Shell's reserves decline and SEC obsolete rules
by Jean Laherrere

Shell's (and El Paso's) recent reserves decline was a shock to the media and the stock market. How can such decline happen in what is believed to be proven? What are the problems ? I already mentioned the problem of reserves reporting in many previous papers (Laherrere 1999). I will try to update my previous papers.

Reserves definition history
Oil and gas reserves represent the cumulative production of a field until it is completely depleted. Production depends mainly on the volume in place (net pay and area), the geology of the reservoir (porosity, permeability), the physics (engineering) of the fluids (pressure, temperature, saturation, density and viscosity), the development scheme (wells =producers and injectors), and the economics (cost and price). The geological uncertainty adds to the economic uncertainties.

Only a range can represent such uncertainty. It is usually given as minimum, most likely and maximum. But bankers and shareholders do not like uncertainty. Rules were issued to protect them when the SEC (Securities and Exchange Commission) in 1978 issued rules to report only proved reserves. The definition means « a reasonable certainty to exist ». The same definition is used by the FDA (Food and Drug Administration) of reasonable certainty of no harm to the consumer to allow the sale of a new product. The problem is that everyone has his own definition of what is reasonably certain and this varies between 51% and 99%.

The history is as follows;
-1936 API reserves definitions with proved reserves
-1961 API-AGA: Proved = "beyond reasonable doubt"
-1964 API, SPE « reasonable certainty »
-1975 USGS McKelvey classification of resources
-1978 SEC-FASB: Proved = "with reasonable certainty"
-1979 Khalimov: Russian classification A+B+C1 reserves reported to be equivalent to proved reserves, despite a different determination
-1979 McKay Esso: Proved (P) = probability 95 %; Proved + Probable (2P)= 50%; Proved + Probable + Possible (3P) = 5% , but minimum =99%, most likely =50%, maximum =1%
-1980 AAPG, SPE and API use SEC definitions
-1983 WPC (Martinez) Proved = "reasonable certainty" or 90% probability
-1985 Grossling: expected value = 2.3 Proved for Non-OPEC; 1.5 Proved for OPEC
-1985 Bourdaire: Proved (P) = 95% (minimum); 2P = mode (most likely); 3P = 5% (maximum); mean = "expected value" = Proved + 2/3 Probable + 1/3 Possible
-1987 definitions WPC (Martinez) Proved = 85%-95% Probability = "high degree of certainty"
-1990 Laherrere: Proved(P) = 85%-95%; 2P = 50%; 3P = 5%-15%
-1991 Caldwell proposes that "reasonable certainty" equates with a 75% probability, between Proved and Probable
-1991 SPE refuses to adopt the probabilistic approach
-1993 DeSorcy: Proved = 80% probability; Probable = 40%-80% probability; Possible = 10%-40%; "Expected Reserves" = Proved + 0.6 Probable + 0.25 Possible; "Established Reserves" = Proved + 0.5 Probable
-1993 Khalimov: Russians reserves are « grossly exaggerated » because they are based on a maximum theoretical recovery.
-1994 Ross: Proved = 75% probability
-1994 NPD drops Proved, Probable and Possible in favour of 90%; 50% (called Most Probable?), 10% and defines 7 classes of resources
-1994 PDVSA (Roger) uses a probabilistic range of 80-50-20%

-1995 SPE/WPC task force on reserve definition headed by A. Martinez (I was a member) proposes a hybrid system whereby the Determinist terms are defined as follows: Proved = "reasonable certainty", but also having a "high degree of confidence"; Probable = "more likely than not"; Possible = "less likely than not"; and the Probabilistic terms are defined as follows: Proved (1P) = 80-85% probability; Proved + Probable (2P) = 40-60% probability; and Proved + Probable + Possible (3P) = 15% probability
-1997 SPE/WPC final text for probabilistic reserves: 1P = 90%, 2P=.50%, 3P=10% and Martinez approaches the SEC to adopt probabilistic approach (without success). Resources are not mentioned.
-2000 SPE/WPC/AAPG definitions of resources (contingent & prospective)
-2003 Canada National Instrument 51-101 obliges to report proved as 90 % and 2P as 50%, 3P is optional
-2004 International Accounting Standards Board (in UK) project to publish rules to be adopted by SEC, but date of completion likely after 2007.

Most of reserves experts were very critical towards the US practice.
"*There are currently almost as many definitions for reserves as there are evaluators, oil and gas companies, securities commissions and government departments. Each one uses its own version of the definitions for its own purposes*" DeSorcy 1993
"*The resource base [of the former Soviet Union] appeared to be strongly exaggerated due to inclusion of reserves and resources that are neither reliable nor technologically nor economically viable*" Khalimov 1993
"An industry that prides itself on its use of science, technology and frontier risk assessment finds itself in the 1990s with a reserve definition more reminiscent of the 1890s" "illegal addition of proved reserves" Capen 1996
"*Why our reserves definition don't work anymore*" Caldwell 1996
"*Virtual reserves - and other measures designed to confuse the investing public*" Tobin 1996
"*The term "reserves" often is treated as if it were synonymous with "proved reserves". This practice completely ignores the fact that any prudent operator will have, at least internally, estimates of probable and possible reserves"* Ross 1998

Reserves definitions discrepancies
The SPE/WPC 1997 text is the result of many compromises between different opposite views (conservative approach of most industry seniors who did not understand probability at this time against scientific approach based on subjective probabilities) and is far from perfect, but now nobody wants to change because it would be to re-open a « can of worms » and lead again to too many discussions. There are several contradictions in SPE/WPC wording because in a deterministic approach, proved which is defined as what is estimated to be recoverable with reasonable certainty is also assumed to be a high degree of confidence. The deterministic probable reserves are defined as more likely than not (in fact a 50 % probability) whereas others use an incremental approach in which probable is what is added to « proved » to reach a 50% confidence. This confusion seems to be accepted, using same words in both approach but different. This confusion as P50 corresponding to probable and not to 2P = proven plus probable is still found in OGJ 19 Jan.2004 page 31.

There are two different people estimating reserves and they seems to live in different worlds: « one value » against « one range », certainty (determinists) against uncertainty (probabilists), and different terms (P2 against 2P), adding to the confusion.

Deterministic approach

Proved P1	*reasonable certainty*
Probable P2	*more likely than not*
Possible P3	*less likely than probable*

Probabilistic approach

Proved 1P	*at least 90% probability*
Proved + Probable 2P	*at least 50% probability*
Proved + Probable +Possible 3P	*at least 10 % probability*

Harrell Ryder Scott 24 Oct. 2002

In fact most actors love this ambiguity, which allows reporting what they want, according to their own internal policies. Most words are ambiguous: oil, reasonable certainty, high degree, low estimate, best estimate, high estimate without any quantification. MMS uses a different probabilistic approach, more scientific and correct, using the mean and not the median:

"*Cumulative probability distributions: A distribution showing the probability of a given amount or more occurring. These distributions include the values for the resource estimates presented throughout this report: a low estimate having a 95 percent probability (19 in 20 chance) of at least that amount (F95), a high estimate having a 5 percent probability (1 in 20 chance) of at least that amount (F5), and a mean (m) estimate representing the average of all possible values. Values of the fractiles are not additive.*

Deterministic: A process in which future states can be forecast exactly from knowledge of the present state and rules governing the process. It contains no random or uncertain components." MMS 1995

USGS does not have to comply with the SEC and uses different terms in 1998 as measured reserves, essentially equivalent to proved reserves, and inferred reserves equivalent to probable reserves. EIA annual report 98 appendix G « Estimation of reserves and resources ») It could seem surprising to see that the USGS 2000 study using a probabilistic approach based on 95%, mean, 5% to estimate the undiscovered fields has not tried to do the same for discovered fields, but in fact they did not have the data to do so.

Most field studies suggest that parameters (mainly net pay, area, porosity, saturation, volume factor) follow a lognormal distribution. A lognormal distribution is in fact a random distribution that looks like a normal distribution squeezed by the zero value because a physical parameter cannot be negative. A lognormal distribution is dissymmetrical and the peak which is the mode or most likely is not the median. Each field is different, so only subjective probability can be applied and many guesses have to be assumed. It is only a long time after that an evaluator have estimated hundred of fields and compared his estimate to the reality (when production is mature) when he can assess whether he is an optimist or a pessimist.

Geologists who are used to drilling dry holes and have the right to be wrong are more optimistic than engineers who are supposed to avoid risks and need to be conservative. Estimates for Prudhoe Bay oil reserves at its discovery were 15 Gb by geologists and 9.6 Gb by engineers (Gilbert ASPO Uppsala 2002), whereas the ultimate is about 13.5 Gb. Geologists are more optimistic on small fields as they wish to prove they are beyond the threshold of profitability than for large fields for which they are afraid to be considered as dreamers. This can be verified when many fields are checked later on. Giants are rare but usually underestimated, as was the case for Ghawar, when it took several years to realize that three discoveries were on the same field. On their side, petroleum engineers prefer to give a conservative estimate, such that later on, if the estimate is increased it will appear to come from technological progress.

Bankers and shareholders hate uncertainty and risks, and love growth. They prefer reserves with only one value, because a range confuses them. It is the reason why the SEC refuses to report probable reserves and to trust the probabilistic approach. Furthermore the US industry

is very conservative. They consider that their system is the best in the world and are unwilling to use the International System of units (metric system) as if they were Liberia or Bangladesh. They still use Fahrenheit temperatures when it is in Celsius for the rest of the world. The 1999 Mars Climate Orbitor (150 M$) was lost as the NASA sent instructions for thrust in SI (Newton) when Lockheed had built it in pounds.

If the SEC rules are too conservative with proved reserves, the Russian classification presented in 1979 by Khalimov as the model for the world (with ABC1 assumed to be close to proved), was recognized later in 1993 by the same Khalimov as grossly exaggerated. I consider that the reported ABC1 value is close to 3P and has to be reduced by 30 % to approach the mean value. Heiberg (2002) proposes to unify the SPE/WPC/AAPG with the NPD/FUN as the Russian classification where C1 in fact extends up to not very likely viable development of contingent resources.

Proved, Probable and Possible reserve probability

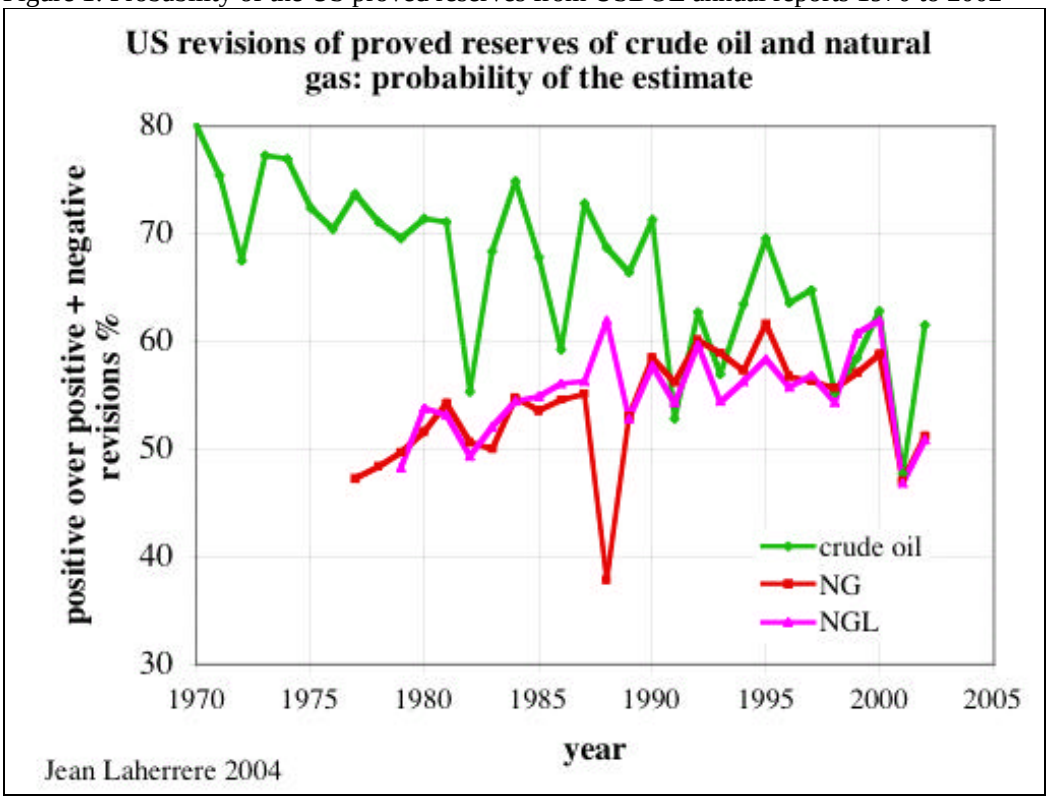
Proved reserve estimate being close to the minimum has for its goal to produce later growth and operators love it, as companies are more judged on growth than on absolute value. (This is why Amazon.com was once valued higher than General Motors.)

Subjective assessment provides mainly the minimum and maximum values with a value in the middle. Most evaluators are convinced that the value in between is the median, being as likely as unlikely, but the median can be estimated only if the total number of possibilities is known, which is not the case. In fact what a geologist guesses is what he feels the most likely, often called the best estimate. When reading the net pay on a log (resistivity for example) of a well he picks the inflection point, which in fact is the most likely and not the median; the same when drawing from seismic lines the area of the structure full of oil. It seems that in a subjective estimate median is confused with most likely and that what is reported is the most likely (the peak of a frequency distribution) and not the median. In fact best estimate (most likely) is the immediate answer and not the value between the likely and unlikely (supposed to be the median). The reference case is the most likely, often called the best estimate, but not the median. In a lognormal distribution the most likely (mode) corresponds to a probability of about 65 % when the mean (expected value) is about 40 %. Last, the maximum or possible reserve is much farther from the « central » value (mode, median, or mean) because of the natural dissymmetry of the log-normal curve, bound on the small values by zero, not unbound on the side of the large values.

Most of people believes that the US proved reserves reported by the US-DOE represents a high probability corresponding to a 90% probability as instructed by the SPE. However, Garb in 1988 wrote that proved were taken by some at 65% (mode value). In fact it is very easy to check by plotting the ratio of the annual positive revisions versus the positive plus negative revisions from the US-DOE US proved reserves. The plot for oil indicated that the probability was around 75% about 1970 and that it is trending towards 55% in 2005, but in 2001 negative revisions were larger than positive, meaning that the probability was below 50%. The natural gas plot which was below 50% at the end of the 70s rose (despite a drop in 1988 when the Prudhoe Bay gas reserves were written off) to 60% in 1995 and is now back to 50 %, which is much less than the mode.

In 1999 MMS proved reserves of the GOM had a negative revision for oil and gas (due to low price?) but positive in 1995, 1996, 1997, 1998 and 2000. In conclusion presently US proved reserves corresponds to less than the most likely value and seems to be trending towards the mean value (around 40% probability), which in fact is the expected value or the goal of any good estimate.

Figure 1: Probability of the US proved reserves from USDOE annual reports 1970 to 2002



Proved reserves problems

US SEC against Canada CSA.

Since the end of 2003, the new Canadian rules NI 51-101 by the Canadian Securities Administrators obliges Canadian companies to report proved reserves corresponding to a probability of 90 % when US companies report a higher value corresponding to about 60%. Ryder 2003 *"Canadians claim that their companies are undervalued vs. US companies"*. So the comparison of Canadian and US proved reserves will be at the disadvantage of the Canadians and it is likely that most Canadians will ask exemption to this new rule, what Suncor and PetroCanada have already got. *"Robinson, a former president of Sproule Assocs. Ltd, recommended that buyers and sellers look at " expected reserves" of the marketed properties, which he equates to P50s or proved plus probable reserves. Because probable reserves are not recognized in the US "proved reserves have been driven up to where they are above expected reserves"*

oil price

SEC wants that proved reserves at year–end be based on the price on 31 December, when companies would prefer to use the annual average, which is more logical, avoiding chaotic behaviour of oil price on this single day. But oil prices influence only reserves of marginal fields, as is the case for many stripper wells in the US which are active only when price is high.

aggregation and multiplication

Adding the estimates of a large number of fields is not straightforward, because the probability ranking of individual fields is not the same. Thus, the sum of the proved reserves of individual fields will be less than the proved reserves of a basin or country, as it is unlikely that every field estimate will be the minimum value. Only mean values may be summed. Yet

the main public databases as published by World Oil, the Oil & Gas Journal and BP, all mistakenly sum what are described as proved reserves.

With a large number of field P90 values, the aggregation for the nation should correspond to closer to P99.When playing dice, with one die the chance to get at least 2 is 5 out of 6 or 83% probability (which can be called proved for SEC), but in throwing 8 dice, the aggregation of 8 times 2 being 16 has a probability of 99 % and there is an 80 % probability of getting 24 which is much higher than the aggregated 16 (Capen 1996). It is necessary to run a Monte Carlo simulation to get a proper estimate of the proved value (as was done by the USGS 2000 study to estimate the P95, mean and P5 of the undiscovered). It is possible to avoid Monte Carlo runs by assuming a lognormal distribution for each parameter and to use a simple equation (Bourdaire et al 1988).

When multiplying each parameter to estimate the field reserves, it is only by multiplying the mode (most likely value) that the product will be the mode value of the field. Multiplying the so-called proved value of each parameter of the field will not give the field proved reserves

Reserve growth

The proved reserves will provide growth if probable reserves are omitted and field reserves aggregation underestimate the real proved estimate of the nation. This growth is mainly due to bad rules and bad practice. It encourages bad forecasts as shown in the next paragraph when compared to the technical mean estimates, which by definition is assumed globally to not provide any growth. As stated by Heiberg et al 2002: "It *could be considered to recommend shifting the main reporting point from proved reserves to the expected value of reserves. There are several advantages to this: The gross under-reporting of reserves that takes place at aggregated levels when proved reserves are added will disappear*." Schlumberger 2003 recommends that reserve growth should be globally removed by using better rules, in fact reporting mean values: "*Revision of proved plus probable estimates should be neutral"*

Technical mean reserves

Most operators have several sets of reserve estimates: internal and external, from the geologists and from the engineers, for the partners, for the development decision, for the financial analysts, for the SEC if listed in the US and now for the CSA (Canadian Securities Administrators) in Canada.

Technical reserves as estimated by operators are usually confidential except in few areas where they are obliged to report to the government agency. What is published for the world as proved estimates comes from enquiries to the national agencies made before year-end before any completion of technical study and without having the price at December31, as SEC rules. Thus, the answer is only political. Most OPEC estimates have not changed estimates since the 1980s when they increased their reserves by about 50 % as they were fighting for their quotas which are based on reserves (and population). This OPEC increase totaled about 300 Gb reserves, when real discoveries were only 10 Gb. As OPEC does not want to disturb the status quo of the quotas they prefer to keep their remaining reserves constant, meaning that they have been discovering every year as much as they produce, which is obviously wrong.

In the last world reserve estimates in OGJ 22 Dec. 2003, out of 105 producing countries only 30 displayed a change in oil or gas reserves from end 2002 and end 2003, as if over 70% of the producing countries found during the year 2003 exactly the same volume that they have produced: it is a joke, but taken as the truth by all official agencies as they are also published by BP Statistical Review which do not want to upset OPEC countries (where they operate).

In 2002 OGJ added Canada's reserves from tar sands, which are unconventional, where most of the production is presently from mining, but OGJ omits reserves from Orinoco extra-heavy oils which produce per well more than 100 times the average production of a well in Texas.

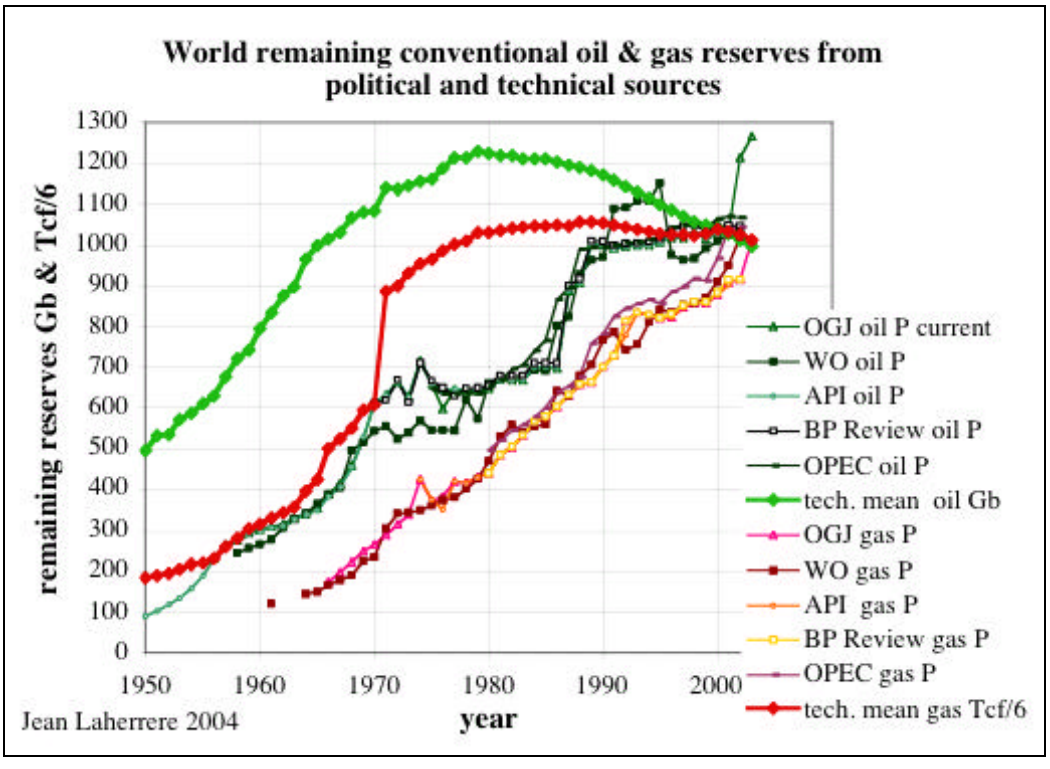
But BP Review did not follow OGJ for Canada (nor did World Oil) and do not include the tar sands in their oil reserves -- but they do include them in their oil production.

The world remaining proved reserves at end 2002 are different from different sources:

source	oil Gb	gas Tcf
OGJ	1 212.880 852	5 501.424
World Oil	1 033.993 1	6 128.653 4
BP Review	1 006.652 484	5 501.5
OPEC	1 067.167	6 273.66

The accuracy of these estimates seems unrealistic, given the huge discrepancies between the different sources. Writing more than three significant digits on any oil and gas data makes no sense, the more so since large discrepancies of oil production data are also found in these sources, due to the bad definition of oil and of reporting. However, more fundamentally, proved reserves show a completely wrong image of the reality since the true estimates are the mean values backdated at the time of discovery year, i.e. the technical data. These values are confidential for most countries and in particular for OPEC countries which possesses 80% of the world conventional oil. Such technical data, called P50 but generally “most likely” or “mean” values, are sold by Scout companies like IHS (formerly Petroconsultants, the only one offering a complete world file), Wood Mackenzie (WM), Infield and others. These technical values show a completely different trend from political data: they are decreasing since 1980 when annual oil discovery went below the annual production as shown in the graphs displayed by USGS 1996 (Masters), Exxon-Mobil (Longwell), BP (Harper).

Figure 2: Comparison of world remaining reserves from political and technical conventional reserves.



These technical data come from a unique database which converts several different sources into a homogeneous (as much as possible) file of mean backdated values. Homogenization is

required because HIS values are globally 25% higher for oil + condensate and 50 % higher for gas (for a total which covers more than 95% of their data) to those of WM. Therefore, what I call technical data in this graph is the only set available worldwide.

SEC stand

The SEC refuses the probabilistic approach as the SPE did 20 years ago, before accepting it in 1997 but in contradiction with the deterministic approach. The SEC engineers (Ryder Scott dec 2003) stated at an SPE meeting: "A *live survey of attendees, half of whom were petroleum engineers, indicated that 82 percent of the respondents did not think that the SEC adequately incorporates today's technologies. Winfrey said that he wasn't surprised that percentage because the SEC reserves definitions are 25 years old. Murphy said that twenty-five years ago we didn't have computers so we couldn't do probabilistic studies and that there has not been a big push from the industry in asking the SEC to allow the reporting of probable reserves"*
Though personal computers are new, big computers were already in use 25 years ago. In 1979 (25 years ago) McKay was presenting a probabilistic approach using Monte Carlo simulation. Furthermore the probabilistic approach does not necessarily need computers (Bourdaire 1988). Guessing subjective probability does not require computers. It is more the concept which is opposed by the SEC (they still dream about certainty) than the method or the tools. Changing minds needs in fact a new generation. In the past reserves estimates were mainly carried out by geologists used to risks and to drill often dry holes, now they are run mainly by engineers who are used to be considered as experts and do not want to be wrong, so they are conservative. Finding oil needs to have the right to be often wrong, but producing oil needs to be right almost all the time.

Shell's reserve decline

Shell announced on 9 Jan.2004 that their proved reserves should be reduced from 20 Gboe by 20% or 3,9 Gboe (2.7 Gb for oil and 7.2 Tcf for gas). These reserves were real but should be put in another category. Shell later provided (5 Feb.) the new categories for these 3.9 Gboe:

- 0.1 are shifted from proved developed to probable and 0.1 to Scope For Recovery (SFR) which means later commercial decision
- 0.3 are shifted from proved undeveloped 0.3 are shifted to probable and 3.4 to SFR

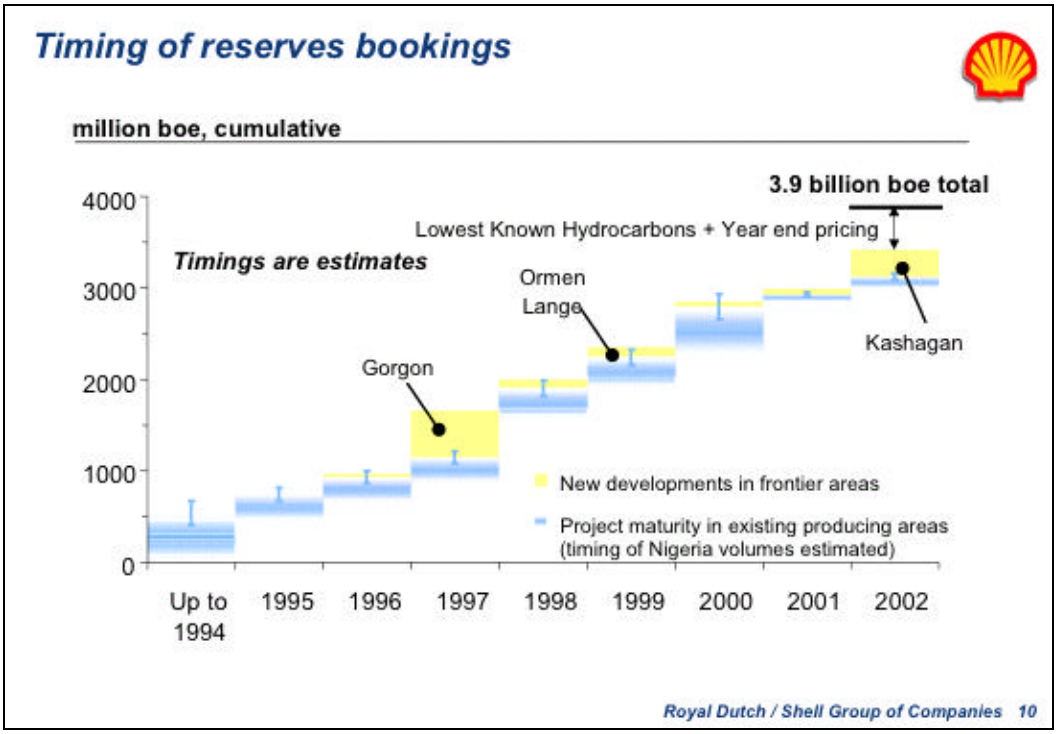
The timing of the booking of those 3.9 Gboe was also given on 5 Feb.

But on 26 Feb. after the decision of developing Kashagan had been taken, Shell announced to put back 380 Mb for Kashagan as proved in 2004. Kashagan is reported by the partners as having 38 Gb of oil in place, 13 Gb of oil recoverable reserves (reserves are always recoverable!) but DB displays a production chart from 2006 to 2065 producing only 11 Gb, which is assumed to be the 2P. Deutsche Bank (DB) shows also that Kashagan will increase Shell proved reserves by 1.2 Gb (for the full phase 29 G$ with a peak of 1,2 Mb/d, as phase I is only 10 G$ for a peak at 450 000 b/d). Shell downgrading for Kashagan was too soon and its estimate seems too low.

US-DOE having reported for the Prudhoe Bay discovery 26 Tcf on proved category before the decision of a gas pipeline were taken, was obliged in 1988 to write off these 26 Tcf. Shell did the same thing for Gorgon fields offshore Australia because they booked the reserves in 1997 at the start of the talks on selling Gorgon gas before the gas was actually sold and the development decided. In OGJ Jan.19, 2004 page 28-33 it is reported that neither Chevron-Texaco nor Exxon-Mobil, the other partners in Gorgon area, report proved reserves. But on the web there is a site (Gorgon Australian Gas, Perth, W. Australia, www.gorgon.com.au) reporting that proved reserves were certified: "I*n January 1999, international petroleum consultants, Netherlands Sewell and Associates of Dalla, Texas, independently certified that proven hydrocarbon reserves for the Gorgon area gas fields were 12.9 Tcf, including 9.6 Tcf for the Gorgon field itself. Proven and probable reserves exceed 17.5 Tcf and possible reserves extend the total to 22.3 Tcf."* Geosciences Australian government -- www.ga.gov.au/pdf/GA1550.pdf -- publishes the list of field reserves and reports Gorgon

field with 18.38 Tcf +132 Mb condensate. The scout companies report the 2P reserves for Gorgon area as 52 Tcf and 49 Tcf. So it is wrong not to report such reserves. What must be changed is not what is proved (or not) but the way to report reserves and, as recognized by all experts and countries, to change the SEC's obsolete rules. The US is the only country obliging companies not to report probable reserves, just as it is the only country (with Liberia and Bangladesh) not to use the SI units. When Deutsche Bank wants to report company reserves they use Wood Mackenzie estimates which are of course 2P estimates. So does OGJ (24 Jan.) when they explain the Shell problem.

Figure 3: Shell timing of reserves bookings

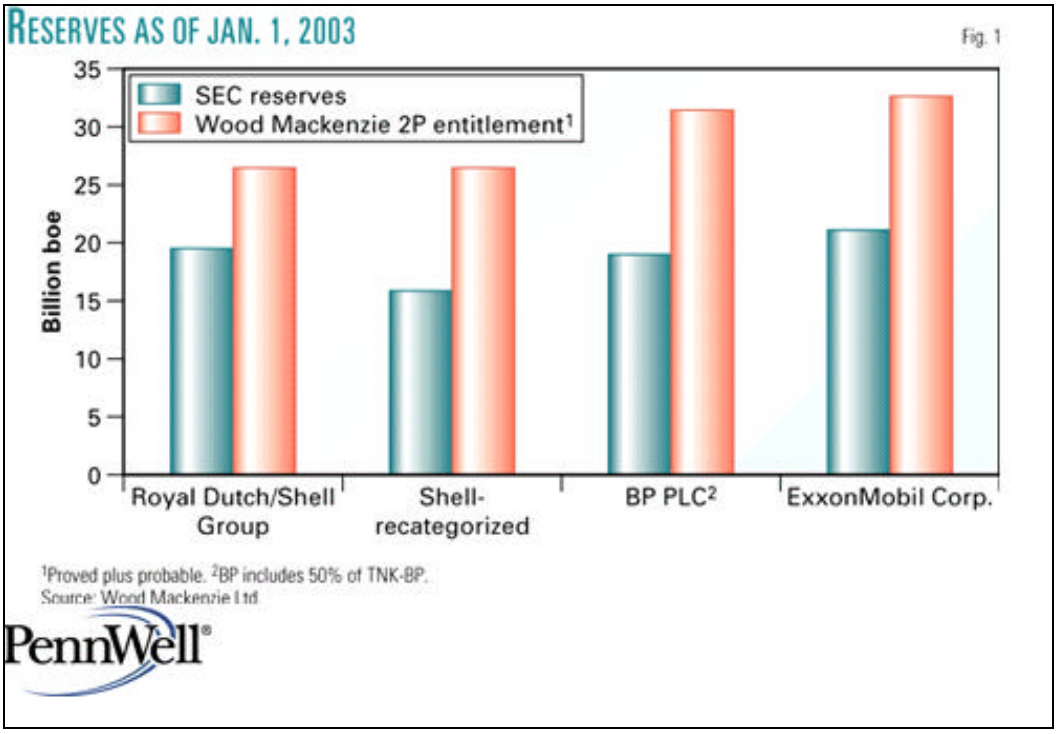


"*The absence of data on probable reserves is a serious loss of valuable information," Chew said. Canadian standards for reserves reporting require a statement of probable reserves and permit a statement of possible reserves (OGJ, Jan. 19, 2004, p. 30). While Exxon Mobil SEC proved reserves as of Dec. 31, 2002, were 21.1 billion boe, the company's discovered resource base was 72 billion boe, reflecting that only 29% of resources were reported as proved."*

The following graph shows that Shell reserves are 16 Gboe as proved, but 27 Gboe as 2P, when Exxon-Mobil reserves are 21 Gboe as proved but 33 Gboe as 2P. With the right categories, the ratio of proved values to 2P values is more in line with BP and Exxon-Mobil.

These 2P estimates are judged by the Deutsche Bank to be the best values to judge the companies, but 2P estimates are not reported by either Shell or Exxon-Mobil as it is forbidden by the SEC. Shell is found guilty to have put Gorgon reserves as proved reserves (as did the US-DOE more than 20 years ago for the Prudhoe Bay gas) which will soon be produced as the demand for gas is growing, but Exxon-Mobil is not guilty to show a large number for resources (these are no rules on resources reporting) which is more than double 2P (72 vs. 33). Reporting no reserves for Gorgon is misleading the shareholder.

Figure 4: Wood Mackenzie estimates for proved and 2P reserves



In the OGJ of January 19 this year "*Ryder Scott Co. LP Chairman and CEO D. Ronald Harrell said Shell's revision illustrates growing concerns with SEC reserves reporting regulations, established 26 years ago. Since that time, the technology that we use to evaluate reserves has increased dramatically beyond the tools and techniques that we had in 1978"*.However in recent months Shell was obliged to decrease reserves in several key fields as for oil Macaroni and Brutus in the Gulf of Mexico, and for gas as Maui in New Zealand and Sable Islands in Canada. It does so more often than the other majors, maybe due to its decentralized structure.

Saudi Arabia reserves compared to Shell

On 24 Feb. 2004 in Washington during a conference organized by CSIS, Aramco engineers Baqi and Saleri presented the potential of production of Saudi Arabia to debate with Simmons who presented the Saudi Arabian oil miracle. Aramco estimates that the proved developed reserves at end 2003 are 131 Gb, while the undeveloped proved reserves are 129 Gb (total proved being 260 Gb) and the probable and possible reserves are 103 Gb. These 129 Gb undeveloped are questionable proved with the SEC rules. In fact WM estimates the remaining 2P at 136 Gb (including Neutral Zone), when IHS estimate is at 200 Gb, meaning that these undeveloped proved are beyond probable. Shell's decrease in proved reserves at 4 Gboe are negligeable compared to what should be decreased for Aramco oil reserves.

Conclusions

What is needed for reserve definitions is good practice and good rules, to which every country in the world agrees. The problem is that oil and gas companies are not asking for precise rules as they prefer poorly defined rules, which allow them more freedom for reporting, and they want to keep confidential their field estimates. The push must come from the governments or from the banks. But OPEC will not change their reporting as long as quotas will be in force. Only when the supply becomes short and quotas useless will OPEC accept to report real estimates. It will take about a decade!

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