

A brief introduction of myself. In 1984, I was hired by MMS as a Mathematical Statistician in part to implement a state of the art statistical procedure for resource assessment. This statistical procedure had the goal to accurately model large prospects. Later, I was reassigned to other functions within MMS. In time, MMS took a different approach for resource assessment. I retired from MMS in 2007.

The question is: Are the published estimates of production historically credible? I will examine the published production estimates from the 2002-2007 Proposed Final Program (PFP). It is now over a decade later, we can now see how well these estimates matched reality.

Table 6 of PFP shows the estimates of projected production. It is attached for ready reference. The following compares the projections and the experience.

For \$30 per barrel oil, anticipated and the actual production so far in billions of barrels:

Planning Area	PFP	So far
Western GOM	1.31	0.055
Central GOM	3.27	0.176
Eastern GOM	0.17	0.0
Beaufort Sea	1.71	0.0
Chukchi Sea	2.42	0.0
Cook Inlet	0.34	0.0
Total	9.22	0.231

For \$3.52 per MCF natural gas, anticipated and the production so far in TCF:

Planning Area	PFP	So Far
Western GOM	7.2	0.684
Central GOM	16.50	1.494
Eastern GOM	0.68	0.0
Cook Inlet	0.58	0.0
Total	24.96	2.178

Simply stated the 2002-2007 PFP vastly overstated the future production. The 2002-2007 OCS Program has so far delivered about 2.5% of the projected oil production. It is evident there is a serious problem. An estimate of zero production from PFP would have been more accurate.

In my discussion with a BOEM subject matter expert at a public meeting indicated that BOEM was aware of this over estimation problem. The expert pointed out that this Draft Proposed Program did display estimates for three different price scenarios of \$40, \$100 and \$160 oil. That is a helpful improvement. It does not address the problem of given a resource assessment and a price scenario the production estimates are so inaccurate.

Granted there is going to be more production in the GOM from the 2002-2007 OCS program, but that increment is not going to close the gap. The situation for the Alaskan sales is clear, there will not be the 4 billion barrels of oil produced.

From this knowledgeable outside observer, I see two problems with the status quo.

First is the modeling of large undiscovered prospects is suspect. On page 10-15 of the Draft Proposed Program indicates that 5% the fields in Central and Western GOM are larger than 178 million BOE. The 2015 Reserves Report data indicates that between 2003-2015 only one field of that size was found. Resource assessment models indicates there many large fields to be found. Reserves empirical data shows that those large fields are not being found. Resource assessment estimates needs to be consistent with the exploration finding rates.

Second the process of transforming the resource assessment into production estimates should be examined. For the Central and Western GOM there is abundant experience from which to build an approach giving credible estimates.

In the last quarter century there has been a technology revolution in statistical modeling. BOEM should be doing a better job. The leadership of the Department needs accurate information to make good public policy.

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Economic Analysis

Economic Assumptions. The proposed final program is assumed to have a lifespan (leasing and subsequent exploration, development, and production) of approximately 40 years starting in July 2002. Given the uncertainty of future price levels, or the "price paths," for oil and gas throughout the 2002 to 2042 period, the MMS developed a range of possible prices bounded by a low price and a high price scenario. The low oil price is set at \$18 per barrel (bbl). This price is consistent with typical worldwide levels over the last 10 years or so. The high oil price of \$30 per bbl is consistent with the oil price highs that have been reached intermittently during the past 2 years. The MMS set the natural gas wellhead price at 66 percent of the oil price on a Btu-equivalent basis. The low natural gas wellhead price is \$2.11 per Mcf and the high price is \$3.52 per Mcf. In both cases, inflation-adjusted—or "real"—prices are assumed to remain constant throughout the productive life of all leases resulting from the new 5-year program. A real discount rate of 7 percent was chosen for the proposed final program analysis.

Table 6. Anticipated Production for Alternative 1—The Proposed Action

Program Area	Oil (BBO)	Gas (Tcf)
Western Gulf of Mexico	0.68	4.05
	1.31	7.20
Central Gulf of Mexico	1.38	7.95
	3.27	16.50
Eastern Gulf of Mexico	0.10	0.41
	0.17	0.68
Beaufort Sea	1.02	Uneconomic
	1.71	
Chukchi Sea	0.96	Uneconomic
	2.42	
Cook Inlet	0.28	0.38
	0.34	0.58
Hope Basin*	0.01	0.29
	0.02	0.71
Norton Basin*	0.01	0.26
	0.01	0.40

Base case estimates (\$18 per bbl and \$2.11 per Mcf) are shown first, with high case estimates (\$30 per bbl and \$3.52 per Mcf) underneath. Oil estimates are expressed in billions of barrels (BBO); natural gas estimates are expressed in trillions of cubic feet (Tcf).

*Estimates for these areas are based on the results of a study that shows what would be available to a local market (processing plant) at given prices.