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WHITE PAPER ON AUTOMATIC BLOWOUT PREVENTERS FOR ELIMINATING TRAGEDIES SUCH AS THE EXPLOSION ON BOARD OF THE DEEPWATER HORIZON ON APRIL 20, 2010

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WHITE PAPER OUTLINE

1.Consider conditions leading to kicks
2.How unmitigated kicks become blowouts
3. Current safety technology
4. Industry efforts to improve reliability and performance
5.The CDS Automatic Blowout Preventer
6. Inventor Background

1.Consider conditions leading to kicks

In the process of drilling for oil and gas, before the major find, smaller pockets of extreme high pressure hydrocarbon are opened and enter the well bore. It is very difficult to know if it is a small pocket, a large one or the major find. The first line of defense is the drill mud because it is also used as a “cork”.
The drill mud is also used to lubricate the drill head and bring the rock shavings on board, and is closely monitored: the same quantity must come up as is pumped in the drill pipe plus the volume of rock dislocated by drilling. Any deviation is significant. A kick is described as a sudden increase in pressure and in the quantity of drill mud entering the well bore. When this occurs, drilling is typically stopped, the drill mud is degassed and, as soon as the kick is mitigated, drilling can resume.

The decision to stop drilling is heavily influenced by the cost factor. For example:
The cost of operating the Deepwater Horizon well exceeded $1,000,000 per day and was more than $50,000,000 over budget.
The mixtures contain, in addition to crude oil, methane and other gases such as highly poisonous, deadly, hydrogen sulphite under very high pressure; these mixtures rise toward the surface of the

oil rig at speeds that increase exponentially if they escape the well.

2.How unmitigated kicks become blowouts

The kick becomes a blowout if the decision to stop drilling, activate the blowout preventer or disconnect the equipment is not made timely.

In fact, on the Deepwater Horizon, even as the blowout was unfolding before their eyes, shooting sky-high the lethal mixture of oil and gases, the emergency button for disconnecting the equipment was not activated until the BP executive agreed.

Unfortunately, the BOP did not function as intended. In my opinion, even if the BOP would have been working flawlessly, the 24" diameter riser pipe with the length of 5,000 feet and containing a high volume of lethal mix of methane and other gases which were expanding exponentially, would have been enough to blow up the Deepwater Horizon many times over. Even if the BOP would have worked flawlessly, the explosion could not have been avoided , but the Deepwater Horizon would not have burned for three days and it would not have sunk the $500,000,000+ oil platform to the bottom of the ocean.

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According to the forensic analysis performed by the United States Chemical Safety Board, the foremost agency analyzing industrial accidents, the solenoid controlling the BOP was wired in reverse polarity to the redundant coil, where the two coils' magnetic fields canceled each other, rendering the BOP's safety feature inoperative.

After considering all the facts, I came to a sobering conclusion, namely current BOPs have a very spotty safety record. Steve Coll, Pulitzer Prize winning author, in his book "Private Empire Exxon Mobile and American Power" writes: "Drilling any oil well requires managing the risk that trapped oil and gas under

extreme pressure in the ground, when punctured with a drill bit, could escape uncontrolledly and ignite.
Mike Williams, chief electronics engineer on Deepwater Horizon, put it this way: 'All the things they told us could never happen, happened.'

Since 2001 the workforce drilling for oil in the waters of the Gulf of Mexico - about 35,000 people altogether - had endured 60 deaths, 1550 injuries, and 948 fires and explosions.
'Deep water oil exploration and drilling in particular, involved risks for which neither industry nor government has adequately been prepared.' Deep water drillers "succumbed to a false sense of security", as the National Commission put it.
One warning sign was the well-documented unreliability of blowout preventers. These were contraptions meant to function as last-ditch fail-safe devices to smother uncontrolled wells before they could blow.

A Norwegian firm, Det Norske Veritas, published a paper that examined fifteen thousand wells operating between 1980 and 2006. It found eleven cases where teams drilling deep water wells, fearing a blowout, had switched on their preventer devices. In only six cases did the wells come under control, an apparent failure rate of almost 50%.

The Department of the Interior commissioned studies by West Engineering Services in 2002 and 2004 that looked in detail at the workings of certain types of blowout preventers, including the one deployed on the Deepwater Horizon, and found that, in many cases, the preventers did not work as advertised. The findings illustrated, the authors of one of the Interior-commissioned studies wrote, 'the lack of preparedness in the industry' to manage 'the last line of defense against a blowout.'" (End of quotation)

3. Current safety technology

In drilling for oil and gas, one of the major problems is lack of experienced personnel and the other is complacency. Things are bad and getting worse as proven by the Macondo well blowout. A lot of experienced and highly skilled personnel have retired or left the field. New hires lack the insight and depth of field experience.
Lack of authority to take appropriate action in the face of danger

compounds this most critical aspect of oil exploration. The crew on Deepwater Horizon was one of the most experienced and held one of the best safety records.

When I considered all aspects of oil and gas exploration, I came to an inescapable conclusion, namely oil and gas exploration in deep water is highly risky at any depth with current blowout prevention technology. Unless an automatic annular blowout preventer valve is employed, with a BOP closing automatically, notifying the crew of the presence of a kick to take immediate appropriate action, and locking the drill pipe in drilling or tripping operation another disaster would be imminent. This is when I set out to design such a valve.

4. Industry efforts to improve reliability and performance

Industry efforts to redesign the shear ram, as to cut the drill pipe even when excessive pressure bows the drill pipe are insufficient, adding substantial costs to drilling operations, and missing the true cause of blowouts. The pressure at the Macondo well had to greatly exceed the 15,000 PSI force necessary to bow the heavy wall drill pipe to one side, added to the fact the blowout preventer was designed for 15,000 PSI static pressure, whereas most kicks come on with dynamic pressure, like a raging speeding freight train, making it extremely difficult to stop with current technology.

The Macondo well started flowing at a conservative estimate of 50 gallons / minute entering the well bore, and by the time it reached atmospheric pressure it expanded 500-fold or more, and shot sky-high. 50 gallons x 10 minutes = 500 gallons, expanded 500 times = 250,000 gallons of potentially lethal gas mix, every 10 minutes.

It is extremely difficult to know what happens 5,000 or even 20,000 feet below. Everything entering the riser has to come on board, there is no other place for the expanding gases to go but up, and nothing to stop it. Every minute of uncontrolled flow is enough to blow sky-high any oil platform, when you consider you only need 3% to 7% hydrocarbon and air in proportion to 97% to 93% for maximum explosive power.

5.The CDS Automatic Blowout Preventer

The Automatic CDS BOP stops in its track instantly any kick from becoming a blowout, deploys automatically without external power and ensures the safety of the crew and equipment, notifying the operators of the presence of a kick in order for them to take immediate appropriate degassing action. With the CDS Annular Automatic BOP it is not necessary to cut the drill pipe.

After many trials and prototypes,my team was awarded Patent #9,388,657 B2 for the CDS Automatic Annular Blowout Preventer, a device capable of automatically stopping any kick from becoming a blowout or, when used in pressurized oil or gas pipelines, to stop spills in the event of a rupture.

The CDS ABOP can also cut substantially the time needed to drill an oil well since it guarantees to stop any kick from becoming a blowout, and in fracking of existing wells it will stop methane from escaping into the atmosphere. It may also reduce the height of a traditional BOP since it can double up as a pipe ram.

The CDS ABOP works by allowing for normal drilling mud circulation between the casing and the drill pipe: at the slightest increase in flow, it closes partially, and it closes shut instantly in the event of any kick.

The higher the kick pressure, the more the CDS ABOP clamps the drill pipe in its viselike jaws of the hinged arms, and it opens automatically as soon as the unsafe pressure is relieved through the choke manifold.

The now-retired Wauconda Fire District Chief Paul Gross, aware of my efforts to eliminate fires and blowouts such as the Deepwater Horizon fire, which the Coast Guard reported to have seen from 90 miles away, agreed to test one of our prototypes.

For a better understanding, we prepared a two-minute Youtube™ video titled “CDS Automatic Annular Blowout Preventer” at: https://www.youtube.com/watch??v=s_1eyqX3fgQ&t=21s. Here you will see Wauconda Fire District pumping high pressure water into a tube equipped with the CDS ABOP: without the CDS ABOP the water would have shot sky-high.

As soon as the flow exceeded the set limit, it closed. You can see the

high pressure water gushing out horizontally on the bottom of the stainless steel pipe and some water coming from the red “Drill Pipe”, and minor prototype leaks.

While the purpose of this white paper is to show the principle of how the CDS ABOP works and not to show unfolding blueprints showing dimensions or component assembly, Steve felt it is appropriate to show a picture of one of the functioning prototypes.

The first picture shows the CDS ABOP opened by the internal spring: it has 5 overlapping laser-cut blades just under 0.50" thickness, each, and together capable to withstand about 3000 PSI. More overlapping blades with higher thickness will proportionally increase the force the CDS ABOP can withhold. The shape of the CDS ABOP is in the form of a dome because it is the strongest possible architecture.
The second picture shows the CDS ABOP with the drill pipe passing through it: as the pressure and flow increases the CDS ABOP closes, much like an inverted parachute, deploying from the outside to clamp the drill pipe. The higher the pressure, the more the drill pipe will firmly hold, until the excessive pressure is mitigated. At this point the CDS ABOP opens automatically and drilling can resume.

If the hydrocarbon industry adopts the CDS ABOP and other measures such as price stability, it will ensure its future for 50 years or more. Humanity is one more oil disaster away from losing trillions of dollars in investments in the oil industry.
I am convinced you are as concerned about the well-being of our environment on which all life depends and exists, and you too want to leave to posterity a planet at least as pristine as you found it.

I do not know what other compelling words to use: I urge you, to the extent you can, please do all you can to contribute and support

our efforts to install the safest automatic blowout preventer in every oil and gas drilling project and pressurized oil and gas pipeline, so disasters like the Sedco 711, Deepwater Horizon, or Hercules 256, or the San Bruno, California gas pipe line explosion and many, many others can be avoided.

If you are interested in purchasing, licensing, or any other arrangements, or know anyone interested in our technology, or have any questions, please contact me at: e-mail cn999@aol.com.
We greatly appreciate peer reviews.

There is no doubt the invention of the CDS Automatic Annular BOP Patent #9,388,657 B2 will give you an unequaled competitive edge, set new safety standards and return high dividends out of all proportions. I urge you to forward this white paper to everyone you know and may be interested.

Joe Levine, head of the US Bureau of Safety and Environmental Enforcement is aware of our efforts and the inherent present technology's critical aspects and imminent dangers in oil exploration, and has pledged support once the CDS ABOP is past the prototype stage and tested under oilfield conditions. We just concluded the prototype stage and are ready for test in oil field conditions.

6. Inventor Background

Lastly, a few words about me and how I came to design Blowout Preventers. I started my career designing high speed embroidering machines for lingerie, then managing preventive maintenance at a company with hundreds of machine tools.

Before starting CD Nelson Consulting, I was in charge of quality for Westinghouse. Here I started a program called Quality Circles and introduced a program called Product Integrity for Critical Components where lives were at stake. This concept changed quality control from a "policing" activity of finding components not meeting technical specifications and rejecting them, to a prevention program avoiding exceptions before they occur, and relied on product integrity under demanding conditions.

Since 1982 I have been managing CD Nelson Consulting. I created the Steamshine™ steam generator, designed for industries where precision cleaning is critical.
Because high pressure steam is dangerous, I designed one of its

notable features: a blowout preventer under the fill valve, for if anybody opens the fill valve while the unit is pressurized, it shuts down instantly and resets automatically after the danger of a blowout is mitigated. The Blowout Preventer feature was necessary because we sold some units to people not technically trained and also to some who use it in their homes.

Demand for Steamshine™ products was brisk, this is how we became a manufacturing company as well. From the beginning we exported to many countries.
After countless prototypes, hundreds of hours of research and experimentation we sold well over 120,000 units worldwide.
Success Magazine had noted our accomplishments in an article titled "The Global Entrepreneur" in its March, 1990 issue.

Truly yours,

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Resources and Credits

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