Potential Impact of Moratorium on Future Gulf of Mexico Production

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Summary
A robust drilling program must continue to maintain or increase domestic oil production to provide for America's continuing energy needs even as alternative energy sources are developed for the future.

The purpose of this brief report is to examine the potential impact of a 6-month drilling moratorium on future production in the Gulf of Mexico. The US Energy Information Agency (EIA) has portrayed the impact as a minor reduction in GoM production (reference 1). However, the moratorium has the potential to cause a much greater impact.

In the face of a 6-month moratorium and uncertainties as to when drilling can actually be resumed and under what conditions and regulations, drilling rigs will leave the GoM and work overseas for extended periods. Two rigs have already announced their departure. This study assumed that the 6-month moratorium results in all drilling rigs leave the GoM with 2 or 5 year contacts to work elsewhere. The impacts on GoM production is studied for these two cases in which no drilling of any production or exploration wells occur during this 2 and 5 year period.

The results are summarized in the table below. The production declines at 15%/year due to natural reservoir production processes. Additional oil is imported to replace this "lost" production and maintain the 2010 production rate, further increasing America's dependence on foreign oil. These additional imports add significantly to the tanker traffic in the GoM. The value of the imported oil ranges from $3 to $96 Billion.

Summary: Potential Impact on GoM Oil Production Assuming the 6-Month Drilling Moratorium Results in No Drilling in the GoM for a 2-Yr or 5-Yr Period after the Moratorium

Year	Years Before Drilling Resumes	Production Rate (MBOPD)	Volume of Lost Production (MMBO)	Additional Shuttle Tankers to Import Lost Production Volume	Value of Lost Production (at $70/bbl)
2010		1,600			
2012	2	1,069	450	1,500	$3,150,000,000
2015	5	657	1,375	4,500	$96,250,000,000

MBOPD = Thousand barrels of oil per day. MMBO = Million barrels of oil.

These unintended consequences of the moratorium are significant. Additionally, the moratorium has significant negative impacts on domestic businesses, employment, energy prices, energy and national security, and safety. Hopefully the extreme cases illustrated in this study will not come to pass. But the study does illustrate how quickly GoM production can deteriorate if a large number of drilling rigs leave the GoM as a result of the moratorium. And drilling rigs have already begun to leave.

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Moratorium and Assumptions

The blanket moratorium was imposed on May 27, 2010. An injunction was filed, another moratorium was imposed on July 13, 2010, and other injunctions are expected. Notices to Lessees have been issued seeking to clarify shallow and deep water restrictions, and new safety requirements are being specified. It is recognized that the moratorium has been lifted for shallow water wells, but the new regulations in place are sufficiently restrictive such that few new permits have been approved.

The purpose here is to look at reductions in total GoM production due to the moratorium. While the drilling moratoriums that have been issued to date are for 6 months, the longer term impact of the moratorium will be estimated and account for two key factors –

1. In the face of a 6-month moratorium and uncertainties as to when drilling can actually be resumed and under what conditions and regulations, it is assumed that all deepwater rigs will leave the GoM and work overseas. Two contract periods will be considered – 2 years and 5 years before these rigs return to the GoM. As of this date, two rigs have already announced that they are leaving the GoM.

   Thus the *effective* length of the moratorium with regard to completing ongoing wells or drilling new wells will be assumed to be 2 and 5 years.

2. GoM production will decline during this period when no ongoing wells are completed or new wells are drilled, and additional imports will be required to replace the oil that would have been produced at the pre-moratorium production rate of 1.6 MMBOPD production

Production from deep water (> 1000 ft) and shallow water (<1000 ft) production is lumped together as total production. Shallow water represents about 30% of the total recent production, and future large oil fields will likely be in deep water. For simplicity here, the moratorium is assumed to ban all drilling in both deep and shallow waters.

Annual Average Oil Production Rates through 2010

Figure 1 shows the total (deep and shallow) average annual production rate in thousand barrels of oil per day (MBOPD) for the years 1993 – 2010.

Historical production data for 1993-2008 was taken from Minerals Management Service (MMS) data (reference 2).

Total production rate data for 2009 was taken from EIA data (reference 3).

Total production rate for early 2010 was reported as 1.6 MMBOPD by the Wall Street Journal (reference 4).

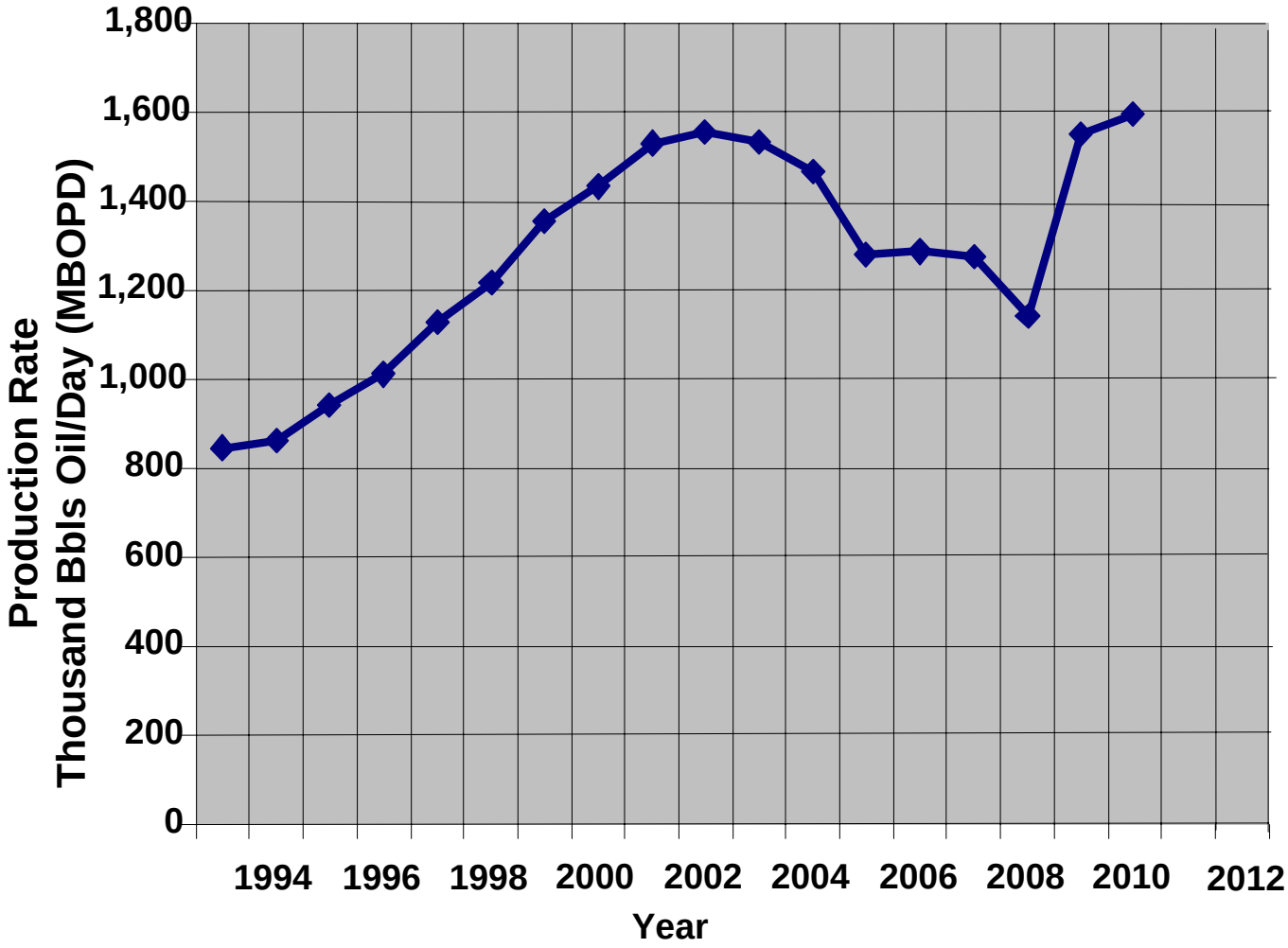

Figure 1. Historical Average Annual Total (Deep + Shallow Water) Production Rate for Federal Waters in the Gulf of Mexico

Note that the total production rate first peaked in 2002 and then declined due to a number of factors including

- the natural decline due to production
- operational interruptions and infrastructure damage due to hurricanes in 2004, 2005, and 2008

During this time, total production decreased about 4.4 %/yr.

In 2009 and early 2010, repairs were completed and production was restored and also expanded due to additional production from new projects, and oil production exceeded the 2002 peak.

Production Decline Rates
The MMS uses production decline rates in their forecast of future production from existing or new fields (reference 1). Deep water oil production is assumed to have an "effective" decline rate of 12 %/yr. This decline rate is based on operators' data and historic data on deepwater reservoirs. Similarly, the effective decline rate for shallow water oil production is assumed to be 13 %/yr. It is presumed that these decline rates derived from individual reservoir performance include the beneficial effects of ongoing drilling for reservoir management and production maintenance. To allow for this, the effective rate of decline for a strictly no drilling case will be conservatively assumed to be 15%/yr. Others have reported higher rates of 20% or more (reference 5).

It was noted above that the peak production rate declined by 4.4%/yr between 2002 and 2008. This represents a "net" decline that included the "effective" decline from producing reservoirs as discussed above; interrupted production due to severe hurricanes in 2004, 2005, and 2008; and additional production from new projects that were starting up. This can be expressed as -

Net Decline = Effective Reservoir Decline + Production Interruption + New Production

It is not possible to estimate the relative size of each of these terms from readily available data. But it is worth noting that between 2002-2008, production was started from 21 new deep water structures and 58 new subsea projects (reference 1). For example, production rate increases totaling 250 MBOPD was reported in 2008 from new platforms (reference 5), yet the overall production rate decreased. With all these new project additions in 2002 – 2008, the production rate still had a net decline of 414 MBOPD (4.4 %/yr) from the 2002 production rate of 1,556 MBOPD.

Production Decline and Loss Production Due to Moratorium
To examine the possible impact of the moratorium as described above, i.e., no drilling for 2 or 5 years due to all rigs leaving the GoM with 2 or 5 year contracts to work overseas, the resulting production decline and the associated "lost" production are estimated using the 15%/yr decline rate discussed above. Results for 10%/yr and 20 %/yr are also shown as a measure of the sensitivity of production rates and the loss of production to production decline

Production Decline The production decline from 2010 to 2016 is shown in Figure 2 for the cases of no drilling for 2 years and for 5 years. Note that the points plotted represent the annual average for the year and are plotted mid-year. The cessation of all drilling is assumed to take place in mid-2010, and the average annual production rate is 1, 480 MBOPD for 2010. In 2012 after 2 years, the production rate falls to 1,069 MBOPD, a decrease of 411 MBOPD. Similarly, the production would drop to 657 MBOPD after 5 years, a decrease of 823 MBOPD.

The U.S. Energy Information Administration (EIA) (reference 1)recently stated *"The reductions in crude oil production resulting from the moratorium are estimated to average about 31,000 bbl/day in the forth quarter of 2010 and about 82,000 bbl/day in 2011"***.** Figure 2 includes these EIS estimates and shows that the EIA estimated impact is

significantly less. In the present study, the production rate has decreased to 1,258 MBOPD, a decrease of 222 MBOPD as compared the EIA estimate of 82 MBOPD. It is expected that the EIA estimate presumed that drilling would immediately resume at the pre-moratorium capacity at the end of 6 months of the moratorium. This is a unrealistic scenario given that two rigs left the GoM for long-term contracts elsewhere during the first month after the moratorium was announced.

Production Loss The production "loss" refers to the production which will not occur in the GOM due to the production decline as measured against the 2010 production rate. The production loss could be described as simply *deferred*, but it is "lost" in the sense that it would have to be replaced by imports during the interim period to maintain the GoM production that existed prior to the moratorium. The production "loss" from 2010 to 2016 is shown in Figure 3 for the cases of no drilling for 2 years and for 5 years. The production loss is 269 MMBO (Million barrels of oil) after 2 years and 1,375 MMBO after 5 years. It is noted that 1,373 MMBO is 1.375 Billion barrels of oil – 1,375,000,000 bbls.

To replace these production volumes with imports would significantly increase tanker traffic in the GoM since the oil would have to be delivered to the existing infrastructure along the GoM coast for processing, refining, and delivery. Oil imports enter the GoM in large oil tankers which are too large to enter ports along the Gulf. Oil is transferred from these larger tankers to smaller shuttle tankers which take the oil to shore. Replacing the 2-year loss of oil with imports would require an additional 1,500 shuttle tanker trips. Replacing the 5-year loss of 1,375 MMBO would require an additional 4,500 shuttle tanker trips.

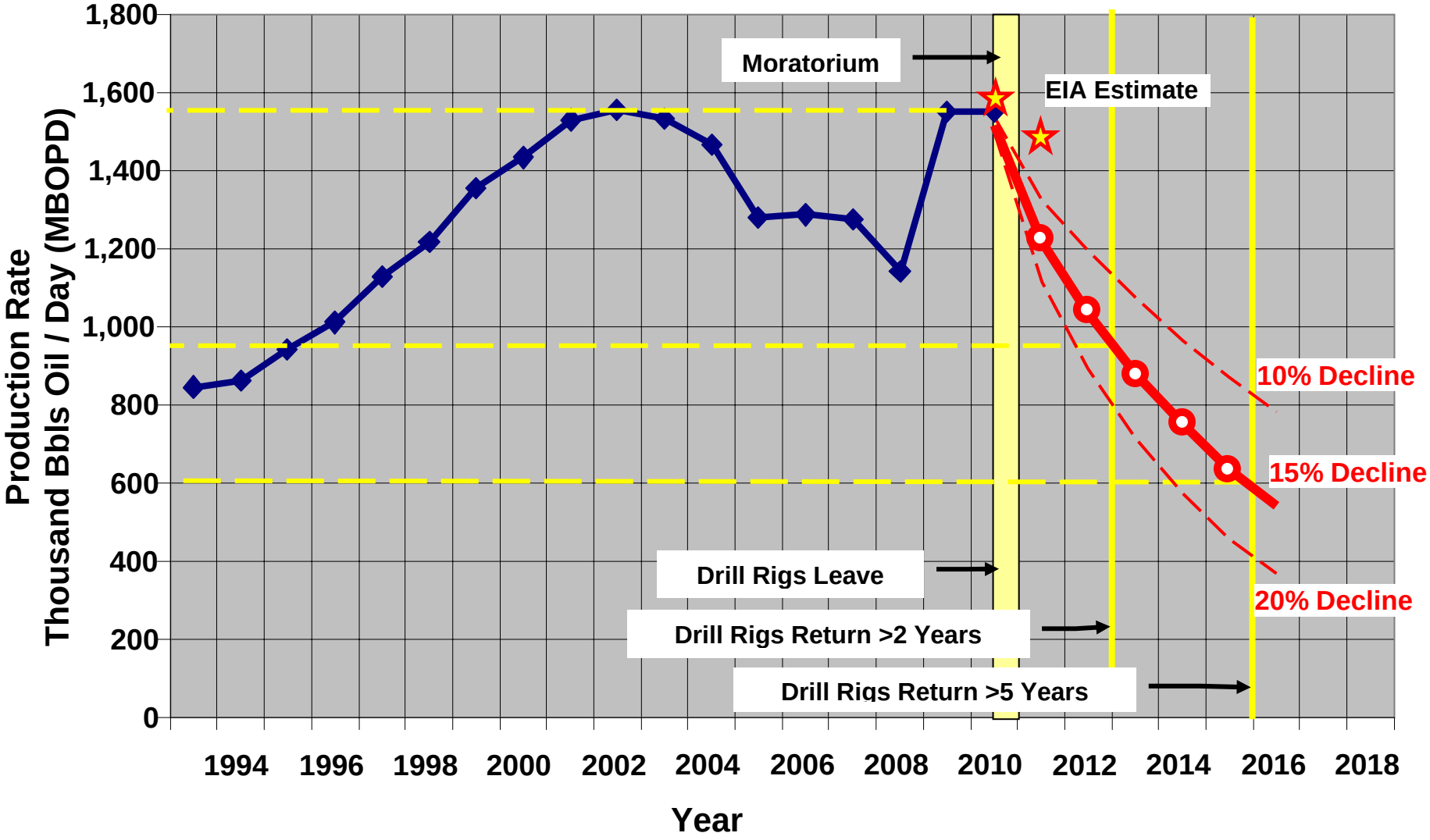

Figure 2. Production Rate Decline Resulting from No Drilling in the GoM for a 2-Yr or 5-Yr Period because all Drilling Rigs Left the GOM to Work Elsewhere during the 6-Month Moratorium

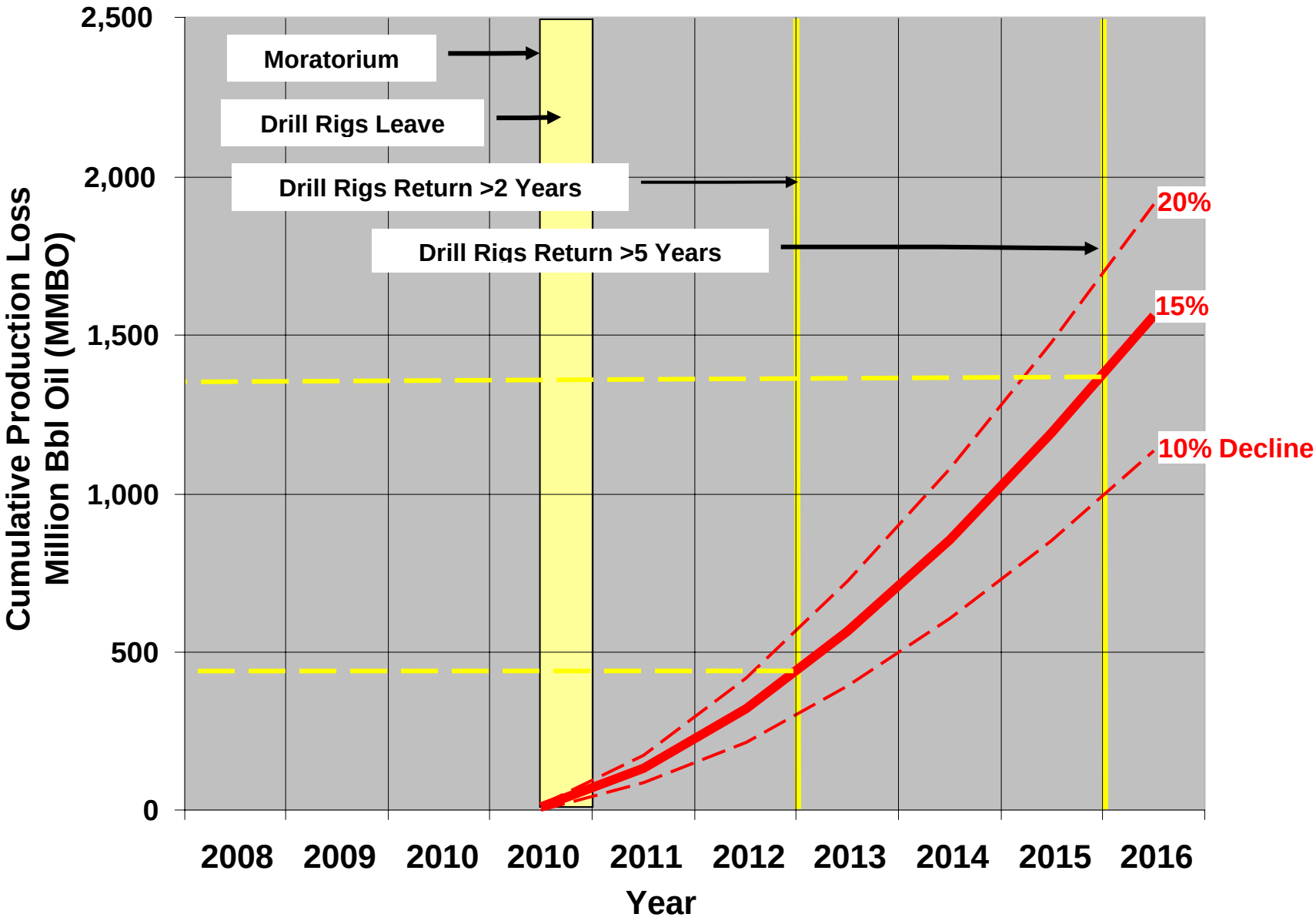

Figure 3. Cumulative Production Loss Resulting from No Drilling in the GoM for a 2-Yr or 5-Yr Period because all Drilling Rigs Left the GOM to Work Elsewhere during the 6-Month

Production Rate Recovery after the Moratorium

After the moratorium and the absence of drilling for either 2 or 5 years, the recovery of production to the 2010 production rate would present a significant challenge. Large deep water GoM projects have production capacities of 200 MBOPD. Thus the 2 year drop in GoM production rate (1,600 to 1,069 or 531 MMBOPD) would require about 3 new large projects to restore the production rate back to 2010 levels. Full production from each project could be achieved in about 5 years (which would be ~ 7 years after the moratorium) for pre-existing discoveries. A large number of reservoir management and maintenance wells (e.g., workover, waterflood, sidetrack, water disposal wells) would also be required to offset declined and declining production in existing fields. The returning rig fleet would be in high demand and challenged to accomplish these tasks as well as explore for new fields. Increasing the production rate to above the 2010 level would be an even larger challenge.

If the majority of the rigs did not return to the GoM until after 5 years, the challenge to return to 2010 production levels would be even larger.

Conclusions

The possible resulting impacts are summarized in the table below. The production declines at 15%/year due to natural reservoir production processes. Additional oil is imported to replace this “lost” production and maintain the 2010 production rate, further increasing America’s dependence on foreign oil. These additional imports add significantly to the tanker traffic in the GoM. The value of the imported oil is shown and ranges from $3 to $96 Billion.

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References

1. **Short-Term Energy Outlook**, US Energy Information Administration, July 7, 2010
2. **Gulf of Mexico Oil and Gas Production Forecast: 2009 – 2018, MMS Report 2009- 012,** U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, May 2009
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4. **Wall Street Journal**, June 29, 2010.
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