International Valuation of Mineral Estates – Mining and Oil & Gas

Presented at the

Appraisal Institute's 2019 Annual Conference
Denver, CO – July 24, 2019

John B. Gustavson, Mineral Appraiser, LLC.
Boulder, CO
About Today’s Presenter:

• John B. Gustavson, M.Sc. in Chem. Eng., MS in Geology
• Almost 50 years in minerals, after …
  • Early days in aerospace industry …
  • Turning “rocket science” into an exploration tool …
  • Focusing first on geology …
  • Then adding engineering and economics …
  • Rounding off with valuation of mineral assets
• Working independently as a Certified Minerals Appraiser
OBJECTIVES

• INTRODUCTION - COMMUNICATION PROBLEM
• MINERAL VALUATION STEPS
  • Highest & Best Use
  • Selection of Approaches
  • Reconciliation
• ADDITIONAL DISCOUNTING
• OIL & GAS CASE HISTORY
• INTERNATIONAL? - THEN IMVAL
  • The IMVAL Template
• CONCLUSION - TAKE AWAY'S
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INTRODUCTION - COMMUNICATION PROBLEM

• The Engineer's tabulation of reserves/resources must be further expanded by a Minerals Appraiser to a market value, denominated as cash.
INTRODUCTION - COMMUNICATION PROBLEM

An Accountant may place that value in financial statements, provide it to management for development decisions, for deal making purposes, or an Attorney may use it in litigation.
INTRODUCTION - COMMUNICATION PROBLEM

An Accountant may place that value in financial statements, provide it to management for development decisions, for deal making purposes, or an Attorney may use it in litigation. Or, a Landowner may ask a Real Estate Appraiser for the Market Value of his Mineral Estate.
INTRODUCTION - COMMUNICATION PROBLEM

• The first part of reserve estimation is well documented and is the domain of geologists and engineers.

• As Mineral Appraisers, we focus here on the next steps:
  • On the mineral valuation and
  • On communicating with Owners, Bankers, Accountants, Attorneys and Real Estate Appraisers.
We Need Appraisal Standards After Reserve Standards

We already have:

Mineral Resources and Reserves, which must comply with international standards, either:

- CRIRSCO for hardrock minerals
- PRMS for oil & gas

NEXT: VALUATION STANDARDS!!!
INTRODUCTION - COMMUNICATION PROBLEM

The Objective is communication among Owners, Bankers, Accountants, Attorneys and Real Estate Appraisers when it comes to valuation of minerals

(liquid, like oil & gas or solid).
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1. Highest & Best Use.

- The Minerals Appraiser must first determine the *Highest & Best Use* of the reserves/resources.

- As with financial statements, that H&BU determination must be based on a specific **Effective Date**, not on a speculative future desire.
Accountants to the Rescue

......as of the Effective Date!
Highest & Best Use.

• The Minerals Appraiser must first determine the *Highest & Best Use* of the reserves/resources.

• As with financial statements, that H&BU determination must be based on a specific *Effective Date*, not on a speculative future desire.

• And the H&BU must be in accordance with the Law....
Attorneys to the Rescue

....and according to prevailing LAW!

(Olson, 1934)
Landmark Case: *Olson vs. United States*, 292 US 246, 255 (1934)

The U.S. Supreme Court found that the *Highest & Best Use* must be:

Either some **existing use** on the date of the transaction,

Or one which the evidence shows to be so **reasonably likely in the near future** that that use would have affected its market price on the date of the transaction and would have been taken into account by a purchaser under fair market conditions.
The value of a mineral property generally increases (as shown by the size of the blocks) from left to right until production.

At what stage is the Property on the date of Valuation, aka *The Effective Date*?
More Detailed Stages of *Highest & Best Use*

### Hardrock Mineral example

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land position under control, favorable exploration environment</td>
<td>Anomalies noted by geophysical, geochemical or grab sampling</td>
</tr>
</tbody>
</table>

### Oil & Gas (Shale example)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unleased land over general shale area</td>
<td>Unleased land over shale fairway</td>
</tr>
</tbody>
</table>

**Key Test:** Each Stage must be tested legally and physically!!!
Highest & Best Use (H&BU) of the Property

The H&BU at a Stage must meet the following requirements *at the time of valuation*: *

- The use must be **physically possible** at that Stage,
- The use must be **legally permissible** at that Stage,
- The use must be **financially feasible** at that Stage, and
- The use must result in the **maximum value**.

* Based on US Supreme Court *Olson (1934)*
Attorneys to the Rescue

THAT, which is already licensed, permitted or zoned on the Effective Date!
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Selection of Approaches

• Appraisal methods are then identified (as many as possible) and supported or rejected.

• Typically, the DCF approach delivers relevant and reliable results for producing properties, while ...

• The Sales Comparison approach and its derivative methods provide more credible results for undeveloped deposits.

• The latter is often only obtained after costly research and adjustments supported by paired sales.
Comp Adjustments from *Paired Sales*

- Effect of Oil Price Alone
  - Same Buyer and Same Seller
  - Adjoining Parcels, Same Geology, Same Stage of Development
  - First Sale in June 2014 at $5,000/ac
  - Second Sale in February 2015 at $3,000/ac
  - No Local Activity in Interim Period
- Only Oil Prices Changed!
  - From $110/bbl Down to $65/bbl
- A Proportional Drop of 40% in Both Oil Price and in Landowner’s Value
- Result: We may adjust Value by Oil Price
# General Rules for Adjustments of *Comp Sales*

- Make many small adjustments (± 10-20%) are more credible than few large.

<table>
<thead>
<tr>
<th>From Comp Sale to Subject</th>
<th>Gridding Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness of mineral beds</td>
<td>-10% 0.9</td>
</tr>
<tr>
<td>Technology trends</td>
<td>10% 1.1</td>
</tr>
<tr>
<td>Geological knowledge of deposit</td>
<td>15% 1.15</td>
</tr>
<tr>
<td>Knowledge of reserves</td>
<td>15% 1.15</td>
</tr>
<tr>
<td>Location near mine expansions</td>
<td>-20% 0.8</td>
</tr>
<tr>
<td>Voting control (&gt;50%)</td>
<td>-10% 0.9</td>
</tr>
<tr>
<td>Surface access or restrictions (Riparian)</td>
<td>0% 1.0</td>
</tr>
<tr>
<td>Nearness to production stage (Timing)</td>
<td>10% 1.1</td>
</tr>
<tr>
<td>Rate of mining</td>
<td>-10% 0.9</td>
</tr>
<tr>
<td>Taxes, local and State</td>
<td>0% 1.0</td>
</tr>
<tr>
<td>Labor, fuel and power cost indices</td>
<td>0% 1.0</td>
</tr>
<tr>
<td>Gridding factor (compounded)</td>
<td>0.93</td>
</tr>
</tbody>
</table>

*Gridding factor (compounded)*
General Rules for Adjustments of *Comp Sales*

- Use observations from the Market, rather than “Own Experience”.

- Two good sources of Market observations:
SPEE Consensus Surveys

Accounting For Risk
Reserve Adjustment Factors (RAFs)

KEY TAKE-AWAYS

Reserve Adjustment Factors by Resource Category

- P90
- mean
- P50
- P10
Fraser Institute Surveys

- Great for paired adjustments for hardrock
- Many parameters are compared from census surveys of Taxation, Infrastructure, Security, a.o.
- Example here: Political Stability
  - Blue “Encourages Investment”, while orange means “Not a deterrent to Investment”, so the sum shows Favorability, or the inverse of Risk
- Comparing a mineral deposit Comp Sale in Wyoming with a Subject in Colorado
  - Wyoming shows 93%, Colorado 76%
  - So adjustment from WY to CO is 0.82, -18%
Valuation Approaches and Methods

- *Highest & Best Use* of the Property must be determined first!
- The selection of appropriate valuation method(s) is left to the appraiser.
- Methodology depends on the stage of use (exploration, development or production) of the mineral property, generalized as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>No</td>
<td>No</td>
<td>Maybe**</td>
<td>Yes</td>
</tr>
<tr>
<td>Sales Comparison</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cost</td>
<td>Yes*</td>
<td>Maybe</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

* By Farm-out  ** See Case History
What Discount Rate does Industry use, when reporting Fair Value?

- A discount rate of **ten** percent for all **proved** properties ??? Including PUD’s?
- Accountants to the rescue!
Accountants to the Rescue

......filings must follow SEC!
Fair Value is NOT Fair Market Value
OBJECTIVES

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Reconciliation

• The use of appraisal approaches lead to varying cash results, which the Minerals Appraiser must reconcile under the Uniform Standards of Professional Appraisal Practice (USPAP).

• Give emphasis to results of Reliability and Relevance.
Attorneys to the Rescue

Daubert v.
Merrell Dow
Pharmaceuticals, Inc.,
509 U.S. 579 (1993)

Reliability and Relevance
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ADDITIONAL DISCOUNTING

After reconciliation to a single value, the Minerals Appraiser must still be prepared with assistance from the market to further discount the result to Fair Market Value.

• Examples are *Discount for Lack of Control* (DLOC) and *Discount for Lack of Marketability* (DLOM).

• This may be necessary because of the legal nature of the ownership of the oil/gas or hardrock deposit.

• Careful! This may require competence in *Business Valuation*!
Attorneys to the Rescue - DLOC

Properties in form of fractional ownership, LLC’s and those governed by Joint Operating Agreements are examples.

Some have more, some have less CONTROL. So the minorities get a DLOC.

A DLOC may range from -10% to as much as -40%, and must be supported
Accountants to the Rescue - DLOC

The Minerals Appraiser may have to look to parallels in the market such as publicly traded, closed-end funds to derive objective discount factors for DLOC.

<table>
<thead>
<tr>
<th>Ticker Symbol</th>
<th>Fund Name</th>
<th>Share Price</th>
<th>NAV$</th>
<th>Discount</th>
<th>Weighting Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCF</td>
<td>BlackRock Real Asset Equity</td>
<td>$9.26</td>
<td>$10.46</td>
<td>-11.47%</td>
<td>2</td>
</tr>
<tr>
<td>BGR</td>
<td>BlackRock Energy &amp; Resources</td>
<td>$26.37</td>
<td>$29.09</td>
<td>-9.35%</td>
<td>3</td>
</tr>
<tr>
<td>BQR</td>
<td>BlackRock EcoSolutions</td>
<td>$8.18</td>
<td>$9.23</td>
<td>-11.38%</td>
<td>1</td>
</tr>
<tr>
<td>SZC</td>
<td>Cushing Renaissance Fund</td>
<td>$27.87</td>
<td>$30.80</td>
<td>-9.51%</td>
<td>2</td>
</tr>
<tr>
<td>PEO</td>
<td>Petroleum &amp; Resources</td>
<td>$30.69</td>
<td>$36.05</td>
<td>-14.87%</td>
<td>2</td>
</tr>
<tr>
<td>TTP</td>
<td>Tortoise Pipeline &amp; Energy</td>
<td>$33.98</td>
<td>$37.14</td>
<td>-8.51%</td>
<td>1</td>
</tr>
<tr>
<td><strong>Weighted Average Discount</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>-10.88%</strong></td>
<td></td>
</tr>
</tbody>
</table>

$\text{NAV} = \text{Net Asset Value}$
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WHY IS HARMONIZATION NEEDED?

• The rapid globalization of mining and oil & gas including international financing.
• Some terms have local meaning depending on the country using the term.
  • The word “valuation” is synonymous with the word “appraisal”, used in certain jurisdictions, including the USA.
  • In other jurisdictions, the word “appraisal” is used for what is termed “evaluation” in the USA.
  • The person called a “Valuer” is unknown in American English! Many call that person an “Appraiser”.

Clearly: Harmonization (Harmonisation?) is needed!
Types of Value

• “Value” is a generic term that may refer to
  • Market Value
  • Fair Market Value
  • Fair Value
  • Investment Value
  • Strategic Value
  • Liquidation Value
  • Collateral Value
  • Assessed Value
  • And so on......

• And add the Terms specified in national codes or standards
Accountants to the Rescue

Fair Value is NOT Fair Market Value
This is IMVAL!

**IMVAL** = **I**nternational **M**ineral **V**Aluation COMMITTEE

Formed in 2012 in Brisbane, Australia by:

- *Australasian Institute of Mining and Metallurgy* and *Australian Institute of Geoscientists* (jointly, VALMIN)
- *Canadian Institute of Mining, Metallurgy and Petroleum* (CIMVal)
- *South African Institute of Mining and Metallurgy* (SAMVAL code)
- *Royal Institution of Chartered Surveyors* (RICS) [UK-based]
- *Society for Mining, Metallurgy & Exploration* (SME) [US-based]
- *International Institute of Minerals Appraisers* (IIMA) [US-based]
The IMVAL Global Group

Observers

SAMOG, SPEE, SME, CIMVal, SAMVAL, VALMIN, IIMA, RICS, IVSC, CAMRA, IFRS

Appraisal Institute

John B. Gustavson
Certified Mineral Appraiser
Purpose of IMVAL

To develop a common template or standard for mineral property valuation (the IMVAL Template)
To harmonize mineral valuation terms and definitions
IMVAL Recognizes:

**Valuation** is distinct from **Evaluation**:

- **Evaluation** of a Mineral Property is a broad physical, legal, economic, and other assessment generally sought for an investment decision, including scoping studies, prefeasibility studies, and feasibility studies.
  - “What does this project entail? How big? Might it be feasible to run?”

- In a narrower sense, **Valuation** is the estimation of the Value of a Mineral Property in money.
  - “What is the cash value of the Property?”
IMVAL Fundamental Principles

- **Competence** – of the Appraiser and any Experts.
- **Materiality** – to document all Relevant Information and Assumptions.
Summary of the Three Pillars

• Mineral-valuation conclusions depend on the interaction of key assumptions and competence as demonstrated by the Appraiser.

• All assumptions should be competently and completely
  • Identified
  • Disclosed and
  • Justified

• Key assumptions apply to
  • Data and derived information
  • Analysis and presentation of the data and derived information
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IMVAL Template Link on IIMA Website  www.mineralsappraisers.org
Commercial Break!!! .......... 10 seconds!

Consider becoming a Member of the IIMA!

See me after the Workshop! Or go to www.mineralsappraisers.org
THE IMVAL TEMPLATE is also.....

• ... a BASE on which countries and societies may harmonize the standards in their respective countries for valuation of minerals as real estate.

• .... a CONSENSUS of current good practices and is not a stand-alone code and does not claim to supersede existing national standards.

• .... invaluable GUIDANCE, when putting a cash value on a deposit, be it raw land, a discovery, at feasibility stages, in development or in production.
The IMVAL Template Provides Principles, NOT Rules

The Template is principles-based and is for use as a global reference to form the basis for national codes on valuation of mineral properties. The Template:

• Sets a high level of standards and guidelines for valuation of mineral properties,
• Harmonizes international standards for valuation of mineral assets under IVS,
• Sets minimum requirements for national codes concerning mineral valuation,
• Consists of current preferred practices to be updated from time to time.
The IMVAL Template Is . . .

• NOT a stand-alone reporting code,

• NOT intended to supersede existing national codes or standards, but to influence and complement them, and

• NOT taking precedence over legal and regulatory requirements of the relevant jurisdiction!
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IMVAL Is The Answer!

• We are off to a good Start!
  • The IMVAL Template is in its 3rd edition and now also in Chinese
  • IMVAL counts a number of interested Observers

• Our Immediate Challenges:
  • Get up an IMVAL Website ...........
  • Continue Liaison with Valuation Organizations (AI, ASA)
  • Bridge the Gap with the Real Estate Appraisal Profession
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CONCLUSION - TAKE AWAY'S

• Highest & Best Use Determination as of Effective Date Is Mandatory
• Apply Multiple Valuation Methods and Reconcile
• Communicate among Technical, Legal and Appraisal Experts
• Consult IMVAL for International!
Thank You!

John B. Gustavson, Mineral Appraiser LLC.

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Oil & Gas Case Study

• Recent *Denver Basin* oil & gas appraisal of *Niobrara* shale deposit at development stage by horizontal drilling, surrounded by producing properties.

• Court case shows conflicting uses of Sales Comparison and DCF approaches.
Denver Basin Case

Horizontal Well Status
• Purple  = Producing wells
• Green   = Permitted locations
• Blue    = Applications
PROPERTY

- **Task:** Find Landowner’s Fair Market Value
- **Subject:** 40-ac Parcel leased by *EOG*
- **Unit Spacing** (not pooled) : 1,280 acres
- **Well Plan:** 6 *Niobrara* + 6 *Codell*
- **Status:** PUD (or Probable?) reserves for 2-mile horizontals (one shown)
## Stage of Highest & Best Use

<table>
<thead>
<tr>
<th>Unleased land over general shale area</th>
<th>Unleased land over shale fairway</th>
<th>Leased land over shale fairway</th>
<th>Unitized acreage by pooling</th>
<th>Unitized, permitted well location</th>
<th>Well drilled vertically, but no lateral</th>
<th>Drilled horizontal, but un-fracked well</th>
<th>Fracked, but not “rested” and tested</th>
<th>Completed well awaiting hook-up</th>
<th>Producing well with no records</th>
<th>Producing well with published history</th>
</tr>
</thead>
</table>

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- Producing well with no records
- Producing well with published history
Sales Comparison Approach

Initial Candidates for Adjustments

To be filtered
Sales Comparison Approach

Candidates for Final Adjustments
Adjustment for Oil Price (by paired sale)

Oil price on Effective Date: $52/bbl
Adjustment for Stage of Development

The SPEE Survey of Economic Parameters Used in Property Evaluation, (2016) contains a table with market consensus results for Unconventional Reserve Adjustment Factors. See Table 31
Adjustment for Royalties

• The industry uses the term "royalty acre", which normalizes the unit price to acreage with the historic 1/8th royalty (equal to 12.5%).

• Example: a leased parcel under a 3/16th royalty lease and a sale price of $7,000 is calculated to have a Unit Price per Royalty Acre of $4,667,

  \[
  \text{namely, } $7,000 \times \frac{1/8}{3/16} = $4,667
  \]
# Summary Adjustments

<table>
<thead>
<tr>
<th>Sale Candidate Surname</th>
<th>Sale Price, $/ac</th>
<th>Royalty per Lease</th>
<th>Unit Price per Royalty Acre*, $/ac</th>
<th>Oil Price Adj. Factor</th>
<th>Dev't Stage Adj. Factor</th>
<th>Factor for 20% Royalty</th>
<th>Adjusted Unit Price, $/ac</th>
<th>Acreage, ac</th>
<th>Fair Market Value, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thompson</td>
<td>7,000</td>
<td>3/16th</td>
<td>4,667</td>
<td>0.91</td>
<td>0.77</td>
<td>1.60</td>
<td>5,232</td>
<td>39.88</td>
<td>208,663</td>
</tr>
<tr>
<td>Phillips</td>
<td>7,000</td>
<td>3/16th</td>
<td>4,667</td>
<td>0.83</td>
<td>0.77</td>
<td>1.60</td>
<td>4,772</td>
<td>39.88</td>
<td>190,319</td>
</tr>
<tr>
<td>McMahon, R</td>
<td></td>
<td></td>
<td>3,804</td>
<td>1.04</td>
<td>0.77</td>
<td>1.60</td>
<td>4,874</td>
<td>39.88</td>
<td>194,375</td>
</tr>
<tr>
<td>McMahon, C</td>
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<td></td>
<td>3,804</td>
<td>1.04</td>
<td>0.77</td>
<td>1.60</td>
<td>4,874</td>
<td>39.88</td>
<td>194,375</td>
</tr>
<tr>
<td>Cannon</td>
<td></td>
<td></td>
<td>3,804</td>
<td>1.04</td>
<td>0.77</td>
<td>1.60</td>
<td>4,874</td>
<td>39.88</td>
<td>194,375</td>
</tr>
</tbody>
</table>

**Fair Market Value of Subject = $200,000**, rounded
Contrasting DCF Approach

• Prepared hypothetical drilling scenario
• Established type curves for local Niobrara and for Codell wells
• Rounded up drilling and operating costs, oil & gas prices, etc.
• Ran Reserves and Economics for operator
• Repeated, but for 20% royalty owner and 40/1,280 fraction of pooled unit
• Picked discount rate from “market observations”
• Read NPV for producing wells from tables
• Did not factor for risks of development and market risks
The appraiser (erroneously) reasoned:

The discount rate that was selected for the royalty interest is 8 percent. This discount rate reflects the equivalent expected rate of return a Buyer would expect for a relatively low risk investment in an oil field royalty.

What about a Discount Rate actually observed for Fair Market Value? Or built up?
From SPEE Consensus:
- Using higher discount rates to reflect greater risk.
- SPEE’s survey RADR range shows that there’s room for professional judgment regarding the specific assets.

Courtesy Michael Morgan, CPA, ASA, IIMA
Take-Away: DCF Results Must Be Adjusted for Risks

- Either by increased **discount rates** for NPV, or
- By **discount factors** to be multiplied into NPV (Producing)