

# The Tragedy of 21 Darts

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This is a long article on the subject of oil & gas reserves and due diligence.

My purpose is to alert you to revision of SEC Regulation S-K and Regulation S-X effective January 1, 2010. Concealed in a handful of benign new regs is a financial truck bomb that's going to blow away "proved reserves" as a meaningful metric of oil company assets.

**Old definition:** *Proved Reserves are those quantities which can be estimated with reasonable certainty to be commercially recoverable from known reservoirs under defined economic conditions. Proved quantities are limited by the lowest known hydrocarbon as seen in a well penetration unless otherwise indicated by definitive geoscience, engineering, or performance data. Seismic data alone is not sufficient to define fluid contacts. Undeveloped locations may be classified as Proved in undrilled areas of a reservoir that can be judged with reasonable certainty to be commercially productive.*

**New definition:** *Industry is no longer constrained by the criterion of certainty. An operator can book incremental proved reserves from planned enhanced recovery projects (gas injection, acid fracturing) based on a pilot project. Coal seam gas, bitumen, oil shale and other unconventional resources can be booked as Proved Reserves. Estimated reservoir properties in the aggregate is a departure from the old rules. The new SEC definition does not require that an analogous reservoir has to be in the immediate area or in pressure communication. Seismic analysis and reservoir models are sufficient to book Proved Reserves.*

Hold on to your shorts, it gets worse.

Under the new SEC rules you don't have to drill a well and actually produce oil. An operator can establish levels of lowest known hydrocarbons and highest known oil through "reliable technology" other than well penetrations. It doesn't have to be 90% reliable or widely accepted by industry peers. It can be AVO bright spots, or a fuzzy patch of seismic that could conceivably be a mud volcano, or the ridiculous Russian hokum of "passive" hydrocarbon indicators. You don't even have to explain exactly what your technology does, if it's proprietary and trade secret.

*We [the SEC] proposed to define the term "reliable technology," expressed in probabilistic terms, as technology that has been proven empirically to lead to*

*correct conclusions in 90% or more of its applications. Several commenters expressed concern that this proposed 90% threshold would be difficult to verify and support on an ongoing basis. We agree that a bright line test would be difficult to apply to a particular technology or mix of technologies to determine their reliability. Therefore, we are not adopting the 90% threshold as part of the definition... The proposal also would have required reliable technology to be "widely accepted." However, some commenters were concerned that this requirement would exclude proprietary technologies that companies develop internally that have proven to be reliable. We concur with these commenters and have removed the "widely accepted" requirement from the final rule.*  
[Federal Register Vol. 74, No. 9, p 2166]

Who were the commenters in favor of playing duces wild? Basically everybody. Oil companies, professional groups like SPE and AAPG, consultants, academics, Wall Street speculators and Bush Administration lawyers.

Why? -- because the Shell reserves fraud made them duck and cover.

### **Two Plus Two Equals Seven**

Under the old SEC rules, "proved reserves" were quantities that geological and engineering information indicated with reasonable certainty could be commercially recovered from known reservoirs. In 1998, the proved reserves outlook was scary. World reserves of conventional crude declined eight percent, from 1.26 trillion in 1997 to 1.07 trillion barrels in 1998.

It was a powerful incentive to start fibbing.

Less than three years after taking over the chairmanship of the Royal Dutch/Shell Group, the world's third-largest oil and gas company, Sir Philip Watts was swept out of office in early 2004 by revelations that the company had overstated its proved reserves by nearly 25 percent. Ousted with Watts was Walter van de Vijver, head of Shell's exploration and production operations. A third top Shell executive, chief financial officer Judy Boynton, was forced from office shortly after the departure of Watts and van de Vijver. It was alleged that Watts, van de Vijver, and Boynton had been aware of the reserves shortfall since early 2002 and had conspired to keep the problem a secret from investors. [[Answers.com](#)]

An isolated incident? Nope. On February 17, 2004, El Paso cut its proved reserves 41%. It triggered a Federal class action suit by shareholders. In July 2001, Seven Seas issued \$45 million in secured debt tied, in part, to the oil reserves held by the company. Engineering consultants Ryder Scott estimated their oil reserves to be 47.9 million barrels. About a year later, Seven Seas revised its reserves downward to 16.3 million barrels, which led to Chapter 7 bankruptcy, a flood of lawsuits and stiff silence at Ryder Scott, the world's most respected 'competent person' outfit.

Matt Simmons tells an interesting tale about discovery of Ormen Lange gas field in Norway and how partners booked vastly different proved reserves based on data from two wildcat wells:

In 2003, the five owners of Ormen Lange all decided that they had enough knowledge to go ahead and begin booking that as proved reserves... BP, who had a 10.3% share, booked 83.7% of their reserves. Norsk Hydro, who had an 18% share, booked 79.6% of their reserves. Shell booked 64.3%. Exxon Mobil booked 32.9% and Statoil booked 25%.

Q: No eyebrows were raised?

No, they couldn't have been raised because no one knew this data. This was all comingled within the total reserves companies report. Companies don't break out field by field. Well, then after Shell shocked the world with their 20% reserve reclassification, the board gets nervous and asks Ryder Scott to come in and do an audit. And two months after the big reserve write-down, they do an embarrassing write-down #2. Write-down #2 I think involved a couple of other areas, but the big area was Ormen Lange. They now only report 22.6% versus 64.3%. And also, guess why Statoil booked 25% and their neighbor Norsk Hydro booked 80%? Statoil had DeGolyer McNaughton as their third party engineering report and they reminded them that to be technically correct, the maximum you could book was 25%. [[Global Public Media](#)]

First gas at Ormen Lange came in July 2007. Everything went swell until April 2009, when production of those "proved reserves" didn't happen as booked:

Ormen Lange gas field's reserves in the Norwegian Sea could be less than previously estimated. Disappointing drilling results in the north of the field made it possible that official reserve estimates of 382 billion cubic meters of recoverable gas could be 100 billion cubic meters too high. [[Offshore247.com](#)]

## **The Tragedy of 21 Darts**

When an entire industry goes haywire, like the "toxic asset" meltdown that almost killed commercial banking and made rating agencies look like sell-side hookers, investors want to know: What the hell went so horribly wrong?

The answer is straightforward. Statistical rocket science wrongly predicted a AAA happy meal from diseased meat, lean tails, and worthless guarantees. Something similar is happening now (very quietly, almost stealthily) in the energy sector.

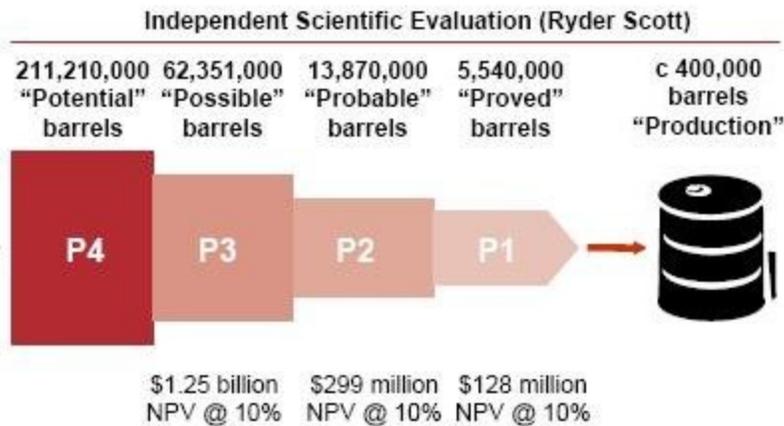
**Math Wiz:** *If you throw 21 darts at Africa, you have a 95% chance of finding oil.*

**Q:** Regardless of basins or known prospectivity?

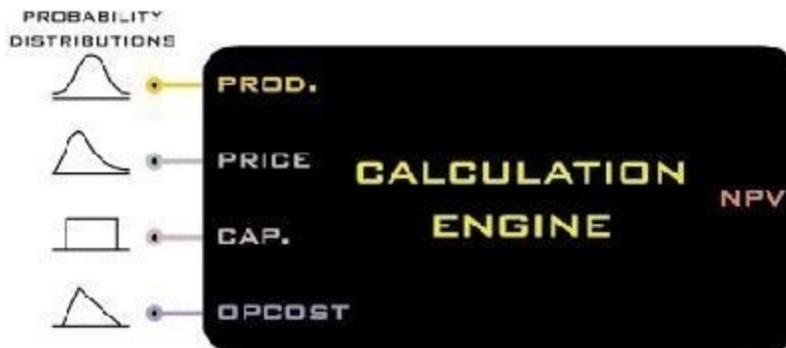
**Math Wiz:** It has nothing to do with geology. It's a statistical fact. If you drill 21 wells anywhere in Africa, there's a 95% probability of making a discovery.

**Q:** What if your first three wells are dry holes?

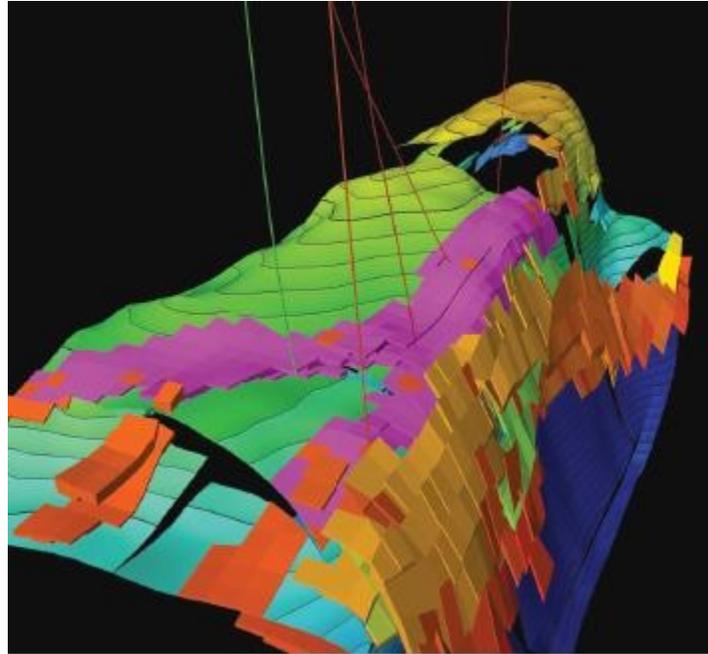
**Math Wiz:** That increases the odds of finding oil in the next well. After a dozen or so, it becomes almost 99% probable that the next random location will be highly successful, enough to justify the entire drilling program.



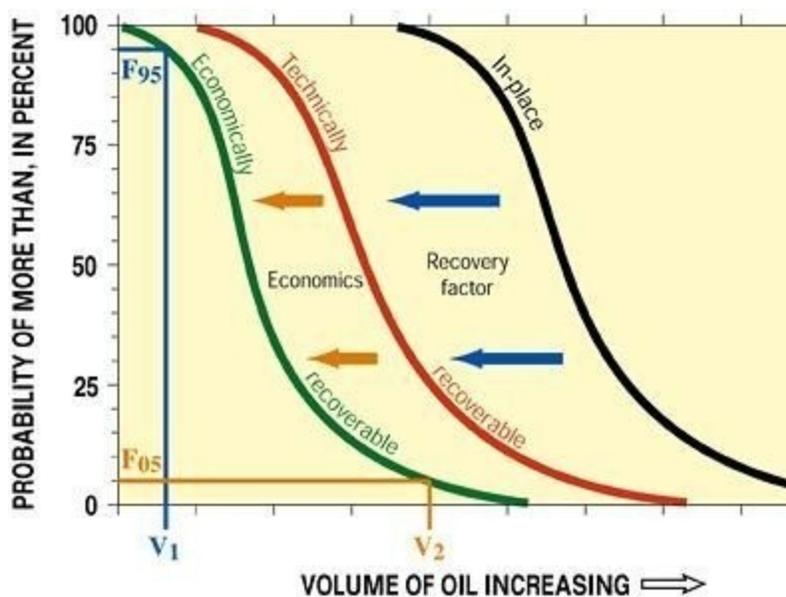
When the Bush Administration SEC succumbed to regulatory capture by Big Oil and discarded the proof in "proved reserves," they opened the door to reporting P1, P2, and P3 capital assets. These are not geological terms. They are probabilities derived from an aptly-named statistical software engine called Monte Carlo.



To cook a Monte Carlo black box project, you input whatever seismic data and well logs you happen to have, ask a petrophysicist to guess a range of porosities and permeabilities, push a button in Petrel, and get a snappy false-color reservoir model suitable for PowerPoint presentation to investors.



The Petrel polygons and a range of possible hydrocarbons (low case, high case) are ported via Excel to Monte Carlo, which runs a couple thousand iterations of probability and spews out P1 (90%) P2 (50%) P3 (10%). Investment decisions are usually made on P2 "more probable than not" estimated reserves. The process is seldom if ever led by rigorous science. Monte Carlo can't process fault picks or coarsening-and-fining facies transitions. Well data is crunched by computer, and assumptions are plugged in concerning production. Reservoir engineers ponder flow assurance and water flooding to maintain pressure. More assumptions (low case, high case). Make a guesstimate of WTI five years from now -- and presto!

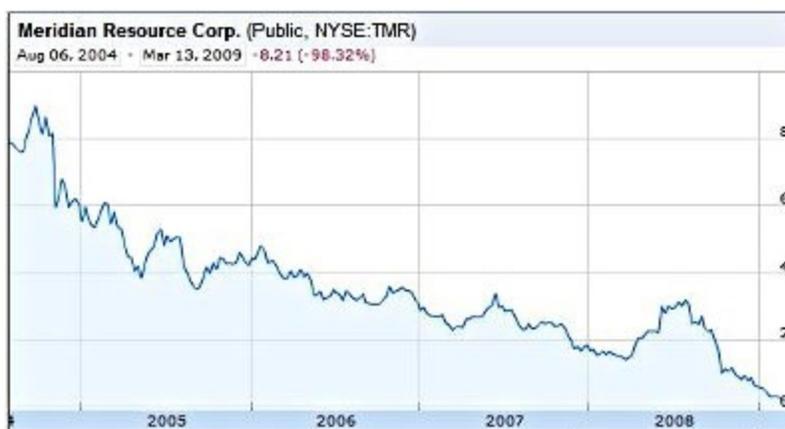


None of this has any relation to the job of oil & gas production. It's a smooth curve of rocket science black box probability. Most of the input values are type averages.

Hey, so what? -- everybody uses P1, P2, P3, and P4 "original-oil-in-place." There's an SPE industry standard Petroleum Resource Management System that defines proved, probable, possible and contingent reserves. What's wrong with PRMS?

A research report from analysts at Credit Suisse in New York stated that U.S. E&P companies are booking "new era," lower-quality proved undeveloped [PUD] reserves for year-end 2006... "PUD locations are being booked simply in conjunction with 'on-trend' acreage acquisitions, often with no wells having yet been drilled and without specific capital budget allocations," the report stated. "This acreage-driven booking process poses obvious questions regarding reserve quality." The analysts noted that rising PUD ratios have been a familiar trend over the past eight years and are poised to increase an average of 35 percent, up from 30 percent the prior year and 23 percent in 1995. [Ryder Scott Reservoir Solutions, Vol 10 No 1, Mar-May 2007]

"Proved undeveloped" acquisitions, huh? Let's look at a notorious reserves player, who booked proved undeveloped reserves of 300 Bcfe plus 9,800 P3 undeveloped acres, 1400 square miles of 3-D seismic, and 12 producing fields in 1998.



If we are unable to obtain further concessions from our lenders and creditors, we would continue to be in default ... and would be subject to the exercise of remedies by our lenders and creditors on account of such defaults. The exercise of such remedies could result in the Company seeking protection under federal bankruptcy laws. [[TMR 8-K, 9/10/09](#)]

In 2006, TMR founder CEO and Chairman Joe Reeves was paid \$1.855 million in salary and bonus -- earning more than the CEOs at Halliburton, FMC, El Paso and Smith International. He controls two million shares of TMR, still sits on the board of directors, and Reuters seems to think his fiscal year compensation was \$6.69 million recently. TMR proved reserves have been cut to 80Bcfe.

**The SPE Petroleum Resource Management System is a license to print money and steal from banks and shareholders. Hocus-pocus of Monte Carlo probability means nothing, unless you have an actual oil or gas discovery and conclusive geoscience that proves the areal extent of reserves.**

Our shop is one of over 100 independent "competent person" outfits that certifies reserves. We don't use PRMS or Monte Carlo. Instead, we make subsurface maps and pick drilling locations. We sign off on reserves volumes if there's enough well data, core analysis, petrophysics, geochemistry, paleontology, and production to justify it. Period. We don't like sell-side. We work for exploration managers.

Typical bedtime reading:

*The deposition model starts in the deepest water zone with dark coloured, crinoidal beds and abundant carbonate mud and argillaceous material (mudstone in the deepest zone facies F1 and wackestone F2). The biostromal zone is mainly built by stromatopoids. [Sedimentary Geology 214]*

On a recent assignment, our client griped about his in-house team, saying "There's been too much button-pushing and not enough critical thinking." The new SEC rules are a joke and professional explorationists know it. Very few will speak out about it, because there was a wave of computer automation and black box software to cover up and gloss over the shortage of experienced oil & gas geoscientists.

The industry has been shedding geologists and engineers for the past two decades. "As an aging generation of workers retires, industry experts say the resulting shortfall in skilled labor could lead to an increase in delays and problems on mega oil and gas projects... Over the next decade, a wave of retirements will strip the industry of its most skilled project managers, just as some of the most complex operations ever attempted are supposed to come on stream." [[Rigzone](#)]

For three decades, oil downsized its people and rarely hired. Focus on staying "lean and mean" trumped any concern that we missed three decades of new employees. [[Matt Simmons](#)]

The latest quarterly report from Hays indicates exploration professionals, in particular geoscientists and senior reservoir engineers are amongst the most sought after in Australia. [[E&P](#)]

The situation is not improved by shopping for the most complaisant mouse jockey you can find to goose the parameters and certify bigger "more probable than not" reserves.

I've seen it too many times. Promoters shop around and there are plenty of sell-side whores who exaggerate blue sky hand-waving on skimpy data.

## II.

Before we look at miscellaneous minnows pretending to be giants, let's talk about the Cornucopia of Ultimately Recoverable Global Oil Endowment -- not a single syllable of which refers to physical reality or prudent use of money. It's merely another Monte Carlo black box prestidigitation. But that doesn't stop well-groomed industry cheerleaders from bullshitting The Wall Street Journal.

The 21st century is very likely to overflow with oil. And since we don't know the total amount of oil resources existing underground, it's impossible to calculate the curve of future supply... The inadequate data we rely on today are from the U.S. Geological Survey, and put the stock of conventional oil resources at least seven to eight trillion barrels. More than two trillion of these are currently deemed to be recoverable, while "proven" reserves are around 1.2 trillion barrels... Yet, the concept of resources and reserves is dynamic. Throughout history, new exploration and the development of new technologies have allowed [us] to discover new oil frontiers and to develop them. What's more, the U.S. Geological Survey's figures may well be underestimated. In spite of the one trillion barrels of oil that we have already consumed, the total available reserves continues to grow... by 2030, more than 50% of the known oil will be recoverable. At the same time, the amount of known oil will have significantly grown by then, and a larger portion of unconventional oils will be commonly produced, bringing the total amount of recoverable oil reserves to something between 4.5 - 5 trillion barrels. What's more, a significant part of "new" reserves will come from the ability to better exploit what we already have. [[Leonardo Maugeri](#)]

Maugeri is a career academic and head of strategy at Eni, the Italian oil monopoly 30% owned by the Italian government. For the past eight years, Eni was nominal operator of the stalled, triple-over-budget Kashagan project, which the Kazakh government plans to expropriate when Eni steps aside and Shell engineers start to produce oil, maybe in 2012. We tried to work with Eni's technical people twice. I wouldn't ask Eni to lead me out of a bathroom.

Okay, calmly and rationally, let's review what USGS actually said about their Monte Carlo-based [2000 Assessment](#) of worldwide ultimately recoverable oil reserves.

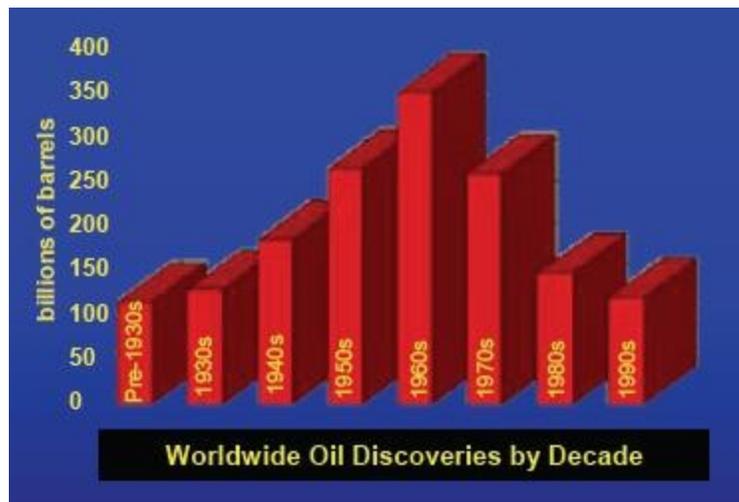
Since we are now 40% of the way through the USGS assessment period (1995-2025), some evaluation of the accuracy of the assessment can be made. But it is important to recognise that the study did not predict what would actually be found in 30 years, but instead estimated what could potentially be found using existing technology... Assuming a constant discovery rate, a total of 173 billion barrels should have been discovered by 2003. Real-world oil discoveries outside the US were less than half of what was expected over this period... IEA (2008) reports a fall in the average number of fields discovered per year since 1996 as well as the average size of those fields. [see [Supporting Data](#)]

Hey, real-world failure is no excuse, right?

Peak Scenario 2200 is constructed on a 7,792-Gb URR platform that spans over four centuries. Six of *All Liquids* seven main components will have exhausted presently-economic resource by Year 2344. [[Freddie Hutter](#)]

### Now Let's Talk Sense

Here's a chart from Matt Simmons, summarizing new proved reserves worldwide decade by decade. Big discoveries were made a generation ago.



New exploration and production does not obey Moore's Law. It's a capital intensive industrial challenge, wrestling with hundreds of tons of iron pipe, physically drilling through solid rock deeper than ever before, from a billion-dollar floating skyscraper, to develop and exploit progressively smaller oil fields.

BP's Thunder Horse project is considered a success, a benchmark of best practice. Amoco

geologists did a great job of identifying known sands under a salt overhang in U.S. waters, where the rule of law and existing pipeline infrastructure squash risk. The platform was delivered on time, on budget. Then the [problems](#) began.



BP's \$3 billion project became a \$5 billion nightmare, requiring an heroic subsea retrofit, but happily Thunder Horse is now producing 300,000 b/d. Payback on exploration expense and floater/subsea capex will be three years. They have 1 billion barrels of proved reserves.

***BP invested \$5 per barrel of proved reserves.***

This is extremely important. Dead-certain payback in U.S. waters with enforceable property rights, oil and gas pipelines nearby, assured market, plenty of engineering back-up and skilled workforce in Houston with bulletproof BP-Amoco geoscience justified \$5 per barrel upfront to tap honestly proved reserves. No bribery or patsies required. No third party project finance, Ex-Im guarantee, or long term leasing.

As we tour the world, basin to basin, looking for recoverable reserves, please keep that in mind. Very low risk \$5 per barrel capex in the U.S. Gulf of Mexico.

### **Western Siberia**

USGS priority rank #1

The West Siberian basin is the largest petroleum basin in the world, covering an area of about 2.2 million km<sup>2</sup>. Three total petroleum systems are identified. Discovered hydrocarbons in these systems are 144 billion barrels of oil and more than 1,300 trillion cubic feet of gas. Extremely high political and legal risk. Russian gangsters. Corrupt local law enforcement. Resource nationalism. Export duty is currently \$38 a barrel. Western staff can be deported summarily. Must employ Russian managers, accountants, rig workers. No infrastructure unless you partner with Gazprom. Sales go through a broker controlled by Vladimir Putin.

## **Mesopotamian Foredeep**

USGS priority rank #2

Comprises Iraq, Kuwait, and the Saudi Neutral Zone. P2 assessment 140 billion barrels undiscovered. Other estimates: 140 billion barrels "proved" plus 50 billion potential in tertiary recovery. Extremely high political and legal risk. Insurgent and terrorist activity in Iraq. Western oil companies only allowed to bring in a small number of managers and technical staff. Resource nationalism. Petty bribery and corruption commonplace. Contracts can be voided. Must employ Iraqi managers, workers. Islamic prayers interrupt work. Western operators never received a penny for the oil they produced under Kurdish licenses, which Baghdad says are illegal.

## **Arctic Ocean**

new USGS rank #2

BP's Monte Carlo guesswork: 200 billion boe. Russia thinks its continental shelf covers half of the Arctic Ocean, including the North Pole. Thick ice cap, icebergs, wildlife. No infrastructure possible. No feasible production systems. Limited exploration season. CGGVeritas, the world's largest seismic surveyor shooting Beaufort Sea off Canada's northern coast. Northern part of the Barents Sea in waters around Svalbard island group are claimed by Norway. [Maps, details](#). It is conceivable that UK-Canadian and Norwegian companies will attempt wildcat exploration.

## **Greater Ghawar Uplift**

USGS priority #3

Saudi government crown jewel. No foreign investment allowed. Western contractors do the engineering of secondary recovery. 95% water cut. USGS thinks remaining P1 reserves may be as little as 5 billion barrels. Saudis have awarded [Halliburton](#) "turn-key" rehabilitation of Ghawar and started 3D seismic survey of Empty Quarter which is likely indeed empty. [Maps](#) and discussion at The Oil Drum.

## **Zagros Fold Belt**

USGS priority #4

Comprises Iran, Persian Gulf waters, Qatar, Kuwait, Basra, Baghdad and Mosul in younger formations. P2 assessment is 40 billion barrels undiscovered heavy oil and 180 trillion cubic feet of gas. LNG projects, pipeline work, war risk, U.S. embargo.

## **Rub Al Kali Basin**

USGS priority #5

U.A.E. and Northern Oman, about 80 billion barrels 400 tcf

*(...boy, this is boring. Are we ever going to get out of the Middle East?...)*

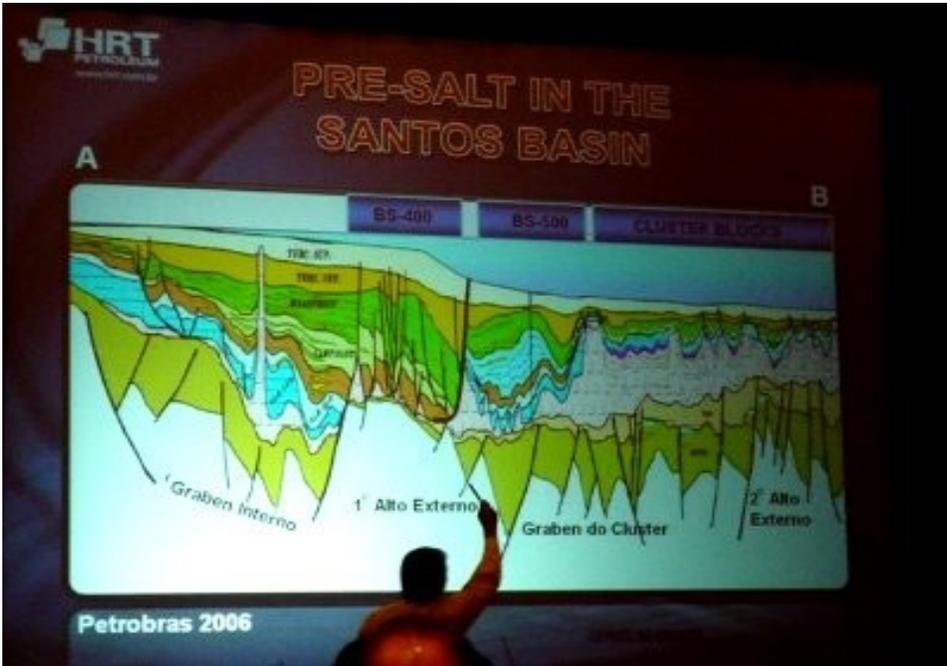
Sure, we'd all like to get out of the Middle East, screw Opec, bring the troops home and declare energy independence with windmills and solar panels. Unfortunately, wishes are not horses and OECD industry collapses without liquid horsepower.

Country	Oil imports	Gas imports
Japan	99.9%	99.9%
South Korea	99.9%	99.8%
EU 25	84%	41%
India	71%	25%
USA	67%	17%
Total OECD	61%	25%
China	53%	2%

What we really need is a Magic Bullet, a Disneyland E-ticket, a game changing "super-elephant" that USGS missed. Not heavy Orinoco crud. Not Canadian tar.

### Monte Carlo Mello Drama

If you like P2 "more probable than not," you'll love Marcio Mello, the Brazillian oil geologist who wowed ASPO Denver with (wait for it, drum roll) **500 billion barrels** of recoverable light crude in the ultradeep pre-salt, most of it in Mello's back yard.



If something seems too good to be true (Bernie Madoff's consistent above-market returns, or AAA sub-prime and Alt-A liar loans), maybe some red flags should go up. Mello's 500 billion barrels of recoverable oil is ten times more than Brazilian energy minister and chief cheerleader Edison Lobão ever dared to dream.

Brazil will have crude for half a century and become a leading oil exporter and "an important player in international geopolitics," the country's energy minister said Wednesday during a congressional hearing. Edison Lobão said that thanks to the vast potential of its pre-salt region, Brazil could produce some 3.8 million barrels per day, double its current output. [Oil Online]

That seems reasonable, right? -- double Brazil's current production over the next 10 years. Especially when it's backstopped by the world's leading deepwater experts, 15 pre-salt discoveries, and 300,000 pre-salt barrels already lifted and refined. Brazilian and Chinese governments, U.S. Ex-Im Bank, and private investors will give Petrobras whatever funding they need to haul up those 50+ billion barrels.

It would be unprofessional and preposterous to fart on a fairytale happy ending. New SEC rules are blinking bright green, allowing PBR to book whatever they want. Proved schmoved. Who cares if it's 300 km offshore and Exxon had a dry hole?

Horizontal drilling and hydraulic fracturing are being considered by Petrobras. Tupi reservoir rocks may be similar to the Toca carbonates of the Lower Cretaceous (Barremian-Aptian) Bucomazi Formation in West Africa. At the Kambala Field in Cabinda, Angola, Toca reservoirs are 75 to 300 ft thick and consist of partially to fully dolomitized carbonates that have matrix porosities of 2-10% and very low permeability. At Kambala, production is controlled by faulting and fracturing and, while the field contains more than 1 billion bbl of oil in place, cumulative production after 30 years is less than 50 million bbl. [Arthur Berman, [quoted here](#)]

Omg r u 4 real? geology is like so not sec dot 2 dude

PROPOSED RULES	FINAL RULES
<ul style="list-style-type: none"><li>• Companies would now be able to select the technology used and be required to disclose that technology for investors to determine whether that technology was appropriate.</li></ul>	<ul style="list-style-type: none"><li>• Adopted substantially as proposed, except that "reliable technology" need not be "widely accepted within the oil and gas industry" and did not adopt a bright line 90 percent test as proposed. See Item 1202(a)(6) of Regulation S-K. See also Rule 4-10(a)(25) of Regulation S-X.</li></ul>
<ul style="list-style-type: none"><li>• Will not propose to require an independent third party.</li></ul>	<ul style="list-style-type: none"><li>• Adopted substantially as proposed. See Item 1202(a)(8) of Regulation S-K.</li></ul>

### III.

Let's examine a simple idea. In every producing oil well, formation, or field there is a finite quantity of recoverable hydrocarbons. This so-called Ultimately Recoverable Resource is definitively known in retrospect after secondary injection, infill and flank development, or fracturing, chemical or steam enhancements that lifted every drop that makes economic sense.

In a mature field, where reservoir performance is fully understood, no sane person will spend more than \$1 to recover less than \$1 of oil & gas. Wells are abandoned, rigs withdrawn, and the field is sold. Smaller operators might be able to eke out a bit more value from "sub-prime" acreage or strata. They have lower overheads and more leisure to search for crumbs.

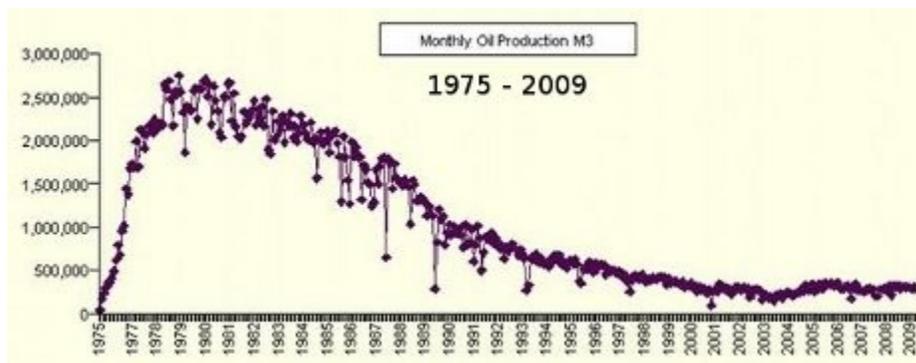
But this, too, must come to an end when it becomes obvious that the resource is economically exhausted. MMS reported for FY2008 that about half of Louisiana's oil and gas leases were non-producing. Not a drop of production. Totally shut in.

So, I repeat that URR is knowable in retrospect. Someday, Ghawar will be a dead field, utterly and hopelessly depleted, producing 200 bpd. Dubai is already feeling the pinch of decline. Dubai's recoverable reserves will be exhausted in less than 20 years.

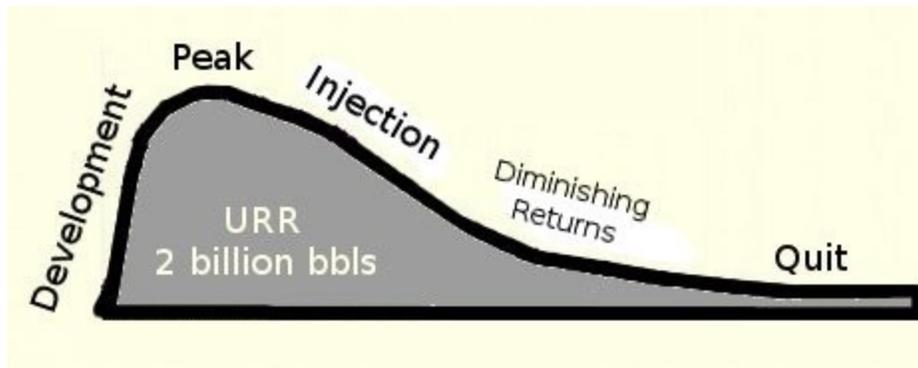
It also happens from time to time that known resources are "stranded" and cannot be economically produced. Tupi gas falls in this category at present. It's over 200km from the nearest pipeline, across ultradeep rugged seafloor. Petrobras is hoping to deploy a floating LNG liquefaction barge (as are other operators). But FLNG is not current technology. It may not be economically feasible if gas prices remain low.

That's why the old SEC rules required that proved reserves had to be commercial (i.e., profitable to produce) with existing technology, at today's price, for a specific market, with plausible means of extraction, separation, transport, and remediation of produced water.

I hope the Monte Carlo clown who urged us to throw 21 darts at Africa took all this into account as "risky" probability of commercial discovery. However, we are not concerned at the moment with random drilling in a war zone or wildlife refuge.



Above is a UK government chart of monthly production in the Forties field, which was discovered in 1970. The curve is typical of individual wells, producing formations, and fields that have been fully and skillfully explored and exploited.



Slightly smoothed, you can see more clearly the sequence of development, peak, decline, and abandonment by the primary operator (in this case, BP). The URR was two billion barrels -- a fact known very early in the Forties exploration program.

It is possible to blunder recovery and wreck a reservoir, which the Russians have done in Siberia, but it is *not* possible to produce an ounce more than an Ultimately Recoverable Resource. The term "reserves growth" does not refer to petroleum accumulations or geological processes that are measured in millions of years.

### Science? What Science?

The retail investor sees PR releases about new discoveries and TV commercials about sexy new technology. Legislators and regulators debate how, when and whether to exploit another increment of the Cornucopia of Endless Oil which official "experts" (who have never drilled a well) continue to expand and blue sky revise upward.

All of which plays right into the hands of promoters, collectively known as minnows, who have little or no production. Their goal in life is a public share offering on AIM or TSX, allegedly to fund a brilliant oil & gas opportunity that bozos like Arco explored and declared uncommercial thirty or forty years ago. *"Well, heck, look at the price of crude today. Duh! We have better technology. We don't even have to drill to make a pile of money on this acreage. We'll do a PowerPoint and flip it to the Chinese."*

It's unfair to single out one of these penny-ante minnows and show you how insane their project is. There are hundreds of them equally nuts. Anonymized to disguise who I'm talking about, here's a typical case. Ryder Scott certified 200 billion bbls of unrisks undiscovered oil in place, plus 400 Tcf unrisks undiscovered gas. Big project. A hired gun consultant told an AAPG meeting that "huge structural traps and conventional sandstone reservoirs have been identified." Sounds great. Sediments are 10,000 meters thick. Wow. All of it is locked up in perfectly valid permits from a white Anglo rule-of-law government, safe as houses!

## Roll Them Bones

Do they have any production? No. Any exploration wells? No. The disclaimer is big enough to drive a health care bill through it.

*In the interests of providing Company shareholders and potential investors with information regarding the Company, including the Company's assessment of its and its subsidiaries' future plans and operations, certain statements included in this press release may constitute forward-looking information or forward looking statements (collectively, "forward-looking statements"). All statements contained herein that are not clearly historical in nature are forward-looking, and the words "anticipate", "believe", "expect", "estimate" and similar expressions are generally intended to identify forward-looking statements. Similarly, forward-looking statements in this press release include, but are not limited to anticipated developments of the Company's various drilling projects and the timing thereof, capital investment levels and the allocation thereof, pipeline capacity, government royalty rates, reserve and resources estimates, the level of expenditures for compliance with environmental regulations, site restoration costs including abandonment and reclamation costs, exploration plans, acquisition and disposition plans including farmout plans, net cash flows, geographic expansion and plans for seismic surveys, or successfully engaging a partner in any of the Company's endeavours. It should be clearly understood that the resource plays evaluated herein are high risk and that there is no certainty that any portion of the undiscovered resources will be discovered and that, if discovered, it may not be economically viable or technically feasible to produce any of the resources. In addition, please note that statements relating to "reserves" or "resources" are deemed to be forward-looking statements, as they involve the implied assessment, based on certain estimates and assumptions, that the reserves and resources described can be profitably produced in the future. Such statements represent the Company's internal projections, estimates or beliefs concerning, among other things, an outlook on the estimated amounts and timing of capital expenditures, anticipated future debt levels and incentive fees or revenues or other expectations, beliefs, plans, objectives, assumptions, intentions or statements about future events or performance. These statements are only predictions. Actual events or results may differ materially. Although the Company believes that the expectations reflected in the forward-looking statements are reasonable, it cannot guarantee future results, levels of activity, performance or achievement since such expectations are inherently subject to significant business, economic, competitive, political and social uncertainties and contingencies. Many factors could cause the Company's actual results to differ materially from those expressed or implied in any forward-looking statements made by, or on behalf of, the Company and the foregoing list of important factors is not exhaustive. These forward-looking statements made as of the date hereof disclaim any intent or obligation to update publicly any forward-looking statements, whether as a result of new information, future events or results or otherwise.*

If you're a momentum trader, none of this matters. Speculative penny stocks have a lot of volatility. You can make money if you buy on the rumor, sell on the news. The minnows generate a lot of news, buying each other, drilling wells that have "positive shows," issuing securities and raising more money from banks and investors.

## Due Diligence

Revision of SEC regs S-K and S-X kicked open the door. You're welcome to place your bets on press releases loaded with disclaimers. But the right way is financial due diligence.

BP paid \$5 per barrel of proved reserves at Thunder Horse. "Proved" was categorically and definitively proved by drilling and first class geoscience. BP didn't have to float paper. They paid cash upfront to build a platform, state-of-the-art subsea iron, and a reasonably short pipeline to carry oil and gas to a thirsty U.S. market.

Compare Petrobras.

### BP PLC

Profitability					
	2005	2006	2007	2008	TTM
Tax Rate	29.6%	35.6%	33.0%	36.8%	37.0%
Net Margin	9.18%	8.39%	7.15%	5.76%	4.04%
Asset Turnover (Average)	1.20	1.25	1.28	1.58	0.95
<b>Return on Assets</b>	<b>11.07%</b>	<b>10.51%</b>	<b>9.19%</b>	<b>9.11%</b>	<b>3.85%</b>
Financial Leverage (Average)	2.60	2.57	2.52	2.50	2.35
<b>Return on Equity</b>	<b>28.18%</b>	<b>27.17%</b>	<b>23.38%</b>	<b>22.87%</b>	<b>9.18%</b>

### PETROBRAS

Profitability					
	2005	2006	2007	2008	TTM
Tax Rate	30.4%	29.7%	30.5%	34.3%	32.3%
Net Margin	18.37%	17.73%	14.97%	15.96%	15.06%
Asset Turnover (Average)	0.79	0.82	0.77	0.93	0.62
<b>Return on Assets</b>	<b>14.60%</b>	<b>14.47%</b>	<b>11.50%</b>	<b>14.78%</b>	<b>9.41%</b>
Financial Leverage (Average)	2.79	2.70	1.99	2.03	2.46
<b>Return on Equity</b>	<b>45.09%</b>	<b>39.63%</b>	<b>25.82%</b>	<b>29.71%</b>	<b>22.43%</b>

I stared at this chart a long time, dumbfounded. How was it possible that a quasi-Soviet bureaucracy, leaking cash like a Nigerian adoption agency, beat the pants off BP in every respect year after year? With similar reserves, similar taxes and equal leverage, Petrobras had double the margin, consistently higher RoA and higher RoE than BP.

Here we enter the snakepit of structured finance. BP eschews [project finance](#). All of BP's exploration risk is on balance sheet, cross-collateralized by all of BP's assets. Petrobras is a hardcore SIV junkie, laying off risk to bankers, hedge funds, governments and vendors. You can see the result on cashflow and credit quality. BP debt has a AA rating. Petrobras is up to their socialist state-owned necks in off-balance sheet leverage and liquidity risk.

Their latest legerdemain is quite funny.

Oct 15 (Reuters) - Brazil's government is seeking to capitalize state-run oil company Petrobras by transferring rights to 5 billion barrels of oil in the offshore subsalt fields in exchange for new shares in the company. The state would then give Petrobras government securities equal to the value of the oil agreed upon between the government and the company based on the preliminary assessment. Petrobras will then return these bonds to the government in exchange for rights to produce up to 5 billion barrels. The share issuance and the rights transfer will be structured as two legally separate transactions, though they happen simultaneously and will have the same value.

Wash, rinse, repeat.

Project finance is a structured finance model that Petrobras uses in addition to the usual sources of corporate finance raised in the financial market. The Company raises resources from investors and finance entities through Special Purpose Companies (SPCs), set up for each project as a means of implementing some of its new business enterprises. These projects are developed in such a way as to minimize the funding and guarantees on the part of the Company. They are implemented without impacting the Company's budget and debt in accordance with the prevailing accounting rules and Brazilian laws. [PBR website]

Petrobras will offer tenders for 28 deepwater drill rigs in September to be built in Brazil. "There may not be enough funding for these projects, so Petrobras may have to step in the middle," a project finance banker in New York said. "They would be a bridge; running the construction, handling the oversight and then bidding out the contracts." After the deals are completed, the drill ships could be sold to the private sector and then leased back to Petrobras for ultra deep water drilling. That's the main idea now under discussion at the Petrobras headquarters in Rio de Janeiro. The rigs to be chartered would be built in Brazil. Under this strategy, the charterers themselves would be responsible for constructing rigs in Brazilian shipyards. [Project Finance Intl]

The cost of project finance? About 1000 basis points in previous PBR-sponsored SIVs – handsome graft paid to Brazilian bankers who are first to be made whole from the project cashflow.

But the Santos pre-salt play is unprecedented, requiring \$100 billion in project finance to explore and produce an estimated 5 billion barrels (\$20 per barrel capex).

What happens if Petrobras is wrong about P2 “more probable than not” recovery?

Higher cash flow generation and proved reserves could allow Petrobras a more significant use of debt over time without putting pressure on credit quality.  
[Fitch Ratings, Sept 2009]

Sure. But what happens if they *don't* have higher cash flow? – crash and burn just like Enron, when structured finance and contractual obligations (to China) wipe out common equity.

## **The Looters Ball**

The average age of the members of the Society of Petroleum Engineers is 55, thinking about early retirement and a golden handshake in the next round of industry consolidation. Their PRMS scam is a nice, safe no-fault Sgt. Schultz defense (“We know nothing! Nothing!”)

Petrobras is bulletproof, no matter what happens or fails to happen at Tupi. Their socialist state-owned tentacles reach into every village and every local politician's back pocket.

U.S. vendors like FMC have been indemnified by our Ex-Im Bank up to \$9 billion.

BP has a sugar cane ethanol project in Brazil, no interest in pre-salt. They'd rather roll the dice in Iraq, where risk is limited to bomb-throwing insurgents and nutzoo mullas. BP's team in Iraq will be a handful of engineers and executives. CNPC is providing half of the money.

What's driving the unprecedented risk-taking, zany off-balance sheet structured finance, and loosey-goosey SEC reserves rule revision is Peak Oil panic. No project large or small is too risky or preposterous. Let a thousand minnows blossom. Drill through the Moho and pray for abiogenic oil, bubbling up from the mantle.

But let's not kid ourselves about corporate motives. The men and women in oil are human. They want a paycheck, as big as possible for as long as they can stay employed. Many are willing to concoct absurd plays and certify contingent resources that will never pay off.

Concurrent with revision of SEC Regulation S-K and S-X, watch out for restatement of assets and accounting policy. Peak oil is going to taste infinitely better with a spoonful of sugar. We don't need any proof in “proved reserves.” Science is a chalk painting we did in Petrel and a Monte Carlo racetrack bet that the P4 of undiscovered crude is moving up, up, up.

***Tradition, discipline and rules  
must be the tools  
Without them?  
Disorder, chaos,  
moral disintegration  
In short, you  
have a ghastly mess!***

-- Mr. Banks (*'Mary Poppins'*)

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