Comments on Bid Adequacy Process

Quoting the Federal Register Notice:

A nonviable tract is considered by BOEM not to have the potential capability of being explored, developed, and produced profitably under economic conditions present at the time of the lease sale.

The nonviable decision

I have looked for instances of major failures of the Bid Adequacy Process (BAP) for decades. In doing a look back study of Deepwater Royalty Relief Act (DWRRA), I found four major failures. Congress in the 90's passed the DWRRA which provided a generous royalty free production amount for Deepwater Leases in the Gulf of Mexico. These four leases were classified as nonviable in the BAP. The leases are located on fields exceeding over 100 million BOE (barrels of oil equivalents).

Lease Number	Field Nickname	Bid Amount	Original BOE in millions of field
G16641	Blind Faith	$401,800	117.1
G20082	Tahiti/Caesar/Tong	$610,560	621.8
G20084	Shenzi	$788,555	490.1
G20085	Shenzi	$791,575	490.1

Two of these fields are ranked in the 15 largest fields in the Gulf of Mexico, however MMS did not see an accumulation of hydrocarbons. The drilling rights to well over a billion BOE were conferred for under four million dollars. Further the DWRRA granted generous royalty free production to these leases. The high bidders obtained a massive windfall!

I asked the MMS staff how could these huge fields be missed. Their response was after the Sale 3D seismic technology was developed which enable the imaging of the fields.

What is the more recent history of nonviable leases in the Gulf of Mexico?

The Tract Decision Rule is the coding of the method for acceptance of the high bid. "A" means nonviable acceptance in Phase I and "E" means nonviable acceptance in Phase II. The attached table shows the Tract Decision Rule counts and total Leases bid on starting in 2000 with Sale 175 through Sale 256. During that period 80.6% of the high bid tracts were accepted as nonviable. MMS/BOEM is finding most of the Leases issued are nonviable.

Next examine, if history confirms that the Leases designated as nonviable do not produce. Taking those Leases starting with Sale 175, then examine the production for January 2022 by Tract Decision Rule.

Tract Decision Rule	Number of Leases Producing	Share of Oil Production
A (NV in Phase I)	14	3.09%
E (NV in Phase II)	59	33.82%
B (3 bid rule)	3	1.99%
C (ADV)	45	60.14%
M (RAM)	1	0.97%

The nonviable leases represented about 60% of the producing leases and about 37% of the oil production.

The recent status quo is:

80.6% is the share of high bids accepted as nonviable.

Those nonviable acceptance represent over half of new producing leases.

New nonviable leases generate over a third of new oil production.

BOEM has been informed about this problem in prior public comments. When GAO published the report, I informed both GAO and BOEM senior management, the real problem with Bid Adequacy Process was the viability decision making process. I am a data miner, not a geologist. The process of the viability decision is outside my area of expertise. As an outside observer, it appears BOEM is in a state of denial. Analysis of MROV, DMROV, ADV and LBCI is a sideshow.

Lower Bound Confidence Interval

The BOEM posting does not provide a description of how the Lower Bound of Confidence Interval is computed. I assume BOEM are using a frequentist statistical approach.

μ = sample mean

σ = sample deviation

n = number of simulations of the cash flow model

1.645 = confidence interval multiple for 90%

$LBCI = \mu - (1.645 * \sigma / \sqrt{n})$

This approach is subject to gaming the process. By increasing n by a factor of 4 and then difference between LBCI and μ is approximately decreased by half. That adjustment works in the other direction also. The decision of the choice of n impacts the proposed BAP.

There is a statistical problem with this approach. Look at this pair of sample simulation values:

Simulation	First	Second
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	15	30
μ	6.0	7.5
σ	4.08	8.32
LBCI	3.88	3.17

By doubling the value in just one simulation the mean (μ) increases by 25%. The standard deviation (σ) increases by 104%. However the LBCI decreases by 18%!

For every paired outputs, the First and the Second, the Second sample has equal or higher observation. But the LBCI acceptance criteria is lower! The above example shows that when the variation increases the mean also increases and decreases the LBCI which is opposite to the response needed for the BAP. A simple way to look at the situation. There are two lottery tickets with the same odds except one ticket has a top prize of 1 million dollars and the other has a prize of 2 million dollars. The BOEM LBCI criteria thinks the 1 million dollar ticket is more valuable.

The key to assessing the output of the discounted cash flow simulation is at the top end of the distribution. That is why I was hired by MMS as a Mathematical Statistician to correctly do that modeling. We employed for the time a state of the art approach to that top end of the distribution. As this example show the LBCI is subject to differences at the high end of the distributions. It should not be used.

Oil is the new coal

Because of the technology revolution of hydraulic fracking created the abundance of oil

and gas production. This abundance caused the replacement of coal as the source of energy for electricity generation. It also is forcing the closure of nuclear electric plants, because they are not cost competitive. Solar and wind generation of electricity has also emerged. Coal is being driven out of the market because it is a high cost and a dirty fuel.

A similar process is occurring for oil. Oil is primarily the fuel for transportation. Oil as a transportation fuel is facing competition from cheaper and cleaner fuels. Oil is challenged by the adoption of EV (electric vehicle). In Norway 80% of new car sales are EVs. In California, Tesla has the top two models in new vehicle sales. Further is the threat to oil from regulation. California plans banning the sale of gasoline powered cars in 2035 and heavy trucks by 2045. Finally, there are other technologies under development like hydrogen and fuel cells.

In recent history the price of oil went negative briefly. The stock market places a larger market cap for Tesla than Exxon Mobile. The only way oil can remain competitive as a transportation fuel is price cuts. Oil in the ground is a depreciating asset. There is no longer a need to compute the DMROV.

Proposed Changes to Bid Adequacy Process:

- Drop the DMROV

- Drop the RAM criteria for acceptance because it is rarely used.

- Do not use the LBCI.

- Reject all high bids for nonviable Leases. The bid submitters can appeal the decisions and explain why it is viable. It would provide BOEM with a learning process on the viability decision. Issuing nonviable Leases is premature leasing. Waiting to when there is an indication of an economic prospect will enable the better receipt of value.

- Implement inter-tract bidding. That is limit Leasing to top say 100 high bids. The current practice is submitting a bid is very likely to be an only bid, further BOEM probably will accept it as nonviable. By forcing the bidders to compete against other companies on other tracts, the most prospective tracts should be issued.

Longer term changes BAP

The 90 day review process is from the era of punch cards and mainframe computers. There is an opportunity to shrink time to making a decision.

Just as hydrocarbon development 3D seismic and hydraulic fracking has revolutionize the oil and gas industry. The same is true in my arena of data mining with the progress in machine learning. The data mining tools are very capable now.

This is an outline on how to dramatically reduce the bid acceptance time.

Step 1 About three months prior to sale date use a tool like a Markov Chain or Logistic Regression to forecast the probability of a tract being bid on.

Step 2 Using the ranking from Step 1 do a viability and if necessary a discounted cash flow simulation analysis for the most likely 100 tracts expected to obtain bids.

Step 3 After day of sale has been completed. For the tracts preprocessed in Step 2 confirm the results to make the final decision. For tracts not processed during Step 2 conduct the legacy analysis. It is likely these tracts will be nonviable.

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SALE_NUMBER	A	E	Total	NV_PCT
175	106	153	344	75.29%
177	69	128	226	87.17%
178-1	194	265	547	83.91%
180	84	194	320	86.88%
181	36	18	95	56.84%
182	182	261	506	87.55%
184	72	203	323	85.14%
185	123	362	561	86.45%
187	40	254	335	87.76%
189	4	6	14	71.43%
190	118	358	557	85.46%
192	114	197	351	88.60%
194	87	252	428	79.21%
196	89	205	346	84.97%
197	2	9	12	91.67%
198	96	219	405	77.78%
200	65	254	381	83.73%
204	91	130	282	78.37%
205	96	420	723	71.37%
206	95	365	615	74.80%
207	79	207	319	89.66%
208	66	188	348	72.99%
210	20	110	162	80.25%
213	83	286	468	78.85%
218	14	140	191	80.63%
222	59	281	454	74.89%
224	0	36	36	100.00%
229	11	85	116	82.76%
233	1	44	53	84.91%
233-2	0	3	3	100.00%
235	8	123	169	77.51%
238	11	56	81	82.72%
241	3	82	128	66.41%
246	6	18	33	72.73%
247	0	109	163	66.87%
248	0	9	24	37.50%
249	0	62	90	68.89%
250	0	127	148	85.81%
251	0	113	144	78.47%
252	0	200	227	88.11%
253	0	127	151	84.11%
254	0	53	71	74.65%
256	0	66	93	70.97%
Total	2124	6778	11043	80.61%