Should an Operator Use NPT as a Measure of Drilling Performance?

Editor's Note: *The Clear Leader* does not normally include articles from service partners; however, we thought this article would help our workforce to understand performance improvement rather than non-productive time (NPT) analysis. Articles are carefully screened and selected based on technical merit and alignment of philosophies, to include people and their skills. This article is intellectual property that can be mutually beneficial. It is designed to provide a "voice" on the subject of NPT. It offers an opinion from the author.

Peter and Helen Rushmore

Rushmore Reviews employees in kilts at Aberdeen castle with bagpiper

About Peter Rushmore and the Rushmore Reviews

The *Rushmore Reviews* was founded in 1993 when Chevron, Texaco, and 10 other operators outsourced the *Drilling Performance Review* (DPR).

The operators had established the DPR in 1989 in order to rationalize the exchange of offset well data in the North Sea. After a few years, the operators group accepted Peter Rushmore's proposal to create a business entity that provides data exchanges as the core company services.

Since the early days, Chevron has been a leader in the development of the *Reviews* and was the first company to commit to participate on a global basis. There was initially little or no offset data in return from many countries, but Chevron saw this as a necessary investment to create a global database.

The *Rushmore Reviews* is operated out of Aberdeen, Scotland and owners Helen and Peter Rushmore now employ a staff of 20. They publish data on wells, completions, and permanent well abandonments from 95 countries. Participating operators include all the super-majors, most of the large- and medium-sized international oil companies, many small independents, and an increasing number of national oil companies including, most recently, Petrobras.

A number of participating operators are currently proposing to exchange data on well intervention activities. This will provide data for the full well life cycle of operations from spud to final abandonment. The aim of the participants of the *Rushmore Reviews* is a single database containing full well life cycle data for every well drilled in the world. This would provide an invaluable resource to operators globally. Membership in the *Reviews* is growing faster today than at any other time in the last 20 years and progress is being made toward this goal. More information on the *Reviews* can be found in SPE 140172 that was presented at the SPE/IADC Drilling Conference in March.

Peter Rushmore
Owner, *Rushmore Reviews*

Bob Tu and Helen Rushmore

This article is based on a presentation I have given to hundreds of drilling and other well construction professionals over the last decade. Its purpose is to stimulate discussion around the issue of how best to measure drilling efficiency or performance.

The presentation has often been met with initial resistance, especially from operator staff who have been working hard over a long period to reduce non-productive time (NPT). This is because some of the points I make are taken to question the validity of that work.

I do not question the need for operators to work to reduce NPT but do critically examine some of the assumptions and beliefs that exist, often unconscious and unexamined, within our industry around this topic. In particular those that negatively impact upon real, sustained performance improvement.

For simplicity, I refer to drilling in this article although these issues apply to all operations during the life cycle of a well.

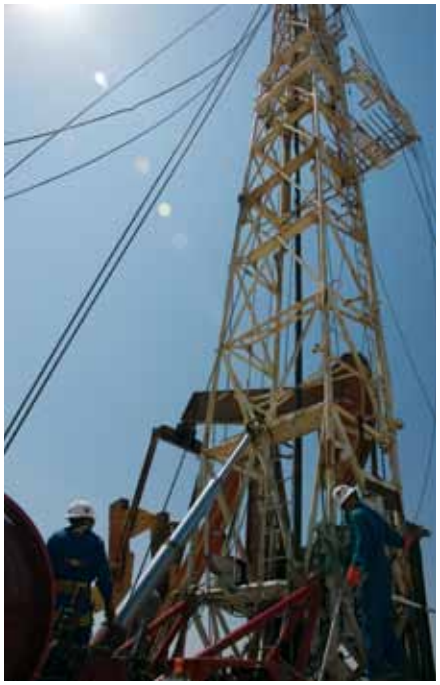
The focus of this article is the use of NPT by operators as a measure of drilling performance. I conclude with a proposal for a better alternative.

I do not address the issue of operators using NPT as a measure of the performance of rigs, drilling contractors, or service companies. I also do not address the use of NPT by contractors as a measure of their own performance.

The presentation has often been met with initial resistance, especially from operator staff who have been working hard over a long period to reduce non-productive time (NPT). This is because some of the points I make are taken to question the validity of that work.

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 17



The only certainty is that the %NPT number, of itself, is quite meaningless.

How Is NPT Normally Reported?

I start the presentation with a question: how is drilling NPT normally reported by operators?

We quickly establish that NPT is normally reported as a percentage. We are all familiar with the term "20% NPT." It can also be reported as time, as in hours or days, but no one has ever told me that they have seen it reported any other way.

Interestingly, nobody has ever asked me, in over fifty presentations, to explain what I mean by NPT. While some operators prefer the term "trouble time" or some other similar alternative, it is always taken by the people at the presentations that they, and everyone else, understand what NPT is without any need for definition or clarification. It is a ubiquitous term within our industry and its meaning is usually taken to be self-explanatory.

I put forth the following proposition: as it would appear, therefore, that every operator in the world reports their NPT as a percentage, there cannot be anything wrong with that, can there?

At this point, many people become suspicious that this is a trick question. I acknowledge this and ask everyone to take their time to consider the question for a moment and to mention if they see anything wrong with reporting drilling NPT in percentage terms. Normally, no one has a problem with this. Hardly surprising, however, since operators have been reporting NPT in percentage terms for as long as anyone can remember.

Which Is Better, 10% NPT or 20% NPT?

Two identical wells were drilled. The first had 10% NPT; the second had 20% NPT. Which well was drilled with the better performance or, to put it another way, which well was drilled most efficiently?

A decade ago just about everyone said that the well with 10% NPT had the better performance. **Figure 1** shows an overview of company growth since 1989.

Many people, now very highly suspicious of a trick question, avoid answering at first and ask questions for clarification. These often revolve around the issue of differences between the wells, but I confirm that these two vertical land wells were technically identical, drilled one after the other by the same rig from the same pad to the same depth using the same casing design, mud program, etc., staying parallel all the way to TD.

These days around three-quarters of the people questioned say that the well with 10% NPT represents the better performance. Nobody chooses the well with 20% and around a quarter respond that they do not know. I confirm that the correct answer is that it is not possible to tell.

In fact, the well with 20% NPT was by far the better performer. The first well

took 100 days to drill with 10 days of NPT (10% NPT) while the second well was drilled in 50 days, still with 10 days NPT (20% NPT).

Percentage NPT Is Meaningless

Percentage NPT (%NPT) is meaningless as a measure of performance because both the numerator and denominator can change independently.

At this point, I get a chorus of objections. One of these is "Why did the first well take 100 days when it could have been drilled much faster?" The answer is that it was drilled slowly and inefficiently presumably for many reasons, but the operations only stopped, or unplanned operations only happened, for 10 days out of the 100. The other 90 days were spent doing planned operations but clearly doing them either conservatively or inefficiently.

This is taken from a real life situation I experienced when working with an operator in the Netherlands. I have rounded the figures, of course, to arrive at neat 10% and 20% values. However, this operator's management were very unhappy when drilling NPT increased from 17% on Well 1 to 28% on Well 2 and demanded to know what had gone wrong. We explained that what had gone wrong was that the drilling had become much more efficient.

Like the folks at my seminar, suspecting a trick question, the management here suspected a trick answer. In their view, higher %NPT meant worse performance, and lower %NPT meant better performance.

After much debate, head-scratching, and residual reluctance of some, it is accepted that NPT, as defined and used in the drilling business, does not relate to any meaningful measure of performance or efficiency.

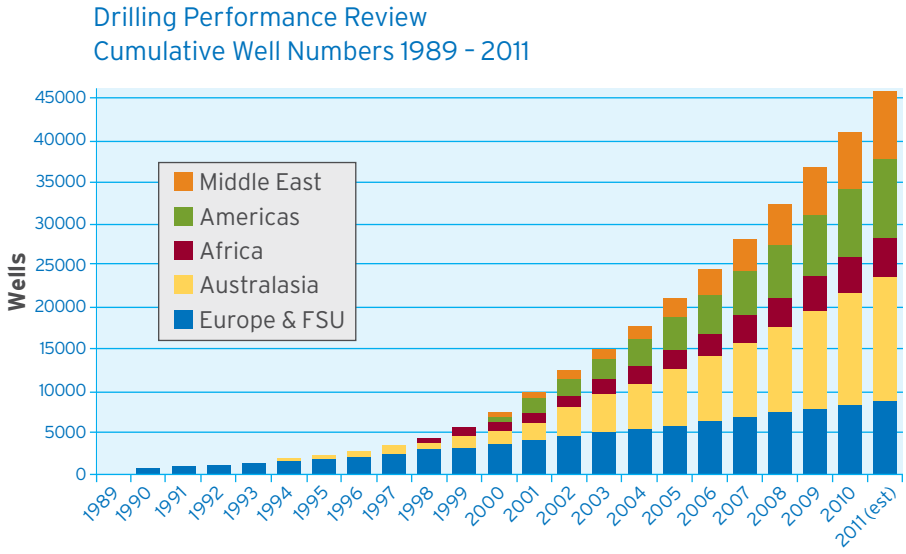


Figure 1 – Cumulative well numbers showing company growth since 1989

Total drilling time (the denominator) varies between wells as does NPT time (the numerator). As a result, the percentage value obtained by dividing one by the other can provide no meaningful or useful information.

At this point, someone usually says, "But if all other factors are equal, when %NPT goes up the well performance is getting worse." That is correct, but not all other factors are equal.

Some wells are drilled very efficiently when NPT is not happening – that is, during the productive time (PT) – and some wells are drilled very inefficiently when NPT is not happening.

If all wells were drilled with the same level of efficiency during PT and the only variation was NPT, then indeed %NPT would be meaningful. However, it is clear that this is not the case.

I now suggest, somewhat mischievously, that the easiest way to reduce %NPT is to just drill very slowly. This is because any increase in "total drilling time" will automatically cause %NPT to decrease.

It is always accepted, although grudgingly by some, that lower %NPT

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 19

I put forth the following proposition: as it would appear, therefore, that every operator in the world reports their NPT as a percentage, there cannot be anything wrong with that, can there?

can mean a more efficiently drilled well, and higher %NPT can mean a more efficiently drilled well. It all depends on whether it is the NPT time increasing or reducing or whether it is the total drilling time increasing or reducing or a combination of the two.

The only certainty is that the %NPT number, of itself, is quite meaningless.

Is There a More Meaningful Way to Report NPT?

Once we all agree that %NPT figures are of no practical use, I ask, "Is there a better way to report NPT than as a percentage?"

The answer is yes. Those operators who report drilling speed as "days per 10k ft" or similar can solve the variable denominator problem by reporting "NPT days/10k ft" or similar. This works because a foot is always a foot, it's never sometimes nine inches and other times 15 inches.

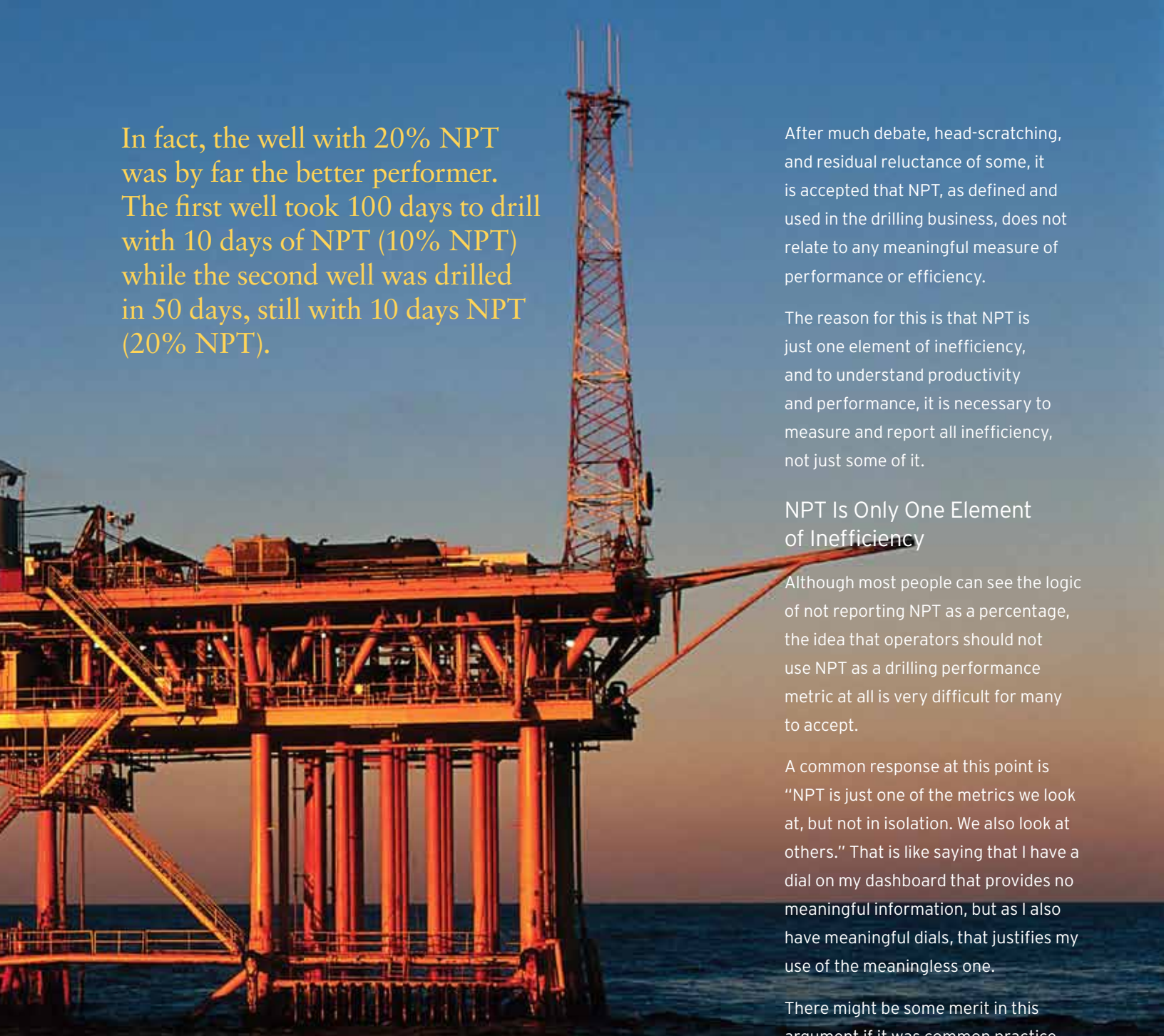
Great, problem solved, but did it really need a seminar to arrive at this conclusion?

NPT, in any terms, should not be used as a measure of drilling performance

Unfortunately, this is not "problem solved" at all because, (and here's where it gets really challenging for some), operators should not be using NPT as a measure of their drilling performance at all – regardless of how it is calculated.

This claim is a challenge to conventional thinking in our industry, so it is helpful to take an external example. Let's consider a car factory that can make 1,000 cars every 24 hours.

On Monday, the production line was stopped for 12 hours by a problem, and the factory produced 500 cars.
I ask, "What – in the usual way we would present this figure in our industry – was



In fact, the well with 20% NPT was by far the better performer. The first well took 100 days to drill with 10 days of NPT (10% NPT) while the second well was drilled in 50 days, still with 10 days NPT (20% NPT).

the NPT of the factory on Monday?" The answer is 50%.

On Tuesday, the production line did not stop at all, and they performed no unplanned operations. However, they had various problems that caused the production line to run slowly, and they made 500 cars. I ask, "What was their NPT on Tuesday?" They answer, "0%."

I say, "Let's make sure we are clear about this. The factory can make 1,000 cars a day. On Monday, they made 500 cars and had 50% NPT. On Tuesday, they made 500 cars and had 0% NPT."

I ask, "What does NPT (as defined and reported in our industry) actually tell you about the performance of the factory?"

After much debate, head-scratching, and residual reluctance of some, it is accepted that NPT, as defined and used in the drilling business, does not relate to any meaningful measure of performance or efficiency.

The reason for this is that NPT is just one element of inefficiency, and to understand productivity and performance, it is necessary to measure and report all inefficiency, not just some of it.

NPT Is Only One Element of Inefficiency

Although most people can see the logic of not reporting NPT as a percentage, the idea that operators should not use NPT as a drilling performance metric at all is very difficult for many to accept.

A common response at this point is "NPT is just one of the metrics we look at, but not in isolation. We also look at others." That is like saying that I have a dial on my dashboard that provides no meaningful information, but as I also have meaningful dials, that justifies my use of the meaningless one.

There might be some merit in this argument if it was common practice to look at NPT metrics in combination with feet per day metrics – particularly on the same chart or in the same table. This would at least allow some mental arithmetic to determine whether the change in NPT is because of decreasing NPT or increasing total time.

How many times, however, have you seen a slide presentation of NPT reduction which also showed

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 21

It is a similar rationale that influences some operator staff to avoid introducing new technology.

corresponding changes to "feet per day" or any other relevant metrics?

Using NPT as a Measure of Drilling Performance Is Harmful

Is the point I am making here perhaps technically correct but of little relevance to the day-to-day business of the industry?

I propose that it is of real relevance because the use by operators of NPT as a measure of drilling performance is not just meaningless – it is actually harmful.

This is because it encourages false reporting, drives undesirable behaviors during the planning phase and at the wellsite, and often results in operators wasting resources by taking an ineffective approach to performance improvement.

False Reporting

To illustrate, let's consider some real drilling data.

Some years ago, a well was submitted to the *Drilling Performance Review* that had been drilled in 65 dry hole days (spud to TD) with less than 4% NPT. This was queried through the quality control checks since the average for this type of well in the country in which it was drilled was 23% NPT.

The operator confirmed that the data was correct, and in fact, the team working on this well had received a special commendation from management and were featured in their in-house magazine. You might think, therefore, that we must be looking here at a top quartile (Q1) performance well.

In terms of "feet per day" for wells in this class, with a similar level of difficulty, it actually ranked 209 out of 297. In other words, it was a third quartile (Q3) well, one drilled relatively inefficiently. This is despite the fact that all of the 208 wells that were drilled more efficiently than this one had higher levels of NPT.

This reinforces that NPT provides no meaningful information about drilling efficiency. Low NPT does not mean good drilling performance – just like the car factory when the 0% NPT day saw the same number of cars being manufactured as the 50% NPT day.

Many times, I have observed shore-based and rigsite staff arranging wellsite activities in such a way as to avoid reporting time as "non-productive," particularly where operator failures caused, or played a part, in the unreported NPT. This allows the "production line," in terms of the car factory analogy, to run slowly but not actually stop. Do contractor equipment breakdowns tend to be reported more often in full?

I suggest that the exceptionally low NPT of the well mentioned above is a testament, not to operational excellence, but to creativity in avoidance and reporting. I also believe that this is

not an entirely isolated example of this behavior. If this is true, what is driving people to this behavior?

Undesirable Behavior

A drilling manager recently told me that he was looking at well plans produced by two different engineers for essentially identical wells. One of these plans included time for a bit run, and the other did not.

He asked the engineer who included the bit run to explain why he had included it. The engineer replied that although there was only a small chance that the bit would need replacing, he programmed the run because if he did not, and the run was required, it would be classified as an "unplanned operation" and therefore as NPT.

As the engineer was fearful of being judged on NPT on "his well," he would much prefer to include an unnecessary operation that would extend the total drilling time rather than run a small risk of incurring NPT.

It is a similar rationale that influences some operator staff to avoid introducing new technology. Much new technology that could improve efficiency comes with a risk of incurring NPT at first. If the most important thing is to avoid NPT, as in the case of this engineer, then the potential benefit of the new technology is outweighed by the fear of NPT.

I once worked for a major operator that tried to avoid this situation by classifying NPT as either "risk acceptable" or "error avoidable." The idea was that trying something new that had an associated risk of NPT was acceptable, but making errors that were avoidable was not. In a sense, this was "relatively good NPT" and "bad NPT." However, it is difficult enough simply getting all NPT accurately reported, and I understand that the operator has now stopped categorizing NPT in that way.

An Ineffective Approach to Performance Improvement

We'll look at this in more detail below but, in the meantime, here are two questions to consider.

- Is it better to reduce NPT on a well by 10% or to reduce PT on a well by 10%?
- Is it easier for operators to reduce NPT on their wells or to reduce the PT on their wells?

How Successful Has the Industry Been at Reducing NPT?

Operators have been providing resources for decades in order to reduce their drilling NPT. Let's examine how successful this has been.

Some years ago, one of the super-majors was considering whether to benchmark its drilling performance on a global basis. I was invited to make a presentation to their annual drilling manager's conference on the benefits of benchmarking.

Before my session, however, I was told by a couple of their managers that this company had a major problem with NPT, and they should concentrate on fixing this before playing around with things like benchmarking.

When the time came for my presentation, I started by asking them some questions.

- What, roughly, is your drilling NPT this year?
  Their answer: about 23%.
- What was it last year?
  Their answer: about the same.
- What was it five years ago?
  Their answer: about the same.
- What was it ten years ago?
  You can guess the answer.

I have since asked these questions of many other operators, and it appears to be the case that drilling NPT has been pretty consistent as long as records or memories go back.

Of course, there are many SPE and industry papers that demonstrate significant NPT reductions in specific projects or areas. The more important question, however, is whether there are any examples of a reasonably sized operator making a significant and *sustained* reduction in NPT over their whole drilling portfolio. I have yet to see one.

> So, when operators are measuring and reporting NPT, they are primarily reporting another party's very obvious problems, mistakes, and failings.

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 23

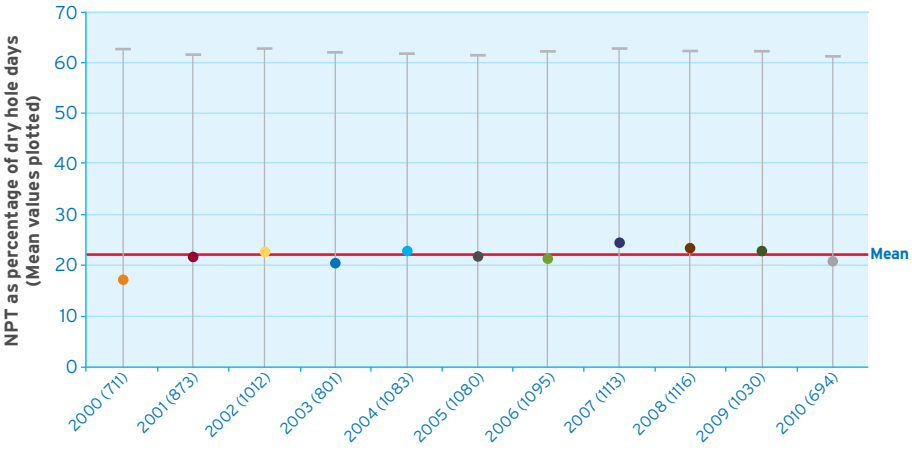


Figure 2 – NPT as percentage of dry hole days by years

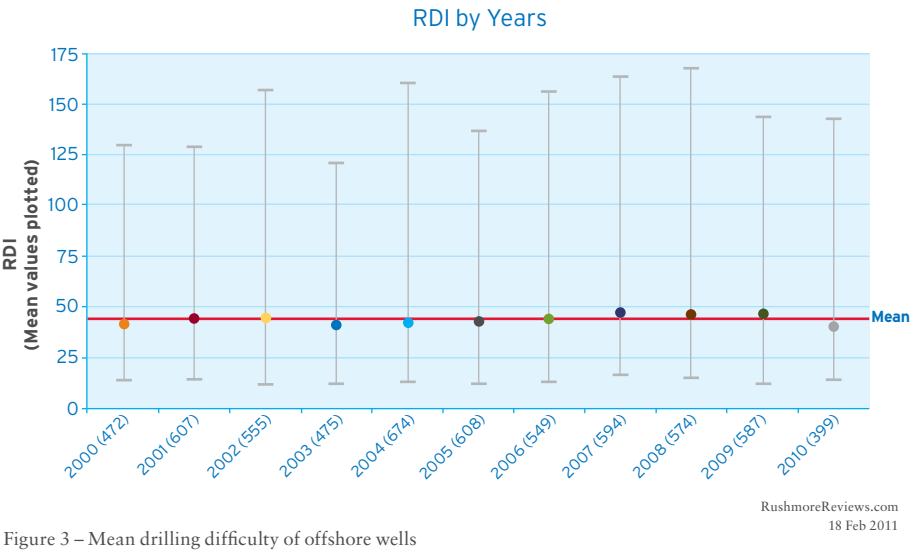


Figure 3 – Mean drilling difficulty of offshore wells

Unfortunately, as wells vary, it is not possible to simply say that because Well #5 was drilled faster than Well #1 it represents better performance or efficiency. It may simply be a much easier well.

Figure 2 shows the mean %NPT for all offshore wells in the *Reviews* database from 2000 to 2010. As you can see, there is no significant change during this period.

When I show this chart, some people say that the reason our industry has not been able to reduce NPT is that wells are getting more difficult – presumably at exactly the same rate at which NPT is reducing.

The chart in **Figure 3** shows the mean "drilling difficulty" of offshore wells from 2000 to 2010.

Wells are not, on average, becoming more difficult to drill. While we are drilling some wells in 2010 that would not have been possible to drill in 2000, the average well

Superficially, it also appears that low NPT means drilling efficiency, and high NPT means drilling inefficiency. Although this is clearly nonsense, it is, nevertheless, a commonly held view within our industry.

is no more difficult today than it was a decade ago. Despite this, NPT remains chronic and highly stable.

A Stable, Chronic Level of Inefficiency

It would appear, therefore, that we work in an industry with a long-term, highly stable, chronic level of inefficiency. Just considering reported NPT for offshore wells, this averages over 20%.

What would the true inefficiency figure really be, however, if we were to also include the "invisible lost time" or the "inefficient productive time"?

What Differentiates Top From Bottom Quartile Operators – Is It NPT?

Have you ever considered what differentiates the best-in-class (BIC), or quartile 1 (Q1), operators from Q4 operators in terms of drilling time efficiency?

Do you think that, maybe, it is their level of NPT? Or have the BIC operators, in the phrase of the 2009 SPE NDT forum in Cadiz, "won the battle to reduce NPT"?

In **Figure 4**, operator 1 (the best-in-class) drills a normalized or standard well in 30 days, with eight days NPT (27%), while operator 5 takes 60 days to drill the same well, with 14 days NPT (23%).

This chart is typical of areas where the BIC operator will drill a well in around half the time of the operator at the other end of the table.

As you can see, what most differentiates the operators is not NPT but their PT.

Therefore, even in the unlikely event that Operator 5 managed to reduce the NPT to zero, that operator would still be a Q3/Q4 performer.

What really separates the best operators is not that they have some secret formula or process for making sure that their rig contractors never have equipment breakdowns or their service companies never have tool failures. The best-in-class operators live with pretty much the same level of contractor and industry inefficiency as everyone else. What differentiates the best operators is their PT is better than the others.

There is very little any individual operator can do to "fix" all the drilling contractors, all the service companies, and all of their other suppliers. It would take many hundreds of engineers, highly trained in manufacturing techniques and other specialties, that could be spared for a few years to work with all their suppliers to tackle this task.

There is, however, a huge amount an operator can do to improve PT which is around 80% of the total well time.

An operator's PT is driven by many factors. These include its culture, policies, and practices. PT is driven by the operator's attitude to performance, the approach to target setting, the relationship with contractors, and the treatment of staff. It is influenced by the operator's approach to business risk and new technology implementation.

An operator has less control over the level of its NPT and more control over

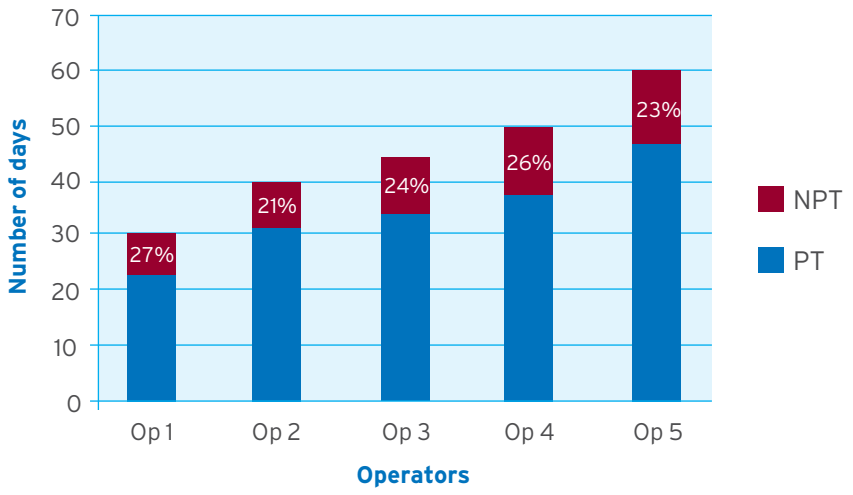


Figure 4 – Days to drill a normalized well, by operator

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 25

*__Note__: *This presentation was made to the SPE forum, "The Battle to Reduce Drilling NPT," in Cadiz in September 2009, to DEA meetings, and to many operators over the last decade. All these meetings have agreed that the rationale for not using NPT as a measure of drilling performance is clear and proven.*

the level of its PT. In that case, does it make more sense, in the long term, for the operator to put most of its performance improvement resources into reducing NPT by 10%, thereby improving well times by 2% or reducing PT by 10%, thereby improving well times by 8% – a factor of four times more?

Clearly, where an operator has an excessive level of NPT, or a specific NPT problem, this needs to be addressed and fixed. Once completed, however, I suggest logic dictates that there is more value to be had by the operator applying 80% attention and improvement resources to PT reduction rather than NPT reduction.

Why Are Operators Still Using NPT as a Measure of Drilling Performance?

So, if the foregoing is true*, why are virtually all operators still using NPT as a measure of drilling performance?

I would like to consider two possibilities.

Who Causes the Most NPT?

To address the first possibility, let's ask the question, "Who, of the various parties involved in drilling, causes most of the NPT?"

Usually, after a rather awkward pause, the "politically correct" answer often provided by operator staff is "Everyone involved does, both operators and contractors."

I then push the point, "Yes, but who causes most? For instance, if you look at a typical operator's NPT report, which parties will you see listed as causing most of the problems that cause the operations to stop?"

At this point, where both operators and contractors are present the contractors will identify themselves as being blamed for causing most of the reported NPT.

Despite the operator's frequent hesitation to answer this question, it does stand to reason that the parties who provide virtually all of the equipment, services, and labor required to construct a well will also be the originators of most of the problems. It is the drilling contractors, the service companies, and their suppliers that cause most of the NPT.

Contractors primarily cause NPT. It is very visible and is very easy to report. And, as NPT is universally reported and can easily be assigned an enormously high dollar value, it becomes the obvious target for attention, especially when wells cost too much.

So, when operators are measuring and reporting NPT, they are primarily reporting another party's very obvious problems, mistakes, and failings.

Now, I would like you to consider this: is there something in all of us that prefers to focus on what other people are getting wrong? Do we all tend to see other party's failings with a greater clarity and concern than we see our own?

A Desire for a Single Measure of Drilling Efficiency

We can now consider a second possible reason for operators using NPT as a measure of drilling performance despite its obvious flaws and harmful influence.

Have you ever considered how a manager, particularly one from a non-drilling background, is able to judge drilling performance? Some companies and managers put a lot of faith in "planned" vs. "actual" performance figures. This has the benefit of being a very easy metric to understand and use. Where actual is better than planned, the performance is judged to be good and vice versa.

A limitation of using planned vs. actual as a performance measure is that, over time, the planned figures become determined by the actual performance. This is because the planners aim to estimate the actual performances as accurately as possible.

A number of operators have made presentations at the *Reviews* annual meetings containing a common theme; "we thought we were performing well, hitting our internally set targets, until we started benchmarking. We then found out that we were actually planning Q3 wells!"

Unless operators know where their planned targets sit in relation to their competitors, planned vs. actual performance bears no relationship to "real-life" achievement.

So, perhaps the manager can use "feet per day" or "cost per foot" figures to determine whether drilling performance is getting better or worse.

Unfortunately, as wells vary, it is not possible to simply say that because Well #5 was drilled faster than Well #1 it represents better performance or efficiency. It may simply be a much easier well.

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 27

The difference between the BIC and the well you just drilled, or the well you are planning, is the GTBIC.

It is even more difficult with "cost per foot" as the company's contracting strategies, normally outside the control of the drilling group, may result in a spread rate higher than the competitors before the well is even designed.

Given the need for management to judge drilling performance in some way, is there an attraction in using NPT to do this? NPT is a single, easy to measure metric that unlike feet per day, cost per foot, or planned vs. actual needs no normalization or further complication. Superficially, it also appears that low NPT means drilling efficiency, and high NPT means drilling inefficiency. Although this is clearly nonsense, it is, nevertheless, a commonly held view within our industry.

These are two theories that might explain, at least in part, why NPT remains a popular, yet deeply flawed, measure of drilling performance among operators.

Finally, before we move on, let me repeat that it is perfectly valid for operators to measure and report the NPT of rigs, drilling contractors, service companies, etc., as part of a total measurement of their efficiency. If a rig has problems with its drawworks breaking down leading to stoppages, the operator must work with the drilling contractor to fix the root cause and move forward.

Is There a Better Measure of Drilling Performance/ Efficiency?

There is, in my view, a desire from management for a single measure of drilling performance or efficiency. If that desire cannot be met by using NPT what might be a better alternative?

An alternative is to measure and report both "visible lost time," aka NPT, and "invisible lost time."

The concept of invisible lost time is well known within the industry, and many SPE and industry papers have examined it.

How many operators actually measure and report invisible lost time? I am not aware of any that do, unless, perhaps, we consider the "technical limit" approach as providing a measure of total lost time.

The "Technical Limit" Approach

There are a number of operators who calculate the technical limit for wells they drilled.

The technical limit is, effectively, the time it would take to drill the well perfectly. In other words, with zero visible or invisible lost time. I am aware that technical limit has no standard industry definition and that some will define it somewhat differently; but, in general, I think this is a fair description.

If the technical limit for a well is 40 days and the operator takes 60 days to drill it, the total "lost time" is 20 days. Conceptually this works well; in practice, however, there is a problem.

This is establishing what the technical limit actually is. There have been a number of wells submitted to the *Drilling Performance Review* showing that an operator has drilled a well faster than its technical limit, even while reporting a significant level of NPT. Clearly, the operators of these wells were not able to establish a technical limit anywhere near where it really should be. There are also industry papers describing how an operator has beaten the technical limit.

The technical limit for a well is usually established by educated guesstimating the minimum times for all operations and adding these or using probabilistic techniques to derive a "fastest possible" time. This can lead to highly variable results, sometimes producing times that can be bettered relatively easily. As such, it is an unreliable benchmark for performance or efficiency measurement purposes although the technique is very valuable in many other aspects.

The "Composite Well" or "Best-of-the-Best" Approach

Some operators set a benchmark for themselves by using the fastest times they have ever achieved for each well section and adding these to provide a target that is their best-of-the-best well.

They then measure the gap between their actual performance and their best-of-the-best well. This does provide

If the technical limit for a well is 40 days and the operator takes 60 days to drill it the total "lost time" is 20 days. Conceptually this works well; in practice, however, there is a problem.

Should an Operator Use NPT as a Measure of Drilling Performance?

Continued from page 29

a rational target based on data and so avoids the problems with technical limit.

Its weakness is that normally the operators using this technique are just measuring themselves against themselves without external reference. It is possible for an operator to be achieving results very close to its "best composite" while being some way behind the BIC operator.

In this regard, it shares with the arbitrary planned vs. actual approach the drawback of potential complacency.

A number of operators made presentations at the annual *Reviews* participants meeting explaining how their previous complacency was caused, at least in part, by either arbitrary (planned vs. actual) or other inward-looking or theoretical metrics.

Gap to Best in Class

Let's take a sporting analogy. Suppose you have an ambition to win the Olympic gold for the 100-meter sprint. What benchmark figure will you focus upon?

You could take the technical limit. You could ask various experts what they think would be the fastest possible time that the perfect runner could achieve. You will, I suspect, get a range of figures. How would you know which one is right, and does it even matter?

Alternatively, you could take a composite or best-of-the-best time by adding the record for 0 to 10 meters to the best time for 10 to 20 meters and so on until you get a theoretical, composite best time for the whole 100m, which has never been achieved.

> Some operators set a benchmark for themselves by using the fastest times they have ever achieved for each well section and adding these to provide a target that is their best-of-the-best well.

Or, for a lot less effort, and a real-life target, you could take the current world record of 9.58 seconds.

The key measure then becomes the gap between your personal best and the record. If you want to get sophisticated, you could also measure the rate at which the record is being improved and extrapolate what it is likely to be by the time you compete in the Olympics.

I have been asked why Unocal in Thailand participated in the *Drilling Performance Review* every year when they already knew that they were best in class. The Unocal folks told me that they wanted to see how fast they were improving compared to how fast their competitors were improving. It is a characteristic of highly performance-focused people and organizations that they do not succumb to complacency. They change their focus from absolute position in the benchmark to their comparative rate of improvement vs. their competitors.

Bringing the sports analogy back to drilling, rather than focusing on a theoretical target, an operator can identify the "world record" well within a class and then measure the gap between its wells in that class and the world record, country record, or well type record as appropriate.

This measure of gap to best in class, (GTBIC) is a real indicator of relative drilling performance or efficiency.

Some operators use a specific BIC well while others use a figure taken from the average of the top 5% of best-in-class wells. In either case, the value obtained is considered the BIC number.

The difference between the BIC and the well you just drilled, or the well you are planning, is the GTBIC.

This is the difference between the time that the best-in-class operator would take to construct a well and the time it takes "me" to construct that same well. This measure has a lot of advantages; but, if nothing else, it is much more difficult to falsely report the days from spud to TD than the time spent on NPT. The gap will include invisible lost time/inefficient PT and technology advantage time as well as NPT.

In the car factory analogy, it is the difference between the 1,000 cars a day best performance and the 500 cars a day achieved performance.

With some operators, it is necessary for the GTBIC, or the quartile position of the planned well, to be provided in order to obtain approval for an AFE. This allows for a calibrated discussion about whether the planned time is overly ambitious (have we ever managed to drill a Q1 well of this class in this area before?), or sandbagged (why are we planning a Q3 well when we can achieve Q2 for this class of well in this area?).

Where an operator has access to reliable global offset performance data, the calculation of the GTBIC is relatively easy. It is possible to establish a GTBIC figure for the vast majority of planned wells. The GTBIC can be calculated for an individual well, a group of wells, the performance of an operator in a specific country or region, or globally.

In the very small number of cases where relevant global offset data may not be available, a calculated "technical limit" can be used as an alternative.

The GTBIC is not a perfect measure of drilling performance or efficiency, but it is better than using NPT and possibly better than any other metric being used for this purpose. It causes the personnel involved in drilling to focus on excellence rather than just avoiding trouble and is less susceptible to false reporting.

Peter Rushmore
Peter@rushmorereviews.com

The GTBIC is not a perfect measure of drilling performance or efficiency, but it is better than using NPT and possibly better than any other metric being used for this purpose.