AMERICAN INSTITUTE OF MINERAL APPRAISERS

N E W S L E T T E R

April 2002 Vol. 6, No.2

IN THIS ISSUE

In Memory Of Thomas B. Henderson, Jr. 1929 – 2001

It is my sad duty to report the loss of Thomas B. Henderson, Jr., an AIMA Member since 1995. He passed away August 4, 2001 in Corpus Christi, Texas. Cause of death was kidney cancer. His wife, Mary Judith Henderson and daughter, Mary Cornelia Gates, survive him. His daughter, Virginia Wood Henderson who was also his business partner, preceded him in death.

Thomas was born April 14, 1929 in Charlotte, North Carolina to one of the pioneer families in the area. He was educated at Phillips Academy in Andover, Massachusetts. He went on to earn a B.S. Degree in Geology at Duke University in Durham, North Carolina and a M.S. Degree at the University of Texas in Austin, Texas. He went to work for Humble Oil and Refining Co. as exploration geologist after graduation in 1953. Then in 1969, he became an Independent Geologist, specializing in prospect generation, consulting, partnership management, mineral interest investment, and mineral valuations relating to oil and gas, uranium, and coal/lignite.

He was an active member of several professional organizations. In addition to AIMA, he was a member of the American Association of Petroleum Geologists (AAPG), the Corpus Christi Geological Society, the Society of Professional Well Log Analysts and the Corpus Christi Geophysical Society. He had the distinction of being the founding member of the AAPG Energy Minerals Division as well as a past president of the Corpus Christi Geological Society. He also was active in community affairs and had served on numerous Advisory Boards, Task Forces, and the Vestry of his church.

Editor's note: *Thomas had contributed a paper for our June 2001 Newsletter which was titled "Production Risk – Thoughts From Oil and Gas Appraisal That Might Also Apply To Other Minerals". His wife, Judy, has informed me he had prepared that paper while in his hospital bed and, that it was his last work project.*

New AIMA Member

Our most recent addition to membership is Mr. Andrew Neil Clay. His mailing address and telephone number is: 1st Floor, Block G; Rochester Place; 173 Rivonia Road; Sandton, Gauteng 2196; Republic of South Africa; Phone 27 11 783 9903. Welcome aboard Andrew!

Minutes Of AIMA 2002 Annual Meeting

Our AIMA 2002 Annual Meeting was held on Monday, February 25, 2002 in Phoenix, Arizona at Kincaid's Restaurant. Trevor Ellis, acting as Chairman, called the meeting to order at 4:40 P.M. Those attending the meeting were; Donald Warnken, Bernard Guarnera, Charles Melbye, John Gustavson, Sam Pickering, Trevor Ellis, Alexandra Eads and Edwin Moritz (by proxy). Trevor reported the election results, which is as follows: President – Sam Pickering; Vice President – Edwin Mortiz; Treasurer – Lawrence T. Gregg; Secretary – John Gustavson; Editor – Donald Warnken. Alexandra Eads, Joseph Limb's Secretary, recorded the

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Minutes of AIMA 2002 Annual Meeting,

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meeting minutes. ***Thank you very much Alexandra.***

Outgoing President's review of AIMA's development and current status.

Continuous annual meetings have served their purpose. Coinciding with the SME Annual Conference and Valuation Sessions remains the most promising venue. *It was suggested that as well as the Annual Meeting, members should be afforded to dial-in via telephone conference if not attending SME Annual Meeting. Feedback is requested from members.*

Oil & Gas group still not coming in due to format of AIMA. Mining is dominant. Website at good point but Michael Cartwright, due to recovery from heart surgery, will no longer be maintaining. Donald Warnken has offered to take over – good luck Don!

International recognition of AIMA is very good. Licensing issues in the U.S. are looming. Individual states feel you are performing Geology not appraising.

AIMA By-Laws & Code of Ethics need approval and this will be addressed with the membership.

Induction of new officers, turn over to Sam Pickering as new AIMA President and Meeting Chairman.

Incoming President's review and goals for AIMA.

Review Goals On Agenda.

Treasurers Report:
$4,003.06 Current Association Balance
$1,409.16 – 2 Websites, Software, Etc Future Expenses
$1,680.00 Income Expected From Dues
$4,273.90 Association Balance After Expenses

Treasurer's report and current number of AIMA members. Gustavson reported for Moritz. Vote – Accepted.

Acceptance of minutes of 2001 Annual meeting as published in the June 2001 Newsletter. Vote – Accepted.

Old Business:

- Update on membership recruiting efforts
- Barney Guarnera volunteered for membership Committee.
- Update on implementation of the Associates and Emeritus categories. Invite our retired members to apply for Emeritus status. Dues are one-half of regular membership. Don to place in Newsletter.
- Should we circulate or publish new membership applicant names and addresses for member comment before approval? Vote – Not Approved.

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AIMA Annual Dues

An Invoice has been included in this Newsletter as a loose leaf for our annual membership dues. The dues are $60. Your check should be mailed to our new AIMA Treasurer, Lawrence Gregg. His address is; % Qore Property Sciences; 11420 Johns Creek Parkway; Duluth, GA 30155.

AIMA Website Updating

Your Newsletter Editor was elected at the annual meeting to be our AIMA Web Master. Therefore, I will be updating our website in the near future. You are requested to review the Membership Directory and report to me any changes to your address that is needed. Also, I am requesting your thoughts and input for the completion of certain web pages that are "Under Construction". My E-Mail address is: Dongene32@aol.com and my home telephone number is 918-663-3074. Our website address is: www.mineralsappraisers.org.

Ore Reserve Valuation Project

Charles Melbye and Bernard Guarners are members of the Mining & Metalurgical Society of America (MMSA) as well as AIMA. Charles has informed your editor that MMSA is planning to propose ore reserve valuation standards. Bernard has been appointed Chairman of a committee of five to study and recommend the valuation standards. They are to furnish the Executive Committee of MMSA their report by March 15, 2002. It will focus on valuation standards for the United States, since Australia and Canada already have theirs. However, the VALMIN (Australia) and the CIM Val (Canadian) Codes will be used as guidelines.

The Executive Committee will present the draft report to an outside panel for review. It will also be presented to various state mining associations and some mining companies. Comments from the reviewing parties are to be considered in the preparation of the final draft.

Messages To The Editor

Your Editor has received E-Mail messages from several members concerning the articles published in the January 2002 Newsletter. I am pleased to report that all were supportive and complementary of the positions taken in each of the "Royalty Income" articles. Also, all have indicated that they would like to see more articles on special appraisal situations such as that described in the Comet No. 1 appraisal. So, your Editor invites each of you to submit a summary of any appraisal that you consider unique or unusual for our next Newsletter. My thanks to Sidney Alderman, Richard Bates and Charles Melbye for those articles.

Minutes of AIMA 2002 Annual Meeting,

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- Approval of draft ethics standards which were published several years ago in Newsletter; Vote Never voted on despite being implemented. Sam to prepare simple format and forward.

New Business:

- Formalizing the use of "CMA" as our nominal for Certified Minerals Appraisers. Vote – Approved. Use is considered discretionary by members.
- AIMA Website. Donald Warnken has very kindly volunteered to take over the upkeep, maintenance and daily running of the Association's website. Future expenditure of approximately $200 approved for necessary software.
- Discussion of continuing education for Certified Members;
  a. Should we sponsor member-led evening AIMA mineral appraisal classes at SME annual meetings?
  b. Formal encouragement or requirement? Vote – Continuing education not needed at this time. Address at next Annual Meeting.
- Could we have more AIMA emphasis on oil and gas appraisal? Consider AIMA meetings and Valuation Sessions at AIPG annual meeting? AIMA needs to look at Oil & Gas Sessions (HECC) in Dallas, Texas which takes place every other year as one possibility to bring more Oil & Gas emphasis in to the group. John Gustavson stated he would check on other similar venues and advise.
- Should we continue our practice of sponsoring Valuation Sessions at each SME annual meeting, or are we about tapped out for topics and authors? The consensus was yes to the question. Sam Pickering will discuss with SME this subject and whether AIMA can get Papers on CD Rom for addition to AIMA website.

Meeting was adjourned at 7:00 PM. Dinner and informal discussions followed.

Outgoing Presidents Review Of AIMA's Development and Current Status

Trevor Ellis, Past President

At our AIMA Annual Meeting in Phoenix, Arizona on February 25th, after approximately two years as AIMA President, I handed the position over to our incoming President, Sam Pickering. On looking back over those two years, I believe we have made some important progress.

Our Phoenix Annual Meeting was the fourth in a row of formal regular Annual Meetings held in conjunction with the

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SPE 37950
Techniques For Valuing Acreage With Unproved Oil and Gas Potential

Edwin C. Moritz, Gustavson Associates Inc.

Editor's Note: This paper was prepared for presentation at the 1996 SPE Annual Technical Conference and Exhibition held in Denver, Colorado, USA. 6-9 October 1996.

Abstract

The purchase and sale of petroleum assets frequently involve unproved acreage that is rank to prospective in nature. The buyer and the seller are faced with estimating a value for this acreage which cannot easily be accomplished with a heavily risked oil and gas production forecast. This paper presents alternative techniques for valuing unproved or speculative acreage, since limited discussion of this subject exists in the literature. The techniques described in this paper are based on appraisal methods developed by the real estate profession and are commonly referred to as the Market, Income and Cost Approaches.

When appraising speculative. The critical first steps in valuation are defining the rights being appraised and establishing the highest and best use of the property. It is also important to characterize the oil and gas potential subject in order to establish guidelines for finding comparable sales in the market. Market data can be obtained from lease sales, county courthouse records, oil and gas auctions, and from publicly-reported corporate financial statements. In addition, exploration costs are considered.

The relevant market data are then analyzed in detail and used in the various appraisal methods. These methods provide estimates of value, which are then reconciled for the final opinion of value. Examples of the types of data obtained and analyses performed will be presented.

Introduction

There is not much discussion in the literature regarding techniques for the valuation of unproved oil and gas reserves. Questions often asked are "What is it worth?" and "How do you value it?" when the task at hand is the Fair Market appraisal of undeveloped properties that are not considered proved reserves. This paper serves to illustrate methods for estimating value for these types of oil and gas properties where income from oil and gas production is uncertain or even speculative.

The methods shown are based on data derived from the market which includes lease bonuses and rentals, and sales of mineral interests and prospects. They are presented as alternatives to the approach of projecting income from a risked, hypothetical oil and gas production stream based on statistical success ratios.

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Out Going President's Review of AIMA Development and Current Status, *Continued from page 3*

Society of Mining, Metallurgy, and Exploration (SME) Annual Meetings. On each of these occasions, AIMA members have effectively chaired the Valuation Sessions at the SME Annual Meetings, which have effectively become an AIMA forum for presentation of our professional papers. In prior years, Annual Meetings for membership effectively did not exist. We intend to continue this arrangement by holding our 2003 AIMA Annual Meeting in Cincinnati, OH on the afternoon of Monday, February 24th 2003, in conjunction with the SME Annual Meeting held February 24 – 26.

One conspicuous problem with this arrangement is that the SME annual meetings are for the mining industry and have no attraction for our petroleum industry members. Input has been sought from these members in the past regarding a similar arrangement with an annual petroleum conference venue such as AAPG. However, essentially no interest has been shown in organizing such an annual get together. One possible solution put forward to allow members to participate in our Annual Meeting city, is for us to provide a dial-in telephone conference service for the business portion of our AIMA annual meeting. We need to investigate this option. Please provide your feedback to our Newsletter Editor, Don Warnken.

During my presidency, I continued to focus much of my energy on inter national liaison. I maintained regular communications with Australian and Canadian leadersin mineral valuation standards development and International Valuation Standards Committee (IVSC). During 2001, I led the IVSC Extractive Industries Task Force in developing its submission to the International Accounting Standards Board on the proposed Extractive Industries Accounting Standard. In the October 2001, I gave the US paper at the VALMIN Conference in Sydney, Australia. AIMA has provided no support nor group position regarding these efforts, and therefore I have not presented myself as representing AIMA. However, the results have been that AIMA appears to the better recognized in many ways internationally than domestically. I have continued these efforts since stepping down from the presidency. In March 2002, I gave the US paper at the South African Institute of Mining and Metallurgy's Valuation Colloquium in Randburg, South Africa, and in May I will be giving the US paper on standards and ethics at the Council of Mining and Metallurgical Congress 2002 in Cairns, Australia. I also continue in the role of the Extractive Industries Task Force Leader for IVSC.

In passing the presidency to Sam Pickering, we discussed the fact that he is sure to want to refocus the position to U.S. issues. This is not to say that I had ignored such issues. In my talks and writings I have attempted to bring attention to the increasing barriers to our professional practice imposed by

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Techniques For Valuing Acreage With Unproved Oil and Gas Potential, *Continued from page 3*

Definition of Rights Being Appraised

An accurate definition of the mineral rights being valued is a critical step to conducting an appraisal. The Appraiser should check the mineral ownership for any special considerations such as vertical depth segregation, split of executory and non-participating royalty interests along with the terms of any existing leases.

When valuing a leasehold interest, attention should be directed toward drilling commitments, emnent domain or force majeure clauses and the specific agreements in place. For a recent case involving properties in the Bakersfield area, the leases were granted in the early 1900's and were structured such that the lessee had a "preferential right to renew". This allowed the lessee to hold the leases in perpetuity if he so desired.

Once the mineral interests have been accurately described, it is then necessary to proceed with the determination of the highest and best use of the property.

Determination of Highest and Best Use

In the Dictionary of Real Estate[1], the highest and best use is defined as follows:

"The reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value. The four criteria the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum profitability."

In order to perform this type of analysis, the petroleum geology for the property must be characterized on both a regional and local basis. Exploratory work on the property in the area is assessed in order to see the improvements or stages of development that have taken on or before the as-of date.

The various stages of highest and best use is for an oil and gas property are shown conceptually on Figure 1, adopted from Gustavson[2]. It is important for the Appraiser to characterize the stage of development to which the property has been advanced. In addition, the Appraiser must employ four objective tests on the contemplated uses for the mineral rights on the property.

The standards[3] dictate that the contemplated use for the property must be legally permissible, physically possible, financially feasible and maximally productive. "Legally permissible" implies that the proposed use for mineral extraction (such as oil and gas drilling) has obtained approval

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Outgoing Presidents Review of AIMA's Development and Current Status, *Continued from page 4*

state level licensing of appraisers, geologists and engineers. I wrote a submission to the Appraisal Foundation on this topic containing my recommendations, and fought the introduction of geologist licensure to Colorado.

Our membership has remained essentially constant during the past two years at just under 30 members, with a few new members replacing a few departing members. We hope that the membership drive being led by Barney Guarnere, and introduction of the Associate and Emeritus statuses will help boost our membership. Meanwhile, the issue of whether continuing education should be required for our Certified Members to maintain their Certification needs to be monitored, given the increasing emphasis on continuing education by many other certifying and licensing bodies.

I offer Sam Pickering my best wishes for his tenure and remain available to provide advice and assistance.

Techniques For Valuing Acreage With Unproved Oil and Gas Potential, *Continued from page 4*

from the governmental authorities regulating the activity. This test is especially important for properties located in environmentally sensitive areas where exploration may be costly and face strict regulatory restrictions. Items such as the acceptance of a development plan in an EIS document or the issuance of drilling permits and seismic right-of –way are indications that the proposed use for oil and gas development may be legally permissible.

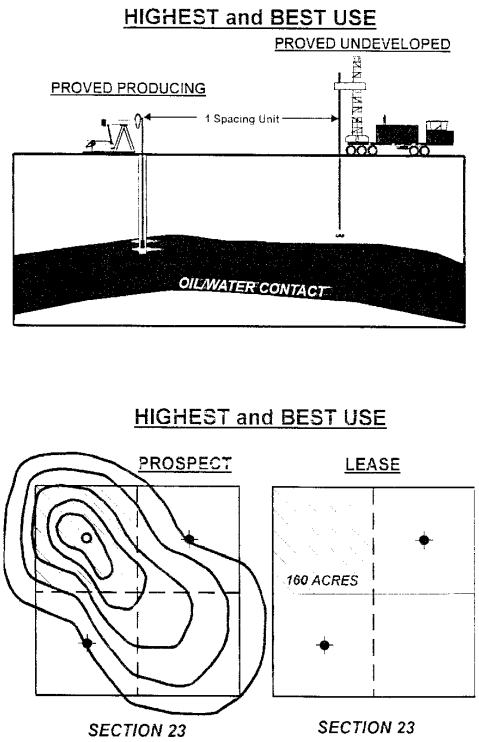
The test for "physically possible" explores whether the access and logistics for the testing and development of the properties, accessibility for acquisition of seismic data is particularly important so that prospects can be defined.

"Financially feasible" tests whether the proposed improvement can be financed and can yield a reasonable rate of return on the investment. Obviously, exploration is a risky business with an uncertain outcome. Nevertheless, this test should be considered from the standpoint of what the proposed development is at the time of the as-of date.

"Maximally productive" implies a use that gives the greatest value to the land given that the contemplated use has passed the three tests mentioned previously. For unproved properties with speculative oil and gas reserves, the Appraiser should consider uses that can support realistic expectations of future income to the property. This would include income from seismic option fees, leasing revenues, prospect promotion and sale or an outright sale of the mineral interest to an interested party.

It should be noted that there is substantial debate regarding potential uses and how this affects value for a given property. Potential uses are based on the principal of anticipation and this relates to what stage of development the property had achieved on the as-of date of the appraisal (Figure 1). A test for a potential highest and best use is that the potential use was of such a probable nature that it influences the value of the property[4].

Figure 1



Once a reliable highest and best use determination has been conducted, the Appraiser can begin to collect and analyze the data that support his or her opinion on the Fair Market Value of the property.

Data Collection

For undeveloped oil and gas properties, the best sources of information include the local county courthouse records, results of federal and state leasing sales and discussions with local mineral owners, landmen and operators involved in the area. A diligent search of the courthouse records will provide lease and mineral deed transactions mostly for fee properties. In addition, recorded assignments of leasehold or operator interests and seismic option agreements should also be collected.

This information provides a statistical sampling of the traffic or market for unproved properties where production has not

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Techniques For Valuing Acreage With Oil and Gas Potential, *Continued from page 5*

yet been established. Most recorded fee leases do not contain an accurate disclosure of the bonus or rental. As a result, the Appraiser is tasked with contacting the parties involved in order to establish the terms of the transaction. This is sometimes difficult depending on the confidentially nature and on how amenable the parties are about disclosing this information.

Leasing activity on the federal and state lands provide good sampling since the results of sale are considered public domain. This information can be used to check the reasonableness of the indicated terms of the fee lease transactions; however, it is not always possible to use the data, if for example the federal government is a party to a dispute.

There is also now a trend in some areas for operators to first pay a seismic option fee in advance of leasing. Depending on the results of the 3D seismic survey, the operator will be selective about how much of the property he desires to lease from the landowner. Therefore, fees from seismic option agreements are also an indicator of the future income stream that an unproved property might and also how much subsequent income the acreage might generate from leasing even if oil production is way out in the future, if ever.

Mineral deeds or the outright sale of a mineral interest are good sources of what undeveloped mineral interests are worth on a per-acre basis. These transactions are typically for cash and are considered "comparable sales". These sales can be used to compare to the subject property in order to assess value patterns in the market. Terms regarding the sale of fee mineral transactions are sometimes equally difficult to confirm but provide a very reliable indicator of value when this information is available.

Assignments of leasehold or operating interests in undeveloped properties indicate value to a particular leasehold interest. Frequently, companies will lease tracts in order to promote prospects to other companies or may simply lose interest if their exploration capital is committed to other projects.

These transactions may involve a cash consideration to cover the original land costs or work commitments in order for the new operator to earn an interest in the property. Also, the assignor may simply reserve an overriding royalty interest on the hope that the assignee drills a well and discovers new oil and gas reserves.

Certain criteria must be established when discussing terms with the parties involved with the market transactions described above. The most important criteria is that the transaction was an arms length sale and that there was no undue duress to either the buyer or seller. Intra-family or intra-company transactions should be discarded unless there are special circumstances.

Other criteria include that the buyer and seller were knowledgeable and that the property was exposed to the market for a reasonable period of time. Because of this criterion, it is important to get a good statistical sampling of the market data. A good sampling will establish reasonable ranges of value which will not be severely impacted if some of the data must be discarded because it does not qualify.

The next step in the appraisal process is the analysis if the data itself which will ultimately provide estimates of value.

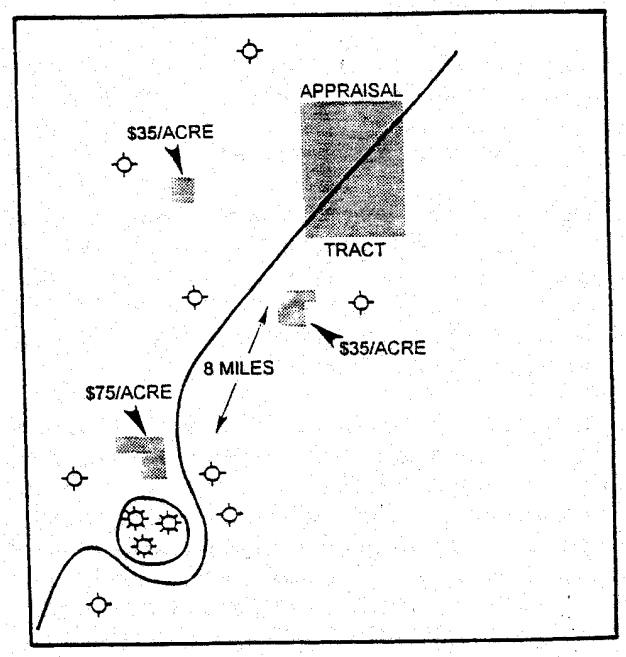
Appraisal Methodology

Once the data has been compiled, it is then necessary to interpret the value patterns in the market. This is accomplished by statistical analysis and by posting the data on trend maps. In addition, the Appraiser needs to synthesize the information from interviews with parties involved in the various transactions.

There are two main methods for appraisal which consists of the market and Income Approaches. The market approach is based on prior sales of similar type properties while the Income Approach is based on a reasonable future income stream that the property could realize.

Figure 2 is a simplified overview of an assignment that involved an appraisal of several individual tracts located adjacent to an Air Force bombing range in Roosevelt County, New Mexico. The tracts were located approximately eight miles to the north of a small gas field. Because the acreage was considered exploratory, it was considered too speculative to project income from a hypothetical oil and gas production stream.

Figure 2



LOCATION OF COMPARABLE SALES IN RELATION TO APPRAISAL TRACT

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Techniques For Valuing Acreage With Oil and Gas Potential, *Continued from page 6*

Market Approach. The basis for the Market Approach consists of the information collected from the mineral deed transactions. The comparable transactions are compared to the subject on the basis of various elements such as distance from production, stage of development, regional and local developments, exploration potential and surface access considerations.

This is a subjective analysis for the most part but a confidence level can be gained by establishing upper and lower ranges for the various sales. For example, acreage located some distance from production and not considered prospective may sell in the range of $25 per net mineral acre versus highly prospective acreage that sell in the range of $100. If the oil and gas potential for the subject is better than rank but not highly prospective, then the value indicated is $50 to $75 per acre.

In the example presented in Figure 2, a few mineral deeds were found and interviews with the parties involved indicated the mineral rights were sold for around $35.00 per acre for generally prospective but exploratory acreage. The acreage involved in these transactions compare favorably with the subject and therefore can be considered as "comparable sales" for use in establishing value for the subject. The tract being appraised consists of 3,779 acres.

Generally, there are not many arm's-length mineral deed transactions for a given area. Consequently they must be calibrated with the lease and prospective data.

Income Approach. This approach makes use of an estimate of oil and gas reserves in place in the appraisal tract, and of an analysis of production and income there from and from surrounding appraisal tracts. This estimate is sometimes determined by volumetric computations involving thickness and porosities of producing formations, water saturation levels, drainage areas, and fluid properties. On some cases the reserves are estimated by analogy, or the average of oil and gas reserves for other wells in the area. Probabilities of success are sometimes introduced because the confidence level in the estimate reduces with the distance from actual production.

The approach described above has a low confidence level for exploratory acreage. Consequently, a derivative method of the Income Approach is used and is referred as the Lease Bonus Method.

The value of interests to be appraised under this method derive from the potential future income stream from the receipt of bonus and rentals through oil and gas leasing. For exploratory acreage, this represents the highest and best use of the mineral rights. This method is based on a present value analysis of thefuture income stream from oil and gas leasing. This method can be used to appraise all rights for properties with no production and only speculative potential therefore.

As stated previously, recorded fee leases do not contain accurate bonus terms. Therefore, it is necessary to confirm bonuses on fee leases through telephone interviews with the lessor and lessees. In most cases, the annual rental and lease term are noted on the recorded documents and this criterion is usually established easily. For the example in Roosevelt County, New Mexico, the data compiled from the leasing activity is presented in Table 1.

Table 1

RECORD OF LEASING ACTIVITY

LOCATION	DATE LEASED	ACREAGE LEASED	LEASE TERM	BONUS PAID	COMMENTS
Sec. 19, 21, 23-T1S-R31E	Dec. 1988	720	5	$35/acre	confirmed by lessor
Sec. 2-34-T1S-R29E	Dec. 1988	3620	8	$15/acre	confirmed by lessor
Sec. 25-T1S-R30E	Dec. 1988	670	5	$15/acre	confirmed by lessor
Sec. 2-34-T1S-R29E	Dec. 1988	3965	8	$20/acre	confirmed by lessor
Sec. 20, 29-T1S-R31E	Dec. 1988	400	5	$15/acre	confirmed by lessor
Sec. 21, 28-T1S-R31E	Dec. 1988	150	5	$15/acre	confirmed by lessor
Sec. 25-T1S-R30E	Mar. 1989	40	5	$20/acre	confirmed by lessor
Sec. 21, 28, 31-T1S-R30E	May 1989	345	7	$20/acre	confirmed by lessor
Sec. 21, 32-T1S-R30E	May 1989	240	7	$15/acre	confirmed by lessor

Results of state and federal lease sales do disclose bonus amounts tendered which can be used to complement the data obtained from fee lease transactions.

Similar comparisons (described in Market Approach) are used for establishing market lease terms for the area of study. Oil and gas development activity on or in the vicinity of the appraisal tract give indications of how prospective or attractive the subject property might be to an oil and gas operator.

The market data is posted on trend maps in order to compare and contrast the comparable acreage with the subject. In addition, the bonuses derived from the market research are analyzed statistically. Good prospective acreage will usually command a higher bonus than rank wildcat acreage. Figure 3 is a histogram for leasing activity along a Niagaran reef trend in the Michigan Basin. The higher bonuses reflect amounts the market is willing to pay for good prospective acreage.

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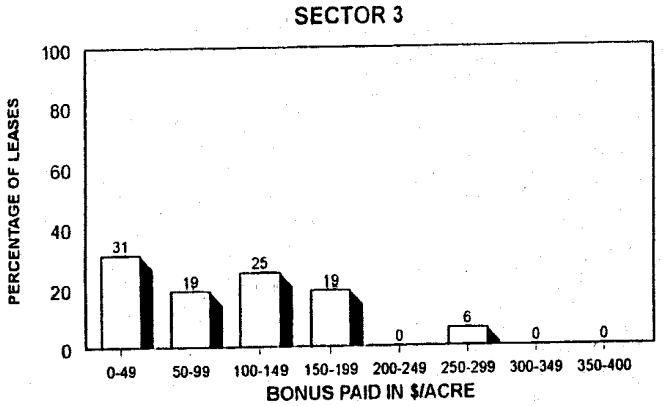
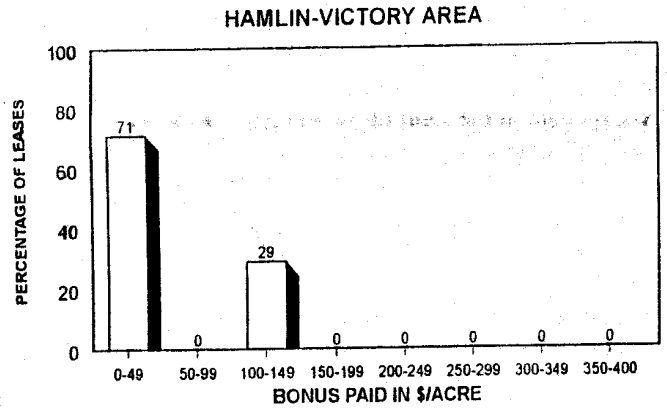
FIGURE 3

PERCENTAGE OF LEASES
VS
BONUS PAID IN $/ACRE





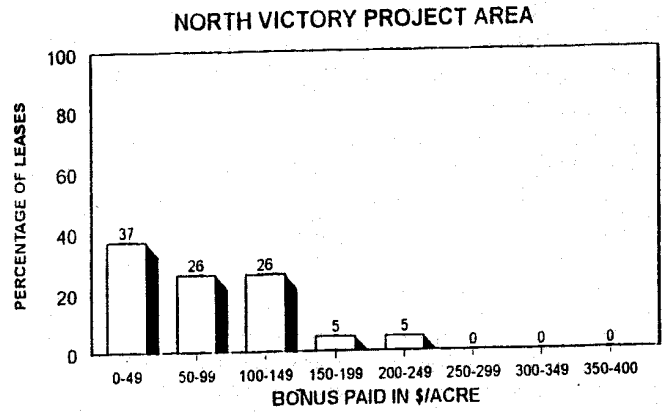
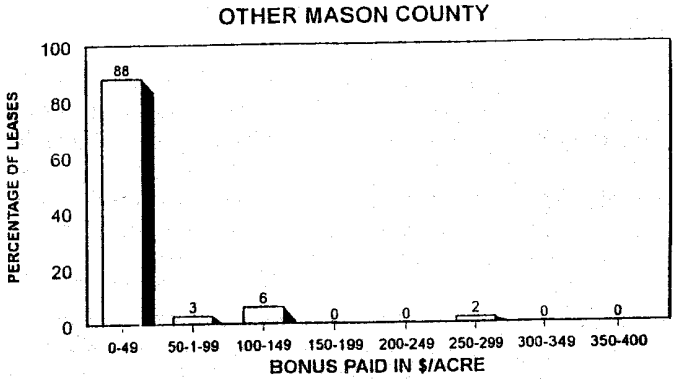


FIGURE 3, *Continued*



The analysis described above will then establish estimates of market bonus, rental and term for a lease on the acreage being Appraised. It is now possible to project income from leasing cycles over the economic life of the property (Table 2). For exploratory properties, this is considered a realistic projection of a future income stream.

TABLE 2

TRACT 202M
ESTIMATED DISCOUNTED CASH FLOW*

Calendar Year	Total Annual Income ($)	10.00 PCT Disc.** ($)	10.00 PCT Cum. Disc. ($)	REMARKS
1	64,243	61,253	61,253	Bonus
2	3,779	3,276	64,529	Rental
3	3,779	2,978	67,506	Rental
4	3,779	2,707	70,213	Rental
5	3,779	2,461	72,674	Rental
6	0	0	72,674	Interval
7	64,243	34,576	107,250	Bonus
8	3,779	1,849	109,099	Rental
9	3,779	1,681	110,780	Rental
10	3,779	1,528	112,308	Rental
11	3,779	1,389	113,697	Rental
12	0	0	113,697	Interval
13	64,243	19,517	133,214	Bonus
14	3,779	1,044	134,258	Rental
15	3,779	949	135,207	Rental
16	3,779	863	136,069	Rental
17	3,779	784	136,853	Rental
TOTAL	238,100	136,900	136,900	

- Totals rounded to next highest $100
- Bonus of $17/net mineral acre
- Term of five years
- Annual delay rental of $1/net mineral acre/year
- Total acreage - 3778.98 acres

* Mid-year discounting

** Present value of 10.00% is used to reflect prevailing interest rates under current petroleum industry economic conditions.

The gap between leasing cycles is meant to simulate a hiatus that the property would encounter as leases expire and are picked up again by other operators. These hiatuses can be modified depending on the market conditions in the general area on the as-of date of the appraisal. This will effect the net present value of the income stream and relies on the judgment and interpretation by the Appraiser.

The as-of date for this appraisal was December 1991, hence a discount rate of 10 percent was used to reflect the petroleum industry's cost of capital at that time. The net present value of the projected future income from leasing ($136,900) reflects the valuation of the appraisal tract using this approach. The

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Techniques For Valuing Acreage With Oil and Gas Potential, *Continued from page 8*

market also buys and sells minerals by a factor of 2 ½ times the market bonus. This is a general rule of thumb and can be used when a quick evaluation is conducted.

Seismic Option Agreements. With the advent of higher resolution 3D seismic surveys, it is now possible for the explorationists to filter large tracts of raw land into prospective versus non-prospective areas. This isolates acreage that has seismic leads or anomalies that warrant further reconnaissance that may include exploratory drilling. As a result, oil and gas companies will typically enter into seismic option agreements with a potential mineral owner. In this arrangement, the oil and gas company pays a fee to the mineral owner to acquire seismic across their land in advance of any lease arrangements. Depending on the results of the 3D survey, the oil and gas company has the option to lease all or selected parcels from the mineral owner.

Unless the competition is high, the mounts paid under this arrangement are usually low on a dollar-per-acre basis. On a recent assignment in North Texas, this Appraiser found that the going rate was around $25 per acre for a seismic option fee. This trend appears to be prevalent in some areas but less in others. It all depends on how successful and expensive the 3D seismic is in a given area. The prevalence of seismic option agreements in the study area should be assessed by the Appraiser as part of the overall analysis.

Prospect Promotion and Sale. As a property is improved to the prospect stage, an oil and gas company can barter, sell, or trade prospects to other companies. This may or may not result in a cash consideration for the prospect itself. Typically, the party offering the prospect will at least attempt to recoup his land cost plus any exploration costs expended to date. Alternatively, the seller may gain a drilling commitment plus a carried working interest in leiu of a cash consideration.

Under these conditions, the value of the property can possibly be estimated based on the total exploration costs prudently expended in advance of drilling. However, care should be taken when employing this methodology because much will depend on how the market perceived the oil and gas potential of the property.

A recent assignment in the Michigan Basin found that leads or seismic anomalies in the Niagaran Reef trend sold for around $50,000 for an 80-acre prospect. Seismic anomaly acreage are areas that have been determined to have specific potential based on seismic evaluation, but in which the leads were not sufficient to drill without confirmation from positive interpretation of additional seismic data.

Reconciliation of the Various Methodologies

The results of the various methods are then considered as part of the overall opinion of value. The confidence level in each approach is weighted based on the data available and how the individual approaches best reflect the market.

Estimates of value were described earlier for the 3,779 acres in Roosevelt County, New Mexico. The Market and Lease Bonuses Approaches provided an estimated Fair Market Value of $132,300 ($35 per acre * 3,779 acres) and $136,900, respectively. The two value estimates compare favorably but the Market Approach only found one or two mineral deeds in the public records. Consequently, the Income Approach or Lease Bonus Method has the highest confidence level and was the basis for an estimated Fair Market Value of $136,900 for the subject property.

Conclusions

There is little discussion in the literature regarding techniques for appraising exploratory properties where income from oil and gas production is speculative. The techniques presented in this paper are alternatives to the approach of projecting income from a risked and hypothetical oil and gas production stream based on statistical success ratios.

When appraising the market value for these types of properties, the oil and gas development in the area should be characterized along with the petroleum geology. A highest and best use analysis must also be conducted for the property so that the correct appraisal methodology can be employed. Market data in the form of oil and gas leases, mineral deeds, exploration costs and sales of prospects are compiled and analyzed in order to assess value patterns in the market.

The Income and Market Approaches are two appraisal methods commonly employed for estimating the Fair Market Value. The Market Approach utilizes mineral deeds or sales of mineral rights as comparable sales in the market place. The Income Approach projects income from oil and gas leasing over 15 to 20 years or four lease cycles. The Cost Approach utilizes the cost of exploration in advance of drilling as an indicator of value. The various approaches are reconciled for a final opinion of value based on the confidence level in each one. Reliable estimates of Fair Market Value are important for eminent domain cases, estate planning and gifting and for corporate divestiture.

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