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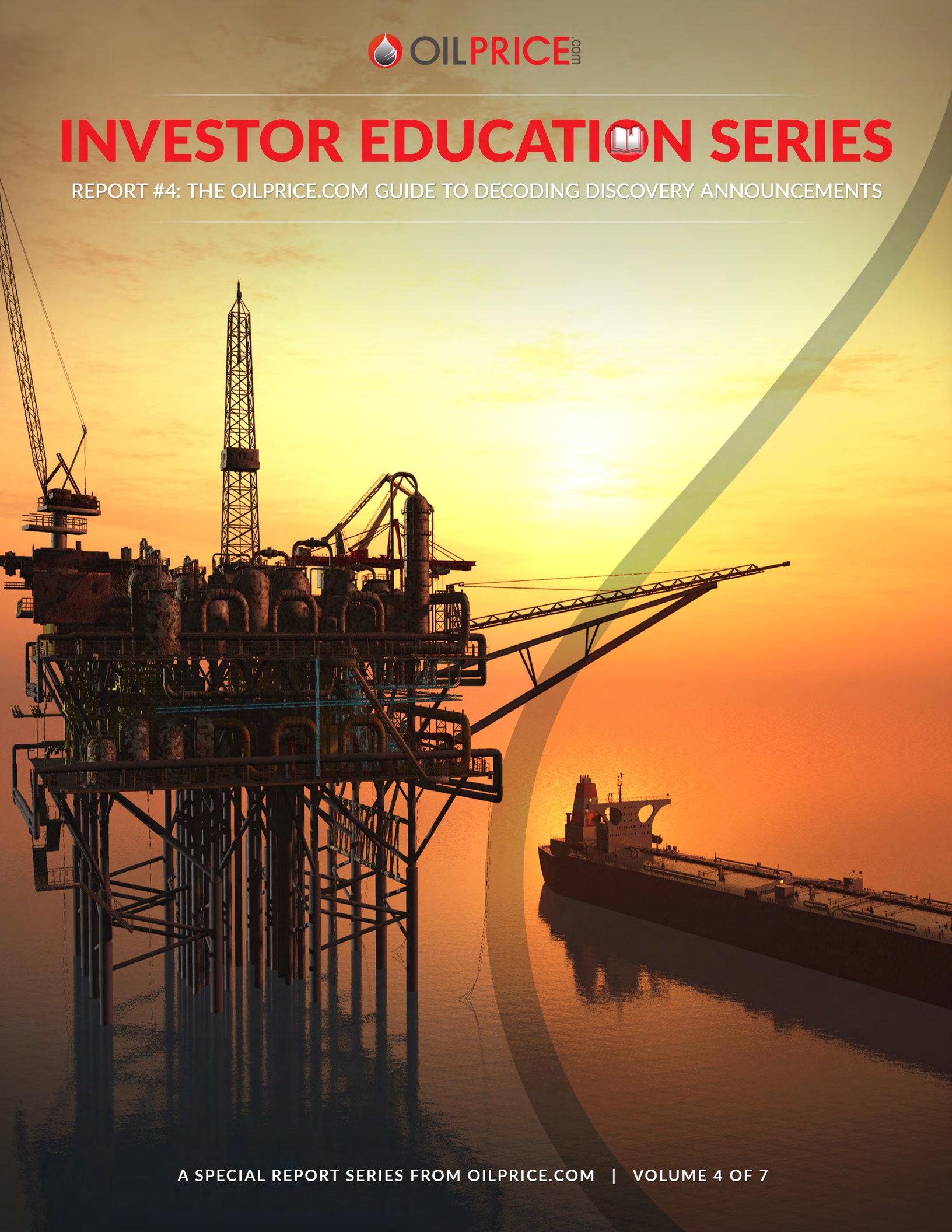
REPORT #4: THE OILPRICE.COM GUIDE TO DECODING DISCOVERY ANNOUNCEMENTS



A SPECIAL REPORT SERIES FROM OILPRICE.COM | VOLUME 4 OF 7

Oil and Gas Discoveries: Sheep in Wolves' Clothing

The Oilprice.com Guide to Decoding Discovery Announcements

Since the onset of the shale boom, oil and gas companies have regaled us almost daily with new announcements of discoveries couched in ambiguous terms like "significant" and "massive". These terms are ambiguous for a reason: To lure investors in to help finance the development of new discoveries. The bigger and better it sounds, the more money is likely to pour in, so spin is everything. The PR aspect of the industry is filled with a great deal of sheer nonsense, and the educated investor will know how to wade through this.

Amid the tsunami of discovery press releases, we are flooded with oil and gas industry code that is impossible for the layperson to decipher. Terms such as "wireline logs", "drillstem tests", "gross reservoir interval", "casing", and "suspending" confuse to the point of no return. In all the tumult, the potential investor focuses singularly on terms that are easier to run through the decoder—such as 'significant'—but have no definable meaning. Investors get trapped in the discovery lingo.

Understanding the terminology at play here can make or break your investment. So our goal with this 20-page special report is to tear apart the terminology for you, dissect these discovery press releases, and paint for you a more realistic picture of what's actually going on. This knowledge will improve your ability to make wise investment decisions based on discovery announcements. It will also give you the tools you need to decipher a discovery as clearly as possible. We will start at the top and work down, with a more hands-on look at an actual discovery announcement. We'll tear it apart, phrase by phrase, and then see if it's still a potentially worthwhile investment.

In this report, you will learn these essential investing tricks of the trade:

- How to interpret and assess a company press release
- Why the nature of discovery size is so ambiguous
- How to decode the less ambiguous but highly complicated, technical terminology used in discovery press releases
- How to put it all together into a bigger picture for smart decision-making
- How E&P companies over-report, or inflate discoveries and reserves

Part I: The Exaggeration Game

Right off the starting blocks, you absolutely must be aware that oil and gas companies have an almost sociopathic tendency to exaggerate their discoveries. Lulled into a false sense of security themselves, they exaggerate either because they believe they really have struck it even bigger than the data is showing—so no harm done if they present a grander picture than they should—or they purposefully exaggerate to attract more cash from investors. There are also cases of outright lies and massive hype around a discovery that doesn't even exist (but we'll address this in a subsequent report on scams and fraud). Either way, exaggerating is easy, but your job to get to the real story is a tough one that requires a fair amount of research. If you understand this going into the game, you are already one step ahead of everyone else.

Exaggerating the size of discoveries is a sure-fire way to attract investors. Not only do you have to watch out for discovery exaggerations or outright lies, you also have to be aware of the trickier tendency of companies to exaggerate how much oil and gas can actually be extracted from

a discovery. Don't be blinded by the initial numbers, as we've stressed repeatedly in previous reports. Even the big companies are guilty of inflating reserves and exaggerating discoveries.

Cases in Point

In 2014, Marathon Oil Corp. CEO Lee Tillman told investors that the company was potentially sitting on 4.3 billion barrels of oil in its US shale acreage. But in filings to US federal regulators, the potential was shockingly lower (5.5 times lower, in fact).

Investigative journalists—led by Bloomberg--have helped us to learn that 62 out of 73 shale companies in the United States have reported dual estimates of the amount of oil and gas they are sitting on—one estimate for the investors (the public) and an entirely different one for the authorities, namely the Securities and Exchange Commission (SEC).

- Pioneer Natural Resources has given investors an estimate 13 times higher than it gave the SEC
- Goodrich Petroleum Corp has given investors an estimate 19 times higher than it gave the SEC
- Rice Energy Inc. (part of EQT) has given investors an estimate 27 times higher than it gave the SEC

If you're an institutional investor, you will already be privy to this knowledge—and most likely that will also be the case if you are an experienced oil and gas investor. But for the smaller, new investors, these creative numbers do exactly what they are intended to do: bring in more capital investment.

There are a number of estimates in this game that are not regulated by the authorities, so companies can tell the public pretty much anything they want without consequence. They can (and do) employ hard-hitting marketing to sell:

- Prospects that have never been drilled, and may never be
- Exaggerated resource potential **(Bloomberg says the average estimate of resource potential given to the public is 6.6 times higher than the estimate given to the SEC)**
- Wells that will take a long time to be drilled, without any estimation
- Wells that promise big potential but for which there is no estimate of the cost of drilling

And keep this in mind if you are considering a shale 'discovery'. Shale production is still relatively new and we really don't know what the *ultimate recovery* will be. So, for now, companies can get away with making some high-minded assumptions with the SEC's blessing. It will be decades before we truly know enough about *ultimate recovery* of oil and gas from shale. What companies are doing here is making a huge leap—i.e., guessing—that they will be able to recover a specific amount of oil and gas from shale through secondary recovery methods. But the truth of the matter is, they do not know.

PART II: Dissecting a Discovery

Let's start by dissecting a January 2015 discovery announcement by a Dallas-based independent exploration and production company:

> Venari Resources LLC, a deepwater oil exploration and production company in the Gulf of Mexico, today announced a **very large** oil discovery at its **Anchor prospect located in Green Canyon Block 807**.

The Anchor-2 Well, which spud in August 2014 and drilled in 5,183 feet of water to a total depth of 33,749 feet, encountered significant high quality oil pay in multiple Lower Tertiary Wilcox Sands. The discovery is located approximately 140 miles off the Louisiana Coast. Venari holds a 12.5% working interest in Anchor. Other co-owners are Chevron U.S.A. Inc., a subsidiary of Chevron Corporation as operator (55%), Cobalt International Energy, L.P. (20%) and Samson Offshore Anchor, LLC (12.5%). Appraisal drilling will commence in 2015.

"Anchor is an exceptional discovery in the Lower Tertiary play demonstrating the vast potential of this region of the Gulf," said Brian Reinsborough, Chief Executive Officer and President of Venari Resources. "I am very proud of what our team has accomplished in the short two and a half years since our formation. We continue to be excited by the prospects in the deepwater Gulf of Mexico as we build our business into an industry leader."

Venari's strategy of non-operated exploration in the deepwater Gulf of Mexico has enabled it to form partnerships with some of the most successful explorers in this resource-rich region, including Chevron Corporation, ConocoPhillips and Anadarko Petroleum Corporation.

HOW LARGE IS "VERY LARGE"?

First things first: The press release describes this Gulf of Mexico discovery as "very large"—a term we can only attempt to understand through oil and gas industry philosophy and a smattering of linguistic psychology.

> Venari Resources LLC, a deepwater oil exploration and production company in the gulf of Mexico, today announced a very large oil discovery at its Anchor prospect located in Green Canyyon Block 807.

"Very large" is not a term that is in popular use in discovery announcements. More frequently, we will hear a discovery described as "significant", "massive" or "gigantic". "Very large" is presumably intended to be a more sober rendering of these three more colorful descriptors. On the flip side, when a discovery is "small", the announcements tend to leave out the adjectives and go straight to plain "oil discovery".

In relation to the press release at hand, we give Venari high marks right from the start for being sober. However, upon further research, you will also learn that Venari is the smaller partner in this discovery, which is described by Chevron as "significant". Another smaller partner, Cobalt, also described the discovery as "significant".

PROSPECTS, BLOCKS, AND PLAYS, OH MY!

The discovery notice refers to "Anchor prospect located in the Green Canyon Block 807". But what is a prospect anyway?

To decipher this, you'll need to understand what a *prospect* is in relation to a *block*. The term ***prospect*** can mean different things:

- Geologically speaking, a prospect is an area of exploration in which hydrocarbons have been predicted to exist in economic quantity.

- The industry also refers to a single drilling location as a prospect. This is, however, not exactly correct.

A group of prospects forms a ***play***, while a ***block*** is a large area of land within a prospect, typically representing 1000s of square kilometers.

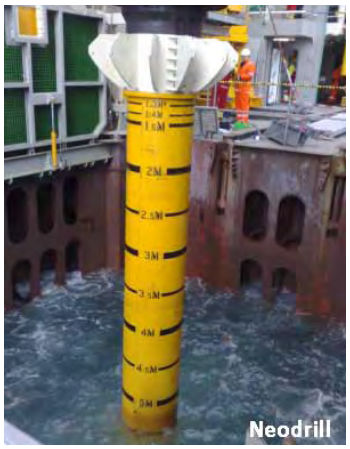
In this case, if you do your homework, you will learn that Venari's Anchor Prospect in the Gulf of Mexico looks like this (and is surrounded by other prospects and discoveries):

Where these press releases fall short is in describing the location. While we know this is the Gulf of Mexico, in the deep waters, we know nothing about what is being explored nearby, or what has already been discovered nearby. Further research will show us that the Anchor prospect is located about 140 miles off the coast of Louisiana, and is part of the Anchor-2 well.

This is where the discovery was made, and it was the second well in Anchor (as the name suggests), the first having been abandoned due to technical difficulties in 2014.

SPUD

The Anchor-2 well was spud in August 2014.Spudding is the process of preparing a well to be drilled. This is the real start of drilling. A larger drill bit is used to drill a surface hole, which is then lined with casing and cement to protect groundwater. Rock, dirt, and other sedimentary material is removed with the drill bit to clear the way for further drilling. This example, however, is referring to an offshore operation, so spudding is a bit different—and a bit more complicated. In deepwater prospects, the rig crew spuds the well by lowering a first string of conductor casing down to the seafloor. This casing is usually at least 36 inches in diameter and is actually part of the structural foundation of the well. A wellhead assembly—which is above the sea floor--is welded to the top of the conductor casing. The wellhead assembly is the anchor for the rest of the casings that will be lowered down after the initial spudding.



> "The Anchor-2 Weil, which spud in August 2014 and drilled in 5,183 feet of water to a total depth of 33,749 feet, encountered significant high quality oil pay in multiple Lower Tertiary Wilcox Sands."

DRILLING DEPTHS

The Anchor-2 well was drilled in 5,183 feet of water to a total depth of 33,749 feet. This means that they started drilling 5,183 feet under water, and went 33,749 feet beneath the seabed.

Of interest here is how depths compare from play to play. A depth of 33,749 feet beneath the seabed is quite impressive and represents the far limits of ultra-deepwater drilling.

The deepest offshore oil well in history was drilled in September 2009 to a depth of 35,050 feet. It was also the site of the disastrous 2010 BP-Macondo oil spill in the Gulf of Mexico. Another rival for the ultra-deepest is another well drilled by Chevron in the US Gulf of Mexico, also in the Green Canyon (Block 512), which reached a depth of 34,189 feet, but under 3,500 feet of water. So how deep did they go? This is an ultra-deep play, which is the final frontier of offshore exploration—it's impressive, as well as impressively expensive. A single ultra-deepwater well can cost in the neighborhood of $300 million (and this was the second well, the first one having been abandoned due to technical complications). This compares to an onshore shale well, which can be completed for $10 million or less, and

a conventional onshore well, which can in some places be completed for as low as $500,000.

HIGH-QUALITY OIL PAY

There are many types of crude oil produced around the world. *The two most important qualities are density and sulfur content*. In terms of ***density***, we're looking at light to heavy, and in terms of ***sulfur*** we're referring to sweet or sour. Light, sweet crude is the most valuable, and hence usually referred to as the highest quality. Light, sweet crude has a lower density, or a higher degree of API gravity, along with low sulfur content. They typically fetch higher prices than heavy, sour crude, which requires more processing.

LOWER TERTIARY

> "Anchor is an exceptional discovery in the Lower Tertiary play demonstrating the vast potential of this region of the Gulf," said Brian Reinsborough, Chief Executive Officer and President of Venari Resources"

The term ***Lower Tertiary*** is often used to immediately indicate ultra-deepwater drilling in the Gulf of Mexico. The lower tertiary is used by the oil and gas industry to refer to a layer of the earth's crust deposited during the Paleogene period, which was between 65 and 23 million years ago. This is a level to which no one was able to drill prior to 2006, while traditional offshore drilling typically reached only as far as the younger, Miocene period rocks.

WILCOX SANDS

The Wilcox Sands, or the Wilcox Trend, is a formation that extends both onshore and offshore, from south Texas, across central Louisiana, to the Mississippi border. This has always been a highly prospective area, but it wasn't due to the technological revolution that ushered in the shale boom and ultra-deepwater drilling capabilities that the excitement became a reality.

> "Venari's strategy of non-operated exploration in the deepwater Gulf of Mexico has enabled it to form partnerships with some of the most successful explorers in this resource-rich region, including Chevron Corporation, ConocoPhillips and Anadarko Petroleum Corporation."

What's missing from this press release? Quite a lot, actually. Venari is a non-operator and the smallest partner in this project, with a 12.5% interest, so if you want more information you could also look at what the partners are putting out there, as they are the ones who are actually drilling. In this particular example, Chevron's press release didn't really offer additional information.

APPRAISAL DRILLING

The well that was spud in August 2014 was an appraisal well. Now the appraisal drilling program can begin. ***The purpose of the appraisal drilling program is to determine the physical extent, reserves, and likely production rate of a field.*** This is where all the real information about a discovery comes from, and where any uncertainties about the discovery are reduced. In this case, the only information we are offered is that appraisal will begin in 2015—so at any time between January 2015 and January 2016.

Overall Assessment

Dissecting a discovery press release such as this one is a crucial exercise that points you in the right direction for further online research. This particular press release offers very limited information for potential investors. Without appraisal

having begun, and without any information whatsoever with regard to potential, we are left with only the abstract idea of what 'significant' or 'very large' may mean, and these are extremely relative terms.

Now, let's look at another press release, this time from a smaller, onshore E&P company:

Madalena Energy Inc. ("Madalena" or the "Company") (TSXV:MVN and OTC:MDLNF) is pleased to provide the following operational update.

Madalena has made a new oil and gas discovery (100% WI) in the Nordegg formation through the drilling, casing, and stimulation of an exploratory well. The well was drilled horizontally in the Nordegg formation to a total measured depth of ,533 metres, with a horizontal lateral section of approximately 830 metres in length. The well was subsequently completed, stimulated and flowed-back on clean-up for 67 hours.

During the 67 hour clean-up period the well flowed continuously up 7 inch casing at an average rate of 396 bbls/d of oil and 1.6 MMscf/d of natural gas for a total of 663 Boe/d (60% Oil). During the final 24 hours of the clean-up period the well flowed at an average rate of 367 bbls/d of oil and 2.1 MMscf/d of natural gas for a total of 718 Boe/d (51% Oil).

During the total 67 hour clean-up period the well recovered a total of 1,100 Bbls of 30.5° API oil, 4.5 Mcf of natural gas and 1,416 barrels of water.

This exploration well was drilled and stimulated for an estimated cost of CDN $2.3 million and is currently being prepared for an extended flow test.

Madalena holds over 140 net sections of Nordegg rights across its land base in the greater Paddle River area and has an inventory of potential horizontal drilling locations.

Additionally, Madalena has drilled and cased two Ostracod horizontal wells (100% WI) offsetting its Paddle River Ostracod oil pool. As these wells were drilled from the same surface pad field operations are being staged. Completion operations are currently ongoing.

TSXV/OTC TICKERS

It is important to know specifically to which kind of company a press release is referring. This is where the tickers come into play. TSX companies are those listed on the Toronto Stock Exchange, while the "V" in TSXV stands for "venture" and is for companies listed on Canada's TSX Venture Exchange. This is a public venture capital marketplace for emerging companies. The "emerging" is an important delineator for a potential investor. TSX Venture is owned by TSX and is an exchange for start-up and developmental and exploration companies seeking financing. It is similar to the OTC BB in the United States. This is the world of junior start-up companies, and there are hundreds of them through which to sift. Here are some quick facts you need to know about TSXV companies to help you mitigate risk:

- These are very high-risk companies because they are developmental and exploration start-ups.
- These are micro-cap companies who can't get listed anywhere else to access public markets for capital. Companies with tiny market values (as low as $1 million) can go public on this exchange, while the average market cap value of these companies is around $16.9 million. These are not at all like U.S. NYSE-listed companies who must have significant revenues, values, or capital requirements before listing.

- Many of the companies will appear at first glance to be shell companies because they have little or nothing to show by way of actual development; most have no sales.
- The majority of the stocks under this ticker will more than likely never see any profit, but do experience very erratic short-term trading.
- Many of these companies will go bankrupt, while you will find that most are funded with less capital than they need to make a go of it.
- There are, however, some extremely good companies here, but determining which ones they are requires a great deal of research into assets and management. If you manage to find the right one, you can make some amazing profits, but you can usually get in on these companies on the ground floor, for pennies. In these situations, it is imperative to first do extensive research (and information is out there for these stocks, as required by Canadian law), and then make a call to the company to get an idea as to what kind of management you're dealing with.
- There are over 2,400 companies listed on the TSXV exchange.

In this particular case, we are looking at a junior company registered both on the Canadian TSX Venture and the OTC BB in the States.

100% WI

Right off the bat, we learn from this press release that Madalena has 100% WI in the project in question. ***WI stands for working interest***. This means it fully owns and operates the discovery area and will be looking for partners to develop it. That's great on one hand, because it means things are less complicated; on the other hand, it means that Madalena is relying on its own financing for development.

DEPTH

According to the announcement, this horizontal well was drilled to a depth of 2,533 meters, with a horizontal lateral section of approximately 830 meters in length. This means that they drilled 2,533 down, and then went horizontal for 830 meters.

COMPLETION, DRILLING, CASING & STIMULATION

In this case, the company has drilled an exploratory well, while casing and stimulation refer to the completion process of the well.

> Madalena has made a new oil and gas discovery (100% WI) in the Nordegg formation through the drilling, casing and stimulation of an exploratory well. The well was drilled horizontally in the Nordegg formation to o total measured depth of 2,533 metres, with a horizontal lateral section of approximately 830 metres in length. The well was subsequently completed, stimulated and flowed-back on clean-up for 67 hours.

Exploratory well

An exploratory well is simply a well that is drilled without knowing how much oil and gas is down there.

Casing

The process of casing a well onshore is similar in theory if not vastly less complicated than casing a well offshore. A casing is a large-diameter pipe that is inserted into a newly drilled section of a borehole. It is held into place with cement.

Stimulation

Stimulation is a broad term. Hydraulic fracturing is but one type of 'stimulation' to get oil and gas flowing through a well. There are a number of other ways to stimulate a well, many of them used before the advent of hydraulic fracturing, and many of them employing chemicals. Unconventional hydrocarbons require significantly more stimulation because the rock in which they are contained is of a low-permeability. Unconventional rocks often have permeability less than the cement that is used to seal the well casing. The process of fracking a well can take several days, but the timeframe is determined by the number of frack stages scheduled, which in turn refers to the portion of the horizontal well section that is being fracked. The current standard is usually 30-40 frack stages. Fracking is the blending of frack fluids (water, sand, and chemicals) at the surface and then pumping them into the well at extremely high pressures, cracking the rock stage by stage so the oil and gas can flow. With respect to this press release, there are no indications of frack stages, but we do know that we are dealing with a horizontal well—so unconventional oil and gas.

FLOW BACK

> During the 67 hour clean-up period the well flowed continuously up 7 inch casing at an overage rate of 396 bbls/d of oil and 1.6 MMscf/d of natural gas for a total of 663 Boe/d (60% Oil). During the final 24 hours of the clean-up period the well flowed at an average rate of 367 bbls/d of oil and 2.1 MMscf/d of natural gas for a total of 718 Boe/d (51% Oil).

Once the well is completed and stimulated, it must be tested for flow-back. Flow-back testing is the process of flowing the well temporarily to determine the economic potential of the well and the reservoir. The flow-back test uses a temporary well testing package—meaning that there are no permanent production facilities at this point. In this case, the flow-back lasted for 67 hours, during which the well flowed continuously.

Flow-back data is key to determining the economic value of a reservoir. Million-dollar and billion-dollar investment decisions are made based on flow-back data. It is this flow-back period that gives an E&P company the information it needs to estimate the economics of installing production equipment and producing the well until it is depleted. Keep in mind that shale oil and gas wells may have a higher initial rate of production, but they also deplete much faster (they have a much sharper decline rate) than conventional oil and gas wells. In this case, the company drilled and stimulated the well for CDN$2.3 million (about US$1.75 million at time of writing). This brings us to rate of flow.

RATE OF FLOW

The company noted a continuous rate of flow during the flow-back testing of 396 bbls/d of oil and 1.6 MMscf/d of natural gas, giving us a total of 663 Boe/d (60% oil). With this percentage, the company paints a picture of a well in which the balance is in favor of oil or liquids as opposed to gas. During the total clean-up flow-back period, the well recovered 1,100 bbls of 30.5° API oil, 4.5 MMcf of natural gas and 1,416 barrels of water. This is only the initial flow test, and the well is being prepared for an extended flow-test. This is a fairly low flow rate, but at the same time, the cost of

Flow Period

The flow period is a part of a well testing process when the well is already flowing. This is how the stability of flow is determine. The goal here is to ensure that the well has reached a stable (continuous) flow.

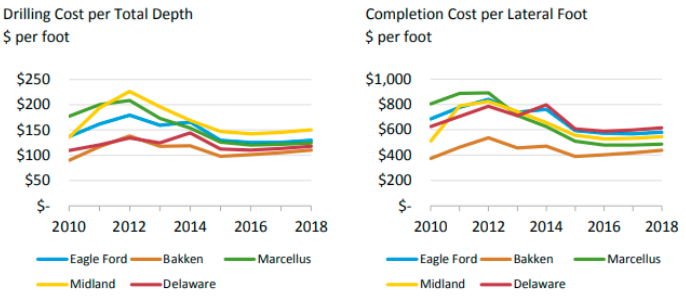
For gas wells, there is a law that often governs well tests: One flow rate immediatelyfollows another, with each flow period reaching stabilized flow. The gas-well deliverability is calculated by the bottom hole pressure at the end of each flow period.

drilling this horizontal well is also comparatively low. In shale plays, it is the high cost of drilling and completing wells that eats up profits from subsequent production.

These are typical oil and gas production rates for single wells

	Oil (barrels per day)		Gas (million m³ per day)	
Quality	Onshore	Offshore	Onshore	Offshore
Fair	300 - 1000	2000 - 5000	0.1 - 0.2	0.3 - 0.7
Good	1000 - 3000	5000 - 8000	0.2 - 0.5	0.3 - 1.0

Let's take the Eagle Ford shale for purposes of drilling cost comparison. At the time, the average drilling and completion cost per well in the Eagle Ford shale is between $5.5 million and $9.5 million—so $1.83 million spent on the well in question here is quite low. Today, drilling costs in the Eagle Ford range from $2.1 million to $2.5 million. The Eagle Ford wells are drilled much deeper than other plays, with the horizontal sections considerably longer.



Note: Midland and Delaware are two plays within the Permian basin, located in Texas and New Mexico

Source: IHS *Oil and Gas Upstream Cost Study commissioned by EIA*

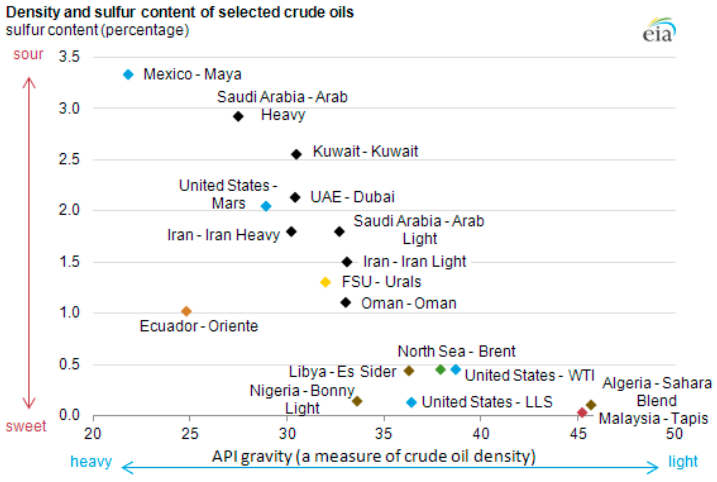
On average, at Eagle Ford, we are looking at targeted depths of 9,000-11,000 feet, and horizontal lengths of roughly 6,000 feet. But flow rates will be in the thousands of barrels per day, not the hundreds.

When production actually starts, you also have to remember that falling pressure and increasing water lead to a gradual decline. When you analyze the potential here, you should figure in a 15-20% annual decline rate. You should also factor in the tendency for 20-30% of a fields reserves to be produced in the first 12-18 months.

In the end, the flow-rate and costs of drilling all balances out to be fairly equal—with the discovery noted in this press release being of a smaller-scale version that will be cheaper and easier to get in on.

30.5° API OIL

The press release notes 30.5° API oil. So what does this mean, exactly? Basically, API gravity is a key determinant of the market value of the oil in question. The two most important characteristics of oil are density and sulfur content. In terms of density, the range is from light to heavy crude. In terms of sulfur content, we are looking at sweet or sour crude. There is an API gravity range, and some crudes fall below or above the range. API gravity is a measure of density. If crude has a higher API gravity, it has a lower density. The most valuable crude has the highest API gravity (lowest density) and lowest sulfur content (which means it is sweet). So what we're looking for here in terms of high market value is light, sweet crude. A chart from the US Energy Information Administration (EIA), evaluates crude in this respect by geographical location:



In this particular case, we are looking at 30.5 API oil, which is closer to the heavy end of the spectrum—or the less valuable end, and more indicative of the heavy oil offerings in Canada.

It is also worth noting, however, that API degrees of oil in a single well can be dynamic. There are cases in which API gravity may start out low and increase over time because horizontal drilling sections can see a fair of amount of variation.

OVERALL ASSESSMENT

In considering a potential investment, it is unwise to consider a single discovery and to base decision-making on this alone. Consider the bigger picture and ask the following questions:

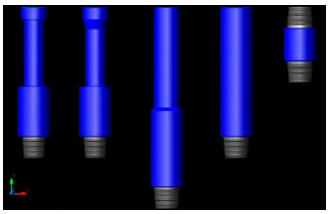
- Has the company diversified its portfolio, or would you be putting all your eggs in this single heavy oil Canadian basket? (In this case, yes, because we are looking at a wide geographical dispersion of assets that extend into Argentina.)
- What else do we know about Nordegg or Paddle River? This isn't Eagle Ford, but a lesser known (if at all known) area that requires significant research. Are there any major producers in this area that would signal better potential?
- This is a small TSXV company; is it worth the risk? One way to determine this is to research individual management members and take a look at their track records and what others have to say about them. Another way is to see where else they are operating and who their partners are. If their partners have solid track records, this is one indication of potentially good management.
- How is the company funding its drilling, and what does its balance sheet look like?
- Overall, discovery press releases from junior explorers will be much more detailed because there is much greater pressure on them to win over investors for funding.

Part III: More Discovery Terms to Trip You Up

The road to discovery is littered with terms that few understand without an engineering degree. These terms won't show up in every press release, and there are quite a few that don't show up in the two examples we have gone into in detail.

Drillstem Testing

So you've made a discovery—now what? Drillstem testing is one of three ways of testing a formation to determine how much it's going to produce and whether it is worth

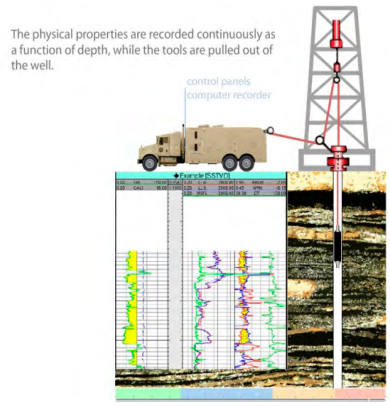


it to complete a well for production. It determines whether there is enough oil and gas down there to make it profitable. This test determines an oil and gas reservoir's productive capacity, pressure and permeability. It is conducted on an isolated zone of interest. A valve is opened and fluids flow through the drillpipe for a specific amount of time—as little as a few hours, or over the course of several weeks. More specifically, the operator connects a measuring device to the bottom of the drill stem (where the drillbit would normally be) and lowers this into the well as far down as the formation. Once at the bottom, the drill stem is activated and is capable of measuring the flow of oil and gas for a specified period of time. It can also identify the types of fluids within the well, the permeability of the formation and the pressure of the reservoir. During this testing, while hydrocarbons enter the

drillpipe, they are not brought all the way to the surface. (A good operator will run more than one of the three types of tests).

Well-Logging (wireline logs)

A second method of testing whether a well is worth completing for production is well-logging. Using this method



involves lowering measuring instruments into the well—either during or after drilling. These well logs measure the electric, acoustic, radioactive and electromagnetic properties of the formation. It is often used during the actual drilling process. This can also be employed at the same time as drillstem testing because the well logging instruments can be placed inside the drillstem. This provides operators will real-time information about what's down there.

Core Sampling

With the third method—core sampling—things are a bit simpler, if not as technologically interesting. Core-sampling involves the obtaining of a small piece of the formation to analyze on the surface. Typically, an operator will take core samples throughout the drilling process. To get a core sample an operator has to remove the drillbit and replace it with a coring instrument (core head), which when deployed to the bottom of the well, brings up a core sample that looks like a cylinder of rock.

Reservoir Intervals & Net Pay Zones

These are terms that one can find throughout many complicated discovery announcements. They are also terms that come with a massive amount of sub-terms that are very important for the investor. It is here that we determine how much money you could potentially earn from a discovery. A discovery's 'big picture' is a culmination of many smaller pictures, and any one of these smaller pictures can change the big picture.

Reservoir intervals are basically the zoning of a reservoir, which is determined by geologists using stratigraphic units: volumes of rock of identifiable origin and relative age range. What the investor is interested in here are "pay intervals" or "pay zones"—those intervals that will contribute to reservoir production.

The terms you need to understand here, and in some cases be able to calculate are:

- Gross reservoir interval: The unit between the top and base of the reservoir that includes both reservoir and non-reservoir intervals (pay and non-pay zones).
- Gross Pay: The summed thickness of rock zones that have hydrocarbon saturation sufficient for economic production.
- Net Pay: The thickness of gross pay zones that should yield water-free production. This can also be referred to as 'net productive thickness', so it represents the thickness of intervals in which porosity and permeability are high enough to economically produce oil or gas.

Net pay is really hard to nail down because not only does it depend on the potential for commercially viable production through the thickness of the rock and its saturation, but it

also depends on prevailing market prices for oil and gas, the available technology, and the costs of drilling and producing—three things that are highly dynamic.

The trick to determining net pay is singling out the economically productive layers from the unproductive or uneconomic layers by looking at well-log data and core sampling data, both explained above. It's a complicated process that involves looking at pore volume (PV), hydrocarbon pore volume (HPV), flow capacity (KH)—three values used to calculate hydrocarbons in place, recoverable reserves and well productivity.

Hydrocarbons in Place

This is a term with which every investor must absolutely be familiar. Essentially, hydrocarbons in place indicates the amount of hydrocarbons likely to be contained in the prospect in question. In other words, it is the result of calculating volumes from reservoir thickness, porosity, and water saturation. Its method of calculation is mindboggling for anyone who is averse to mathematics.

The amount of hydrocarbons in place is calculated using a volumetric equation that looks like this:

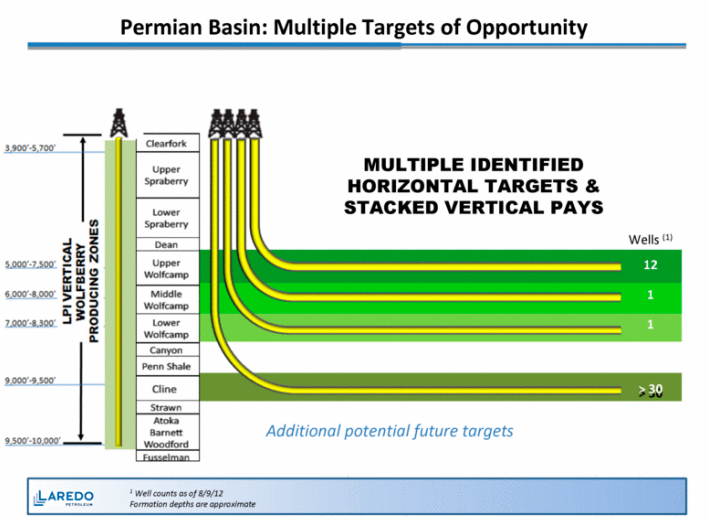
GRV x N/G x Porosity x Sh / FVF

Dissecting this equation, the elements include:

- GRV: Gross rock volume, which means the amount of rock in the trap above the hydrocarbon water contact
- N/G: The Net/Gross Ratio, or the proportion of the GRV formed by the reservoir rock, with a range of 0 to 1
- Porosity: The percentage of the net reservoir rock occupied by pores (typically 5-35%)
- Sh: Hydrocarbon saturation (discounting the pore space that is filled with water)
- FVF: The formation volume factor, which is a factor that describes how the oil shrinks and the gas expands when brought to the surface.

Stacked Reservoirs

Frequently we will learn from a company press release that "stacked reservoirs have been identified". This is a reference to something new discovered about the internal architecture of the reservoir, which is composed of varying-quality rock types that are 'stacked' on top of each other, each with different geologic and hydrocarbon characteristics.



What to Take Home with You

Today, all the real action is offshore; and not just offshore but in the ultra-deep waters. This is where the big finds are, and where they will continue to be for the most part in terms of contributing significantly to the global supply equation. What you're investing in here is a longer-term operation with a large company—and often a fully integrated supermajor. It's a huge risk in terms of operational complexity, but much less of a risk in terms of which company you're choosing to invest in.

For the smaller investor who is keen to get in on the ground floor of something potentially exciting onshore in North America, the fast returns game is with the juniors. There are hundreds and hundreds of them to sort through, but if you can find the right one with the right assets and the right management team, you can potentially make some huge earnings on a discovery. Once you can decipher the code, you're half way to mitigating risk and earning money.

And this brings us full circle to our next special report on scams and fraud, where we will take you through the world of the corporate sociopath—someone who is on the lookout for gullible investors and always finds them—as well as a million other fraudulent potholes that even experienced oil and gas investors get stuck in.

Exploration Licenses in the United States

In the United States, most onshore oil and gas rights are owned by private individuals, which means that companies must lease exploration rights from the individual owner. The lease will be based on terms negotiated by both parties—a scenario that is rather unique to the United States. Elsewhere, petroleum resources are owned by governments, in which case companies must negotiate with the government—usually the country's oil ministry—of the country in question to obtain an exploration license.

Exploration Licenses Outside the United States

The first step to exploration outside the United States is to obtain a license from the government in question. This is generally obtained through a licensing round in which bidding is used to pump up the value of the potential prospect. The company or joint venture offering the best term wins. Once a company wins the exploration license, seismic scanning of the subsurface begins, typically using 2D and/or 3D seismic imaging technology. This is complemented by regional geological surveys and additional geological data from neighboring drilling sites. (We'll take you through the ins and outs of international exploration and production in a subsequent special report.)

Play Fairway Analysis

In the exploration process, ask to see a Play Fairway map, which expresses the level of confidence in the five geological factors using colors.

Green = high confidence / Red = low confidence

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