

APPRAISING OIL & GAS PROPERTIES

A Newsletter for Appraisal Professionals

Richard J. Miller & Associates, Inc.

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Thinking About Stuff

And Heere's Sara! In Temecula, CA. Sara Anne Lillie, 7lbs. 7oz. All concerned are doing fine. So far we have a computer whiz, a doctor/Princess, a Master of Her Universe, and the new one. That's four x USC tuition. \$\$\$\$ Grandpa better get a real job.

Big Government: In one of those often curious meetings of historic points in time, the latest State of the Union fantasy by the current occupant of the White House and the release of the equally ambitious program of our own Governor Gray Davis coincided, more or less, with the 88th birthday of President Reagan, who said: "A government big enough to give you everything you want is big enough to take away everything you have." Reagan never received a scholarship to Oxford but he knew manure when he saw it.

Free Willy: No, not him. We have a new environmental crisis brewing on the West Coast. It seems that Killer Whales, those adorable black and white critters from Sea World and Free Willy I, II, III, IV... have decided that sea otters, those other adorable furry critters that are protected by law, make better snacks than seals, their usual fare; sort of Brie vs. Cheese Whiz, I guess. Anyhow, this has the enviros in a panic. A suggestion was made to throw Barbara Boxer (D-CA) at them but the animal cruelty folks complained.

Defenseless in Seattle: Have you been following the trial? No, not that one. The Justice Dept. is trying to prove that Microsoft is a monopoly and that Gates & Co. have used the Windows™ operating system to dominate the PC market and force competitors such as Netscape and Sun, along with Compaq and others, either out of business or into situations where competitors and presumably consumers (you and me) are disadvantaged. As we go to press the Justice Dept., with nothing better to do, has settled a lawsuit against Intel for (gasp) driving hard deals with computer makers. Now let's see. With a small box on my desk running Windows 95/98 and using Intel processors I can; do the work, that 10 years ago, took 10 people; access the Internet (through Netscape and AOL, not MSN); download new software from Microsoft and competitors; compose all sort of documents, spreadsheets, and graphic presentations: and then fax or E-mail all of it at the speed of light to literally thousands of people everywhere at the same time from the comfort of my ergonomic chair. I can do all that on a computer that costs less than \$1,000 (monitor extra) through an access provider costing \$20/month. Your government thinks Microsoft and Intel should be punished for this. At the same time, the Postal Service (there's an oxymoron), which claims a monopoly on First-Class mail, has decided that it needs 33¢ rather than only 32¢ to fold, spindle, and mutilate your snail-mail during the time from when they decide to pick it up to when they decide to deliver it. Am I missing something here?

The trial has, however, been interesting. The Microsoft defense team has been running like Version 1.0 with glitch after nasty bug. Remember those scenes in the old B-westerns where the bad guys made the hapless saloon patron "dance" by shooting around his feet? In this case Microsoft is both shooting the gun and doing the dancing - a pitiful sight. Sort of like the Republican Congress.

Help is on the Way: According to the OGJ Newsletter (3/1/99) current Energy Secretary, and former Assistant Former-White House Intern Placement Officer, Bill Richardson says the "DOE is still working on several tax-relief options for the U.S. oil industry including tax credits for marginal production. 'Such relief would have to be cost-effective and would require budget offsets,' he said. 'Any tax relief proposal would require the concurrence of the rest of the administration and passage of legislation by Congress.'" Wow! That is a truly awesome string of caveats and loop-holes regarding an effort that is useless if there is no income and marginal production is extinct. Pardon my scepticism but I know three chipmunks who are more likely to be able to teach quantum physics before oil producers are going to get any "help" from this government. Besides, such "help" usually has a high price.

Legal Notice: A judge in Dallas has ruled that Quicken Family Lawyer,TM a software program, is guilty of practicing law without a license. Striking a blow for impoverished attorneys, the court may order that Family Lawyer is illegal for sale in Texas. While this is silly enough, how can such an order be enforced? Checkpoints on the Oklahoma border? Internet filters? Software police?

Traffic Alert: Tipster Bill reports seeing the Arkansas Governor's Official Double-wide being towed north toward New York.

Three Approaches to Value

In the December, 1998 newsletter we began a series on the three primary methods of property appraisal. The Comparable Sales Approach was discussed in the first segment. This issue of the newsletter will treat the Cost Approach.

Read the Fine Print In this and the previous newsletter, discussion has been presented of the Comparable Sales and the Cost Approaches to value. This discussion has been presented in the interest of affording greater understanding and broadening knowledge amongst scholars and practitioners alike. Let my friends or others be concerned that this discussion should or could be construed as a form of implied, tacit, or (perish the thought) overt endorsement of either method for oil and gas property appraisal, please place your minds at rest. I read fairy tales to my grandkids, too - but that does not mean that I believe that a frog can turn into a prince.

The Cost Approach

The Cost Approach is a commonly used method of valuing many types of properties. The method assumes a relation betwixt cost and value. According to the 10' Edition of The Appraisal of Real Estate ("ARE"): "In the cost approach to value, the cost to develop a property is compared

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with the value of the existing property or a similarly developed property." Further, the method works on the principal of substitution in assuming that "...no prudent buyer would pay more for a building or other property than it would cost to buy a similar site and construct improvements of equal desirability and utility without undue delay." The appraiser estimates the cost to Reproduce or Replace the existing structure and then deducts all accrued depreciation in the property being appraised from the estimated costs as of the appraisal date. [Note: Unless otherwise stated all quotes are from ARE, 10th Edition.)

This sounds relatively straightforward. Using the apartment building example from the last issue, assume there are no sales of comparable properties which can be used to estimate value. As the appraiser, you gather the data necessary to estimate the cost of a new apartment building. You then depreciate the value of the new building to the age of the existing building. What could be simpler? Cost of construction less depreciation equals value - sort of. If the subject property is nearly new - so much the better. What could go wrong? The extensive use of the Cost Approach in real estate appraisal has caused very clear procedures to be developed for stepping right through the calculation. This is as close to cookbook as you get in appraisal. There are even handy tables which provide data on the relative obsolescence or "Percent Good" of the individual components of the structure.

Unfortunately, I could find no Percent Good tables for doing a Cost Approach appraisal for an oil property.

The Cost Approach and Oil Properties

A guy walks into the local newspaper and places two ads in the real estate section.

For Sale. New 100,000 sq. ft. commercial structure. Freeway access, zoned C-1, loading docks, partition to suit buyer. For sale at cost of construction - \$5 million.

The structure may well be valued at \$5 million if that is the cost of constructing a similar building. You can either buy it or build your own for the same cost. Here the Cost Approach works reasonably well. Value appears to be related to cost.

For Sale. Three new 10,000 ft. wells. Drilled for oil using latest technology. Fully cased. Pumps installed. New tanks and LACT unit. No oil. No gas. No log response. Sidewall cores contain excellent shows of basalt and granodiorite. Cost to drill and equip - \$5 million.

What if, instead of no gas, our friend above had three 10 MMCFD wells for sale? Gas production has been known to decline. Did anyone see a pipeline connection? Would you still pay the \$5 million cost of construction as purchase price? Maybe - but only after, what? - an Income Approach appraisal.

Given this thumbnail sketch of the Cost Approach it is difficult to see an application to oil property appraisal. Mineral properties are not valued by the Cost Approach because they fail the basic assumption of the method - that cost of construction is related to value. Oil property values have little to do with the cost of development (construction). The oil business does not work on an "If you drill it, oil will come" theory. If I go out and drill a well on a 40 acre lease for \$1 million, there is no relationship between the \$1 million and the value of the property. If the well is dry there is no value aside from salvageable pipe and whatever geologic information was obtained. Drilling another well for \$1 million in that location or a similar location may or may not have value. On the other hand, if I had drilled that well into the Woodbine 60 years ago it might still be producing and would have returned the cost of the well 100 times over. More likely, I would be somewhere 'm between, subject to the vagaries geology, reservoir mechanics, the price of oil, and whatever else effects value.

Having said all that, it may yet be worthwhile to take a look at the Cost Approach so that we can understand why it does not work for oil property appraisal.

Application

The Cost Approach is not applied to Land. Land is valued separately. It is generally accepted that you cannot *reproduce* or *replace* land. You can do a lot of things to land but it is always there. Minerals are like land. They can be used up, frittered away, or retained but they cannot be Replaced except very, very slowly. Nor can they be Reproduced. There is only one Elk Hills, one Coalinga, one Spraybury. Other fields may be found but they are new fields, not reproductions. Even new fields with similar characteristics would not be developed in the same manner so they are not reproductions either.

The Cost Approach is only applied to so-called "Improvements," which is what we call dirty old oil wells when trying to increase the assessed valuation. Improvements are artificial, they are built by people who have need of their use. They can be built, repaired, torn down, and replaced. Reproduction and Replacement of "Improvements" requires expenditures of Capital. It is these costs of Replacement or Reproduction which form the foundation for the Cost Approach.

Costs

What Costs should be included in the Cost Approach? There are direct or "hard" expenditures for labor and materials used in construction. This is the cost of plumbers, carpenters, and electricians along with concrete, steel, pipes, and fixtures. It also includes all the equipment in the structure; the heating and air conditioning, water treating, fire sprinkles, lights, etc. The costs of obtaining permits, insurance, and project management are included as part of the total. In short all the costs from ground breaking to Grand Opening. There are also Indirect or "soft" costs which include financing, engineering fees, and commissions. Don't forget entrepreneurial profit. This gives us the total cost of the project the Replacement or Reproduction costs. By the way, these terms are not synonymous. Reproduction, as you might guess, means construction of a building or facility virtually identical in form and function to the existing building or facility. An Art Deco

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office building would be Reproduced at current cost as an Art Deco office building using the same materials, construction standards, design, layout and quality of workmanship as the original. It would also include all of the deficiencies, super adequacies, and obsolescence of the original. Needless to say, there is not much Reproduction building done what with changes in building codes and the decline in craftsmanship.

Replacement cost is the cost to construct a facility with equivalent utility to the subject facility using modern methods and materials. Forget the Art Deco - put up a prefab concrete, architectural mishap designed on a computer.

Depreciation

In either case, Replacement or Reproduction, the job is not finished. For one thing, the subject property may not be new, in which case the cost of a Replacement must be depreciated to account for the difference in age. That is, if a 20 year old warehouse is "replaced" with a new warehouse the cost of the new warehouse must be reduced or depreciated to account for 20 years of wear and tear on the warehouse being valued. In the Cost Approach, *depreciation* is referred to by several terms. There is accrued depreciation, book depreciation, economic life, remaining economic life, effective age, and actual age. Depreciation here is not an accounting term but is related - in a way. The Appraisal of Real Estate defines depreciation as "...a loss in property value from any cause. It may also be defined as the difference between the reproduction cost or replacement cost of the improvement and its market value."

One way of estimating depreciation is by the Age-Life method. The method is relatively easy to use. Assume you are trying to value a treating, separation, and shipping facility that serves a major producing property. Further, assume that the facility has an expected design life of 50 years and the remaining economic life is 32 years. The effective age is 18 years. The ratio of effective age to total economic life (18/50) is applied to the current replacement costs to estimate total accrued depreciation. The value of the facility is the replacement cost minus accrued depreciation.

Age-Life is a lump-sum method of estimating depreciation which has limitations. It does not recognize the different types of depreciation (see below) and upsets purists. But it is very handy, particularly for facilities like treating plants which are adjuncts to other operations and have no stand alone value. Consider the example above but assume that the economic life of the property is now found to be 30 years, not the full 50 years for which the facility was designed. The effective age is now 38 years not 18 years and the Age-Life ratio is 38/50 - a significant reduction in value. Does this happen? As we speak, many properties, projects, and fields are undergoing substantial accrued depreciation as the result of sustained lower oil prices.

There is a more rigorous method which ARE calls the "Breakdown Method" - a rather unfortunate term when referring to equipment and facilities. "To apply the breakdown method of estimating accrued depreciation, an appraiser analyzes each cause of depreciation separately, measures the amount of each, then totals the estimates to derive a lump sum figure that is deducted from the estimated reproduction or replacement costs."

In this approach, the depreciation from several different sources is estimated and then deducted from the replacement costs. ARE refers to three sources of depreciation: Physical Deterioration, Functional Obsolescence, and External Obsolescence. The first two have subcategories called Curable and Incurable which generally relate to whether or not a physical or functional problem can be fixed.

The usual example of Curable Physical Deterioration is a building (Replacement cost = \$2,500) which has a damaged roof which will cost \$250 to repair, thus reducing the replacement value to \$2,250. If the cost to repair the roof had exceeded the cost of a replacement then it would be Incurable. An appraiser can make this aspect very detailed by considering the physical deterioration of every component of the structure, defining it as Curable or Incurable, and working out the appropriate depreciation. When these are deducted from the replacement costs, the appraiser has adjusted the value of the property for physical deterioration.

The next step is Functional Obsolescence which ARE defines as "...a loss in value resulting from defects in design. It can also be caused by changes that, over time, have made some aspect of a structure, such as materials or design, obsolete by current standards." Functional Obsolescence can be Curable or Incurable. "To be curable, the cost of replacing the outmoded or unacceptable aspect must be the same as or less than the anticipated increase in value." A building with three floors and no elevators might have FO if all new buildings are Otis-equipped. The value of the existing property is diminished to the extent that the cost of curing FO exceeds the added value.

Finally, there is External Obsolescence (EO) which is "...the diminished utility of a structure due to negative influences emanating from outside the building,... usually incurable on the part of the owner..." and which can be subdivided into **Locational** and **Economic Obsolescence** "Emanating negative influences" sounds like penumbras having a bad day. Locational Obsolescence can mean a lot of things a change in zoning, a new by-pass that shifts traffic patterns, or general neighborhood deterioration. Locational Obsolescence is local. In contrast Economic Obsolescence has been defined as: "Impairment of desirability or useful life arising from factors external to the property, such as economic forces on environmental changes which effect supply-demand relationships in the market."

In "Valuing a Business" (3rd Edition, 1996, pg. 698702) Shannon Pratt discusses Economic Obsolescence at great length and suggests that there are two categories or forms of Economic Obsolescence which deal with (a) Curability and (b) Universality. Curability relates to whether the EO is Curable or Incurable. Universality relates to whether the EO is local, regional, national, or international. According to Pratt, "Because economic obsolescence is caused by factors external to the physical structure of the property, most economic obsolescence is considered to be incurable" (emphasis added). Universality also relates to whether EO effects a local portion of an industry or is industry wide. "The degree of the impact of universality on the value of a property is a function of two factors... the special purpose verses general purpose nature of the property... (and) the breadth and scope of the secondary market for that property type"

There is a lot that could be discussed on this subject but Pratt goes to the heart of our issue with no help from me. "One element frequently associated with industry wide economic

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obsolescence is the change in product selling prices. Typically, if average product selling prices across the industry decline materially, and with some anticipated level of permanence, then economic obsolescence occurs with respect to the special purpose real property and tangible personal property used in that industry. For example, a general and prolonged reduction in the price of a barrel of crude oil will cause economic obsolescence to occur in the assets used in the oil and gas exploration."

Facilities

In some instances, the Cost Approach is used to separately value production facilities such as treatment plants and gathering/shipping facilities. While each case has to be considered on its merits, the primary problem here is that production facilities rarely, if ever, have value as a stand-alone unit. When oil properties are bought and sold in the marketplace, the property is traded as a whole: the reserves, wells, pumping units, tank batteries, shipping facility, water plant - you name it. The oil is worthless if it cannot be produced. I have yet to hear of anyone buying the production equipment on a producing property but not buying the minerals - or vice versa. There may be spare equipment that is separately valued or there may be salvage purchases, but they are exceptions - not the rule - and would hardly apply when using a Cost Approach for an existing production property. Probably the only real use for a Cost Approach in oil property appraisal is to conveniently allocate or apportion the overall market value of a property.

Finding Costs

Various sources publish so-called "finding-costs" for new oil and gas reserves which consist of the costs of drilling, exploration, and leasing and are reported as \$/Bbl or \$/MCF of newly discovered reserves. Some evaluators have attempted to use these figures as part of a Cost Approach estimate of value, on the theory that the value of existing reserves is equal to the cost of finding new reserves. This theory supposes that a Belridge or Hugoton field property could be replaced at current finding costs. The fallacy here is obvious. The existing reserves are reasonably well known and may be fully developed with a 50-year history, in-place facilities, and available markets without all the uncertainty associated with exploration drilling. Further, finding-cost figures are rarely site specific - they are often nation-wide or regional at best. Finding costs for attic traps in Louisiana salt domes is not the same as for horizontal wells in the Austin Chalk or multiple intervals in the Monterey. The finding costs must be adjusted (See Comparable Sales method) to reflect the replacement costs in the location of the property being appraised. Even then, it would be incorrect to apply that value to a known volume of reserves. For one thing, reserves cannot be determined by a Cost Approach so where do you get the reserves number from other than an Income Approach? Second, the number of potential oil fields in a given geologic province has been shown to be a finite distribution of field size; therefore, the probability of actually "finding" something must be considered and included in the calculation.

It seems obvious, from the foregoing, that the Cost Approach has little application to oil and gas property appraisal. The value of an oil property is in the future revenue to be obtained from the sale of produced minerals. Nothing in the Cost Approach addresses that issue.

Appraisal: Art? Science? or Profession? Part II

[Editors Note: The following is a continuation of the discussion begun as Part I in our December, 1998 newsletter to which some reference may be necessary]

Is oil property appraisal a Science? Probably not. Not in the sense of high-energy physics, organic chemistry, or toxicology. Our niche is more an applied science. Is appraisal an Art? Some think so. How many times have you heard this one? "Now Mr. _____ isn't it true that appraisal (or petroleum engineering or geology or economics) is more of an art than a science?:" to which the answer is usually, "Yes, that's true." This conversation usually occurs after Mr. _____ has been found to have bungled some part of his appraisal and is attempting to wiggle out of it. There usually ensues a lengthy explanation about how his (or her) results cannot be verified because they are based on everything he ever heard, ever read, ever knew yada yada. We have all seen evaluations that were creative and which had an abundance of that "beauty is in the eye of the beholder" aspect; some were so artistic that they could have qualified for grants from the National Endowment for the Arts.

So what is oil property appraisal? Art or Science? If it is an applied science, how much science is applied and who decides how much is enough? If it is not all science, how much is art? Or is it not really "Art" that we mean, but the use of Experience and Judgement to round off the sharp comers of the engineering, geology, and finance that are the necessary underpinnings of any rational oil property appraisal.

When placed in the context of Experience and Judgement, Art is not so much unfettered creativity as it is Craftsmanship. Any government-funded clown can throw paint on a wall - not everyone can build a Chippendale sideboard. Do you ever watch Norm Abrams on PBS? - the master carpenter who turns out everything from roll-top desks to greenhouses in a 30-minute show: even faster during beg-a-thons. Norm does things right - plans ahead, selects his wood, measures twice: cuts once, uses laser power tools - all the joints fit, no bent nails, and the finish is always perfect. If appraisal is "Art," it is (or should be) the Norm Abrams variety.

Let's start with the science. Oil property appraisal is firmly grounded in petroleum engineering (PE) and geology. PEs become evaluators and appraisers not the other way around. Are PE or Geology sciences? Not long ago I read several reports by a petroleum engineer who began almost every discourse with: $F = ma$. Force = mass x acceleration. This is high school physics brought to us by Isaac Newton, et al; elementary but enough to begin to explain virtually every facet of fluid flow in porous media which is, after all, the essence of petroleum engineering. The behavior of reservoir fluids is a function of organic chemistry and thermodynamics. Primary production from oil and gas wells is a function of physics and chemistry and, with enough data, can be predictable based on relatively simple mathematical relations.

PE is an applied science because it takes pure science, where every event is repeatable, and uses it to understand natural systems which are not perfect, about which data may be limited, and which are subject to intrusion by everyone from the lease operator on up. Geology is a science which analyzes and explains how the earth got here, how it changes, and where it is going. (Here

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in California some of the local geology is going north - the rest is going south both literally and, since the election, figuratively). Testing theories in geology is harder than in other sciences because the experiments take longer but it is a science nonetheless. When combined with geophysics it is the necessary complement to PE. If you cannot understand the PE and the geology, you cannot do the appraisal.

There is a certain amount of science in the economics and finance aspects of an oil property evaluation. These are largely behavioral sciences which attempt to explain why people, as individuals and groups, act the way they do. The primary application of economics to oil property appraisal is not price cost projection but investment theory, particularly as related to risky ventures. Over the past 20-30 years, several Nobel prizes have been awarded for investment theory work that is directly applicable to oil property appraisal including (but not limited to) the Capital Asset Pricing Model.

Finally, there is mathematics and statistics, which have application to virtually every phase of the appraisal process. I recently ran across an article in the January, 1965 Appraisal Journal entitled, "Statistical Inference in Appraisal and Assessment Procedures", by William C. Pendleton in which the author discusses the application of regression analysis to data regarding sales of land as a means of extracting useful appraisal Parameters. (*See Newport v. Sears Roebuck*). This approach was not unique in 1965. Today, one can scarcely open an appraisal text without finding extensive applications of statistical modeling to appraisal issues. The "Appraisal of Real Estate" has an excellent Appendix B styled "Mathematics in Appraising," which presents basic methodologies for analysis of data and the testing of conclusions. It is only a short trip back across the bridge from appraisal to engineering mathematical models are used to predict future performance. All this notwithstanding, there are those appraisers who run in horror at the use of mathematics beyond simple ratios.

So where does the Experience and Judgement come in? rates; in short there was no "general acceptance" of the use of If I can use geophysics to find the reservoir; petroleum these ratios to value oil properties. The Daubert criteria were engineering to project production; economics to project income also used to illuminate the steps to general acceptance. and investment criteria; and statistics to estimate the probability of correct results, what need is there of E&J?

Experience is the wisdom that comes from making mistakes, and Judgement should help you avoid making the same mistake twice. Experience is best obtained directly; we were all kids once - some longer than others. Experience can also be obtained indirectly - by paying attention to what others tell you and, depending on the degree of confidence you have in the source, either accepting or rejecting the information. Note the caveat regarding confidence. The way we build our confidence in people is by how often they are correct or at least not dangerously incorrect. The same is true of elements of criteria of engineering, geology, economics, or appraisal practice. Judgement is the ability to distinguish between useful and useless information, between a well-founded method of appraisal and something pulled out of the air or elsewhere. Experience teaches us which methods work and which ones do appraisal not. Judgment allows us to make the appropriate choice.

In appraisal, a lot of weight is often placed on the appraiser's Experience and Judgment, in some cases to the virtual exclusion of any other criteria. No one would suggest concerned with whether the testimony of an expert would be that the appraisal of an oil property is a purely mathematical, scientific exercise. But just as Judgment is necessary to temper the rigorous application of, say, an income approach model, the Experience and Judgment elements must also be subjected to testing by verifiable means. "Appraiser's Judgement" is not a one-way street or a free ride to values that cannot otherwise be supported. We have all seen appraisals that have an excess of Appraiser's Judgment with a minimum of data to back up that judgement. Unfortunately, so many of these types of appraisals and "experts" have gotten notoriety that, to a degree, the appraisal profession has been tarred with the broad brush of sloppy work. As the *Joiner* court said, **ipse dixit** is not enough.[General Electric v. Joiner, see cite in Part I, December, 1998]

The California case noted previously [Texaco v. County of Kern] is of interest in this context. In an AAB hearing in 1988-90 a witness presented evidence of value derived, in part, through the use of 3 simple ratios which were purportedly derived from market sales. These ratios had not been used in any prior appraisal and were, in fact created by the witness just before the hearing. There had been no objective analysis, no publication or peer review, and no testing to determine if the ratios measured what they purported to measure. The ratios were used in a variety of ways to adjust (a) comparable sales values and (b) to select discount rates for an income approach. The use of these ratios was challenged on the Kelly/Frye grounds that they were not used by other appraisers, had not been tested, and there was no demonstration that the ratios were related to either comparable sales value or discount rates; in short there was no "general acceptance" of the use of these ratios to value oil properties. The Daubert criteria were also used to illuminate the steps to general acceptance.

The Appeals Court rationalized that Kelly/Frye did not apply because the ratios were "tools" which were apparently used by the witness to aid his analysis of the comparable properties. The court did not opine as the validity of the ratios as useful "tools" only that they were not "scientific" enough to be controlled by Kelly/Frye type criteria.

Reading between the lines, the court discounted the appraisal process as largely a function of judgment and, in fact, obscured the need for the testable approaches to value that would be required under Daubert or the general acceptance criteria of Kelly/Frye. This is in contrast to the federal cases (previously noted in Part I) in which Daubert criteria were applied to real estate appraisals, each of which were less rigorous in appearance than the evaluation done by the witness in the AAB case. While it might be "legally correct" to say that appraisal methods are not "scientific evidenced", appraisal testimony, particularly where large values are at issue, should be supported by some functions.

That is where Professionalism comes in. *Frye* is concerned with whether the testimony of an expert would be accepted in the scientific community. General acceptance grows out of the normal procedures of a profession or skill group. Peer review, adequate testing, and known error rate tests were not dreamed up by courts and passed down to us lowly workers. The courts adopted processes that already existed in the scientific/engineering/professional communities. The Frye doctrine said that acceptable scientific evidence should be based on methods and procedures

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accepted by others in the same profession; *Daubert* simply codified the progression to acceptance in both the profession and the court. It is sometimes argued that this restricts "new" methods. Maybe; but it is more likely to thin out the charlatans.

This then must be the real test. Good appraisal practice must be defined by those who practice appraisal.

The Income Tax and Oil Property Appraisal

"The current tax code is a daily mugging."
President Ronald Reagan, September 2, 1985.

Now that I got that off my chest let's talk about Income Taxes and how they relate to the appraisal- of oil properties. For simplicity we will only discuss Federal taxes. Start with the proposition that properties do not pay income taxes. People and corporations pay income tax, therefore, income tax should not be considered for property valuation. True enough as far as it goes - which isn't far enough. Income taxes have to be paid, and like Abandonment Restoration, and Remediation costs, the funds have to come from somewhere. Besides, in some situations, depending on the tax code at the time, income tax provisions can enhance the value of a property particularly in relation to other properties. Evaluations of properties done by industry are generally done AFIT (After Federal Income Tax). On the other hand, appraisals done for ad valorem and estate taxes, and for financing are usually done BFIT (Before Federal Income Tax) on the premise that tax treatments of the same income stream would vary based on individual circumstances. That is reasonable if the purpose is uniformity in valuation.

If the appraisal is being done AFIT, presumably all the applicable tax treatments, federal and state, would be considered and the only real issue is the addition of a few more columns of calculations and the use of an AFIT discount rate. But if the appraisal is BFIT, the tax issue doesn't necessarily go away some aspects still bear some thought. IF we know that the real world is AFIT and if we are trying to reach an estimate of FMV on a BFIT basis, we have to at least be aware of the problems created by tax decisions when comparing market values to appraised values. Obviously, if properties are bought in the market place on an AFIT basis, the AFIT value reflects the tax treatment accorded by the buyer based on his and/or his attorney's reading of the relevant tax code.

Assume for simplicity, that all potential buyers pay at the same tax rate, what other tax factors effect value? Tax Credits and Depletion, Depreciation, and Amortization (DD&A) provisions. Most of the Tax Credits have been phased out but a few, such as the Tar Sands and Tight Gas Sands credits, are still around for those who qualified. Likewise, the really good DD&A provisions were taken out in the 1986 rewrite of the Tax Code, but a few still exist. Further, any analysis of sales evaluated prior to 1996 must determine if advantageous tax provisions had any effect on value. The 10% Investment Tax Credit did a lot to help finance the acquisitions of heavy oil properties in the early 1980's. The demise of the Tax Credit along with the 1995-86 price drop put an end to the buying spree.

The impact of the credits could be significant. Assume that an appraiser is valuing a property for acquisition where there is a projection of heavy oil production at an estimated nominal price of \$12.00 Bbl. The BFIT value is \$x million. However, in running the AFIT value the appraiser determines that a \$3/Bbl Tar Sands Tax Credit may be applicable and uses the credit to reduce the anticipated Income Tax payable on the income stream. Using the AFIT income stream augmented by the Tax Credit, which reduces Tax Payable, the appraiser estimates the FMV of the property using an appropriate AFIT discount rate. If five other appraisers also value the property and have identical BFIT projections but none accept the Tax Credit, the first appraiser can (1) fashion a larger bid for the property because he anticipates a greater AFIT income stream or, (2) can anticipate a higher AFIT return if he bids the same purchase price as the other five. Whether he actual receives the credit is irrelevant to his current determination of value.

This and similar circumstances have been noted in the review of actual sales data to obtain BFIT discount rates and other data. Where there is no AFIT cash flow, blissful ignorance prevails; but when AFIT and BFIT cash flows are available, the incidence of tax credits and DD&A provisions can Produce an inconsistence between BFIT and AFIT discount rates where the BFIT rate appears abnormally low. In these cases, the Tax Credit or some portion thereof must be added back to the BFIT income stream before deriving the discount rate, generally by incrementally increasing the oil price projection. In a similar manner, an investment Tax Credit (ITC) has the effect of reducing capital expenditures for equipment covered by the credit. This reduction must be captured in the BFIT cash flow before deriving the BFIT discount rate.

Book and Paper Review

Assessors Handbook Section 502, Advanced Appraisal, California State Board of Equalization, December, 1998 Sacramento.

The California SBE has, over the past several years, embarked, on the task of re-writing and updating the entire Assessor's Handbook. This compendium, mercifully broken down into sections, includes (1) the interpretation by the SBE of California property tax law, rules, and practice and (2) recommended Practice for the county assessors in appraising all types of property. AH502 is a small but extremely important section dealing with the three approaches to value (Cost Comparable Sales, and Income) in substantial detail. This section, along with a companion Section 501, updates a relatively old and sparsely written General Appraisal handbook that often created as many issues as it answered. It is the discussion of the Income Approach that is particularly relevant to oil and gas appraisal; and in this area AH502 is exceptional in presenting the components of the income projection, the application of various forms of direct and yield capitalization, and the composition of the discount rate including the risk function. Each reader and user would find different parts of greatest value; however, from this user's standpoint, it is the cogent yet complete treatment of the Cost-of-Capital and the application of the Capital Asset Pricing Model that adds the most utility and brings assessment appraisal practice in California into the late 20th Century. When combined with AH566 (August, 1996) and the Shannon Pratt book "Cost of Capital" (reviewed in December, 1998 newsletter), appraisers have a very much enhanced tool box.

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Like any other effort of its kind, the writing and adoption of AH502 was not without contention but the finished product is a credit to the SBE staff that wrote this and previous sections. There is even a modest touch of irony captured in the text. Buried way back in Appendix A: Deriving Discount Rate Using Data from the Capital Markets, is footnote #180 which refers to the *Texaco v. County of Kern* case discussed above. One of the many issues argued in that case, back in 1989-90, and referred to by the Appeals Court, was the proper construction and use of the CAPM. Had AH502, in the current (12/98) form, been in place in 1989, the CAPM issue and several other arguments would have been moot and an appeal may not have been necessary.

While written for California usage, AH502 is a very good general purpose appraisal manual which is much easier reading than *The Appraisal of Real Estate* and other texts. AH502 and all other sections of the *Assessors Handbook* are available in PDF format at www.boe.ca.gov/proptax.htm

Studies and Reports

"Fair Market Value Transactions, Cost-of-Capital, and Risk: California Oil Property Transactions 1983 Through 1998," Richard J. Miller & Associates, Inc., January, 1999, prepared for Western States Petroleum Association (WSPA). Copies available on request.

This is the 15th edition of the annual study prepared for WSPA and CIPA to determine evaluation parameters, primarily discount rate and price/cost escalation rates, being used in the marketplace to value oil and gas properties for acquisition and sale. The study collects data from buyers and sellers in specific property transactions and attempts to extract Fair Market Value discount rates and price/cost escalation rates along with other data. A cost-of-capital (WACC) analysis for a representative sample of the oil industry is also done.

While the study retains its primary purpose of analyzing actual property transactions, the format and content of the report have been changed, along with the title, in recognition of the shift in emphasis of the study to the measurement and explanation of the differing results obtained from market sales when compared to calculations of cost-of-capital. A further expansion of effort is also directed toward defining the intermediate points in the range of expected returns between debt and equity and the yield rate on an individual property. Preliminary results suggest that a quantification of the return-of-investment and liquidity components is possible.

Sales of properties with 100% Proved Developed Producing (PDP) reserves account for 70% of all sales in the database and have an average discount rate of 23.5% with a 6.2 standard deviation. Discount rate is shown to have a reasonably good correlation to Reserves Risk which is measured as the percentage of PDP reserves credited to the acquired property by the buyer.

The study found a Weighted Average Cost-of-Capital (WACC) for a group of 41 oil and gas companies, at year-end 1997 of 14.1% BFIT which is a decline from the prior year. The AFIT Cost-of-Capital for the same group of companies is 9.8%. Comparison of the BFIT WACC to the mean DCR for 100%PDP properties indicated a relatively consistent difference of 5-7 percentage points. The difference is interpreted to include (1) Return-of-Investment, (2) specific property risk, and (3) liquidity.

Appraising Oil and Gas Properties is a publication of the Petroleum Engineering and Appraisal consulting firm of Richard J. Miller & Associates, Inc. For further information, letters and continents, and/or additional copies, please write, call, fax or E-mail:

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Society of Petroleum Evaluation Engineers
Annual Meeting San Antonio
June 6-8, 1999

The SPEE will hold it's annual meeting this year in San Antonio. The technical program has been built around specific valuation issues: the future of oil and gas prices, discount rates, and the proper treatment of risk in Fair Market Value appraisals. SPEE invites all persons interested in appraisal issues to attend. We are friendly people and, who knows, you may enjoy yourself. For information contact:

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