \$3,965 million of the Non-Integrated/Independent segment of the study group, the market cap premium would be about 1.07%, which would result in an increase in average AFIT COE from 9.659% to 10.766%. When corrected to BFIT, this represents an increase from 14.86% to about 16.56%. The capital structure is about 78.3% equity, which results in a 1.33 percentage point increase in BFIT WACC to 16.21%.

⁸⁹ "Cost of Capital Quarterly - 2005 Yearbook," Ibbotson Associates, Chicago, IL, 2005; pg. 121-152

Similar but expanded work has been done by Grabowski and King.⁹⁰ While Ibbotson relates the size effect to market capitalization, Grabowski and King have defined "size" as not only market capitalization but also 5-year Average EBIT, Sales, Number of Employees, Book Value of Equity, and other criteria. Further, they have ranked the companies in their sample set into 25 equally sized portfolios rather than the deciles used by Ibbotson, which allows greater precision in the selection of the appropriate adjustment. The Grabowski and King work focuses on developing a relation of "size" to a total risk premium, which includes size and takes the place of the market risk $[(R_m - R_f)\beta]$ portion of CAPM. On this basis, the AFIT smoothed equity risk premium is 2.26% for the largest companies (average market cap of \$84,208 million) to 13.79% for the smallest (average market cap of \$49.0 million).⁹¹

Application of Market Capitalization Effect to Market Sales

If, as discussed above, each oil property is considered to be a Pure-Play company, the Market Capitalization Effect work of Ibbotson and Grabowski/King could be used as a basis for deriving alternative discount rates, which would then serve as comparison points for actual sales data. The Ibbotson Pure-Play results could be included by scaling the Market Capitalization Effect data to fit around the Pure-Play results or by applying the liquidity adjustment outlined by Ibbotson.

The arithmetic mean purchase price of all the 258 sales in the WSPA Working Database is \$21,535,245; the median purchase price is only \$1,255,500. If the average purchase price is considered to be the market capitalization of the property, then the average transaction would be in Ibbotson decile 10 and would require a premium of 6.41% to be added to the AFIT CAPM derived cost-of-equity. If all other parts of the WACC analysis for year-end 2004 were unchanged, the Market Capitalization Effect alone would increase BFIT WACC by 6.21 percentage points to 19.71%.⁹² Despite the addition of this capitalization premium, the result remains a return on readily liquid securities not on non-liquid, higher risk oil properties.

For this analysis the Grabowski data (Exhibit 11) is also used. Based on the purchase prices of the 258 sales in the Working Database the vast majority of the property sales accumulated for the WSPA Study fall in portfolios 23, 24, and 25, with the overwhelming majority in portfolio 25. There is no further scaling within the several portfolios.

⁹⁰ "New Evidence on Market Capitalization Effects and Rates of Return," Grabowski, Robert and King, David in Business Valuation Review; September, 1996. Also "Market Capitalization Effects and Equity Returns: An Update," Business Valuation Review, March, 1997. See also: "Duff & Phelps Risk Premium Report," Grabowski, Roger and King, David; Duff & Phelps LLC, 2005

⁹¹ "Duff & Phelps Risk Premium Report," Grabowski, Roger and King, David; Duff & Phelps LLC, 2005, pg. 24

⁹² $(0.7643) \frac{(9.24 + 6.41)}{0.65} + (5.561)(23569) = 19.71\%$

For Pure-Play or single property companies in Group 23, the smoothed average risk premium is 11.65%, while in Group 25 the adjusted risk premium is 13.79%. The resulting Cost-of-Equity and WACC for the three groups would be as follows:^{93, 94}

	<u>Equity Risk Premium, %</u>	<u>AFIT COE, %</u>	<u>BFIT COE, %</u>	<u>WACC, %</u>
Group 23	11.65	16.49	22.76	19.06
Group 24	12.27	17.11	23.71	19.81
Group 25	13.79	18.63	26.05	21.64

These results are a significant improvement over the industry average WACC but are still less than the market sales data results where the mean discount rate is 23.1% for 100% PDP properties where the average purchase price (Market Capitalization) is \$5,133,928 million. This outcome strongly suggests that (a) adjustment of the WACC to reflect company (property) size is a useful starting point for further reconciliation, and (b) a properly determined Cost-of-Capital can be used as a source for a discount rate and can also serve as a means to test the discount rates derived from actual sales. In this context, there is reason to vigorously question discount rates which fall below 19-20%.

As noted by Ibbotson and by Grabowski, the discount rates obtained using these data are rates to be applied to *risk-adjusted* cash flows. Additional premiums would be required to account for whatever property specific risk may remain. Since the Market Capitalization Effect measures some risk, the adjustment may be less than that suggested by the SPEE survey or other sources.

Three Factor Model

The Three Factor Model is an expansion of the CAPM based on research by Fama and French⁹⁵ at The University of Chicago and by other researchers,^{96,97} into the function of the beta component of CAPM. This research suggests that refinements can be made to CAPM to account for valuation factors not measured by beta. There has been voluminous study of this issue, which is far from being resolved. However, financial analysis using the Three Factor Model is being done, and Ibbotson, among others, publishes Three Factor Model data along with standard CAPM data.

Three Factor Model data are currently readily obtainable only by SIC code, not for individual

⁹³ Long-term Riskless Rate is 4.84 % for 30-year Treasury Bonds @ 12/31/04.

⁹⁴ Corrected to BFIT using $\frac{\text{AFIT COE}}{(1 - t)}$

⁹⁵ Fama, Eugene F. and French, Kenneth R., “*The Cross-Section of Expected Stock Returns*,” Journal of Finance, Vol. 47, 1992, pp. 427-465

⁹⁶ Kothari, S.P., Shanken, Jay and Sloan, Richard G., “*Another Look at the Cross-Section of Expected Stock Returns*,” Working Paper, December 1992

⁹⁷ Black, Fischer, “*Beta and Return*,” Journal of Portfolio Management, Fall 1993, pp.8-18.

companies. For this study, SIC Code 131, which corresponds most closely to the Non-Integrated/Independent group of companies in the Cost-of-Capital analysis, was researched to obtain Three Factor Model estimates of Cost-of-Equity.

SIC Code 131 - Crude Petroleum and Natural Gas: This group (Exhibit 12) includes 85 companies, such as Anadarko Petroleum Corporation and Berry Petroleum and most of the companies in the WSPA/CIPA Non-Integrated/Independent group. For this group, the Median cost-of-equity using the Three Factor Model is 10.44 % AFIT. When adjusted to BFIT, the cost-of-equity for this SIC code would be 16.06 % which is 1.201 percentage points greater than the 14.86 % basic BFIT CAPM cost-of-equity for the Non-Integrated (Independent) group of companies.⁹⁸ Substituting the Three Factor cost-of-equity in the Cost-of-Capital analysis results in a WACC of 13.82% for year-end 2004.⁹⁹

Conclusions Regarding Standard and Adjusted Cost-of-Capital

The incorporation of the Market Capitalization effect, using either Ibbotson or Grabowski, and/or the Three-Factor model, allows refinement of the cost-of-equity portion of the WACC to account for some of the factors that research has found to have an influence on the market perception of the value of the equity of companies and industries. The use of the Ibbotson approach yields an adjusted BFIT WACC of 16.12%, a 1.33 percentage point increase over the basic WACC. The Grabowski approach would result in larger increases in WACC particularly for those companies with market capitalizations in the range of the average property purchase price (19.06 % to 21.64%). Finally, the Fama-French approach yields a small increase to 13.82%.

These approaches do not replace the CAPM model but do improve the model by adding certain elements. While there remains considerable debate in the financial and academic communities regarding the benefits and/or drawbacks of these approaches (and others) there is no question that they do provide necessary amplification of the cost-of-equity estimation procedures. These results are presented herein for information and comparison purposes.

Comparison to WACC Analysis from Third-Party Studies

There are very few studies of market sales data that are available for review and which have been done with sufficient consistency and frequency to allow comparison to the results of the WSPA Study. These independent sources have generally supported and confirmed the results of this study, particularly regarding base discount rates and the influence of risk.

Texas Property Tax Division Study

For more than 20 years, the Texas State Property Tax Board, now the Property Tax Division of the

⁹⁸ Data from “*The Cost of Capital Center*,” Internet site operated by Ibbotson Associates, Inc., Chicago, IL [www.valuation.ibbotson.com]

⁹⁹ $WACC = ((0.78267)(16.06)) + ((0.21733)(5.761)) = 13.82\%$

Texas Comptroller of Public Accounts, has conducted a study and published a report in which the primary focus is the derivation of a discount rate for the appraisal of oil and gas properties using a Cost-of-Capital approach.¹⁰⁰ This report is provided to local property tax appraisal districts to guide their selection of discount rates for oil and gas property appraisal. For several years the Property Tax Division (PTD) report also included a property sales study conducted by the staff of PTD.

**TEXAS COMPTROLLER OF PUBLIC ACCOUNTS
PROPERTY TAX DIVISION
Weighted Average Cost-of-Capital @ December 31**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Integrated Companies	15.8	14.83	16.1	15	13.17	13.9	13.19	12.8	15	16.1
Non-Integrated Companies	13.9	13.92	15.8	14.04	14.19	13.7	13.44	14.5	15	15.6
“Hurdle Rate Premium”	2	2	2	2	2	2	2	2	2	2

The results of the PTD Cost-of-Capital¹⁰¹ study are summarized below for 1995 through 2004. The PTD and WSPA results are consistent from year to year. The PTD uses essentially the same textbook approach as is used in the WSPA Study. Some differences occur in the mechanics of the calculation and in the sources of information for components such as beta factors. Those differences aside, either calculation provides a starting point for a discount rate.

The PTD has determined that the addition of a 2% *"Hurdle rate premium"* is necessary in order to apply the Cost-of-Capital data to the appraisal of oil properties for ad valorem tax. This hurdle rate premium is consistent with industry and general financial practice of targeting a minimum return rate that exceeds the Cost-of-Capital and with the *Cost-of-Money Plus Return* component of the early SPEE surveys. PTD also recommends the addition of percentage points to the base discount rate to account for *"Property Risk Attributes,"* which are defined to include (a) limited production history, (b) single completion leases, (c) offshore leases, (d) enhanced oil recovery, and (e) short remaining life. For these risk factors, the adjustment ranges from 1 to 3 percentage points. The PTD further recommends that tax appraisers consider other risk adjustments for (a) high or increasing watercut, (b) erratic production, (c) long history-stable production, (d) gas curtailment, and (e) environmental concerns. The ten risk factors can often be accounted for as part of the income stream construction, however, where that procedure is not sufficient, compensation for risk in the form of increasing or decreasing the discount rate is an acceptable approach.

¹⁰⁰ The Comptroller’s Office is required by law to provide recommendations to County Assessors in Texas as to oil and gas pricing and discount rates for use in oil and gas property tax appraisal and is also charged with auditing the appraisal of County Assessors and/or their consultants

¹⁰¹ *"Discount Rate Range for Oil and Gas Properties,"* Texas Comptroller of Public Accounts, Property Tax Division, July, 2005, Austin, TX

Total Returns/Equity Returns

Historically, the acquisition of producing properties in California has been done with equity capital. Data from California oil property sales indicate that the vast majority of oil and gas properties are purchased by the payment of cash to the seller where funds are apparently taken from the pool of investment capital available to the buyer. As noted previously (page 47), of the 433+ documented sales in the WSPA database for the 1983 through 2005 period, fewer than 10% of those transactions indicate any form of payment to the seller other than 100% equity cash. The other forms of payment include cash plus the proceeds of specific loans, but also include cash plus stock, stock warrants, exchanges of other properties and conditional payments subject to changes in oil price.

Based on this information, it is apparent that knowledgeable and informed buyers of oil and gas properties are most likely to use equity capital for acquisition as opposed to mortgage debt financing. It would, therefore, be reasonable to assign the equity Cost-of-Capital as a discount rate for oil property appraisal.

Comparison of Property Transaction Data to Financial Market Data

The WSPA Study presents the results of two separate, but directly related, analyses of market data; the discount rates derived from actual transactions and the estimated Cost-of-Capital for those corporations that would be considered potential purchasers and sellers of oil and gas properties. The two discount rate sources represent processes that are related in both theory and practice. Numerous studies, along with standard financial references, demonstrate that WACC and/or variations of WACC are used as the foundation for capital budgeting decisions, including those involving property acquisitions. The observation in this and other studies that discount rates from actual transactions continually exceed the Cost-of-Capital should be expected. Both elements are also related to the broader economic-financial context of the oil and gas industry.

Access to market data from actual sales offers the best opportunity to understand how buyers and sellers of oil and gas properties determine the price that they are willing to pay and the return they are willing to accept for a specific property. This window is not always clear; it is opaque in some areas and distorted in others. As shown by the statistical analysis, there is a broad consensus as to the appropriate level of FMV discount rates, but there are large areas at either end of the spectrum that promote questions that can only be imperfectly answered. Market data alone may not be a sufficiently reliable base for making discount rate decisions. The use of Cost-of-Capital analysis to supplement, confirm, deny, or reinforce market sales results is necessary. In this discussion, an attempt is made to reconcile the seemingly disparate results from the two approaches.

The results obtained from the Market Sales analysis and from the Cost-of-Capital analysis are not independent and/or unrelated phenomena. The decision to acquire an oil property necessarily flows from a determination that a satisfactory return can be achieved from the property. The expected return is a function of the Cost-of-Capital but must be related to the difficulty and risk of operation of a specific property, and thereby is related to the anticipated return that is expected from the actual acquisition. Fortunately, several expansions of Cost-of-Capital, particularly cost of equity, analyses have occurred

in recent years that allow the Cost-of-Capital approach to be more closely tied to the market sales approach.

The problem with using the Market Derived and/or Cost-of-Capital sources is that they do not provide consistent answers, at least not on the surface. Except in certain circumstances, discount rates obtained from market sales do not match discount rates taken from cost-of-capital analysis. The Market Derived discount rates always exceed the Cost-of-Capital discount rates. This disparity is apparent regardless of the data source. The reason for such a relatively uniform and disparate relation between derived and cost-of-capital rates is obvious when one considers the purpose of the cost-of-capital and the application of the COC as a minimum return on capital investments.

If the COC is the minimum required rate-of-return on invested capital, then it should not be surprising if the returns from actual transactions consistently exceed the COC. This observation, while useful in assuaging concern over the difference in rates noted above, is not particularly helpful to the evaluator who must decide which rate to use for estimating the market value of the XYZ lease. Knowing that such a difference should and does exist is all the more perplexing when the evaluator does not have access to, or does not feel comfortable with, market sales data but must rely on COC information. If the COC is the *Minimum Required Return* and the market data is the actual return, the conscientious evaluator might then want to determine how to bridge the gap.

Measuring the Difference

A comparison of the discount rates derived from (a) the Market Sales analysis, and (b) the Cost-of-Capital, indicates that the annual mean discount rate from all property sales differs from the annual mean WACC by as little as 3.0% and as much as 10.4%, but over the 1990-2004 period market sales discount rates exceed the WACC by about 7.6% (Exhibit 14). The values shown as Mean discount rate and Mean WACC are the arithmetic averages of Market Sales and WACC derived discount rates for each year as discussed in previous sections of this report. The analysis of market derived discount rates from property sales with 100% PDP reserves may be more informative. The annual difference between Mean WACC of 15.5% and the Mean discount rate from the 100% PDP sales of 22.6% averages about 7.05 percentage points. The standard deviation of the 100% PDP discount rates is 1.6, which is close to the standard deviation of 1.8 for Mean WACC over the same period and is considerably less than the standard deviation of 7.0 for all properties.

Market Derived Discount Rate vs. Weighted Average Cost-of-Capital

Year	All Properties Mean DCR%	100%PDP Mean DCR%	Cost-of-Capital Mean WACC, %	^a All, %	^a PDP, %
1985	27.6	25.7	18.9	8.7	6.8
1986	23.8	24.1	15	8.8	9.1
1987	22.1	23	15.1	7	7.9
1988	24.2	22.8	15.6	8.6	7.2
1989	25.5	27.6	15.6	9.9	12
1990	21.8	21.1	18.8	3	2.3
1991	22.8	22.2	18.5	4.3	3.7
1992	25.5	24.7	15.5	10	9.2
1993	24.2	22.4	13.8	10.4	8.6
1994	25.6	22.1	17.3	8.3	4.8
1995	22.4	22.4	14.8	7.6	7.6
1996	23.6	19.2	16	7.6	3.2
1997	20.6	19.9	14.1	6.5	5.8
1998	26.3	*	16.2	9.2	-
1999	18.6	*	15.6	3	-
2000	*	*	15.6	-	-
2001	*	*	15.2	-	-
2002	*	*	12.9	-	-
2003	19.1	18.5	12	7.1	6.54
2004	*	*	13.5	*	*
1985-2004	23.4	22.6	15.5	7.9	7.05

* Insufficient Data Points

The Texas Property Tax Division ("PTD") annual study found similar results to the WSPA Study and reached comparable, but not identical, conclusions. The primary focus of the Texas Study is the derivation of a WACC for a group of integrated and independent public oil companies. However, during the period 1987-1993, PTD also obtained market data from sales transactions in Texas involving primarily 100% PDP properties.¹⁰² The PTD discount rates were derived as BFIT and Risk-Inclusive returns in essentially the same manner as the WSPA study. The PTD published both the WACC and the sales analysis in the reports for 1987-93.

¹⁰² "1997 Property Value Study: Determination of Discount Rate Range for Petroleum and Mineral Properties," Texas Comptroller of Public Accounts, Property Tax Division, November 1997, Austin, TX

Sources of the Difference

From an appraisal standpoint, the differences between the WACC derived discount rates and the market derived discount rates occurs primarily because of the differing composition of the two rates.^{103,}
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1. The Cost-of-Capital, by construction, does not include a return-of-capital component while the discount rate derived from sales explicitly includes a component for return-of-investment in addition to return-on-investment. The market derived rate represents the requirement on the part of the investor to receive (a) a return of and on investment, and (b) to be compensated for the inherent risk in the investment. The WACC derived discount rate consists of only a return-on-investment. See Discussion Appendix G.
2. The Cost-of-Capital, as derived for publically traded companies, is the return anticipated on an equity and/or a debt investment. These equity and/or debt investments are highly liquid and can be bought and sold on a variety of markets virtually instantaneously. In contrast, oil producing properties are real estate and are inherently illiquid.
3. The WACC rate includes a measure of risk, but it is the risk of a portfolio of investments where risk is moderated by the diversity of the portfolio. Property sales data are generally derived from discrete individual properties, while the Cost-of-Capital of public companies is reflective of investors expectations for all the activities of the company.

The difference between the rates consists of the return-of-investment coupled with the difference in risk between a portfolio of debt and equity returns and reliance on a fixture stream of income from a single source. It is often necessary to bridge the gap between the results of the two methods, either because the number of actual sales is small or to provide a second source of reliable data to support market derived data.

Pure-Play analysis offers one way to bridge the gap between the Cost-of-Capital and market sales data. The work by Ibbotson (noted above) found that for companies which engaged primarily in oil and gas extraction, the estimated AFIT cost of equity is 11.38% (data through March, 1996) and, after adjustment for income tax and liquidity, the BFIT WACC is 20.15%. Ibbotson cautions that this WACC would only be applied to Risk-Adjusted cashflows, so that if the cashflow from a 100% PDP property is properly adjusted using the average of 97.2% noted in the 2001 SPEE survey¹⁰⁵, the 20.15% could

¹⁰³ The difference between market data and Cost-of-Capital data or usage has been an issue in real estate. See “*The Use and Misuse of CAPM in Property Tax Valuation*,” Schweih, Robert P., *Journal of Property Tax Management*, Fall 1994

¹⁰⁴ See also, “*Valuing a Business*,” Pratt, Shannon R., Reilly, Robert F., Schweih, Robert P., Third Edition, 1996, Richard D. Irwin (Times-Mirror)

¹⁰⁵ Twentieth Annual, “*Survey of Economic Parameters Used in Economic Evaluation*,” Society of Petroleum Evaluation Engineers, June 2001, Houston, TX, pg. 22

be applied to obtain an estimate of market value. Similarly, the 20.15% could be used to estimate value for a cashflow from a 100% PUD property if the appropriate adjustment factor (55.6% in the 2005 SPEE survey) is first applied to the cash flow.

Ad valorem tax appraisal requires that each property be valued individually based on the characteristics and income producing capacity of that property; that is, as a stand-alone entity rather than as an asset of a company. It is a short conceptual step to think of each property as a Pure-Play company whose only business is to produce that property. This is similar in concept to taking the acquisition value of an oil company, which is purchased in the stock market, and ascribing that value to the company's oil and gas reserves. However correct or incorrect it might be, the latter is a relatively common practice.

If each property is considered to be a Pure-Play company, then the Pure-Play discount rate extracted from equity market data, such as done by Ibbotson, is applicable. Further, the Pure-Play WACC can serve as a check on the market sales data. But a Pure-Play discount rate derived for an entire SIC code is only a starting point and is incomplete. First, in the absence of generally accepted risk adjustments, the single value Pure-Play WACC or cost-of-equity is not adequate and must be adjusted to account for risk. The Pure-Play rate provides a floor discount rate which is already adjusted for liquidity. Second, the Pure-Play rate has no component for return-of-capital since it is derived from capital markets where cost-of-debt and cost-of-equity assume reversion at full value. The risk issue can be partially addressed by considering the Pure-Play results that would be obtained by incorporating the effect of market capitalization on expected cost of equity.

Application of WACC Discount Rate as Minimum Rate

The derivation of the WACC is of more than academic interest. The requirement in Rule 8(g)(2) for the estimation of a cost-of-capital discount rate with parity to the market sales derived rate recognizes the role of the cost-of-capital in finance as a source of information for investment decision-making and as a comparison point against which the income results of properties and projects can be measured. It is apparent from the data reported above that the basic derivation used in this report is not sufficient for use for Rule 8(g)(2) purposes and that several issues remain to be resolved in order to fully integrate the market sales data and the cost of capital data into Rule 8 for use in appraising properties for ad valorem tax.

Conclusions:

1. The number of fair market value property transactions continues to decline from historic levels.
2. Actual property transactions demonstrate a consistent level overtime in excess of 20% BFIT for the lowest risk (PDP) properties.

3. Discount rates derived from financial market data are consistently lower than rates derived from property transactions.
4. Data collected from 433 transactions spanning the 1983 through 2005 indicate that 90% of transactions (by number of sales and by dollar amount of purchase price) are concluded using 100% cash from retained earnings with only a small percentage using debt as part of the acquisition funding.
5. The use of more than 90% retained earnings suggests that the correct measure of financial market Rule 8(g)(2) derive discount rates as the corporate cost-of-equity rather than the WACC.

Part III - Integrating Market Data into SBE Rule 8 and Rule 468

The discussion in Part I of existing California law and SBE Rules and regulations for appraisal of oil and gas properties combined with the discussion in Part II of the transaction and financial market data that is available for use by oil property appraisers leads to the next step which is the integration of the market data into the SBE rules.

The California property tax system, as it applies to oil and gas property appraisal, is grounded on four elements:

- The requirement for appraisal assessment at Fair Market Value
- A set of procedural Rules set down by the SBE
- The Assessors' Handbook which defines the application of the rules
- Access to market information through the COS and other taxpayer sources

Given this structure, ad valorem tax appraisal should be a simple process of extraction of market data and application of that data according to the SBE Rules with guidance from the Assessors' Handbook. Unfortunately, natural systems, such as the market(s) for oil and gas properties, are rarely as tidy as are the artificial regulatory regimes which are supposed to reflect those systems or markets. The primary problem is that participants in the marketplace (buyers and sellers) rarely follow the rules or meet the expectations of tax authorities. This means that while there may be appraisal rules on the one hand and a representative market-derived data base on the other, some additional work is necessary to reconcile the market data to the requirements of the SBE Rules before the market data can be applied to fair market value appraisal for property tax.

This section of the report examines three primary subjects:

- The integration data from property transactions into the appraisal of properties under SBE Rules 8 and 468.
- The derivation and use of financial market data as a source of discount rates in Rule 8.
- The relationship of data and evaluation parameters developed for use in property tax appraisal to the market for properties and the capital markets.

Before proceeding with a discussion of the measures needed to reconcile market data to SBE rules a brief recapitulation of the SBE rules, the Assessors' Handbook interpretation and the available market data may be useful.

California Regulations do not Establish Unique Appraisal Requirements

SBE Rule 2 defines the Value Concept as follows:

*"... the words 'full value, "full cash value," "cash value," "actual value," and "fair market value" mean the price at which a property, if exposed for sale in the open market with a reasonable time for the seller to find a purchaser, would transfer for cash or its equivalent under prevailing market conditions between parties who have knowledge of the uses to which the property may be put, both seeking to maximize their gains and neither being in a position to take advantage of the exigencies of the other".*¹⁰⁶

This concept is consistent with generally accepted appraisal practice and with evaluation methods used by the industry for determining the fair market value and/or financial value of producing oil and gas properties.

SBE Rule 8 forms a good basis for the appraisal of oil properties by the Income Approach. The rule is an instruction for the appraisal of properties for ad valorem tax and is specific in defining what may or may not be included in a cash flow prepared for the purpose of determining ad valorem tax value. In paragraphs (b) and (c), the appraiser is required to perform an income approach appraisal that includes deductions for current expenses and certain capital expenditures but shall not include deductions for amortization, depletion, depreciation, debt repayment, interest, rents and royalties, property taxes, corporate net income taxes, and franchise taxes measured by net income. In using the Income approach, the *"...appraiser values an income property by computing the present worth of a future income stream. The present worth depends upon the size, shape, and duration of the income stream and upon the capitalization rate at which future income is discounted to its present worth."*¹⁰⁷

In paragraph (g), the appraiser is instructed to obtain a discount rate for application to the income approach from two sources - actual market sales of (oil) properties and/or the cost-of-capital for prospective purchasers of such properties. Paragraph (g) is very general in defining the approach to be used in deriving discount rates by either method and provides no guidance to resolving any conflicts that may occur in the application of discount rates derived under paragraph (g) to cash flows constructed as required by paragraphs (b) and (c).

SBE Rule 468 is specific to oil and gas property appraisal and, like Rule 8, is well constructed. Paragraph (b) directs the appraiser that oil reserves to be valued for assessment are to be determined *"...taking into account reasonably projected physical and economic operating conditions."* where *"...Present and projected economic conditions shall be determined by reference to all economic factors considered by knowledgeable and informed persons engaged in the operation and buying or selling of such properties, e.g. capitalization rates, product prices and operation expenses".*[emphasis added] The examples are not intended to be an exhaustive list. Further, paragraph (c)(1) states *"...values shall*

¹⁰⁶ Title 18, CCR, Section 2

¹⁰⁷ Title 18, CCR, Section 8

be determined using factual market data such as prices and expenses ordinarily considered by knowledgeable and informed persons engaged in the operation, buying and selling of oil, gas and other mineral-producing properties and the production therefrom."¹⁰⁸

Both Rule 8 and Rule 468 rely heavily on the marketplace as (1) a data source (actual sales, financial markets) and (2) a context where the marketplace is made up of "...*knowledgeable and informed persons.*" In other words, while it may be tempting to view the extraction of market information such as discount rates as little more than an arithmetic exercise or the development of property appraisals as an extension of the evaluator's own preferences, SBE rules and the Assessors' Handbook continually overrule this idea and require that property tax appraisal, in all its aspects, occur within the context of the marketplace. Data extraction and assessment appraisal do not occur in a vacuum but must be related to the motivations and actions of knowledgeable and informed buyers and sellers in the market place.

Integration of Discount Rates from Market Transactions

Rule 8 paragraph (g)(1) defines the method to be used in deriving discount rates from market sales as follows: *"By comparing the net incomes that could reasonably have been anticipated from recently sold comparable properties with their sales prices adjusted, if necessary, to cash equivalents (the market-derived rate)."* Rule 8 makes no other statement about the form or method of the derivation. The traditional interpretation of this description of discount rate derivation is to calculate the internal rate-of-return ("IRR") on the purchase price using the before income tax cash flow. This procedure has the virtue of being relatively uncomplicated and satisfactory for many transactions.¹⁰⁹ Integration of transactional data into Rule 8 presents few difficulties. The primary concern is that the source transactions be fair market value and have sufficient data to be useful. If that criteria can be met then the only difficulties that may need to be considered are:

- (a) Reconciliation of evaluations in which estimated property tax is deducted.
- (b) Reconciliation of evaluations in which income tax issues are significant.
- (c) Reconciliation of evaluations in which debt amortization and interest payments are included as expense items.
- (d) Do adjustments need to be made to the derived discount rate(s) because of variations among the source evaluations?

Assessors' Handbook, Section 502 describes the necessity of using only fair market value transactions as data sources. *"Determine that the sale meets the conditions of section 110 (a) ("open*

¹⁰⁸ Title 18, CCR, Section 468

¹⁰⁹ The reference to "comparable properties" is a rather enigmatic term in a Rule 8 context since, as noted above, the procedure of constructing a cash flow that is representative of a specific property tends to incorporate most, if not all, the characteristics of a property that set it apart from other properties and renders them into an income stream that is directly comparable to the income stream from another property. In this context, discount rates properly derived from such sales are directly comparable. This is particularly true when statistical correlation analysis shows no significant relation between DCR and a number of other parameters.

market” conditions and cash equivalency).” “The sales from which discount rates are derived must meet the requirement of an open market transaction and cash equivalency as set forth in section 110 (a).” Section 110 (a) of the R&T code expresses the concept of market value which is echoed in SBE Rule 2.

In other words, the first thing that the appraiser must do when considering the derivation of a discount rate from a sale is to determine that the sale meets the condition of fair market value and that the value has been reduced to cash equivalent. It seems obvious that if an evaluator is intent on deriving discount rates for use in the fair market value appraisal of an oil and gas property or properties from sales it would be necessary to use only sales that were determined to be fair market value. Sales that are not market value cannot provide market data. Further, it is essential that the cash equivalency condition be observed. The failure to properly account for non-cash payments deferred payments, and other tangible and/or intangible aspects of a transaction can seriously distort the derived discount rate. There may be a temptation, due to the paucity of oil transactions in a given time period, to accept and use any transaction with sufficient data as a source for a discount rate but this is a failure of purpose and leads to the inclusion of non-representative data from non-market transactions. The fair market value definitions exist for a reason and should be followed.

If the evaluator relies only on fair market value sales and observes the cash equivalency requirements then a smaller but reliably applicable database can be developed over time.

Reconciliation of Deduction for Property Tax

Most buyers who are familiar with California deduct a certain percentage of future revenue for anticipated ad valorem tax in their BFIT cash flows. The deductions for property tax are not uniform and in some cases are not clearly identifiable. It might be preferable to reverse these deductions and calculate a discount rate from a revised income stream still using the buyer’s information stream, however, SBE has directed that an increment of 1% be added to the discount rate to compensate for ad valorem tax costs.

Reconciliation of Income Tax Credits and Deductions

Rule 8(b) and (c) specifically exclude the deduction of income tax, franchise tax, and DD&A¹¹⁰ from cash flows used to value properties for ad valorem tax. However, many buyers of properties clearly base their purchase decision on after-tax cash flows which, depending on when the transaction was evaluated, may make significant use of a variety of deductions primarily to offset future capital investment. The purchase price in these transactions is derived using an AFIT cash flow and an appropriate AFIT rate-of-return and is an AFIT value.

¹¹⁰ Depletion, Depreciation, and Amortization

In the early-to-mid-1980's (prior to the Tax Reform Act of 1986) investors were allowed substantial tax credits against the cost of capital equipment. These credits along with accelerated depreciation were used to, in effect, help to finance investments in steam injection facilities. While these benefits were realized in the after tax income stream there is no question that the credits also influenced the BFIT income stream¹¹¹ and should be recognized as a part of the BFIT discount rate derivation. This issue is moot, however, for transactions since 1986-88 and no reconciliation is necessary for later transactions.

Reconciliation of Debt Repayment and Interest Payments

Less than 10% of transactions report any form debt financing as part of the acquisition and none of the evaluations examined for the WSPA/CIPA study include appear to include debt repayment and/or interest as part of the income stream, therefore, no reconciliation is needed.

Adjustment Due to Variations in Source Evaluations

Some evaluators have voiced concerns that discount rates derived from transactions must be adjusted to account for the differences among the various transactions and evaluations. There has been debate, for instance, that product price projections must be standardized; that cost deductions should be made uniform; that, if the source evaluation included a cost prohibited by Rule 8, the income stream should be adjusted to remove the offending cost; and conversely, if a source evaluation does not include a cost item that is deemed necessary for property tax appraisal, the cost should be added to the income stream - all of which should be done before deriving the discount rate. This adjustment of evaluations is a tempting idea until considered in a wider context.

No two evaluations are identical. One of the issues that is often raised with regard to derived discount rates is the relation of the discount rate to elements of the Income Stream or, in a broader context, to the characteristics of the property; to the terms of the transaction; and/or to the economic conditions in the market place. In the past some observers have suggested that Market Derived Discount Rates (MDDR) for transactions that escalate product prices cannot be applied to appraisals using flat pricing or that MDDR from one time period cannot be used for another period or that transactions MDDR from in which the buyers deducted estimated AR&R costs is not applicable to income streams that ignore AR&R costs or which account for them in other ways. Whatever the motivation for these concerns, the concept of a functional relationship is counter-intuitive and mis-understands the purpose of capital investment.

¹¹¹ A study done in 1991 as part of the WSPA/CIPA property sales analysis found 33 transactions wherein federal income tax credits created a substantial difference in BFIT vs. AFIT income streams and in the discount rates derived from the respective income streams. The study found that when the Investment Tax Credits were allocated against the BFIT capital investments the result was an average increase in BFIT discount rates for the 33 transactions of 4.61 percentage points and raised the average BFIT discount rate for all 123 sales in the study at that time from 25.3% to 26.4%. The WSPA/CIPA study report does not include tax credit reconciled discount rates.

Investors make acquisitions of oil properties with the expectation of future income and a return-on and -of their investment. The sole objective of investment is to earn a return and, as returns are realized, to re-invest with the anticipation of continued growth. The great utility of the Income Approach is that it allows all the characteristics of the property, the economy, and the buyer's expectations to be sub-summed into a single future stream of income which can then provide a return on the investment.

Fortunately, the components of the Income approach combined with the development of petroleum technology over the past 100+ years results in a methodology that allows unique properties to be evaluated to a position of virtually direct comparability. The technology exists to allow the appraiser to take into account and otherwise evaluate most, if not all, of the characteristics of oil and gas production from specific and unique properties and to obtain a value without resort to other methods. Assuming the availability of data and the disposition to do the required analysis, an income stream can be derived from each unique property. The income stream so obtained is directly comparable to all other income streams derived in a similar manner. It remains only to convert the income stream to a present value by the use of a present value factor.

The statistical analysis done as part of the WSPA/CIPA study, largely in response to some of the expressed concerns noted above has shown conclusively that only one factor appears to relate to the discount rate and that is the "risk" of the property as defined in terms of the reserve class or classes which provides the future production. As shown in the previous discussion, there is no relation of discount rate to any other component of evaluation.

This flexibility and versatility of the cash flow or Income approach allows each property to be evaluated based on its own unique characteristics and yields a result, a cash flow or income stream, that is almost perfectly comparable from one property to another. If the income stream is properly constructed, most of the characteristics that would set projects and properties apart are dissolved in the cash flow calculation leaving only relatively intangible differences to be considered. Intangible differences may include environmental or regulatory controls which more or less onerous than normal expectations, particular benefits to be derived that are not quantifiable (location of property, "fit" with existing operations), or "management" decision. These factors and others may or may not directly impact the perceived value of a property or project and may cause a purchaser to be willing to pay more or less than the cash flow evaluation would indicate.

Integration of Financial Market Data into Rule 8 and Rule 468

While the derivation and application of the MDDR has engendered the most interest and debate, the integration of Cost-of-Capital (COC) data deserves close examination not only because it is a co-equal source of discount rates but the integration is more difficult. One reason is the relative vagueness of Rule 8(g)(2). The SBE has, however, greatly expanded the discussion of COC discount rates in AH502 and in AH566. This expanded exposure of the subject provides a solid foundation for integrating financial market data into property tax appraisal and is essential because the language of the rule refers to transactions where the property carries a mortgage.

The discussion in Part II regarding the derivation of cost-of-capital discount rate in compliance with Rule 8(g)(2) demonstrated that calculation of such a rate is readily accomplished with publically available data and that the derived rate would provide a useful baseline for market value discount rates. However, it was also observed that several issues must be addressed before a cost-of-capital discount rate can be developed for application in a Rule 8 appraisal of an oil property.

1. The cost-of-capital is a corporate discount rate that provides a starting point for a property specific discount rate.
2. In order to satisfy Rule 8(g)(2) the cost-of-capital must reflect the proportions of debt and equity used by actual and prospective purchasers of properties.
3. There must be adjustments to the Cost-of-Capital to account for (a) Return-of-Investment, (b) Liquidity, and (c) Specific Property or Portfolio Risk.

WACC as Corporate Opportunity Cost and Baseline Discount Rate

In financial management, the discount rate performs a traditional and comprehensive role. As noted by Brealey & Myers:¹¹² *“To calculate present value, we discount expected future payoffs by the rate of return offered by comparable investment alternatives. This rate of return is often referred to as the **discount rate, hurdle rate, or opportunity cost of capital**. It is called the opportunity cost because it is the return forgone by investing in the project rather than investing in securities.”* [Emphasis in original]

In the context of the WSPA Study, the rate of return offered by *“...comparable investment alternatives...”* is the return derived from actual market transactions. As will be shown below, this return has been consistently found to be in the 19-22% range for the lowest risk (100%PDP) properties. However, market derived returns on oil properties are not always available, and, even where available, a second source of data is often desired. The WACC is commonly used to provide an estimate of *“opportunity cost”* as a starting point. The WACC has also been referred to as a *“minimum required return”* for capital budgeting purposes. The WACC is described as *“The expected return on a portfolio of all the company's securities...”*¹¹³ When used as an opportunity cost, the WACC must represent the minimum return because, as noted by Brealey & Myers, it is the *“...return forgone by investing in the project rather than investing in securities.”* Since the WACC is the expected return on the company's securities, any funds invested in a project must earn at least the WACC or the company would have been better off to buy its own stocks and bonds. Broadening the WACC by calculating an average WACC for an industry group of companies does not change the minimum required return (MMR) aspect of WACC, but simply substitutes an industry return for an individual company return.

Where WACC is used as the basis for capital budgeting, it is not unusual for evaluators to add an increment to WACC to provide the opportunity for an enhanced return that justifies investment of

¹¹² Brealey, Richard A. and Myers, Stewart C., “Principles of Corporate Finance,” Fourth Edition, 1991, McGraw-Hill, pg. 13

¹¹³ Ibid, pg. 408

corporate capital.¹¹⁴ This increment is often called a "hurdle rate." While this term is the same as that used by Brealey and Myers, it has specific meaning in industry and serves a purpose. Brealey and Myers also note that the WACC "... is used in capital budgeting decisions to find the net present value of projects that would not change the business risk of the firm."¹¹⁵ Note the reference to the firm. "Unfortunately, the [WACC] formula applies to the firm as a whole, not necessarily to any specific project."¹¹⁶

Further, "The first thing to notice about the weighted-average formula is that all [the] variables in it refer to the firm as a whole. As a result the formula gives the right discount rate only for projects that are just like the firm undertaking them. The formula works for the "average" project. It is incorrect for projects that are safer or riskier than the average of the firm's existing assets. It is incorrect for projects whose acceptance would lead to an increase or decrease in the firm's debt ratio."¹¹⁷

The WACC is clearly a threshold since a project with an anticipated return less than WACC would diminish the value, and increase the business risk, of the firm. On the other hand, the addition of an increment above WACC as a "hurdle rate" is intended to provide the enhanced equity return. For use in valuing oil properties for market value, the alternative to WACC as an Opportunity Cost could be BFIT ROE.

Historical Industry Performance as a Measure of Opportunity Cost

Neither oil property acquisitions, and the underlying appraisals, nor the management decisions that result in acquisitions (or decisions not to acquire) occur in a vacuum. The reliance of industry and regulatory authorities on the WACC is a clear recognition that oil property valuation is not a unique methodology but has an indisputable financial basis. For that reason, it is useful to review the financial performance of the oil industry over the past 40+ years.

This analysis examines the return-on-equity¹¹⁸ ("ROE") of oil industry companies as the measure most closely related to actual market data. Three principal data sources are used.

- For the period 1989 through 2005, quarterly data is taken from the "Corporate Scoreboard," published in Business Week magazine. This source calculates AFIT return-on-equity for all industrials and for various segments of industry including a Fuels group that includes

¹¹⁴ Note: The Texas PTD studies add a minimum 2 percentage points to the calculated WACC for use in property tax appraisal

¹¹⁵ Ibid, pg. 408

¹¹⁶ Ibid, pg. 465

¹¹⁷ Ibid. pg. 456

¹¹⁸ *Return-on-Equity*, as defined in standard texts and as used in the three data sources, is Net Income After Taxes and Extraordinary Items divided by Stockholders' Equity.

an Oil and Gas sub-group. Over time the composition of the group has changed due to mergers and other events, but there has been considerable consistency of reported results over the period of interest. The most recent data is for the 2nd Quarter¹¹⁹ of 2005 for 29 companies.

- Data for 1968 through 1990 is taken from an American Petroleum Institute ("*API*") report.¹²⁰ This source provides an annual AFIT return-on-equity for a group of companies comprised primarily of integrated and large independent producing companies.
- Additional data for 1968 through 1988 is taken from reports published by The Chase Manhattan Bank ("*Chase*").¹²¹ This source reports annual return-on-equity for essentially the same group of companies as is used by API.

**AFIT RETURN-ON-EQUITY
OIL AND GAS INDUSTRY**

	Period	Mean, %	Median, %
Business Week	1989-2005	14.1	12.7
API	1968-1990	12.9	12.5
Chase	1968-1987	13.5	12.4

Comparison of the data from the three sources indicates that the results are consistent and can be integrated over the entire period of almost 40 years. As shown in the table below, the API data has an arithmetic Mean of 12.9% and a Median of 12.5%; the Chase data has a Mean of 13.5% and Median of 12.4%. The annual data from API and Chase are plotted along with the Business Week data in Exhibit 15; the quarterly Business Week data for 1989-2005 are shown in more detail in Exhibit 16.

The Business Week data plotted in Exhibit 16 includes three data groups: All Industrials, Fuels Group, and the Coal, Oil and Gas ("*COG*") sub-group. The three data sets provide an interesting contrast over certain periods where the oil group tends to coincide with the Industrials, but there are other periods of wide divergence. While there are significant variations in the returns over the period that are related to conditions in the oil industry and/or the economy as a whole, there is also a central tendency for the COG group that seems to be in the 13.65% range. As noted in the table above, the mean for the Business Week group is 14.12%, but it is also apparent that returns have varied from as low as 4% to 26.7% in just the past 9 years. Over the period of 1996-2005, the mean ROE for All Industrials is

¹¹⁹ *Business Week*, August 29, 2005, McGraw-Hill, New York, NY

¹²⁰ Discussion Paper No. 017R, "*Financial Trends of Leading U.S. Oil Companies: 1968-1990*," American Petroleum Institute, October 1991, Washington, D.C.

¹²¹ "*Financial Analysis of a Group of Petroleum Companies*," The Chase Manhattan Bank, N.A., New York, New York, for each year 1961 through 1988

13.86% (median = 14.95%), while the mean and median for the COG group is 16.28% and 17.50% respectively. The volatility in the Oil and Gas group over the entire 40+ year period can be traced largely to changes in oil price, along with changes in the general economy that may or may not be related to energy costs.

The significance of this data is that it suggests that equity holders in oil and gas companies could reasonably expect long-term after-tax returns on equity of 16-18%, based on historical performance over the 40+ years. Considering that the market sales data indicates that virtually all property acquisitions are based on equity capital only, it is then reasonable to consider the 16-18% AFIT range to be the minimum expected return for property investments.

A rational Cost-of-Capital analysis that is consistent with historical performance can provide a connection between past performance and future expectations. It is in this context that the longer historical period has greater value than a shorter period that may be influenced by near-term events such as current oil price fluctuations. In that regard, the nearly seamless continuity of the 1968-2005 period would appear to make the 14.12% mean AFIT ROE for the COG group a good baseline.

However, certain further considerations are necessary. First, historical performance is not a guarantee of performance in the future. Second, the ROE provided by API, Chase and Business Week are after-tax (AFIT) returns which must be converted to pre-tax returns for use in evaluating properties. Third, the return-on-equity from common stock equity investments represents returns from highly liquid assets based on income streams from a large number of sources. Fourth, the return-on-equity provides no return-of-equity component.

The conversion of an AFIT ROE to a BFIT ROE can be done by the simple expedient of dividing the ROE by (1-T), where T is the statutory marginal tax rate. Using the current 35% Federal rate, the mean "COG" ROE would become 21.7% before income tax.¹²²

Application of Financial Market Data

The discussion of return-on-equity as a comparison point is useful and consistent with the information obtained from oil property market transactions in California. As demonstrated above (page 47) over 90% of actual property transactions in California are done with equity capital alone, usually in the form of cash flow retained earnings. The cost-of-equity capital alone, calculated in the WSPA/CIPA Study as part of WACC analysis, averages 18.81% over the 1985-2004 period ranging from 13.92% to 25.0%. While this provides very useful data that is consistent with Rule 8(g)(2) some other approaches can be used to test and confirm the equity return data.

¹²²

The 35% rate has not been the statutory marginal tax rate over the entire 1968-2003 period, and a rigorous procedure would make specific corrections for each year. However, it is presumed that the AFIT return-on-equity from periods prior to the introduction of the 35% rate would reflect the tax rates then in effect and, if adjusted to BFIT at those rates, would be consistent with more recent returns.

Instead of doing a WACC calculation, another approach would be to use reported financial data to calculate a discount rate compatible with the requirements of Rule 8(b)(c), and (g)(2). All market derived financial data regardless of source are reported as AFIT rather than Before Federal Income Tax (BFIT). Earnings reports, net profits, returns-on-assets, return-on-equity, and stock prices, are all quoted as AFIT values. Some measures of company performance may be quoted as pre-tax results but the so-called "bottom-line" is an AFIT value. This is so because all business and individuals for that matter, must pay federal and, where applicable, state income tax just as they must pay operating costs, salaries and wages, and interest payments. While some companies may be adept at managing tax liability and can take advantage of the benefits and curiosities of the tax system, eventually taxes are paid. Dividends and others returns to stockholders are after income tax is paid.

The primary source of information about public companies is the annual report and SEC filings such as the Form 10-K and Form 10-Q among others. These documents contain a wealth of information about the financial performance of the company which is used by analysts and others to construct the kind of data provided by S&P, the Wall Street Journal, Value Line, Ibbotson, Business Week, Reuters, and a large number of other data sources.

The AFIT nature of financial market data imposes some limitations on the use of that data for ad valorem tax appraisal purposes. While California property tax regulations do not state specifically that the income stream and discount rate are supposed to be BFIT, the conditions imposed by Rule 8(c) create a BFIT requirement. Rule 8(c) does not allow deduction of certain expense categories from the income stream. These include:

- Amortization
- Depreciation and Depletion
- Payment of Interest
- Payment of Taxes

The importance of using financial market data as a comparison point and context for discount rate derivation and selection cannot be over emphasized. Therefore, an opportunity to use financial data in Rule 8 context should be exploited.

In order to make the most effective use of the available financial data, the AFIT results should be converted to BFIT for application to property tax appraisal. Fortunately, it is possible to use a rather simple process to convert AFIT financial returns to BFIT returns using the existing data. The primary source of information for the conversion is contained in the annual SEC 10-K filing for public companies. Under current regulations and GAAP all the necessary data is presented in the Balance Sheet and Income Statement (and related notes) which forms the core of the 10-K filing. Virtually all Balance Sheets and Income Statements enumerate the following line items:

- Stockholders Equity (AFIT)
- Net Income After Taxes
- Income Taxed Paid
- Interest Paid

- Depletion, Depreciation, & Amortization (DD&A)
- Accumulated DD&A

Conversion of the AFIT results to a BFIT results compatible with Rule 8(c) and 8(g) follows a simple procedure:

1. Net Income After Taxes
plus Income Tax Paid
plus Interest Paid
plus DD&A
equals BFIT Net Income
2. Stockholders Equity (Book Value)
plus Accumulated DD&A
3. BFIT Return-on-Equity equals $\text{BFIT Net Income divided by (Stockholders Equity + Accumulated DD\&A)}$

This procedure uses book value for stockholders equity but another calculation can be done using the market value of Stockholders Equity (Stock Price times Number of Outstanding Shares). The result in either case is a return-on-equity that is consistent with the requirements of Rule 8.

The above procedure has been employed to develop Rule 8 compatible financial returns for use as comparison points for discount rates calculated under Rule 8(g)(1) and (2). For each year starting with year-end 1996, a large group of publically traded oil and gas companies ["the prospective purchasers" required by Rule 8(g)(2)] has been assembled and the data provided in the SEC 10-K filing has been used, as described above, to calculate a BFIT Return-on-Equity compatible with Rule 8(c) which is deemed to represent the returns required by investors in oil and gas properties in California. Return-on-equity is the primary calculation result since, as previously noted, Rule 8(c) precludes the accounting for debt amortization and interest payments thereby limiting consideration only to equity. Further, anecdotal evidence from actual transactions, particularly by companies that form part of the sample group, involve no debt for property acquisitions. These two conditions make return-on-equity the proper comparison point. The results of this analysis are shown below and (graphically) in Exhibit 17.

<u>Year</u>	<u>BFIT ROE</u>
2004	21.18
2003	20.43
2002	18.95
2001	22.04
2000	22.62
1999	13.94
1998	15.28
1997	16.66
1996	18.40

These returns, which are historical and therefore represent the actual performance of the industry over the 9 year period, reflect the results of company operation and prevailing economic conditions. They also represent the composite of the returns achieved on all the properties and projects in the company's portfolio of investment. They may not be the targeted returns but, given the ability of modern corporations to manage operations, expenditures, and investment the returns do represent the range of tolerable, if not always acceptable, results. These data also fit quite comfortably into the financial market data derived in the WACC calculation and from actual returns.

Adjustment for Components Not Included in WACC

From an appraisal standpoint, the differences between the WACC derived discount rates and the market derived discount rates occur primarily because of the differing composition of the two rates.^{123, 124}

1. **Return-of-Investment.** The Weighted Average Cost-of-Capital, by construction, does not include a return-of-capital component while the discount rate derived from sales explicitly includes a component for return-of-investment in addition to return-on-investment. The market derived rate represents the requirement on the part of the investor to receive (a) a return-of-investment and return-on-investment, and (b) to be compensated for the inherent risk in the investment.
2. **Liquidity.** The Cost-of-Capital, as derived for publically traded companies, is the return anticipated on an equity and/or a debt investment. These equity and/or debt investments are highly liquid and can be bought and sold on a variety of markets virtually instantaneously. In contrast, oil producing properties are real estate and are inherently illiquid.

¹²³ The difference between market data and Cost-of-Capital data or usage has been an issue in real estate. See "The Use and Misuse of CAPM in Property Tax Valuation," Schweihs, Robert P., Journal of Property Tax Management, Fall 1994

¹²⁴ See also, "Valuing a Business," Pratt, Shannon R., Reilly, Robert F., Schweihs, Robert P., Third Edition, 1996, Richard D. Irwin (Times-Mirror)

3. **Portfolio Effect.** Property sales data are generally derived from discrete individual properties, while the Cost-of-Capital of public companies is reflective of investors expectations for all the activities of the company. The WACC rate includes a measure of risk, but it is the risk of a portfolio of investments where risk is modulated by the diversity of the portfolio.

Having identified three sources for the differences between market derived and cost-of-capital discount rates, it is necessary to bridge the gap between the results of the two methods, either because the number of actual sales is small or to provide a second source of reliable data to support market derived data. Oil property appraisal has taken a few steps to bridge the gap between the readily available COC rates and the specific property discount rates needed for appraisal use. This process has essentially tried to move from cost-of-capital for large publically traded companies to the discount rate that might be used for small, single purpose closely-held companies that could serve as a surrogate for a specific property source.

Adjustment for Liquidity

The most obvious difference between Market Derived discount rates and WACC rates is the liquidity of the underlying assets. Liquidity is defined as, *“The amount of time required to convert an asset into cash.... For noncurrent assets liquidity generally refers to marketability.”*¹²⁵ Marketability is the *“...relative ease and promptness with which a security or commodity may be sold when desired...”*¹²⁶ These terms are often used interchangeably.

The WACC is a function of the returns from a mix of equity and debt instruments issued by publically traded companies. They are highly liquid investments. In contrast, oil properties are a special form of real estate for which there is a limited market and, like houses and office buildings, even under the best of circumstances can require weeks to conclude a transaction. This difference in liquidity is easy to state but very difficult to measure. Some success has been achieved by equating oil properties to the equity returns of closely held or privately held corporations which are subject to liquidity adjustments. The practice of business valuation of private firms must address this issue with some frequency. As noted by Pratt et al and incorporated by Ibbotson and Kaplan,¹²⁷ *“This is appropriate since... [w]hen the business and the real estate it occupies are virtually inseparable, as in the case of a single-use property... the intertwined business/real estate entity will have more of the economic characteristics of a business entity than the economic characteristics normally associated with real estate. When that is true, approaches normally associated with business appraisal are likely to lead to*

¹²⁵ *“Valuing a Business: The Analysis and Appraisal of Closely Held Companies,”* Pratt, Shannon R., Reilly, Robert F., Schweih, Robert P., Third Edition, 1996, Richard D. Irwin (Times-Mirror) Page 333

¹²⁶ Ibid, pg. 333

¹²⁷ *“WACC for Pure-Play Oil and Gas Extraction and Refining Entities,”* Ibbotson, Roger G. and Kaplan, Paul D., Chicago, IL, prepared for and presented to Western States Petroleum Association, January 15, 1997, page 11

a more reliable appraisal result than approaches normally associated with real estate appraisal. This mirrors the characteristic of an oil and gas ora refining property.

But there is more to the liquidity issue. Pratt et al note that the “...market for securities in the United States is the most liquid market... in the world.”¹²⁸ and that “Empirical evidence demonstrates that investors are willing to pay a high premium... or ...extract a high discount relative to actively traded securities for stocks or other investment interests that lack this high degree of liquidity.”¹²⁹ Pratt is referring here to securities in closely held companies as compared to those such as the 38 oil and gas companies used in the WACC calculation whose shares are continually traded on the NYSE and other exchanges. A closely-held company is one that may have tradeable shares, but they are so owned by a small, often related group of investors and are so infrequently traded that there is no established market for the shares and hence limited liquidity. Assume that *Pure-Play Company* (“PPC”) is a private company whose sole business of the company is producing and selling crude oil. In contrast to shares in a publically-held company, the only liquidity available to PPC shareholders are sales among the current shareholders. This is not sufficient to establish a market value of a corporate WACC at year-end 2005.

Pratt discusses “*Marketability Discounts Evidenced by Prices of Restricted Stock*,” which is a publically issued stock that is restricted from trading for a period of time.¹³⁰ The valuation of such stocks has been studied extensively and is covered by SEC regulations.¹³¹ A compilation of the results of 10 separate studies covering the past 30 years suggest discounts of restricted stock ranging from 23% to 45% and averaging 32.9%.¹³² The average is consistent with the results of most of the individual studies. Applying the average discount to estimate a Cost-of-Equity for Pure-Play Company could be done as follows:

Average AFIT Cost of Equity ¹³³	=	10.284%
Adjustment for Liquidity	=	10.284%/0.671 = 15.326%
Conversion from AFIT to BFIT	=	15.326%/(1-0.35) = 23.579%

¹²⁸ Ibid, pg. 333

¹²⁹ Ibid, pg. 333

¹³⁰ Ibid, pg. 333

¹³¹ Securities and Exchange Commission, Accounting Series Release No. 113: Statement Regarding Restricted Securities (Chicago: Commerce Clearing House, Federal Securities - etc.)

¹³² “*Valuing a Business: The Analysis and Appraisal of Closely Held Companies*,” Pratt, Shannon P., Reilly, Robert F., and Schweihs, Robert P., Third Edition, Irwin, pg. 343

¹³³ “*Fair Market Value Transactions, Cost of Capital, and Risk: California Oil and Gas Property Transactions 1983 through 2004*,” Richard J. Miller & Associates, Inc. for Western States Petroleum Association, January 11, 2005, Exhibit 1.

$$\begin{aligned} \text{WACC}^{134} &= ((0.22656)(5.659)) + ((0.77344)(23.579)) \\ &= 1.28\% + 18.24\% = 19.52\% \end{aligned}$$

However, the above is only applicable for issued and tradeable shares. Pure-Play Company shares are not tradeable. Pratt also reports the results of marketability discounts for privately held shares before public offerings. One study of 173 transactions in the 1980-93 period found a mean discount rate of 47%.¹³⁵ A second study of 879 transactions from 1975 through 1992 found a Median discount of 62.1%.¹³⁶ The two studies employ differing methodologies. Without judging one compared to the other, a discount of 55% would seem to represent the data. Applying a 55% discount to the 11.895% AFIT cost-of-equity results in an adjusted WACC for Pure-Play Company as follows:

$$\begin{aligned} \text{Average AFIT Cost of Equity}^{137} &= 10.284\% \\ \text{Adjustment for Liquidity} &= 10.284\%/0.45 = 22.85\% \\ \text{Conversion from AFIT to BFIT} &= 22.85\% (1-0.35) = 35.16\% \\ \text{WACC}^{138} &= 28.473\% \end{aligned}$$

This adjustment would account for the liquidity issue.

Adjustment for Portfolio Risk

The corporate debt and equity returns that are used to calculate the WACC at a certain date derive their value to investors, in large part, because they represent the potential growth in equity value from all of the sources of income available to the company. ChevronTexaco, for example has literally thousands of individual income streams from each producing property, refinery, service station, StarMart and uncounted other sources. Even a modest independent company has several hundred income streams providing revenue. This diversity of income sources means that, at least in theory, the loss or failure of performance of any one, or even several, income stream(s) does not have any significant effect on the bottom-line return. Of course, not all income streams are equal, so even among

¹³⁴ For this calculation the industry average cost of debt (5.659%) and the average capitalization (22.656% Debt and 77.344% Equity) are taken from the WSPA Study, 2005, Exhibit I.

¹³⁵ “*Valuing a Business: The Analysis and Appraisal of Closely Held Companies*,” Pratt, Shannon P., Reilly, Robert F., and Schweihs, Robert P., Third Edition, Irwin, pg. 343

¹³⁶ Ibid, pg. 348

¹³⁷ WACC analysis for year end 2004, this report, Exhibit 9.

¹³⁸ For this calculation the industry average cost of debt (5.659%) and the average capitalization (22.656% Debt and 77.344% Equity) are taken from the WSPA/CIPA Study, January, 2005, Exhibit 9.

the streams there are varying risks, but the concept is still valid. In comparison to ChevronTexaco, the independent producer may have a higher risk because a downturn in income from production cannot be recovered through offsetting refining and/or marketing returns. This "*Portfolio Risk Effect*" is shown as the difference between owning only the XYZ lease or, conversely, owning 100 leases similar to the XYZ lease. In the first case, loss of the lease income could be extremely damaging and there is substantial associated risk. In the second case, loss of one property similar to the XYZ lease might be noticed, but the risk of failure of the company or major loss is mitigated by the remaining 99 leases in the portfolio. The returns expected by investors in the stocks and bonds of the companies used in a WACC calculation reflect this lower portfolio risk. The result is a cost-of-capital that is less than the return expected for a single property. In the same sense, the discount rate used to value a single income stream from the XYZ lease should reflect the risk of the potential loss of that income stream with no Portfolio Effect to cushion the damage.

Quantifying Liquidity and Portfolio Risk through Pure-Play Analysis

The return premium necessary to mitigate Liquidity and/or Portfolio Risk issues is difficult to identify and to quantify in property transactions. One approach to the issue is the use of a variation of the WACC known as the *Pure-Play Analysis*. By this method the WACC is calculated for companies whose sole business is oil and gas production. This is an adaptation of a methodology commonly used in business valuation. The theory is that the discount rate for producing properties can be approximated by determining the cost-of-capital for companies whose business income is entirely, or in large part, from production. If a sample group of publically-traded companies whose business is 100% oil and gas production, with no downstream business, is assembled, the cost-of-capital for those companies could be used as an estimate, not a surrogate, for specific property discount rates.

In 1997, Ibbotson Associates completed a study for the Western States Petroleum Association.¹³⁹ In that study, Ibbotson estimated the cost-of-capital for companies whose business was (a) 100% production, or (b) 100% refining. The COC was calculated using a standard WACC approach, where the cost-of-equity was derived using the Capital Asset Pricing Model ("CAPM"). Ibbotson used *Standard Industrial Classification* (SIC) codes to focus on two industries: SIC 1311 (Crude Petroleum and Natural Gas) and SIC 2911 (Petroleum Refining) and then determined the number of companies within each industry that had at least some participation in that industry. Starting with the CAPM calculation, Pure-Play betas were derived from the betas of publically traded companies based on the degree to which the companies were engaged in upstream production or refining. Regression analysis was used to relate the percentage of each company's participation in Production or Refining to the beta for those companies. The result is an estimate of a beta of 0.63 for companies that are 100% in crude oil and natural gas production, and a beta of 0.73 for companies whose business activity is 100% petroleum refining.

¹³⁹ "WACC for Pure-Play Oil and Gas Extraction and Refining Entities," Ibbotson, Roger G., Kaplan, Paul D. Chicago, IL. prepared for and presented to Western States Petroleum Association, January 15, 1997.

These estimated Pure-Play betas are then used to calculate a cost-of-equity using CAPM for each Pure-Play entity. The cost-of-equity is then combined with the cost-of-debt and a typical capital structure to calculate an AFIT WACC of 9.51% for a hypothetical Pure-Play producing company and 10.87% for a Pure-Play refining company. After adjusting for *Liquidity* using a 25% factor and adjusting for Income Tax, the Ibbotson analysis obtains a Before Tax WACC of 20.15% for Pure-Play producing companies and 23.04% for Pure-Play refining companies.

These are useful results. The Pure-Play producing company result of 20.15% BFIT suggests that, when liquidity is taken into account, a company which receives all of its business income from oil and gas production has an effective discount rate of 20.15%. This is quite close to the results (23.1%) achieved from the empirical data for 100% PDP properties.

Regardless of the purpose of an evaluation, each property should be valued individually based on the characteristics and income producing capacity of that property; that is, as a stand-alone entity rather than as an asset of a company. It is a short conceptual step to think of each property as a Pure-Play company whose only business is to produce that property. If each property is considered to be a Pure-Play company, then the Pure-Play discount rate extracted from capital market data, such as done by Ibbotson, could be applicable. Further, the Pure-Play WACC can serve as a check on the Market Sales data. But a Pure-Play discount rate derived for an entire SIC code is only a starting point and is incomplete. This approach reduces the Portfolio Risk and Liquidity Risk and moves closer to a valuation of primarily small company stocks where all the return is derived from production.

Publicly-traded companies are not individual, specific properties. Even Pure-Play companies have multiple income streams. The Ibbotson analysis addressed the Liquidity and Portfolio issues, but two others, *Property Risk* and *Return-of-Capital*, remain. In regard to Risk, Ibbotson cautions that this BFIT WACC would only be applied to Risk-Adjusted cash flows. *"The WACC/CAPM approach presented here treats systematic risk and illiquidity as the only aspect of the subject entities that investors take into account when formulating expected rates of return. This is appropriate if the expected future cash flows which are to be discounted have been calculated taking all sources of risk into account through probability-weighting. In the case of oil and gas extraction properties, sources of risk that must be taken into account in expected future cash flows include, but may not be limited to, the complexity of the reservoir, the recovery method to be employed, and the regulatory environment."*¹⁴⁰

That is, Ibbotson assumes that the Pure-Play discount rates will be applied to risk-adjusted cash flows so the Pure-Play rates are comparable to risk-adjusted discount rates, not the risk-inclusive rates which make up most of the empirical data.

If the cash flow from a 100% PDP property is properly adjusted using the average risk adjustment factor of 97.6% noted in the 2005 Society of Petroleum Evaluation Engineers (SPEE) Survey,¹⁴¹ the 20.15% could be applied to the BFIT cash flow to obtain an estimate of market value.

¹⁴⁰ Ibid, pg. 2

¹⁴¹ "Survey of Economic Parameters Used in Property Evaluation," June, 2005 Society of Petroleum Evaluation Engineers, Houston, TX, pg. 24

Similarly, the 20.15% could be used to estimate value for a cash flow from a 100% PUD property if an appropriate adjustment factor (55.6% in the 2005 SPEE Survey) is first applied to the cash flow. In the absence of generally accepted risk adjustments, the single value Pure-Play WACC is not adequate and must be adjusted to account for the risk associated with a specific property (reserves). The Pure-Play WACC rate provides a floor discount rate that must be adjusted for property risk.

Adjustment for Return-of-Investment

In real estate appraisal, it is expected that an investor will want to obtain both a return *of* the investment being made and a return *on* that investment. It is no different in property evaluation. *"The notion that an investor anticipates realizing a complete recovery of invested capital plus a payment for the use of capital prevails in the real estate market just as it does in other markets. The term return of capital refers to the recovery of invested capital; the term return on capital refers to the additional amount received as compensation for use of the investor's capital until it is recaptured. Investors are concerned with both return of capital and return on capital. The rate of return on capital is analogous to the yield rate or the interest rate earned or expected."*

In real estate investments, capital may be recaptured in many ways....Investment capital may be recaptured through annual income or it may be recaptured all or in part through resale of the property at the termination of the investment. If the property value does not change between the time of the initial investment and the time the property is sold, the investor can recapture all the capital invested at its sale. Thus, the annual income can all be attributed to the return on capital. In this case, the indicated income rate - i.e. the overall capitalization rate - will equal the return on capital.

If, on the other hand, the property value is expected to decrease over time and the investor does not expect to recapture all of the original investment at the time of resale, some of the income stream must be used for the repayment of capital. In this case, the rate of return on capital will be somewhat less than the indicated income rate (i.e. the overall capitalization rate in direct capitalization). The difference between the rate of return on capital and the indicated capitalization rate will be the rate of return of capital. The recapture rate is considered positive."¹⁴²

As noted above, discount rates derived from actual sales are total returns that include both return-of-investment and return-on-investment. Returns derived from cost-of-capital measure only return-on-investment. The difference is significant and can be measured.

Return-on-Investment: WACC as an Interest Rate

The WACC is, by definition and construction, only a form of interest rate. This is shown by the primary components. Cost-of-Debt is the interest rate or Yield-to-Maturity on outstanding debt. It does not include principal repayment. When a bank or other lender grants a loan and assigns an interest rate, it is done on the assumption that the principal will be repaid, either over the term of the loan or at maturity; it is no different than interest on a Certificate of Deposit, which can be redeemed for full value

¹⁴² "The Appraisal of Real Estate," Eleventh Edition, 1996, Appraisal Institute, Chicago, Ill, pg. 457-458

at maturity. Cost-of-Equity, as calculated by the CAPM and by all other methods, is a forward rate-of-return on an equity investment. Returns on stock investments are composed of future dividend payments plus anticipated growth in value (share price). CAPM calculates the additional risk-related interest rate required, over and above a safe rate of interest to attract funds to higher risk equity investments.

Both the debt return and the equity return assume that the principal can be recovered at any time by the investor by redemption of the bonds (debt) or sale of the stock (equity). The WACC model assumes that the investment is held for a long time. This makes the projected return from WACC the anticipated return from a perpetuity, which in turn produces a uniform return.

Financial analysts will argue, quite correctly, that return-of-investment is taken into account in the WACC through the Depletion, Depreciation and Amortization ("DD&A") provisions of the income tax. This may be true to an extent and would be an important consideration if: (1) an AFIT discount rate were being derived, and/or (2) the WACC were being derived for/from internal corporate purposes/data. But, in this exercise, the objective is a BFIT WACC calculated using only the statutory tax rate adjustment with no consideration for DD&A or other deductions. This approach is necessary for four reasons. First, the returns being measured by CAPM and WACC are the forward rates to investors in the corporation, not to the corporation itself, so that the DD&A deductions do not apply. Second, the rate that is sought is a forward rate for a specific property - not a historical or even current rate for a company. Third, the property does not pay income taxes, the company does. Finally, the WACC is structured to calculate the returns to an investor in the company's debt and equity, not in the company's projects.

Payout as a form of Return-of-Investment

Surveys of oil and gas companies and a review of acquisition evaluations, suggest that *Payout* remains a useful, if subordinate, investment criteria. The Payout approach simply determines the time required to recover the original investment from the anticipated cash flow of the project or property. Payout provides for the return-of-investment by estimating the time necessary to accumulate the original investment from cash flow. In common industry practice, Payout is calculated as the accumulation of all cash flow from the start of receipt of income until the original investment is recovered. Depending on economic and other conditions, an acceptable Payout might be 3 to 5 years. The shorter, the better. If the Payout were 5 years, then one could infer an average annual return-of-investment of 20% for those five years. All income received after Payout contributes to return-on-investment.

In real estate evaluation, property acquisitions are commonly mortgaged for a term, which may approach the useful life of the property. If an oil property with an expected life of 25 years is acquired, the same approach could be used to estimate return-on-investment. If Payout is calculated as a percentage share of total expected cash flow over the life of the property, then some measure of return-of-investment is obtained. Over a 25-year life, the average annual return is 4% rather than 20%, but Payout or return-of-investment is achieved. This is a very simple approach. There are relatively complex calculation methods in real estate appraisal that can be used to calculate the return-of-investment by treating it as payment of mortgage principal. Even using our simple approach,

we could say that part of the difference between the Cost-of-Capital and market discount rates is the return-of-investment equivalent to scheduling Payout over the economic life rather than the first few years of production.

The Real Estate Approach

Real estate appraisal has long since resolved this issue. Three methods, commonly known as the *Ring Method*, the *Inwood Method* and the *Hoskold Method* are used to solve this problem. The Hoskold Method is discussed here as being most appropriate to oil and gas appraisal. The method was developed in the 1880's by a mining engineer to resolve the issue of capital recovery from depleting assets (coal mines). The method stipulates that capital recovery occurs at a "*safe*" interest rate and that this rate is added to the expected earning rate to create a total return rate that includes return-of and return-on-investment. As capital is recovered from the income stream, the funds are reinvested at a safe rate to accumulate to the recovery of the initial investment.

Applying a Real Estate Approach

An exploration of the qualitative adjustment of the WACC to account for return-of- investment has been conducted as part of the 2002 WSPA Study.¹⁴³ The discussion below is drawn from that report. In that analysis, investment rates of 15%BFIT and 20% BFIT were used to test the correction necessary for an average WACC (15-16% BFIT) and the Pure-Play result (20.15% BFIT). The analysis was done by creating a very simple income stream declining at 15% per year over a 10-year term. It was assumed that Return-of-Investment was obtained at a fixed rate per year and that Return-on-Investment was obtained from the balance of the income stream. This simple analysis showed that in order to obtain full recovery of the original investment in 10 years and earn a 15% BFIT return on the original investment, the income stream would have to be discounted at 28.624% BFIT to determine a value for the Income Stream. The Income Stream would have to be discounted at 37.825% BFIT in order to obtain a 20% BFIT return-on-investment.

These rates are substantially greater than the market discount rates derived from sales where the average discount rate for 100%PDP properties is 21.8% BFIT. The strong suggestion is that the market sales data represent anticipated return-on-investment, which incorporates some of the Liquidity and Portfolio risks, along with specific property risks that were discussed above, but that they do not include a component for return-of-investment which will be obtained by Payout. In other words, a derived discount rate of 21.8% for a 100% PDP property approximates the Pure-Play return of 20.15% BFIT and may contain some property risk. Using the SPEE risk adjustment of 97.2% for 100% PDP properties, the 20.15% would become 20.73% BFIT. A Hoskold approach could then be used to account for return of investment.

¹⁴³ "*Fair Market Value Transactions, Cost of Capital, and Risk: California Oil and Gas Property Transactions 1983 through 2001*," prepared for Western States Petroleum Association by Richard J. Miller & Associates, Inc., January 16, 2002, pg. 60.

If a safe rate of interest of 7% over a 10-year term is assumed, the sinking fund factor is 7.24%, which if added to the 20.73% BFIT yields a total rate of 27.97% BFIT. This is almost 10% short of the calculated discount rate of 37.825% BFIT. There are two possible explanations for the difference. First, the simple 10-year income calculation does not consider reinvestment of recovered investment to aid in the return on investment. This adjustment would apply, however, only if the funds were invested in a savings account. Second, the real estate methods, including Hoskold, assume level income - not declining income as was projected in the calculation.

On the other hand, the problem could be the 10-year term that was assumed in the calculation. Oil properties are commonly expected to produce and are valued on terms of 20 to 30 years. A 7% sinking fund factor for 20 years is 2.44%, while a 30-year factor is only 1.05%. Using the Pure Play rate of 20.15% BFIT as a starting point and a 20-30-year term results in a range of 21.21% to 22.59% BFIT. Adjusting for reserves risk (97.2%) results in a range of 21.82% to 23.24%BFIT. This range is consistent with the market derived rate of 21.8% for 100% PDP properties.

Part IV - Issues in the Appraisal of Petroleum Properties

The confluence of the SBE rules for property valuation, particularly Rules 2, 4, and 8, with the availability of market sales and financial market data should make the appraisal of oil and gas properties a relatively simple matter of collecting and applying market data to estimates of future income. The development of the Assessors' Handbook and decisions in certain court cases have provided information and direction that help to refine the process to a large extent. However, some vexatious issues remain to be resolved. These issues relate primarily to the appropriate level of discount rate to be used in petroleum property appraisal but also include (1) concerns about the proper accounting for the liability for abandonment and related costs and (2) the application of arbitrary adjustments to market data in the derivation of discount rates from market sales. These issues are discussed below along with solutions based on the interpretation of existing SBE rules and the expanded treatment of appraisal issues in the Assessors' Handbook. In this discussion, the Assessors' Handbook and other statements by the SBE are accepted as both the recognized authoritative sources and as extensions of generally accepted appraisal practice.

The issues examined are the following:

- Proper methods of discount rate derivation
- The relationship of transactional and financial market discount rates
- Financing of market transactions
- Relationship of the financial markets to discount rate determination
- Determination of a rational threshold for discount rates
- Treatment of abandonment and related liabilities in petroleum property appraisal
- Distorting effects of arbitrary adjustments to transactions data

These issues overlap in several areas and some have been discussed previously to one degree or another. The discussion below will also, of necessity, include some repetition but the prominence of these issues allows some license to be employed.

Proper Methods of Discount Rate Derivation

A property transaction is not necessarily a proper source of a fair market value discount rate simply because the data is available to allow the calculation to obtain a discount rate to be done. Calculation of the internal rate-of-return is a relatively mechanical process of the requisite data is provided. However, not all transactions are appropriate sources of discount rates for use in assessment appraisal. There are three conditions that must be met in order to derive discount rates that are compatible with existing SBE rules.

First, the property transaction must be a *market value* transaction. That is, the property transaction used as a data source must comply with the appropriate definition of "*fair market value*" as stated in the R&T Code, SBE Rules 2, and elsewhere in ad valorem tax and general appraisal practice. The latter relation is important because, as noted above, the R&T Code and Rule 2 rely upon fair market

value definitions that are consonant with relevant legal opinions and real estate appraisal practice. In that context, a transaction that does not meet general appraisal practice conditions for market value cannot meet the Rule 2 conditions for fair market value and, therefore, is not appropriate for use as a source transaction for extracting a discount rate to be used for market valuation.

The effect here is one of the exclusion rather than inclusion. Transactions resulting from eminent domain actions cannot be considered to be fair market value because the property owner is always being coerced into selling the property - otherwise there would be no need for an eminent domain action to be considered, let alone pursued. Further, the theoretical outcome of an eminent domain usurpation of property is to provide the owner "*just compensation*" which is not necessarily the same as market value. An example would be oil properties acquired by the Los Angeles Unified School District for the Belmont High School project in the Los Angeles City oil field.

Transactions resulting from legal actions, such as lawsuits, also must be carefully examined. Here again there is always some form of coercion in place otherwise there would be no need for the legal action. Legal actions would include property transfers occurring out of bankruptcy, probate distributions, suits for specific performance, and intra-family divisions of property. Transactions between related parties and/or "insiders" should also be excluded primarily because of the lack of exposure of the property to the marketplace of other "knowledgeable and experienced" persons.

Corporate acquisitions, particularly mergers accomplished through stock offerings, but also including purchases of large blocks of properties, should be considered very carefully. Corporate mergers are based on the value of the corporation in total, not necessarily on the appraised value of the properties owned by the company. These are obvious degrees of difficulty in this issue. The Chevron/Texaco or Exxon/Mobil mergers provide no useful insight for Rule 8 purposes but other acquisitions, such as Monterey/MacFarland, may be useful if properly evaluated.

Probably the most difficult type of transaction to consider as a data source is one in which the buyer has a particular motivation to acquire the property which transcends the value of the income stream alone. This is true of corporate (merger or stock purchase) acquisitions but also extends to the potential premium placed on the property by the buyer because: (1) the property fits into existing and operated properties, (2) the property is necessary to complete a development program, (3) the property provides production or facilities that benefits other operations of the buyer, or (4) any other condition or rationale conceived by the buyer. The issue is that (a) the particular reason for the transaction is unique to the buyer and (b) it is often not possible to estimate the value of the premium. Examples of the latter would be properties with gas or water processing plants, access to steam co-generation equipment, access to pipelines, and gas properties that could provide fuel for power generation. The clues to transactions in the "particular motivation" category are purchase prices that exceed the price that might be offered by "persons generally" and which result in very low or even negative discount rates. While this is not to suggest that transactions in this category should be rejected outright, there is a greater requirement in these cases for the exercise of discretion and common sense. The solution to this dilemma is to attempt to resolve the issue through extended discussions with the buyer and to err on the side of caution in applied discount rates obtained from such sources.

Second, there must be sufficient reliable data to allow derivation of a discount rate. There are two caveats here, (a) sufficient and (b) reliable. One of the benefits of the COS system is that there is some uniformity imposed on the data collection process, however, there is no guarantee that enough data will be provided or that it will be reliable, in terms of representing the intent and expectation of the buyer, to be used for derivation of a Rule 8 (g) discount rate. It is incumbent on the person doing the derivation to ensure that the data is representative of a market evaluation. There is an ancillary issue here which is that, in deriving a discount rate, the analyst should make use of all the data provided and should calculate a discount rate that represents the entire expectation of the buyer for the property. For example, if the buyer provides income streams from more than one class of reserves and based the acquisition on the combined income from all the reserves classes, then all the income streams should be used to derive the discount rate. The sufficient and reliable conditions apply to the adequacy of the information from the buyer. If there is not sufficient reliable data, the transaction should not be used. This means the data cannot be created or the evaluation altered by parameters that did not come from the buyer. If the buyer does not provide an oil price projection, the person attempting to extract the discount rate cannot create a price projection and use it in the evaluation.

Third, the discount rate must be derived using the cash-equivalent value as the purchase price. Failure to recognize this obligation will often create a mis-alignment of the actual purchase price and the buyer's income stream. Further, the transaction may include value considerations that are not reflected in the income stream. An example would be a contingent payment based upon future oil prices exceeding a base level of, for instance, \$14/Bbl. While this may be a consideration, if the buyer's income projection is run at \$14/Bbl flat for the life of the property it would not be proper to (a) add an estimate of the future contingent payment to the purchase price or (b) attempt to impose a price projection that exceeds the \$14/Bbl price since the buyer obviously does not expect the increase in price will occur. Either attempt would introduce speculation into the analysis and render the derived discount rate useless for Rule 8 purposes.

When these three conditions are met the remainder of the discount rate derivation is a relatively simple process of calculating an internal rate-of-return of the cash equivalent purchase price on the buyer's anticipated income stream.

The Relationship of Discount Rates Derived from Market Sales and Financial Markets

While Rule 8(g)(1) quite properly gives preference to the market transaction source of discount rates, it seems logical and necessary that the Rule 8(g)(1) and 8(g)(2) methods should be expected to give similar results when the derivations are properly conducted. An issue often arises when market sales data are used exclusively and the resulting discount rates are either (1) not compared to cost of capital derived as cost rates or (2) the cost of capital discount rate is incorrectly calculated. Given the role accorded to the cost-of-capital by industry as a minimum required rate-of-return it is not rational to accept a market sales derived rate that is measurably less than the applicable cost-of-capital unless there is a compelling reason, supplied by the buyer, to do so. In that instance, the transaction should be reconsidered as possibly not being market value. The ancillary issue of comparing discount rates derived from actual property transactions to improperly calculated cost-of-capital discount rates also must be addressed.

Assessors' Handbook, Section 502 provides detailed methodology for calculation of cost-of-capital discount rates. However, it is common to find the SBE instructions being set aside in preference of calculation methods using (1) incorrect measures of the percentage of debt and equity and (2) effective rather than nominal tax rates. This issue can be resolved by strict adherence to the practice is described in the Assessors' Handbook.

Accounting for Financing of Market Transactions

Rule 8(g)(2) directs that the costs of debt and equity are to be weighted according to the respective amounts of each that are employed by "perspective purchasers". While the textbook approach to calculating the WACC is to use the corporate mix of debt to equity, usually about 70% equity and 30% debt, some evaluators apply arbitrary ratios drawn from sources other than financial markets or actual property transactions.

As noted in Part II of this report, the COS filing requires, under penalty of perjury, that buyers provide information about the source of funds for property transactions. Information derived from 433 market sales establishes that more than 90% of all transactions are financed by 100% equity in the form of retained earnings. This means that, for Rule 8(g)(2) purposes, the cost-of-equity is the appropriate source of a discount rate. Comparison of the cost-of-equity, either from forward calculation or from analysis of historical returns, to discount rates derived from property transactions indicates a much closer fit than from comparison to the weighted average cost-of-capital using corporate debt/equity ratios.

The use of only the cost-of-equity is perfectly reasonable within the context of Rule 8(g)(2) not simply because the accumulated COS data since 1983 demonstrates that retained earnings are the preferred funding source but also because the common procedure in petroleum property financing, particularly for individual properties, is to provide the purchase price out of retained earnings and then refinance the company's operations through drawdowns on corporate lines-of-credit or other sources to maintain a useful balance of debt and equity. The solution to this issue is to use only the cost-of-equity or at best a WACC calculation using a weighting of less than 5% debt.

Relationship of Financial Markets to Discount Rate Analysis

The appraisal of oil and gas properties for ad valorem tax or any other purpose does not take place in a vacuum. Further, appraisal for ad valorem tax is not a unique pursuit but must follow the appraisal practices used in the marketplace for oil properties. To do otherwise is to ignore the Rule 2 requirement for fair market value appraisal and the Rule 8 requirement for reliance on the marketplace of "knowledgeable and informed" persons as a source of data. By extension then, the extraction and/or development of discount rates for oil property appraisal must bear some relation to the broader financial markets which are the sources of funds for property acquisitions and investments.

This means that discount rates derived from property transactions must be compared to both forward industry rates-of-return and historical returns-on-equity investment in order to test the credibility of the derived discount rate. The derived rate may well differ from financial market returns

but if the derived rate is measurably lower than returns for similar investments then the derived rate should be reconsidered and probably not used until the discrepancy is been resolved.

As an example, the derivation of discount rates that are negative or substantially less than the WACC or, more correctly, the cost-of-equity may be arithmetically accurate but should probably be set aside for further consideration and investigation. It is possible that the buyer has a unique motivation for purchase the property and that should be resolved, but it is also possible that the data is incomplete (income from UnProved reserves, internal evaluation rather than SEC evaluation) or that the acquisition includes assets other than the producing property. All these examples have occurred in the WSPA/CIPA data base. If the projected and historical BFIT COE is 18-20% or greater it is not logical or likely that the negative, zero, or very low anticipated rate-of-return (discount rate) would be either accepted by “persons generally” or applied by “prospective purchasers” of petroleum properties.

Determination of a Rational Threshold for Discount Rates

The threshold rate is described in Rule 8(g) which indicates that rates derived from property sales should equate to the discount rate derived from the cost-of-capital used to make the investment. In the case of oil and gas properties, 20 plus years of accumulated property sales and capital markets data, along with careful analysis of that data, indicates a threshold discount rate for 100% PDP properties of 18% to 20% BFIT. This transaction derived rate is consistent with historic capital markets cost-of-equity of 20-24 % for the petroleum industry.

Treatment of Abandonment Cost in Ad Valorem Tax Appraisals

For several years assessor's have resisted the idea of accounting for abandonment costs according to the recommended practices stated in Assessors' Handbook, Section 566 and, further, have suggested that property transaction evaluations submitted by buyers of properties must be modified to include a deduction of estimated abandonment¹⁴⁴ costs before deriving a discount rate. While it is not always clear how the abandonment adjustment to the buyers evaluation is being made, it is apparent that no matching adjustment is being made to the purchase price. The argument seems to be that (a) the adjustment to the cash flow is necessary to accommodate the requirement to deduct abandonment costs in assessment appraisals¹⁴⁵ and that (b) the discount rate derived from the altered income stream and the unadjusted purchase price is the rate that should be applied to petroleum properties for assessment appraisal.

This argument (1) reflects a lack of attention to appraisal practice in general and SBE recommendations and (2) creates an artificial appraisal environment that ignores the marketplace. Assessors' Handbook Section 566 addresses the issue of abandonment by directing the appraiser to reduce the income stream by an amount necessary to accumulate the estimated abandonment costs at

¹⁴⁴ Abandonment is presumed to include property restoration, however, it is not obvious that environmental remediation is included.

¹⁴⁵ Expressed in Assessors' Handbook, Section 566, pg. 8-5 and in *Dominguez Energy v. County of Los Angeles* (1997) 56 Cal. App. 4th 839

the time the funds are needed to meet the abandonment liability. However, observed practice is to ignore this requirement and place the abandonment costs at the end of the property life where, in most instances, the cost has no impact on value. That being the case, there would be no need to alter the property sales valuations to derive a lower discount rate. There are several problems with the suggested approach:

- A. There is no evidence that investors who deduct abandonment costs expect or accept a lower discount rate than do investors who do not deduct abandonment costs. Therefore, to assume that assessors would need to use a lower discount rate to offset deduction of abandonment costs has no factual foundation.
- B. Abandonment costs are not a property risk, therefore, whether the anticipated costs are deducted or not should have no effect whatever on the discount rate.
- C. The available evidence does indicate that investors account for abandonment costs in a number of ways including reduction of the purchase price and/or requiring expenditures, in some form, by the seller to reduce the potential abandonment liability.
- D. The argument confuses the concept of individual property appraisal with the status of the owner/operator. Generally accepted accounting practice(FASB Statement 143) requires operators to set aside funds to meet abandonment liabilities when they become due using essentially the same approach prescribed by Assessors' Handbook Section 566. By assuming the funds will be made available by the operator when needed rather than accumulating the necessary funds as described in Assessors' Handbook, Section 566 assessors are, in effect, valuing the operating company, not the property.
- E. Even if the postulated treatment of abandonment costs were found to be correct, thereby placing ad valorem tax appraisal in a very unique class by itself, the calculation method employed is considerably in error. First, the costs of abandonment and restoration for a property are readily determined by appraisers. County assessors commonly require operators to provide abandonment cost information and at least one county (Kern) publishes that information. Remediation costs are more problematic but only by degree. Therefore, it should be possible to estimate abandonment costs for every property at lien date. Second, if abandonment costs are going to be assigned to some future date (whether or not the SBE method is applied) the current costs must be escalated by (a) the expected increase in actual costs and (b) the reasonably expected rate of increase in regulatory requirements. This could result in an escalation rate that exceeds basic inflation by several percent. Third, abandonment is not an uncertainty and therefore does not represent a risk element to be included in the discount rate. Further, the abandonment liability does not bear the same risk as the property as a whole, therefore, the discount rate applied to the future abandonment cost should be substantially less than the 19-20% discount rate that would attach to the property. A discount rate that is essentially risk-less would be appropriate.

The solution to this issue is to recognize that the abandonment liability attaches to the property - not to the operator - and that the property, as a standalone asset, must be valued net of the abandonment liability. There are three ways to do this.

1. Calculate the estimated cost of abandonment for the property at lien date. Since this is the present value of the abandonment cost simply deduct that amount from the present value of the income stream calculated using a market derived discount rate. This approach puts the assessor in the place of the buyer who reduces the price of the property to account for abandonment potential.
2. Estimate the cost of abandonment at lien date and calculate the amount that will be needed for abandonment at the end of the economic life of the property by escalating the current cost by an appropriate rate. Then devise a consistent program to recover the estimated future cost out of expected cash flow and apply that program of deductions to the property income stream. The use of an interest rate as part of a sinking fund is entirely optional.
3. Calculate a Rule 8(g)(2) discount rate as the corporate cost-of-equity (return-on-equity) and use that as the basis for the discount rate. Since the corporate cost of equity already includes deductions to account for future abandonment costs no further discount rate adjustments for abandonment are needed.

Distorting Effects of Arbitrary Adjustments to Transaction Data

It is generally agreed that the Income Approach is only method used by the petroleum industry and the financial community to value oil and gas properties. The method allows the evaluator to (a) consider a wide range of operating and/or production characteristics of each property and (b) evaluate a wide range of variables that would or could impact the potential for obtaining income from that property. The Income Approach relies on the determination of the amount that an investor would be willing to pay for the right to receive the net income that the property would be expected to yield, adjusted for risk and time.

The size, shape, and duration of the income stream are essential considerations to the appraisal of oil properties and deserve due consideration. Oil and gas producing properties (fields) are individually unique. Each field is a separate geologic occurrence that, unlike tract houses or office buildings, cannot be duplicated and, while similarities may exist between fields, has no replica in nature. These geologic conditions include the size, shape, depth, and lithology of the source and reservoir rocks on the large scale and such factors as porosity, permeability (relative and absolute) and water saturation on the smaller scale. Moreover, even in the same field, these conditions are not uniform so that any or all of the physical properties of the reservoir(s) may, and probably will, differ over the aerial and vertical extent of the reservoir. It is not uncommon for leases in one part of a field to produce from the same reservoir but to have a reservoir section with differing lithology existing at a greater or lesser depth with different porosity, permeability, and water saturation.

In addition, as noted above, oil and gas must be produced to have value and that production is not immediate or easily predictable. Production of oil and gas occurs over many years with production rates and ultimate recovery subject not only to all the geologic conditions of the field and lease, but also subject to the methods of production (flowing, pumping); the amounts of water and gas production; the number of wells; the age and quality of equipment; the competence of the operator; the gravity of the oil; and the need for gas compression, artificial stimulation, and/or enhanced recovery methods.

Finally, there are economic, regulatory and other conditions that vary from locality to locality that make each field unique. In some fields, continued production requires an expensive program of steam injection which is subject to (1) oil, gas, and electric power prices and costs; (2) the ability to operate steam generating facilities subject to air quality regulation; and (3) the ability to dispose of large volumes of water subject to environmental constraints. A "similar" field producing under primary production conditions would not have these concerns and nor is it certain that a "similar" field under steamflood in another area or region would be subject to the same conditions.

The **size** of the present worth of the income stream depends on the volume of oil and gas that can be produced and the net income per unit volume of production (sales revenue minus costs). The produced volume depends on all the physical characteristics of the field and reservoir plus the method of production and development over the time of production. The net income depends on the product prices and the costs associated with producing, treating, and selling the crude oil and gas. The **shape** of the income stream is primarily a function of the method(s) of production over time which could be influenced by the introduction of stimulation or EOR methods and by the timing of the introduction of changes in production methods. A secondary effect on the shape of the income stream could occur through price changes for oil or gas or both such as occurred in 1973, 1979-80, 1986-87 or 1998-99. Finally, the **duration** of the income stream is influenced by all of the above but directly relates to the time required to produce oil and gas and to receive the income until it is no longer economic to do so.

The great utility of the Income Approach to value, over all other methods, in the appraisal of petroleum properties is that the construction of the income projection allows all the physical, operating, and economic characteristics to be rolled together to produce a single result - a future stream of income. In the case of an acquisition, the purpose is to estimate the price that can be paid for the property and still obtain a return commensurate with the accepted risk. Every business finance and appraisal authority recognizes the purpose of investment is to earn a return. In the evaluation of a potential acquisition, a change in the anticipated income stream would be accommodated by a change in the purchase price offered in order to retain the expected return; particularly if the change produced a decline in the income stream. The Income Approach is readily adaptable to the evaluation of alternatives.

It is therefore a fallacy and poor appraisal practice to introduce arbitrary changes into the income stream used by the buyer to purchase a property, expect that the purchase price would remain the same, and then calculate an artificial discount rate. A discount rate obtained by such a process is not a market rate.