

Federal Court



Cour fédérale

Date: 20130812

Docket: T-436-05

Citation: 2013 FC 750

BETWEEN:

**VARCO CANADA LIMITED
VARCO, L.P.
WILDCAT SERVICES, L.P. and
WILDCAT SERVICES CANADA, ULC**

**Plaintiffs/
Defendants by
Counterclaim**

and

**PASON SYSTEMS CORP. and
PASON SYSTEMS INC.**

**Defendants/
Plaintiffs by
Counterclaim**

**PUBLIC VERSION OF THE
CONFIDENTIAL REASONS FOR JUDGMENT**

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PHELAN J.

I. INTRODUCTION

[1] This action relates to the infringement of Canadian Patent No. 2,094,313 [the 313 Patent], the rights to which are held by the Plaintiff, Varco L.P. The 313 Patent relates to the braking function in automatic drilling systems used principally in the petroleum industry. The Patent is more particularly focused on automatic drilling systems used in drilling rigs to regulate the release of a drill string during the drilling of a borehole.

[2] The Defendants, Pason Systems Corp. and Pason Systems Inc. [collectively “Pason”], both individually and collectively, make and rent in Canada an automatic drilling system known as the Pason AutoDriller.

[3] The Plaintiffs claim that Pason infringes the 313 Patent by manufacturing, selling, renting and exporting the Pason AutoDriller as well as inducing Pason's customers to use the Pason AutoDriller.

The Plaintiffs claim damages or an accounting of profits as well as punitive and exemplary damages.

[4] Pason denies infringement and attacks the validity of the Patent on almost as many grounds as it is conceivable to assert, including some novel twists on known grounds.

[5] In addition to the usual matters of a complex patent trial, this litigation was influenced by parallel or similar litigation in various US courts, but most particularly an action in the US District Court in Denver. The most striking influence was the seepage out of documents in the US processes which were relevant to the Canadian litigation. As a result, after final argument this litigation had to be re-opened, evidence taken in the United States and further arguments made on key aspects of this case.

For ease of understanding and consistency of findings, the "new evidence" is incorporated into these reasons as part of the narrative and analysis and not as a stand alone topic.

[6] The most relevant portions of the 313 Patent are attached as Schedule A to these Reasons.

A. *Parties/Patent Ownership*

[7] The Plaintiff Varco L.P. [Varco LP] is a limited partnership organized under the laws of Delaware, Maryland with its principal office and place of business in Houston, Texas.

[8] The Plaintiff, Varco Canada Limited [Varco Canada] is a corporation organized under the laws of Alberta, having its registered office in Edmonton, Alberta. It is a subsidiary of Varco LP.

[9] The Plaintiff Wildcat Services L.P. [Wildcat Services LP] is a limited partnership organized under the laws of Texas with a principal office in Cypress, Texas. The company and its subsidiary were acquired by Robert Prejean.

[10] The Plaintiff Wildcat Services Canada ULC [Wildcat Services ULC] is an unlimited liability company organized under the laws of Nova Scotia with its registered office at Halifax.

[11] Unless otherwise specified, the Plaintiffs are collectively referred to as Varco.

[12] The Defendant Pason Systems Inc. is a corporation organized under the laws of Alberta with its principal place of business at Calgary.

[13] The Defendant Pason Systems Corp. is also a corporation organized under the laws of Alberta with its principal place of business at Calgary. It is a wholly owned subsidiary of Pason Systems Inc.

[14] The Defendants are collectively referred to as Pason unless otherwise specified. Pason is a Canadian oilfield services company that specializes in developing software and hardware to improve the drilling process. It designs and manufactures integrated systems for data acquisition, well site reporting, remote communications and internet information management.

[15] Pason's two principal products, at issue in this litigation, are its Electronic Drilling Recorder [EDR] and the Pason AutoDriller.

[16] The 313 Patent was issued on August 24, 1999. The first owner, and the inventor of what is known as the Wildcat autodriller [Wildcat], was Bobbie Bowden [Bowden]. He did business, at the time, under the name Wildcat Speciality.

[17] On July 1, 2001, Bowden, doing business as Wildcat Specialty, assigned the Patent to Wildcat Services LP.

[18] On or about March 12, 2003, Wildcat Services ULC, a newly created wholly owned subsidiary of Wildcat Services LP, became a licensee of the Patent and took over the business of renting Wildcat Autodrillers in Canada.

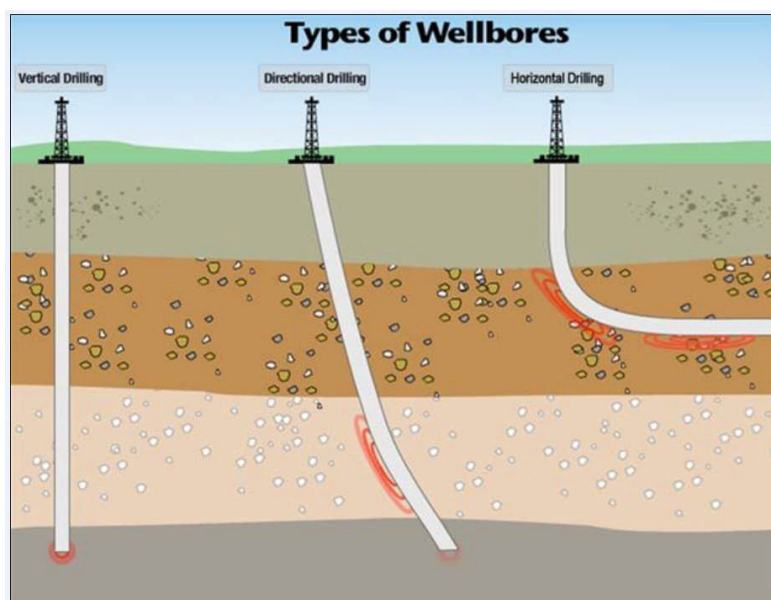
[19] On June 30, 2004, Wildcat Services LP assigned the Patent to Varco LP as part of Varco LP's purchase of all of Wildcat Services LP's major assets. Thereafter, Varco Canada became a licensee of the Patent and the sole entity that rented Wildcat Autodrillers in Canada.

[20] Varco LP is the current owner of the 313 Patent.

B. *Nature of Problem to be Solved*

[21] The experts confirmed that there are basically three types of oil wells: 1) vertical wells which are drilled straight down; 2) directional wells which are drilled at an angle from vertical, and 3) horizontal wells – a type of directional well. The sketch below is an approximate visual representation of those wells.

Figure 1



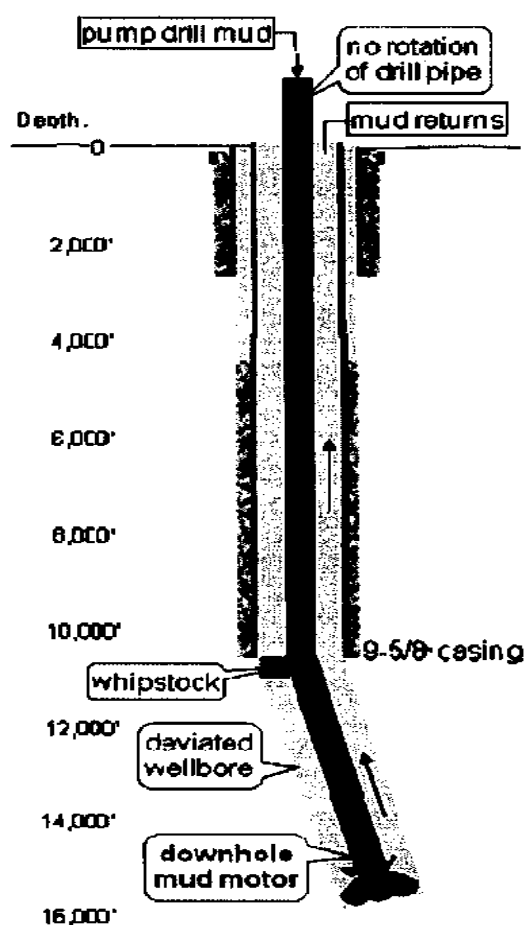
(Red shading is Court's notation of area of curve)

[22] Directional drilling became a popular method of drilling because it could increase the productivity of a well. Horizontal drilling increased starting in the late 1980s in part due to advances in technology, such as the downhole mud motor.

[23] In directional wells, the preferred method of rotating the drill bit was to use a downhole mud motor (rather than rotating the entire drill string).

[24] A downhole mud motor is affixed above the drill bit and drilling mud (a drilling fluid) is pumped inside the drill pipe from the top of the standpipe down to the mud motor and back to the top. The circulation of the drilling mud up and down the pipe causes the drill bit to turn and cut through the formation. The pressure of the drilling fluid provides the power to the mud motor. A schematic from Exhibit 521 shows the basics of the rotary bit with mud motor.

Figure 2



[25] The pressure of the drilling fluid is directly related to the amount of torque that the mud motor applies to the drill bit. The greater the drilling fluid pressure, the greater the torque on the bit – the cutting power. When contact with the formation is increased, there must be an increase in drilling fluid pressure to continue the drilling function. The change in pressure is measured by a pressure gauge on the standpipe at the surface of the rig.

[26] Vertical wells generally were drilled using weight on bit [WOB] as the basis to advance or retard the drill string. WOB is the amount of force between the drill bit and the formation being drilled. The increase in WOB allows the drill bit to drill into the formation – akin to the force used to push a home automatic drill into the drywall in one's basement.

[27] In vertical wells, the WOB is proportional to the weight of the drill string (known as a “hook load”) as shown on the weight indicator in the driller's console. In this type of well, the WOB is the hook load with the bit just off bottom minus the hook load while drilling where the formation takes some of the hook load.

[28] In the 1960s the drilling process of vertical wells was automated. These automatic drillers worked off the WOB readings and by release of the drill bit to engage the formation.

[29] While the term “release” is often used, it is synonymous with “brake”. Gravity would pull the bit down the vertical shaft, the driller would regulate the engagement of the bit with the

formation by braking the drill to prevent further downward movement or releasing the bit to facilitate the downward movement.

There are a number of WOB autodrillers including “the Satellite” which was covered by a US patent in favour of J.E. Bowden, Bowden’s father – US Patent No. 3,265,359 [the 359 Patent].

[30] WOB worked well in vertical wells but were problematic for directional wells. Because of the curve in a directional well, part of the weight of the drill rested in the curve which distorted the WOB calculation. Therefore, without the functionality of WOB autodrillers, drillers in directional wells had to manually control the drill string brake in response to changes in drilling pressure.

[31] Drillers knew that, in directional wells, drilling fluid pressure generally related to the torque delivered by a mud motor which related to the contact force between the bit and the formation.

[32] For directional wells, drillers began to look at drilling fluid pressure to understand what the WOB might be in a directional well.

[33] Since autodrillers were generally more efficient, more precise and cost effective than manual drilling, there developed a need for an automatic drilling system that worked effectively in horizontal and directional drilling. The expert evidence which the Court accepts concludes that the 313 Patent was designed to address this need. The primary improvement of the invention described in the 313 Patent is the ability to automate the drilling process in directional wells using drilling fluid pressure in conjunction with WOB.

II. HISTORY OF INVENTION

A. *Introduction*

[34] The history of the invention and the patenting of the invention are largely told through Bowden. The history covers his own development of the device, the testing of it and the interactions with patent attorney/agents Donald Comuzzi and Marcus Bates. Some of the pertinent events will be described in other sections of these Reasons.

B. *Credibility*

[35] The Defendants take issue with Bowden's story. Although they had little or no evidence from witnesses which challenged Bowden's version, they have attacked Bowden's credibility and consistency principally through circumstantial evidence, alternate interpretation of documents, and through cross-examination. They postulate a different theory of the case which essentially calls Bowden a liar, a fraudster and one who engaged in substantial skulduggery.

[36] The case for invalidity, other than the interpretative aspect of the patent, turns substantially on whether Bowden's story is "more probable than not" as the civil burden of proof is sometimes described. The invalidity attack challenges Bowden on whether he publicly disclosed the invention more than one year before the patent filing date. It also challenges how Bowden went about the process of filing his US patent and Canadian patent applications.

[37] There is no doubt that there are gaps in Bowden's version of the facts. His forgetfulness about events led this Court to re-open the trial so as to obtain the complete evidence of the US patenting process. Bowden's recollection was subject to the frailties of memory influenced by the

length of time between events and the time he had to testify either in this Court or in similar or related cases in the United States District Court and state courts in the USA.

[38] Bowden was “a marketer” for his invention and remained “a marketer” even on the witness stand. He also suffered from the not uncommon failing of seeing events in the most favourable light from his own perspective and dismissing less favourable matters as unimportant. However, he is not, at least in the evidence before this Court and in my opinion, any of the things of which the Defendants accuse him. At the end of the day, his story remained generally consistent, plausible and credible. While the Court approaches his evidence with caution, it generally accepts his version of events over the Defendants’ theory, in large part because the Defendants could only advance a theory (or theories) attacking Bowden’s evidence.

[39] The Defendants’ theory of the case on this point would require a finding that Bowden lied under oath in US and Canadian court proceedings, misrepresented facts to numerous people over an extensive period of time, even to the extent of possibly committing bankruptcy fraud in the United States. There is insufficient evidence to make that type of finding.

[40] Bowden had been around drilling rigs from his earliest years. His father was a driller who invented a WOB autodriller described in the 359 Patent, which was marketed as the Satellite driller. Upon returning from the US Navy where Bowden worked as a machinist’s mate, he returned to his father’s business.

[41] About 1971, Bowden formed his own company to distribute his father's autodriller and to run his own business in the refurbishment of airfield instrumentation equipment.

[42] In late 1991 and early 1992, Bowden conceived of and built his first autodriller. He conceived the idea because he had seen drillers release the drill string in directional wells based on indications in a pressure gauge. Since his father had automated a driller using WOB in vertical wells, Bowden thought he could do something new – develop an autodriller for directional wells. This would necessitate using WOB and pressure to regulate the drilling function.

[43] Work on a prototype began in that period using his shop, his garage and spare parts he had from his work in the oil industry. By February 1992 he had built his initial prototype, but Bowden did not know if it would work on a rig or how it would function with a mud motor. He had no test facility of his own. The utility of the prototype needed to be confirmed through testing.

C. *Testing*

[44] The Patterson rig was owned by Union Pacific Resources Corporation [Union Pacific] or Patterson Drilling (the evidence is not clear) in the Austin Chalk area of Texas. Bowden asked Gene Finney, the Union Pacific drilling foreman, for permission to test his prototype. To secure permission, Bowden disclosed that his autodriller worked off both bitweight or pump pressure. There is no evidence that Bowden disclosed how the device was built or how it worked in any detail.

[45] The issue of whether Bowden disclosed his invention during the period when it was on the Union Pacific rigs is critical to the Defendants' allegation of invalidity due to public disclosure.

[46] There were no confidentiality agreements or other forms of non-disclosure obligations created, but rig operators in this business would from time to time allow a product to be used on a rig before it was fully developed.

(1) First Test

[47] Initially Finney agreed to allow testing on one full well but required that at the end of testing, Bowden would have to remove the prototype.

[48] In the test drilling on the first well there were three employees of Patterson Drilling, the drilling contractor, and two employees of the mud motor company.

[49] It was Bowden's testimony that he personally did all the drilling using the pressure mode, that he disconnected the pressure hoses when the drillers used the prototype in WOB mode and that he locked the prototype so no one could examine it when he was not on the rig to ensure that no one could examine the device.

[50] The testing on the first well occurred between February 19, 1992 and March 6, 1992. After the first test concluded, Bowden took the device off the rig and returned it to his shop where he made improvements to the device. A key change was the addition of a three-way switch to allow an operator to select pressure or WOB or a combination of both at the same time.

(2) Second Test

[51] Bowden then tested the device on a second well between March 15, 1992 and April 3, 1992.

[52] The test on the second well disclosed a problem with gas pockets which allowed the brake to be suddenly released, dropping the bit and damaging the motor.

Bowden addressed this problem by adding a wellhead pump pressure compensating valve. He also realized that he could set the pump pressure as the primary control and set WOB as the secondary control and then use the limiter to restrict the fall of the drill string in pressure pockets.

[53] Bowden was not allowed to test his device when the curve was drilled on the second device. The curve, as shown in Figure 1, is where the use of WOB drilling becomes problematic as earlier described. To Bowden this was a critical limitation of the test because drilling the curve was critical to directional drilling. Bowden felt that he had to do further testing to ensure that his device would work as he intended. Bowden did admit that by April 13, 1992, the device “was pretty well perfected”.

(3) Third Test

[54] Testing on the third well occurred between April 13, 1992 and April 27, 1992. Bowden was now allowed to drill the curve which he did successfully on April 20, 1992. In Bowden’s opinion this was the proof that the device worked and that testing was completed. On that same day Bowden and Finney agreed on a daily rental rate for the autodriller of \$48. Finney, according to Bowden,

offered to compensate Bowden for the use of the prototype during the testing phase although that had not been part of the original testing agreement.

[55] Thereafter Bowden started to build and market the autodriller through the summer of 1992.

[56] I have concluded that it was on April 20, 1992 that Bowden's invention was finally proven and completed. Bowden was clear that until he could test the device in the curve, he could not know that he had invented a workable device that solved a problem no one else had solved. It is "20/20 hindsight", not a convenient thesis for the Defendants, that the device was in all material respects complete at some prior date. However, the judgment of the inventor on this issue is an important factor. The concern Bowden had was significant; it was of substance, not merely form.

[57] Pason contends that Bowden had disclosed his invention prior to April 20, 1992. It suggests that there was prior disclosure to Finney, that Bowden had trained the Patterson drilling crew and the mud motor company directional drillers in such a manner as to disclose the invention; that Bowden was fully paid for the use of the autodriller during the "supposed" test phase; and that the testing was part of Bowden and his later associate Prejean's business model of letting customers use the device for free for a period and then rent it backdated for the trial period if they liked it.

[58] While Bowden admitted that he told Finney and people on the rig generally what the device would do, he did not either tell them or show them how the device worked. He denied that he showed or explained the internal workings of the device.

[59] There was no evidence from either Finney or the drillers or anyone else that there was such prior disclosure. While the Defendants ask that the Court draw an adverse inference from the Plaintiffs' failure to call these individuals, prior disclosure is the Defendants' allegation to prove and they did not call those people either.

[60] It is not to say that Bowden's story is trouble free. He outlined a scheme where he ran the rental payments in 1992 through a company called Lampo's Steam Cleaning for obscure reasons of insurance and bookkeeping. This was an organization that Bowden claimed he knew nothing about, did not know who owned it, yet gave them approximately 20% of the rental revenue.

[61] As troubling as this evidence may be, it does not materially assist on the issue of prior disclosure. It does touch on Bowden's own credibility, but not sufficiently for the Court to reject the core aspects of his evidence.

[62] Bowden's device, the Wildcat, had a number of advantages. It was more efficient, reliable and cost saving than other drills. Even the Defendants' own patent expert acknowledged its qualities.

[63] The Wildcat was commercially successful, growing from 40 Wildcats rented in 1999 to 500 by 2004.

[64] The business model for Wildcats was described as “try it for a few weeks. If you like it, then you pay for it”. This was the model used by Bowden and Prejean. Prejean started in sales and marketing the Wildcat eventually took over ownership of the company in 2001.

[65] Between 1999 and March 2003, the Wildcat was marketed and serviced in Canada by Alberta Gauge and Drillers Service Corp. Prejean formed Wildcat Services Canada ULC in March 2003 and bought out Alberta Gauge and Drillers Service Corp. The impetus for the “buy out” was Prejean’s concern for Alberta Gauge’s ability to market and Prejean’s plan to ramp up Wildcat rentals aggressively.

[66] Having put 50 Wildcats on rigs in Canada in 2003 and expecting to go to 100, such plans were impacted when the Defendants started deploying its Autodriller.

III. BATES LETTER AND FILE

[67] Before turning to Pason’s AutoDriller and maintaining a general chronological theme to this Background, it is necessary to address the above topic.

[68] To say that the Defendants’ claim Bowden to be a scoundrel, whose evidence is to be wholly rejected, is an understatement. The Defendants suggest that Bowden’s evidence is largely a fabrication. A critical aspect of its attack is that Bowden made public disclosure well prior to April 20, 1992 – even to the point of suggesting that Bowden had his invention in October 1991 and that the testing in March-April 1992 was really part of the business strategy of offering customers a free trial period after which they had to buy the product.

[69] As part of these alleged shenanigans, the Defendants contend that Bowden had received advice from a patent attorney (a patent agent in Canadian terms) Marcus Bates Sr [Bates] in a letter [Bates Letter] that his invention was not likely patentable because of prior art. They further alleged that Bowden hid the letter from his lawyer who prosecuted the patent application [Comuzzi] and failed to disclose the prior art to the US Patent and Trademark Office [USPTO] thereby committing fraud on the patent Office (a US legal concept much in debate) and otherwise engaging in inequitable conduct.

[70] The evidence surrounding the pre and post patent search in September 1992 to the filing of the patent application in April 1993 is at times confusing; both the oral evidence and document trail is missing critical parts.

[71] At the original trial, Bowden outlined a series of events starting with retaining Bates in September 1991 to do a patent search, having received the Bates Letter of September 1992, to having retained a patent lawyer Comuzzi in March-April 1993 to prepare the US patent application before the one-year grace period had expired. Most germane is that Bowden said that he had not described to Bates the invention or idea in any detail.

[72] At trial, the Bates Letter of September 1992 was produced. It identified 29 prior art references including Le Compte, Dillon and US Patent No. 3,223,183 to Varney [the Varney Patent]. The Bates Letter also contained a specific description of Bowden's embodiment of invention and advice that based on the prior art, patentability was doubtful.

[73] While the Bates Letter was produced at trial, the whole of Bates Sr's file concerning Bowden's invention [Bates File] had never been produced in any of the related litigation in the US. It appears that all parties assumed that the Bates File was either lost or destroyed.

[74] After this trial had concluded and argument made, but prior to release of a decision, counsel for the Plaintiffs advised the Court that the Bates File had finally been located. Counsel also advised that Bowden, having now seen the file, informed that his recollection has been faulty and that the evidence before the Court was not entirely accurate. Of particular significance was the record of a meeting between Bates and Bowden at Bates' airport home/office on June 19, 1992.

[75] As the Court was faced with admittedly inaccurate evidence on what the Defendants contended was critical evidence, the trial was re-opened to admit evidence disclosed by the Bates File.

[76] It was intended that both Bowden and Bates would give evidence in Austin. It turned out that Bates was unable to testify due to declining health and mental capacity. However, his deposition recorded on video taken in the parallel US Federal District Court was admitted in evidence. His son Bates Jr testified as to the authenticity of the file and deciphered some notations but had no other involvement in this matter.

[77] Bowden's evidence in light of the Bates File was not particularly useful because he had no independent memory of the meeting on June 19, 1992. He confirmed that the meeting occurred

because his son recalled going to Bates' home/office – a trip made memorable to Bowden's son because he had just received his driver's licence.

[78] There is no doubt that the Bates File was genuine. It was detailed and well organized. I do not doubt that the notations reflect Bates' understandings and perceptions as well as accurately reflect his own actions.

[79] With respect to Bates' deposition evidence, there is greater reason to be cautious in accepting it as entirely accurate or complete. On April 11, 2011, when Bates gave his evidence, he had been suffering diminished mental capacity issues. Bates Jr said that Bates' mental capacity was day-to-day but at the time of his deposition, it was a "good day".

[80] Having reviewed the deposition evidence, it is clear that Bates was struggling with mental capacity issues in addition to the normal memory difficulties most witnesses have with events some time past – in this case almost 20 years. For example, he had trouble recalling his age or remembering that he lived at the Bates airfield in 1992 or that he had an office there.

[81] Bates had no specific memory of many of the key events of his interaction with Bowden and had obvious inaccurate memory of some events, such as believing that he had filed Bowden's patent application.

[82] These obvious difficulties, which undermine the reliability of Bates' evidence, were confirmed by medical advice. Within a month of his deposition, Bates was determined to lack

medical/legal capacity due to memory loss and dementia. Within two months thereafter, he was diagnosed with significant progressive dementia affecting his memory, his behaviour, his reasoning and judgment. These difficulties were not new; his son referred to his father's unusual behaviour as early as US Thanksgiving 2009.

[83] Against this sad state of affairs, I have little confidence in the accuracy of Bates' testimony. However, his notes and documents in the Bates File have some reliability.

[84] These documents show that portions of Bowden's evidence were inaccurate. He was in contact with Bates more frequently than just September 1991 when he suggested that the patent search was ordered. He had the meeting of June 19, 1992 at Bates' home/office after which the patent search was ordered. The results of that search were reflected in the Bates Letter. The documents suggest that it was Bates who sent Bowden to Comuzzi because Bates did not have the time to prepare the patent application – rather than Bowden's evidence that he got Comuzzi's name from the Yellow Pages and that he had always wanted to use a lawyer.

[85] Bowden explains his current memory problems as stemming from his evidence in parallel US proceedings. His evidence in those proceedings was the basis of his Canadian evidence but he gave his US evidence when his wife was in the late stages of a terminal illness and he was travelling between Denver and his home to attend to his wife. He says that this stress caused his own confusion.

[86] The Defendants' ask the Court to totally reject Bowden's evidence because of its unreliability. While some of the problems of Bowden's evidence have already been noted, what is striking from the documents is how consistent the Bates File is with the core of Bowden's story.

- Bates' notation of the June 19, 1992 meeting refers to the invention having been reduced to practice four months ago but that the first part was not public disclosure but testing. Four months from June 19 would be consistent with when Bowden began his testing. There was even a notation to the date of April 15.
- There was a reference to the fact that the patent application had to be filed "about next April" to avoid the statutory bar. It is unclear to what the bar refers, but most likely the one-year rule regarding public disclosure.
- Bates' checklist (used in all his patent files and reflecting the results of a client interview intake) recorded that the idea was reduced to practice four months ago, that it was publicly disclosed two months ago and that the statutory bar is "about 10 months from now".

These last two references are to April 1992 and April 1993 respectively.

[87] While none of the notations are particularly specific as to a day in April, they tend to point to the mid to latter part of April as the time of public disclosure and time for filing the patent application.

[88] In the Bates File there was a memo of March 8, 1992 from Bowden which describes the invention in patent-type language. Bowden had no recollection of it or the circumstances of its

creation. There is nothing in the Bates File or its timesheet that assists. It is just one of the many gaps in the documentation.

[89] As a result of the re-opened trial and evidence that generally confirmed the core of Bowden's story, the Defendants developed a new theory of Bowden's evidence. The Defendants contend that Bowden had to rely on a date in late April 1992 because he had declared bankruptcy on April 7. Presumably if the invention had been developed then, the benefits of the patent would have accrued to his creditors.

[90] Other than this bare allegation of a motive for an April 19 date, the Defendants have produced no real evidence to support this latest theory. It is an allegation at least bordering on criminal conduct. The Court cannot accept this theory as a fact without more convincing evidence.

[91] Flowing from the re-opened trial, the Defendants raised a new event showing prior disclosure of Bowden's invention. In October 1991 at Gonzales, Texas, there was a local parade. Bowden entered a float in the parade with an exhibit which consisted of a box on which were mounted some gauges and a decal with the name "Wildcat".

[92] Bowden testified that the box was empty. It is impossible to conclude that the provision of an empty and unlocked box with some gauges and a decal contradicts the evidence that Bowden's story of starting to work on the autodriller began in January 1992. Nor can I see how the empty box constitutes prior disclosure of the invention.

[93] In the end, the Bates Letter and Bates File did little to advance the Defendants' defence. The evidence shows the frailties of Bowden's memory and his tendency to put things in the most favourable light as referred to earlier in these Reasons. However, the re-opened trial evidence is more confirmatory than contradictory of Bowden's narrative.

[94] To round out the facts, Bowden had advised Comuzzi why he did not think the prior art in the Bates Letter was relevant. In March 1993, Bowden again contacted Comuzzi and began to work with an associate, Chris Makay, on the patent filing. Comuzzi informed Makay of the prior art issue and the belief that it was not relevant. There is nothing to suggest, as the Defendants have, that Bowden tried to hide the prior art issue from Comuzzi or that somehow Bowden, Comuzzi and/or Makay planned to hide prior art from the USPTO.

[95] It is now appropriate to outline the circumstances of the Defendants' device which is said to infringe the 313 Patent.

IV. PASON INVENTION

[96] Pason, which was incorporated in 1978, is a Canadian oil field services company that specialized in developing software and hardware for the drilling process. Jim Hill, President and CEO of Pason since 1987 when he acquired the company, was its chief corporate witness.

[97] As noted earlier, one of Pason's principal products was the EDR, the system for all data capture and monitoring of the equipment at a rig site. It was introduced to the market in Canada in 1994.

[98] The EDR is a computer-based product which collects, stores and displays drilling rig data. It is connected to rig sensors to measure a variety of drilling parameters: WOB, speed, torque, drilling fluid pump rate, drilling fluid pump pressure, rate of penetration and others. The data is processed in a computer, displayed on the drilling rig floor, networked with other users at the well site, digitally stored and transmitted to an offsite office.

[99] The EDR was successful in Canada. It was employed on 90% of the active drill rigs in Canada by October 2003.

[100] By 1999, Pason had decided to develop an autodriller which could perform directional and horizontal drilling. Pason also knew that of the autodrillers in the market, only the Wildcat was designed for directional and horizontal drilling. The ability to control the drill using pressure as a parameter was a critical element of any Pason autodriller.

[101] As a result of patent searches, sometime in 1999 Pason became aware of Bowden's patents both in Canada and the USA. Hill was informed that the Pason device could infringe the 313 Patent.

[102] Pason directed its attention at the Wildcat because it was the only autodriller that used WOB and pressure parameters as Pason intended its device to do. Toward that end, Pason set up on rigs using the Wildcat system to acquire data on its operation. Pason was benchmarking against the Wildcat particularly in respect of the use of pressure. It tested its device at places where Wildcats were installed to emulate the same results as the Wildcat.

[103] Pason's emphasis on pressure as a parameter for horizontal wells was consistent with all of the industry evidence that the use of pressure as a parameter was essential for non-vertical drilling.

[104] In the course of its investigation, Pason retained the services of a Canadian patent agent Terry Leier. Leier was never called as a witness in this trial despite being alive and in Canada. The purport of his advice comes from such Pason witnesses as Hill and Holt (described later) along with letters of advice.

[105] Fairly summarized, Leier's advice was:

- if the infringing device had all the elements of the patented device and more, the extra elements did not make it less infringing;
- infringement is considered in the context of the purpose of the invention;
- one must consider the function of each element of the claim and if it is carried out by an equivalent apparatus, like software, there can still be infringement;
- the Pason system operated within the parameters of Claim 14, at least some of the time; and
- Pason's software implementation of the elements found in the Wildcat was functionally equivalent to the elements of Claim 1 of the 313 Patent.

[106] Aside from the general points on claim construction, on infringement and in respect of Claim 1, Leier concluded that the Pason system appeared to operate within the parameters of

Claim 14 as well. Leier advised that unless Pason could invalidate the 142 and 313 Patents, the operation of the Pason system fell within Claim 14.

[107] Pason attempted to explain its continued pursuit of its autodriller without addressing the Wildcat claims as being based on Leier's advice that the Patent was overly broad and invalid. The advice on invalidity was based on the "Varney patent" having anticipated Bowden. However, the Varney patent as a basis for invalidity was never relied on in this Court.

[108] When Pason proceeded with its autodriller, it was fully aware of the patented Wildcat device and its operation. The only conclusion one can draw is that Pason had been warned that despite the differences between the Wildcat and the Pason device using software, it was at risk of infringement unless it could establish invalidity.

[109] The essential agreed difference between the Pason device and the Wildcat is that the Pason device is electronic whereas the Wildcat is mechanical – similar to one is digital, the other analog.

[110] Pason hired Trevor Holt in 1999, an electrical engineer with experience in programming computerized control systems in the oil and gas industry. In 2000 he began work on the programming for Pason's autodriller which was to be electronic, able to interface with Pason's EDR and would incorporate multiparameters including WOB and pressure.

[111] There were problems developing an algorithm to handle WOB. By 2003 those problems were solved and Holt then developed an algorithm for the pressure parameter. The Pason AutoDriller was released to the public in March 2003.

[112] The Pason AutoDriller, as described by Pason, had three major physical components:

- (a) The AutoDriller control box, which includes a microcontroller computer board (on which the algorithm is installed in memory), and a stepper motor driver;
- (b) The stepper motor; and
- (c) The drawworks drum ticks encoder (a device for measuring the precise movement of a drawworks drum).

[113] The Pason AutoDriller control box must be connected to the EDR. The EDR consists of a number of components connected around the drilling rig, including a number of sensors (such as sensors for WOB, drilling fluid pump pressure and depth), an EDR junction box for processing the input from those sensors, a server computer for logging data, and a dog house computer which provides the user interface for the EDR and any connected device, including the Pason AutoDriller.

[114] The stepper motor has a wire rope wrapped around its rotating end. The other end of the wire rope is connected to the handle of the drum brake typically found on conventional drilling rigs. As the stepper motor turns clockwise or counterclockwise, the brake handle will be respectively pulled or released.

[115] The drawworks drum ticks encoder mounts on the shaft of the drawworks on the rig to provide to the Pason AutoDriller microcontroller an indication of the movement of the drawworks.

[116] The stepper motor driver receives its commands from the Pason AutoDriller microcontroller. The stepper motor driver can only process two types of commands:

- (a) a quantity of steps dictating the magnitude of movement of the stepper motor (and therefore the brake handle to which it is attached). Each step corresponds to a single unit of rotation of the stepper motor.
- (b) direction instructions, which dictate the direction of movement of the stepper motor. A “pull” direction will result in the stepper motor turning clockwise, which will result in pulling up on the brake handle. A “release” direction will result in the stepper motor turning counterclockwise, which will result in releasing the brake handle and letting the draw-string run.

[117] The commands ultimately sent to the stepper motor driver are the result of data processing performed by a software algorithm stored on the microprocessor, which is used to calculate the precise motion needed to be applied at the brake handle. This calculation is performed 50 times per second (i.e. every $1/20^{\text{th}}$ of a second).

[118] The stepper motor driver takes the direction and steps information and in turn energizes the stepper motor to cause it to move the prescribed number of steps and direction over the next $1/20^{\text{th}}$ of a second. This turning motion pulls or releases the brake handle by the number of steps calculated by the algorithm.

[119] Varco and its experts contend, as discussed later, that despite the differences between the Wildcat mechanical system and the Pason AutoDriller electronic system, the critical elements of the 313 Patent are performed by the Pason AutoDriller.

[120] In countering the infringement claim, Pason says that if its first algorithm [Old Version] infringes, its second algorithm [New Version] does not. Varco's counter through its experts is the colloquial equivalent of "one can dress up a pig but it is still a pig" – the Pason AutoDriller still does what the 313 Patent teaches. However there is no serious disagreement of how the Pason AutoDriller or the algorithms function.

[121] The following description of the two algorithms is set out from the evidence of Holt. The description of the Old Version is extensive so one can contrast it with the New Version.

[122] The Old Version of the algorithm was used in Pason AutoDrillers from 2003 until 2008 in the United States, and from 2003 to September 2009 in Canada and elsewhere.

[123] [Redacted by Court Order due to claim of trade secret]

[124] [Redacted by Court Order due to claim of trade secret]

[125] [Redacted by Court Order due to claim of trade secret]

[126] [Redacted by Court Order due to claim of trade secret]

[127] [Redacted by Court Order due to claim of trade secret]

[128] [Redacted by Court Order due to claim of trade secret]

[129] When the Pason AutoDriller was operated using the Old Version of the algorithm, the stepper motor driver signals were not representative of any one of the measured parameters of WOB, pressure or any other parameter. Although the system measured drilling fluid pressure and considered it (depending on the setpoints selected by the user), due to the influence of the many other measured parameters and values used by the algorithm, the resulting stepper motor driver signals never represented the change in drilling fluid pressure.

[130] It is clear that the Pason AutoDriller used more parameters than the Wildcat but this is not determinative of infringement nor does it uncut the essential parameters of WOB and pressure.

[131] The New Version was deployed in 2008 on Pason AutoDrillers in the United States, and in September 2009 in Canada and the rest of the world. It is currently in use worldwide.

[132] [Redacted by Court Order due to claim of trade secret]

[133] [Redacted by Court Order due to claim of trade secret]

[134] The issue of infringement will be addressed again later; however, Pason continued to sell its AutoDriller in the face of the Wildcat. It held out to customers that the Pason AutoDriller controlled drilling based on pressure differential, that it also used WOB and that it could use both pressure and WOB at the same time.

[135] Pason had a considerable marketing advantage over others in the autodriller market. It had a significant presence in the drilling market because of the strength of its EDR product. Because of this market strength, it was able to add its Pason AutoDriller to the suite of products it offered to rig operators who already used the EDR.

[136] The advantage Pason enjoyed is that it could offer, particularly for those rigs with the EDR performing electronic data recording and with Wildcats doing the drilling, an easy way to consolidate drilling and recording under Pason products. Pason experienced rapid growth in 2003 (81 rigs) to 2004 (431 rigs) and thereafter.

[137] The effect of Pason's introduction of its AutoDriller on Prejean/Varco was significant. The Plaintiffs did not have the opportunity to deploy its product as expected despite being able to meet the Canadian demand for its product.

[138] The evidence establishes that had Pason not brought its Pason AutoDriller to market, the Plaintiffs could have serviced the entire Canadian market for this type of product, and invested further to meet any expanding demand. There is no evidence of other serious competition in Canada

between autodrillers capable of vertical/horizontal/directional drilling than the Wildcat and the Pason AutoDriller.

[139] As a result of the existence of the Pason AutoDriller, the Plaintiffs were forced to cut prices in the face of an expanding market.

[140] Pason also had foreign subsidiaries in the USA, Mexico and Australia. It sells critical components of its Pason AutoDriller to these subsidiaries prior to May 2007. It claims that since May 2007, it has not assembled the individual components together in Canada prior to export.

[141] Following export of the components, these foreign subsidiaries rent the Pason AutoDriller/components to customers in those countries.

[142] Pason earns revenue from these foreign subsidiaries through (a) mark-up on components, and (b) a share in the Pason AutoDriller royalties/rentals paid to the foreign subsidiaries.

V. ISSUES

[143] There are five issues to be determined; some issues having several subparts:

1. The proper construction of the 313 Patent in particular Claims 1, 11 and 14.
2. Whether the Defendants infringed Claims 1, 11 or 14, either/or as made and used in Canada or in the export of components.

3. Whether Claims 1, 2, 3, 4, 9, 10, 11, 13, 14 or 15 are invalid by reason of anticipation (prior art or public use more than one year before the priority date), obviousness, lack of utility and overbreadth.
4. Whether the application for the 313 Patent should be deemed abandoned for failure to respond in good faith to the Canadian Intellectual Property Office [CIPO] examiner.
5. The appropriate monetary remedy – damages or an accounting of profits.

VI. ANALYSIS

A. CLAIM CONSTRUCTION

[144] The parties agree only in part with respect to the crucial issues in the claim construction of Claims 1, 11 and 14 of the 313 Patent.

[145] The relevant claims are set out below:

Claim 1. An automatic drilling system for automatically regulating the release of the drill string of drilling rig during the drilling of a borehole, comprising:

a drilling fluid pressure sensor;

a drilling fluid pressure regulator coupled to said drilling fluid pressure sensor, said drilling fluid pressure regulator measuring changes in drilling fluid pressure and outputting a signal representing those changes;

a relay coupled to said drilling fluid pressure regulator, said relay responsive to the output signal of said drilling fluid pressure regulator to supply a drill string control signal at an output thereof; and

a drill string controller coupled to said relay wherein a decrease in drilling fluid pressure results in said relay supplying a

drilling string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in drilling fluid pressure results in said relay supplying a drill string control signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

Claim 11. A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure;

producing a signal in response to changes in drilling fluid pressure, said signal representing the changes in drilling fluid pressure;

relaying said signal to a drill string controller; and

controlling said drill string controller to increase the rate of release of said drill string when said signal represents a decrease in drilling fluid pressure and to decrease the rate of release of said drill string when said signal represents an increase in drilling fluid pressure.

Claim 14. A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure and bit weight;

producing a first signal in response to changes in drilling fluid pressure, said first signal representing the changes in drilling fluid pressure;

producing a second signal in response to changes in bit weight, said second signal representing the changes in bit weight;

selecting any one of said first signal, said second signal, and both said first and said second signals to control the release of said drill string; and

relaying said selected signal or signals to a drill string controller which regulates the release said drill string in response to said selected signal or signals.

1. Whether the “signal representing these changes” (Claim 1) and the “signal representing changes in drilling fluid pressure” (Claims 11 and 14) must represent changes only in drilling fluid pressure;
2. Is the inverse relationship between changes in drilling fluid pressure and the rate of release string mandatory/essential?
3. What is the meaning of “selecting” in Claim 14 (is it manual or automatic)?

[147] The Defendants add to the above issues:

1. What is the meaning of “drilling fluid pressure regulator”?
2. Are the claims in the 313 Patent restricted to conventional drilling rigs having a gravity-fed drill string that is controlled by a friction brake?

(1) Legal Principles

[148] There is no basic disagreement between the parties as to the legal principles of Claim Construction. Before dealing with either infringement or validity, the claims must be construed by the Court as of the date of publication of the Patent (October 20, 1994). (*Free World Trust v Électro Santé Inc*, 2000 SCC 66, [2000] 2 SCR 1024 [*Free World*]; *Whirlpool Corp v Camco Inc*, 2000 SCC 67, [2000] 2 SCR 1067 [*Whirlpool*])

[149] The claims are to be construed purposively which is an objective exercise as to what a “person skilled in the art” [Skilled Person] would have understood the inventor to mean by the words of the claim (*Whirlpool* at paras 45-47).

[150] It is settled law that a patent must be read by a mind willing to understand, not by a mind desirous of misunderstanding. Such willing mind plays close attention to the purpose and intent of the author (*Whirlpool* at para 49(c)).

[151] The 313 Patent describes an automatic driller that can be used to drill directional holes with a mud motor that accounts for changes in drilling fluid pressure that occur as drilling fluid passes through a mud motor. The invention automates the process of controlling the rate of release of the drill string, something which previously had to be done manually.

[152] The invention relates to an automatic drilling system that controls the rate of release of the drill string in vertical, directional and horizontal drilling in response to any one of or any combination of bit weight, drilling fluid pressure, drill string torque and drill string RPM.

[153] The issues of claim construction as well as many of the issues in validity and infringement are dependent on the expert evidence. In this case, the Plaintiffs put forward Gary Wooley; the Defendants' principal expert was Tommy Warren.

[154] Both of these experts were well qualified. Their reports were generally clear and they genuinely tried to help the Court. However, as in many of these cases, the Court must accept one expert's opinion over the others as the Court is in no position to form its own technical opinion.

[155] Gary Wooley is a PhD in mechanical engineering and has worked in drilling on-site and in directional drilling. He has provided research and engineering support to those in the field. After

leaving the oil company ARCO, he was a consulting engineer in drilling and software development and licensing. Subsequently, he established his own engineering consulting company dealing with a multitude of drilling issues and writing software programs. He has also been accepted as an expert witness in numerous US cases.

[156] Tommy Warren has an equally impressive CV and qualifications. For much of his career, he was in the research area at Amoco Technology Center or in research at Tesco Corporation. He has published numerous articles in the field of drilling. He is also the holder (with others) of a number of US patents in drilling apparatus. He has not previously appeared as an expert witness.

[157] As a general rule, the Court finds Wooley's evidence more clear, consistent and persuasive. Wooley's advantage of both practical and academic experience, which is more closely related to these types of products, is preferred over Warren's more research-based experience.

(2) Person of Ordinary Skill

[158] There are areas of agreement between Wooley and Warren as to the Skilled Person and some areas of disagreement.

[159] As to the areas of agreement, the Skilled Person would have several years of experience in the oil and gas drilling business and have a good understanding of the basic drilling process and the use of drilling equipment. This would include (but not be limited to) the following types of persons: drilling engineers, on site drilling representatives of oil and gas companies, tool pushers (supervisors of the drilling crew), drillers (persons operating drill rig and directing efforts of the floor hands),

floor hands, directional drillers (drillers with special skills and equipment for directional drilling wells), contractors with special drilling skills and others involved in the drilling business.

[160] Where the two experts part company on this issue is in respect of the knowledge and experience of the Skilled Person. Warren opines that the Skilled Person should have either a bachelor's degree in Mechanical or Petroleum Engineering with five years' experience in drilling rig control systems or little to no formal education but at least 10 years of practical experience in using and servicing autodrillers and associated drilling rig equipment.

[161] Wooley's opinion is that a person with somewhat lesser education or experience would constitute a Skilled Person. That person's education level would vary from engineers with college or university degrees to field hands who did not graduate high school but who had substantial experience in the field.

[162] To the extent that there is a significant difference between the two experts, Warren emphasizes education while Wooley focuses on experience. Wooley, by his own qualifications, encompasses both education and experience whereas Warren is more research-focused.

As said previously, the Court prefers Wooley's evidence generally and in this regard the Court accepts the more practical/experiential emphasis of Wooley without the limiting requirement of advanced education or necessarily a fixed number of years of experience established by Warren.

[163] Therefore, the Skilled Person is as defined by Wooley.

(3) “ONLY” re changes in drilling fluid pressure (Claims 1, 11 and 14)

[164] The Defendants’ position is that the signal output from the drilling fluid pressure regulator is a signal representing changes in drilling fluid pressure only. The Defendants’ expert reaches that conclusion by reading in limitations in dependent Claims 2 and 5 to Claim 1, an unsound approach to claim construction (see *Eli Lilly and Co v Apotex Inc*, 2009 FC 991, 351 FTR 1).

[165] Warren has read in the word “only” to Claims 1, 11 and 14, a word that does not appear in any of the claims.

[166] As Wooley points out in discussing these dependent claims, a “regulator” is a device for controlling or limiting something or maintaining a designated characteristic by receiving or sensing a signal, processing or producing a response. In this case the response is to effect an increase in the rate of release of the drill string or to effect a decrease in the rate of release of the drill string.

[167] There is no limitation in the 313 Patent as to the type of device that could be a regulator. The type of regulator in the preferred embodiment was a pneumatic device but Wooley confirmed that Claim 1 is not so limited; the regulator could be hydraulic, electrical, mechanical or electronic.

[168] The preferred embodiment (313 Patent at 7-8) refers to measuring pressure, bit weight and torque. Considering Claim 12, for example, it is clear that a signal can represent more than one parameter.

[169] In the end, the issue is resolved by reference to what a Skilled Person would understand. It is appropriate for the Court to use such evidence in its determination of the claim language (*Whirlpool* at para 48).

... In *Catnic*, as in the earlier case law, the scope of the monopoly remains a function of the written claims but, as before, flexibility and fairness is achieved by differentiating the essential features ("the pith and marrow") from the unessential, based on a knowledgeable reading of the whole specification through the eyes of the skilled addressee rather than on the basis of "the kind of meticulous verbal analysis in which lawyers are too often tempted by their training to indulge" (*Catnic*, supra, p. 243).

[170] As Wooley testified, a Skilled Person would not read the limitation of "only" into the Claims.

[171] Warren's evidence to support his interpretation was strained and not persuasive. While first admitting that a signal (in Claims 11 and 12) could represent multiple parameters, he then concluded that the Patent did not teach how a conflict between one parameter above its set point (the value or number set for a parameter to trigger a response) would be resolved if the other parameter was below its set point. However, he conceded that the conflict he saw was resolved in the preferred embodiment.

[172] By reference to the preferred embodiment and construing the claims with the mind of a Skilled Person willing to understand, the signal representing changes in drilling pressure does not mean a signal representing only changes in drilling fluid pressure nor is there any conflict in operation of two or more parameters.

(4) Inverse Relationship – Mandatory (Claims 1 and 11)

[173] The “inverse relationship”, as it has been described at trial and in Claims 1 and 11, describes the relationship between changes in drilling fluid pressure and the rate of release of the drill string where an increase/decrease in one results in a decrease/increase in the other.

[174] Claim 1 describes it as “... a decrease in drilling fluid pressure ...”.

Claim 11 describes it as “... to increase the rate of release of said drill string ...”.

[175] The Defendants claim that this inverse relationship is an essential feature of Claims 1 and 11 and therefore is mandatory in the sense that every time the pressure reaches above the set point, there must be a decrease in the rate of release of the drill string – that the relationship is always followed, without exception.

[176] Both experts agree that the inverse relationship is an essential feature of the invention. The evidence is that if in normal operations the equipment was not operating in that way – as pressure decreased, the drill string would advance so drilling could continue against the underground wall, meaning that the Patent would not have much utility.

[177] The Defendants’ position has the advantage to them, particularly in terms of infringement, that the Pason Autodriller algorithm measures pressure every 1/50th of a second and therefore leaves open the possibility that there could be a point in each 1/50 of a second when the relationship did not exist.

[178] This is a strained interpretation of the Claims which must firstly be considered on the basis of normal operations. The whole purpose of the invention is to set up, on an automatic basis, the relationship of a decrease in one or more parameters (pressure, bit weight, etc.) resulting in the release of the drill string to continue drilling operations.

[179] Further, both experts cite instances of exceptions to the inverse relationship. Wooley lists instances of an exceptional nature, such as a low setting for the air flow regulator so that there is no reaction from the regulator.

[180] Warren admitted that Claim 1 covers the preferred embodiment and that in the preferred embodiment there are instances where the inverse relationship is not observed.

[181] In any event, applying a purposive interpretation to the Claims in light of the purpose of the invention and the realities of operation, the inverse relationship, while important, is not mandatory at all times but is normal and to be expected.

(5) Selecting Automatic/Manual (Claim 14)

[182] The Defendants' position is that the selecting step in Claim 14 (see underlined portion below) is a manual operation.

Claim 14. A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure and bit weight;

producing a first signal in response to changes in drilling fluid pressure, said first signal representing the changes in drilling fluid pressure;

producing a second signal in response to changes in bit weight, said second signal representing the changes in bit weight;

selecting any one of said first signal, said second signal, and both said first and said second signals to control the release of said drill string; and

relaying said selected signal or signals to a drill string controller which regulates the release said drill string in response to said selected signal or signals.

[Emphasis added by Court]

[183] One of the difficulties with the Defendants' position is that Claim 14 is a "method for automatically regulating the release of the drill string ...". There is nothing in the wording of Claim 14 to suggest manual operation or selection.

[184] Wooley's opinion is that the "selecting" step is done after the parameters have been set and the selecting as between two signals is done automatically.

[185] The Defendants rely on a portion of the Specification (313 Patent at 4, first paragraph) to support their position of manual selection.

Each of the regulators attaches to a relay which is responsive to that regulator output signal to supply a drill string control signal to a drill string controller. The relays connect in series so that all the regulators may be utilized concurrently to provide a drill string control signal to the drill string controller via their respective relays. Furthermore, the relays attach to relay selectors which switch the relays on and off to permit an operator of the automatic driller to select which one of or which combination of the regulators are to control the drilling operation.

[Emphasis added by Court]

[186] Wooley explained that the selecting step referred to in the Claim is not the manual selecting done by the user before the device is put into operation – the step of establishing the set points.

[187] Wooley’s opinion is consistent with the United States Court of Appeals for the Federal Circuit’s decision in *Varco, LP v Pason Systems USA Corp*, 436 F (3d) 1368 (Fed Cir 2006) [*Varco, LP*]. That Court held that the drilling system automatically selects between the primary and secondary controls during operations.

To clarify this setup procedure, the specification explicitly states that this initial setup occurs “before the [selected] regulator . . . will automatically regulate” the release of the drill string. ’142 patent, col. 8, ll. 57-61 (emphasis added). The district court relied on this portion of the specification to support its requirement of manual operation. To the contrary, this portion of the specification sets forth an initial setup or calibration step that precedes the claimed selecting step. In effect, the district court erred by reading the initial setup or calibration step into the claimed selecting step.

(*Varco, LP* at 9)

With this initial adjustment in place, the drilling system then automatically selects between the primary and secondary controls during operation. Thus, the prosecution history confirms that selecting in claim 14 does not encompass the initial setup or calibration of the drilling system, but rather the conflict resolution process between primary and secondary controls during operation.

(*Varco, LP* at 10-11)

[188] Fairly and purposively read, Claim 14 makes clear that the selecting of the signal to control the drill string is done automatically.

(6) Other Claims Construction Issues

[189] The three previous claims construction issues were at the heart of this litigation. The Defendants have raised two subsidiary issues.

[190] The issue of whether a drilling fluid pressure regulator can receive only a single input has been previously addressed.

[191] As indicated earlier, on the issues of claim construction which are the purview of the Court, Wooley's input has been of greater assistance and the Court accepts his evidence on this issue that a Skilled Person would understand that the claims contain no such limitation.

[192] Lastly, the Defendants say that the Patent is intended to cover any drilling rig that lowers a drill string whereas the Plaintiffs argue that the Patent is restricted to conventional drilling rigs having a gravity-fed drill string that is controlled by a friction brake.

[193] The issue turns on the word "release" as used in the Claims. Wooley opined that a Skilled Person would understand this to mean, in the context of the Patent, reducing brake friction on a conventional brake controlled drilling rig which would have the effect of increasing the rate at which the drill string is lowered.

[194] Warren, on the other hand, opined that the term "release" would cover any "advancement" of the drill string. It is unclear what type of advancement he had in mind other than a system that

drives the drill string. His reliance on the second embodiment is misplaced as its description never uses the word “release”.

[195] The invention considered as a whole is based on releasing a brake that lowers the drill string. It was admitted that the second embodiment was an afterthought and Wooley opined that it was not covered by the Claims.

[196] In the Patent the related art which discussed control of the rate of release of the drill string referred to releasing or applying a brake handle.

[197] The word “control” in the context of the Patent’s prior art meant applying the brake. The words “control” and “regulating” are used in the context of releasing the drill string in response to changes in one or more parameters.

[198] The Defendants’ position is not persuasive. The Patent is limited to conventional brake-controlled drilling rigs that release a brake and allow the drill string to fall under the force of gravity.

[199] Lastly, with respect to Claims 1, 11 and 14, the further issue is whether the drilling control signal can only be responsive to one parameter, pressure. While the relay is to be responsive to the signal from the drilling fluid pressure regulator, the Claim does not say that the relay to the controller can only be responsive to the pressure signal.

[200] For example, Claim 12, dependent on Claim 11, shows that the relaying of the “said signal” to the controller represents changes in two parameters, pressure and torque.

[201] Lastly, the Defendants allege that a purposive construction necessitates a finding that reference to “release of the drill string” includes a conventional drilling rig having a gravity-fed drill string that is controlled by a friction brake, a drilling rig having a drill string in the form of a hydraulically driven coil tube with a drill bit, and any other rig that lowers a drill string.

[202] The purport of the Defendants’ submission is that the patent is broader than Varco’s position that the 313 Patent is restricted to conventional rigs having a gravity-fed drill string that is controlled by a friction brake. The argument depends to some extent on the second embodiment’s reference to the invention being configured to regulate a coil tubing drilling rig.

[203] Wooley was of the view that while Bowden might have tried to broaden the patent that way, he could not agree that that was how the patent should be interpreted. The background of the Figure 14 and the coil tube was that it was a last minute add-in after the real purpose and descriptions of the patent had been drafted.

[204] The whole basis of the patent application was the control of the drill string. I concur with the limitation Varco says should be understood in the patent as being more consistent with the inventor’s intent and the purpose of the invention.

[205] Having interpreted the principal claims and the issues arising, the Court is next required to address the infringement issue.

B. INFRINGEMENT

[206] The basic principles on the law of infringement are not seriously in issue. Section 42 of the *Patent Act*, RSC 1985, c P-4 [*Patent Act* or the *Act*], sets out the right of the patent holder to exclude others, for the term of the patent, from making, constructing or using the claimed invention or selling it to others to be used.

[207] The Plaintiffs claim that Pason infringed Claims 1, 11 and 14 of the 313 Patent a) by the manufacture, use and rental of the AutoDriller in Canada and b) by exporting the Pason AutoDriller, manufactured in Canada, to foreign countries for use in those foreign countries.

[208] The burden of proof on this issue rests with the Plaintiffs. As held in *Free World*, infringement arises if the offending item takes all of the essential elements of a claim in the invention. As referred to earlier, the addition of features does not avoid infringement if all the elements of a claim have been adopted.

(1) Claim 1

[209] Claim 1 consists of the following four elements:

- a drilling fluid pressure sensor;
- a drilling fluid pressure regulator;
- a relay; and

- a drill string controller.

[210] In concluding that Pason has infringed the Patent, I have relied significantly on the expert evidence of Wooley.

[211] The Pason AutoDriller has a drilling fluid pressure sensor in the form of the pressure transducer and EDR J Box.

[212] It also has a drilling fluid pressure regulator in the form of the microcontroller. It performs the function of a regulator in Claim 1 because the microcontroller receives the data that comes from the drilling fluid pressure sensor, processes it and then outputs a signal representing the changes in drilling fluid pressure to a stepper motor driver.

[213] The algorithm generates the output from the microprocessor. The microcontroller interprets the parameter (WOB/pressure) and if more or less braking is required to maintain the set points, it sends a signal to the stepper motor to move the brake handle as necessary.

[214] As held in the Claim Construction section of these Reasons, Warren's interpretation that the Patent's regulator is restricted to only one parameter has not been accepted.

[215] The Court concludes that the microcontroller in the Pason AutoDriller is a regulator that measures changes in drilling fluid pressure and outputs a signal representing those changes.

[216] The Pason AutoDriller has a relay in the form of the stepper motor. The stepper motor converts the signal from the microprocessor and passes it on to the stepper motor. Even Warren admits that the stepper motor receives a signal and outputs another signal. As concluded by Wooley, there is no requirement that the signals be based on the same parameter. The fact that the signal received by the stepper motor relates to multiple parameters is not material to this issue.

[217] The last element in the claim is the drill string controller which regulates the release of the drill string. The stepper motor in the Pason AutoDriller directs the action of the brake handle in response to the signal from the stepper motor driver.

[218] In the context of this case, the term “regulate” is synonymous with “control”. I accept Wooley’s opinion as well that the stepper motor in the Pason AutoDriller performs the function of the controller in the Patent.

[219] The Defendants contend that the Pason AutoDriller does not rely on the inverse relationship referred to in the Claim Construction section of these Reasons. It was their position that since the inverse relationship was mandatory under the Patent, the Pason AutoDriller did not infringe because its operation, by virtue of the algorithms, was not always dependent on the inverse relationship.

[220] The Court’s conclusion on Claim Construction is sufficient to dispose of this alleged distinction. However, there are further reasons that undermine the Defendants’ position.

[221] Both devices follow this inverse relationship the overwhelming majority of the time. If they did not, neither device would function as intended or have much value. Momentary disconnects from this relationship are not a basis for distinguishing the devices. As Wooley explained, both the Pason AutoDriller and the Patent's preferred embodiment have this disconnect from the inverse relationship periodically.

[222] Pason witnesses concede the normal existence of this inverse relationship. This is also consistent with the Defendants' evidence in US proceedings.

[223] The Defendants place reliance on the algorithms as negating the inverse relationship – if not in the Old Version, then in the New Version.

[224] The evidence with respect to the algorithms is not persuasive. Pason's evidence lacked explanations and detail when contrasted with that of Wooley who looked at the details of the computer codes and related material.

[225] Pason relied on demonstrative evidence rather than a detailed explanation of the various steps in the code. The demonstrative evidence contained one admitted fundamental error.

[226] There is little evidence to support Pason's opinion that the Old Version did not maintain the inverse relationship. The Plaintiffs' evidence effectively rebuts Pason's position.

[227] In maintaining that the New Version did not maintain the inverse relationship, the Defendants relied on diagnostic data from a single rig. Over the course of the proceedings, this data was manipulated, altered and replotted by the Defendants' experts and did not stand up under cross-examination.

[228] In my view, this evidence was too unreliable for the Court to draw very much relevant assistance. It did not establish the Defendants' proposition.

[229] It is also relevant that the New Version arose after an adverse (to the Defendants) verdict in the USA. Pason ultimately promised to modify its Pason AutoDriller. The algorithm appears to be an attempt to get around the US judgment.

[230] There is no evidence that the New Version is materially different from the Old Version. The New Version may be slightly different but it still performs the same function in essentially the same way.

[231] It remains a critical feature of the Pason AutoDriller that it can operate using pressure only as the controlling parameter by simply adjusting the set points of the other parameters high enough that they are of no relevance.

(2) Claim 11

[232] Claim 11 has four elements/steps in its method for "automatically regulating the release of the drill string":

- measuring drilling fluid pressure;
- producing a signal in response to changes in drilling fluid pressure;
- relaying said signal to a drill string controller; and
- controlling a drill string controller to increase the rate of release of the drill string when a signal represents a decrease in drilling fluid pressure and to decrease the rate of release of the drill string when the signal represents an increase in drilling fluid pressure.

[233] The Defendants rely on their arguments regarding Claim 1 as the basic reasons for arguing that the Pason AutoDriller lacks the essential elements of Claim 11. For largely the same reasons as the Court found Claim 1 to be infringed, Claim 11 is likewise infringed.

[234] The Pason AutoDriller used in conjunction with its EDR performs a method for automatically regulating the release of the drill string. Pason admitted to this, both with respect to Claims 1 and 11.

[235] The Pason AutoDriller used with the EDR measures drilling fluid pressure. The Defendants' arguments about measuring only changes in pressure and the "always on" inverse relationship have already been disposed of.

[236] The microcontroller performs the function of producing a response to changes in pressure in much the same way as the microcontroller performs the function of a regulator.

[237] The stepper motor driver performs the function of relaying the signal produced by the microcontroller to a drill string controller – the stepper motor in much the same way as the stepper motor driver performs the function of a relay.

[238] The stepper motor in the Pason AutoDriller performs the function of controlling a drill string controller in much the same manner that the stepper motor performs the function of a controller.

[239] The issues of inverse relationship and versions of algorithms have already been dealt with.

[240] The Court concludes that Pason has infringed Claim 11.

(3) Claim 14

[241] The Pason AutoDriller, when used in conjunction with the EDR, performs a method of automatically regulating the release of the drill string which is the method described at the beginning of Claim 14.

[242] This Claim has five elements:

- measuring drilling fluid pressure and weight bit;
- producing a first signal in response to changes in drilling fluid pressure, which signal representing the change in drilling fluid pressure;
- producing a second signal in response to changes in bit weight, such second signal representing changes in bit weight;

- selecting any one of said first signal, said second signal or both to control the release of the drill string; and
- relaying the selected signal or signals to a drill string controller which regulates the release of the drill string in response to the selected signal or signals.

[243] The Pason AutoDriller, when used in conjunction with the EDR, measures drilling fluid pressure and bit weight.

[244] Consistent with Claim 14 and Wooley's opinion, the microcontroller in the Pason AutoDriller performs the function of producing a first signal in response to changes in drilling fluid pressure.

[245] The microprocessor receives the bit weight signal from the bit weight sensor of the EDR, processes this data according to the Pason AutoDriller software and produces a response in the form of a signal representing those changes in bit weight. The microcontroller performs the function of producing a second signal in response to changes in bit weight.

[246] While Wooley opined that the microcontroller performed the function of selecting either or both of the first and second signals, the Defendants contested that description. They still resist this point despite Holt's admissions at trial that the selecting step occurs in the Pason AutoDriller, the existence of Holt's e-mails confirming this selection process and even Warren's concessions on cross-examination.

[247] The weight of the evidence confirms that the Pason AutoDriller performs the step of selection of a pressure signal or WOB signal to control the release of the drill string.

[248] Lastly, the stepper motor driver in the Pason AutoDriller performs the function of relaying the selected signal or signals produced by the microcontroller to a drill string controller – the stepper motor in the Pason AutoDriller. The stepper motor performs the function of a drill string controller by controlling the brake handle and thereby regulating the release of the drill string.

[249] The Court concludes that the Defendants have infringed Claim 14.

(4) Inducement

[250] A subsidiary issue in view of the finding of direct infringement of both the product and method claims is Pason's inducement of third parties to infringe the Patent.

[251] As held in *Weatherford Canada Ltd v Corlac Inc*, 2011 FCA 228, 95 CPR (4th) 101, a determination of inducement requires the application of a three-prong test:

- the act of infringement must have been completed by the direct infringer;
- the completion of the acts of infringement must be influenced by the acts of the alleged inducer to the point that, without the influence, direct infringement would not take place; and
- the influence must knowingly be exercised by the inducer.

[252] The Defendants do not appear to seriously dispute this issue except in the context of foreign sales and operations which they say are beyond the protection of a Canadian patent and any award of damages. On the issue of damages, the Defendants earned the amounts from foreign operations in Canada.

[253] The primary means of inducement exercised by Pason is through the instructions it gives to purchasers as to the operation of the Pason AutoDriller. Instructions to complete an act of infringement is one form of inducing infringement, as held in *Windsurfing International Inc v Trilantic Corp* (1985), (sub nom *Windsurfing International Inc v Bic Sports Inc*) 8 CPR (3d) 241 at 263-268, 63 NR 218 (FCA) [*Windsurfing*].

[254] Pason provides numerous manuals to its customers and field technicians on how to assemble, install and operate the Pason AutoDriller. The manuals are accurate and Pason expects them to be followed. In addition to manuals, Pason ensures training of employees on the assembly, installation and operation in its foreign subsidiaries.

[255] Given the sales of the Pason AutoDriller, both domestic and foreign, it is more likely than not that such customers assembled and/or used the Pason AutoDriller, that the customers were influenced by Pason's manuals, instructions and training, and that Pason knew (indeed expected) that customers would act in accordance with what Pason supplied.

[256] Even if the assembly of the Pason AutoDriller is not done by customers or technicians on their behalf, the operation of the Pason AutoDriller infringes Claims 11 and 14 and Pason is liable

for inducing that infringement by others. The acts of inducement occur at least in part in Canada for which Pason is liable.

(5) Infringement by Exportation

[257] It is agreed that the Pason AutoDriller is manufactured in Canada and that Pason does not manufacture in any other country. The issue in this section is Pason's claim that since it ships to outside Canada all of the Pason AutoDriller parts but in unassembled form, there is no infringement and they are permitted to retain the revenues earned from an activity which, if performed in Canada, would be infringement.

[258] Pason has subsidiaries in the United States, Mexico and Australia. As referred to earlier, Pason earns revenues from those subsidiaries, both on the mark-up on sales of the Pason AutoDriller as well as a share in rental royalties paid to the foreign subsidiaries.

[259] In South America, Pason operates through an agent. Pason retains ownership in its Pason AutoDriller which are shipped to the agent for rental to customers. Pason receives a share of rental revenue paid to the agent.

[260] It is well established in decisions such as *JM Voith GmbH v Beloit Corp*, (sub nom *Benoit Canada Ltd v Valmet-Dominion Inc*) [1997] 3 FC 497, (sub nom *Voith (JM) GmbH v Beloit Corp*) 73 CPR (3d) 321 (FCA) and *Windsurfing* that simply separating the parts of a device and shipping the parts for later integration and assembly does not avoid the liability for infringement. The Court of Appeal commented "[t]o suggest that a patent infringement suit can be successfully avoided by

selling parts as components of a kit in contradistinction to their sale assembled, is [...] errant nonsense” (*ibid* at 265).

[261] In *Windsurfing*, the sailboard came as a kit consisting of several components for later assembly. The assembly did not have to occur in Canada. The important feature was that the sale was made in Canada.

[262] Prior to 2007, Pason shipped its Pason AutoDrillers in kits so that a field technician, either in Canada or elsewhere, could install the Pason AutoDriller. After May 2007 Pason stopped shipping kits. Thereafter, when a subsidiary or agent needed a Pason AutoDriller, it ordered the component parts. These parts were boxed and shipped to the subsidiary or agent who then has all the parts necessary to assemble the Pason AutoDriller.

[263] The change in 2007 is one of form not substance. The change was made to facilitate customs processing and inventory tracking; not to substantially change the way Pason AutoDrillers were shipped outside Canada. The revenue continued to flow to Pason in the same manner.

[264] The reality is that the shipment of parts, along with the relatively simple later assembly, is the shipment from Canada of Pason AutoDrillers.

[265] The Defendants correctly point out the territorial limitations of the Canadian *Patent Act* and of this Court’s jurisdiction to enforce patent protection. The method claims, Claims 11 and 14, are infringed outside of Canada and are not directly protected by this Court’s jurisdiction.

[266] However, the product claim is protected because the sale of the infringing product occurs, at least for purposes of this case, in Canada where Pason is paid for the goods and shipments.

C. VALIDITY OF PATENT

[267] Having found that the Defendants have infringed the 313 Patent, the Defendants raise several issues attacking the validity of the Patent. The grounds advanced, as referred to earlier are:

- anticipation by means of prior disclosure in the prior art and by Bowden's public use at Union Pacific prior to April 19, 1992;
- obviousness;
- inutility;
- overbreadth; and
- deemed abandonment/bad faith.

(1) Anticipation – Prior Art

[268] Section 28.2(1) of the *Patent Act* provides the basis for the grounds of invalidity:

28.2 (1) The subject-matter defined by a claim in an application for a patent in Canada (the "pending application") must not have been disclosed

28.2 (1) L'objet que définit la revendication d'une demande de brevet ne doit pas :

(a) more than one year before the filing date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant, in such a manner that the subject-matter became available to the

a) plus d'un an avant la date de dépôt de celle-ci, avoir fait, de la part du demandeur ou d'un tiers ayant obtenu de lui l'information à cet égard de façon directe ou autrement, l'objet d'une communication

public in Canada or elsewhere;	qui l'a rendu accessible au public au Canada ou ailleurs;
(b) before the claim date by a person not mentioned in paragraph (a) in such a manner that the subject-matter became available to the public in Canada or elsewhere;	b) avant la date de la revendication, avoir fait, de la part d'une autre personne, l'objet d'une communication qui l'a rendu accessible au public au Canada ou ailleurs;
(c) in an application for a patent that is filed in Canada by a person other than the applicant, and has a filing date that is before the claim date; or	c) avoir été divulgué dans une demande de brevet qui a été déposée au Canada par une personne autre que le demandeur et dont la date de dépôt est antérieure à la date de la revendication de la demande visée à l'alinéa (1)a);
(d) in an application (the "co-pending application") for a patent that is filed in Canada by a person other than the applicant and has a filing date that is on or after the claim date if	d) avoir été divulgué dans une demande de brevet qui a été déposée au Canada par une personne autre que le demandeur et dont la date de dépôt correspond ou est postérieure à la date de la revendication de la demande visée à l'alinéa (1)a) si :
(i) the co-pending application is filed by	(i) cette personne, son agent, son représentant légal ou son prédécesseur en droit, selon le cas :
(A) a person who has, or whose agent, legal representative or predecessor in title has, previously regularly filed in or for Canada an application for a patent disclosing the subject-matter defined by the claim, or	(A) a antérieurement déposé de façon régulière, au Canada ou pour le Canada, une demande de brevet divulguant l'objet que définit la revendication de la demande visée à l'alinéa (1)a),
(B) a person who is	(B) a antérieurement

entitled to protection under the terms of any treaty or convention relating to patents to which Canada is a party and who has, or whose agent, legal representative or predecessor in title has, previously regularly filed in or for any other country that by treaty, convention or law affords similar protection to citizens of Canada an application for a patent disclosing the subject-matter defined by the claim,	déposé de façon régulière, dans un autre pays ou pour un autre pays, une demande de brevet divulguant l'objet que définit la revendication de la demande visée à l'alinéa (1) <i>a</i>), dans le cas où ce pays protège les droits de cette personne par traité ou convention, relatif aux brevets, auquel le Canada est partie, et accorde par traité, convention ou loi une protection similaire aux citoyens du Canada,
(ii) the filing date of the previously regularly filed application is before the claim date of the pending application,	(ii) la date de dépôt de la demande déposée antérieurement est antérieure à la date de la revendication de la demande visée à l'alinéa <i>a</i>),
(iii) the filing date of the co-pending application is within twelve months after the filing date of the previously regularly filed application, and	(iii) à la date de dépôt de la demande, il s'est écoulé, depuis la date de dépôt de la demande déposée antérieurement, au plus douze mois,
(iv) the applicant has, in respect of the co-pending application, made a request for priority on the basis of the previously regularly filed application.	(iv) cette personne a présenté, à l'égard de sa demande, une demande de priorité fondée sur la demande déposée antérieurement.

[269] There are two requirements for the assertion of anticipation – there must be disclosure and a Skilled Person would have to be able to perform the invention on the basis of that disclosure.

[270] The law on these points is well set out in *Apotex Inc v Sanofi-Synthelabo Canada Inc*, 2008 SCC 61, [2008] 3 SCR 265 [*Sanofi*], at paragraphs 25 and 37.

25 He explains that the requirement of prior disclosure means that the prior patent must disclose subject matter which, if performed, would necessarily result in infringement of that patent, and states, at para. 22:

If I may summarise the effect of these two well-known statements [from *General Tire and Hills v. Evans*], the matter relied upon as prior art must disclose subject matter which, if performed, would necessarily result in an infringement of the patent... It follows that, whether or not it would be apparent to anyone at the time, whenever subject matter described in the prior disclosure is capable of being performed and is such that, if performed, it must result in the patent being infringed, the disclosure condition is satisfied.

When considering the role of the person skilled in the art in respect of disclosure, the skilled person is “taken to be trying to understand what the author of the description [in the prior patent] meant” (para. 32). At this stage, there is no room for trial and error or experimentation by the skilled person. He is simply reading the prior patent for the purposes of understanding it.

37 Drawing from this jurisprudence, I am of the opinion that the following factors should normally be considered. The list is not exhaustive. The factors will apply in accordance with the evidence in each case.

1. Enablement is to be assessed having regard to the prior patent as a whole including the specification and the claims. There is no reason to limit what the skilled person may consider in the prior patent in order to discover how to perform or make the invention of the subsequent patent. The entire prior patent constitutes prior art.
2. The skilled person may use his or her common general knowledge to supplement information contained in the prior patent. Common general knowledge means knowledge generally known by persons skilled in the relevant art at the relevant time.

3. The prior patent must provide enough information to allow the subsequently claimed invention to be performed without undue burden. When considering whether there is undue burden, the nature of the invention must be taken into account. For example, if the invention takes place in a field of technology in which trials and experiments are generally carried out, the threshold for undue burden will tend to be higher than in circumstances in which less effort is normal. If inventive steps are required, the prior art will not be considered as enabling. However, routine trials are acceptable and would not be considered undue burden. But experiments or trials and errors are not to be prolonged even in fields of technology in which trials and experiments are generally carried out. No time limits on exercises of energy can be laid down; however, prolonged or arduous trial and error would not be considered routine.

4. Obvious errors or omissions in the prior patent will not prevent enablement if reasonable skill and knowledge in the art could readily correct the error or find what was omitted.

[271] In respect to anticipation by publication/prior art, Justice Binnie in *Free World* outlines that the test is a difficult one because of the benefits of hindsight. After the invention, it is too easy to say it was already “out there” and tie together various bits and pieces of prior art to show that the essence of the invention was already known. Justice Binnie’s comments at paragraphs 25 and 26 set out the relevant framework:

25 Anticipation by publication is a difficult defence to establish because courts recognize that it is all too easy after an invention has been disclosed to find its antecedents in bits and pieces of earlier learning. It takes little ingenuity to assemble a dossier of prior art with the benefit of 20-20 hindsight. ...

26 ... A signpost, however clear, upon the road to the patentee's invention will not suffice. The prior inventor must be clearly shown to have planted his flag at the precise destination before the patentee.
...

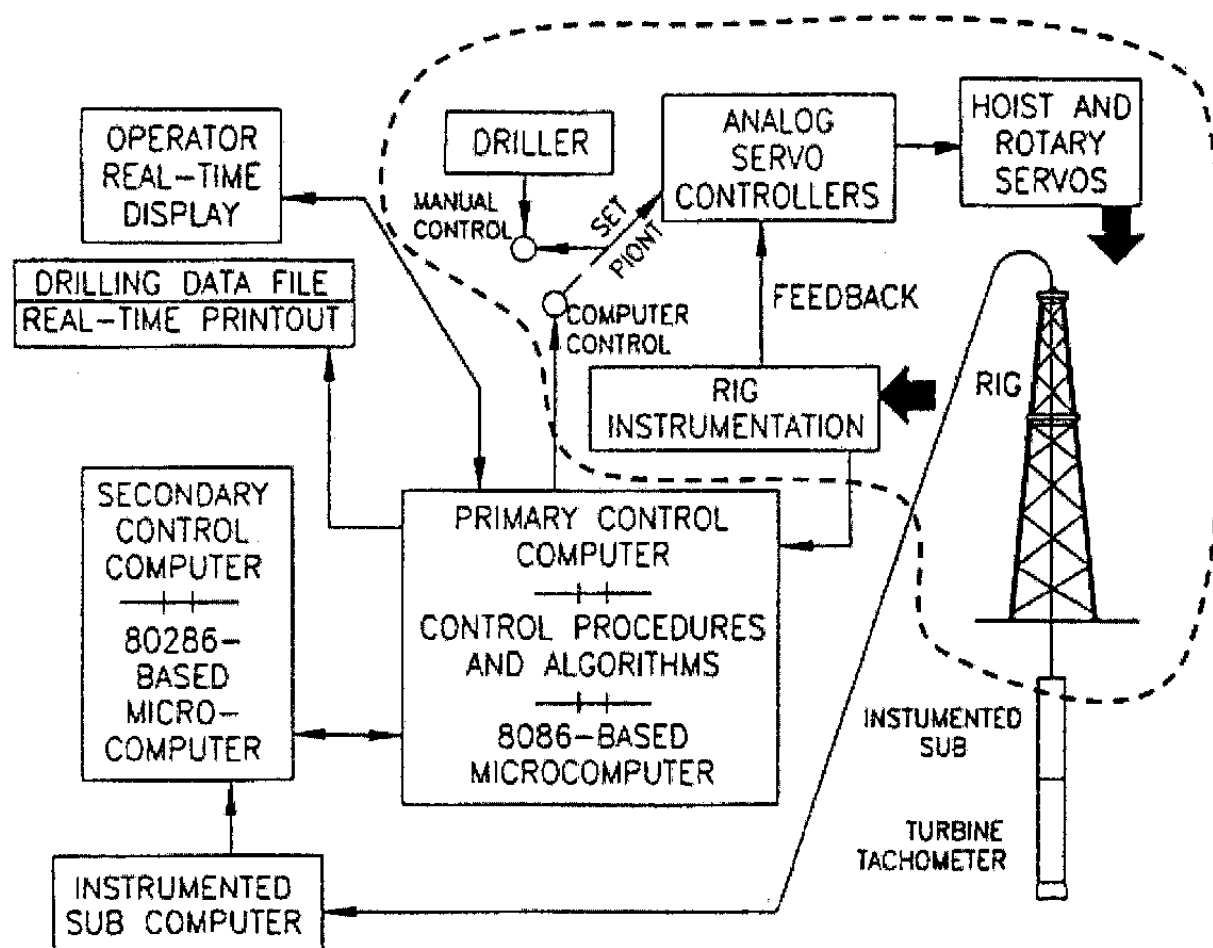
[272] The Defendants rely on three pieces of prior art:

- 1990 Brett/Warren Paper
- Le Compte patent
- The Hobhouse Patent (#3,550,697)

(a) *Brett/Warren Paper*

[273] I accept Wooley's opinion that the Brett/Warren Paper [the Paper] does not anticipate the Patent. The Paper is directed at a computer control as the following diagram from the Paper evidences. It is also focused on vertical drilling, not directional.

Figure 3



[274] The Paper does not discuss, even obliquely, an automatic driller which uses pressure as a parameter. It describes the use of a hydraulic cylinder with a piston – there is no drill string nor a rate of release nor a control of the rate of release.

[275] While the Paper tangentially mentions a manual control and Warren points to this as anticipatory of Bowden's device, the 313 Patent is based on an automatic drilling system. Claim 1 refers to an automatic drilling system and Claim 11 refers to automatically regulating the release of the drill string. The Paper does not disclose the patented invention.

[276] Even if there was such disclosure, it does not meet the requirement of enablement. The Paper does not provide all the information which, for practical purposes, is needed to produce the claimed invention without the exercise of any inventive skill – the requirement laid down in *Beloit Canada Ltd v Valmet Oy* (1986), 8 CPR (3d) 289 , 38 ACWS (2d) 415 (FCA).

[277] Not only are there no details of a functional automatic drilling system, the Paper discourages the pursuit of the automatic control of the drilling process. It refers to the problems of such automatic control and the inutility of the work done in the Paper. It speaks to the hope that some of the problems identified in the Paper will be solved someday.

[278] The Paper neither addresses nor solves the problem of controlling the directional drilling nor does it reference the important parts of the Patent. There is no convincing evidence that the Paper anticipated the Patent.

(b) *Le Compte Patent*

[279] The purpose of the Le Compte patent, as the Defendants' expert Warren conceded, is to maintain a constant weight on bit, by isolating the lower portion of the drill string from the upper portion of the drill string.

[280] Wooley's explanation of the Le Compte patent is that it includes a telescoping joint that collapses, causing an increase in the drilling fluid pressure inside the telescoping member. This increase in drilling fluid pressure is used as a warning system to the driller – the creation of a warning system being an admitted purpose of that patent.

[281] By maintaining a constant weight on bit, the Le Compte patent does the opposite of what the 313 Patent tries to do, which is to cause a direct effect on the drill bit when the drill string is released.

[282] The Le Compte patent cannot be used in directional drilling because the drilling fluid pressures needed to drive the mud motor would interfere with Le Compte's drilling fluid warning system. The Le Compte patent did not solve the problem of the drill string lying on its side in a directional hole. The Le Compte patent deals with vertical drilling.

[283] The Defendants engage in that cobbling together of bits and pieces that Justice Binnie warned about (although in the context of different pieces of prior art). The parties trade on snippets of admissions (so called) to suggest that an expert has conceded a point. The fact is that Wooley and

Warren have different opinions, neither conceded to the other. I find Wooley's more persuasive as it focuses on what the two inventions were intended to do.

[284] The "proof of the pudding is in the eating" so to speak. The Le Compte patent has been around since 1932 and no one has seen it as a springboard to the problem that the 313 Patent addressed. If it had been such a disclosure, it has not enabled anyone to solve the problem that the 313 Patent did.

(c) *The Hobhouse Patent (#3,550,697)*

[285] The Hobhouse patent likewise does not anticipate the 313 Patent. In some ways it is similar to the Brett/Warren Paper in its reliance on a hydraulic cylinder and piston system to raise and lower drill pipe into the hole. The Hobhouse patent describes something completely different from the Patent.

[286] There is no controlled rate of release of a drill string. Wooley reviewed the patent in detail; Warren's review was more cursory.

[287] There is no evidence that Hobhouse was enabling or solved the problem addressed in the Patent.

[288] In summary, no prior art cited to this Court met the test of either disclosure or enablement referred to earlier in this section.

(2) Anticipation – Prior Use

[289] Paragraph s 28.2(1)(a) of the *Patent Act* deals with anticipation by prior disclosure to the public. Paragraph s 28.2(1)(b) deals with anticipation/lack of novelty.

[290] April 19, 1992 is the governing date for anticipation by public disclosure one year prior to the relevant US patent filing date of April 19, 1993.

[291] The Defendants contend that Bowden disclosed the invention more than one year prior to the patent filing date. The facts surrounding this alleged disclosure have been substantially described, as this Court finds them, in the Background of these Reasons. The prior use argument deals both with anticipation by disclosure and obviousness by disclosure.

[292] To reiterate, to succeed the Defendants must prove that there was disclosure of the invention and that the disclosure was sufficiently enabling for a Skilled Person to practice the invention without the exercise of inventive skill.

[293] It is the Defendants' burden to establish on the balance of probabilities – more likely than not – that Bowden made an enabling disclosure, in this case, in relation to the Union Pacific wells.

[294] The Defendants have to establish that Bowden's evidence is, at minimum, misleading but in reality a complete lie. They have tried to do so through accusations, suspicions, innuendo, claims of improbability and some adverse comments by Warren. What they have not done is put in direct evidence from persons who were at the well sites that challenge Bowden's evidence. The Court is

being asked to reject sworn evidence which stood up reasonably well on cross-examination in exchange for very little real opposing evidence. No one has come forward to testify that Bowden disclosed the invention or that what Bowden told them was enough for a Skilled Person to recreate the invention.

[295] This is not to say that the evidence is always crystal clear. There are some puzzling points and gaps; some due to the passage of time, memory lapses or in the case of the arrangement with Lampo Steam Cleaning, difficult to understand. However, weighing all in the balance, I find that the Defendants have not convinced me that Bowden's core narrative is untrue or unlikely.

[296] I accept that what Bowden did is what any inventor on his/her own would do – come up with the idea; built a model or prototype; ensure that it operates; and having no lab or other test facility, determine a way to test the prototype to see if it works as intended; make adjustments and test until the inventor is reasonably satisfied that the invention works as planned.

[297] There is no evidence that seeing the Wildcat metal box or even the dials for WOB and pressure would disclose sufficient information for a Skilled Person to know how the device controlled the drill string and reacted to the two parameters. Access to the inner workings was precluded by Bowden locking the device in his absence.

[298] The evidence disclosed in the re-opened trial does not materially alter the core of Bowden's original trial testimony. The existence of the steel box with some gauges and a sign Wildcat posted

on it showing up in parade photographs from October 1991 is not sufficient basis to determine that there had been enabling disclosure of the invention.

[299] There is no substantial evidence that a visual inspection of the Wildcat steel box would itself enable a Skilled Person to describe how the invention works.

[300] Both parties refer to the decision in *Wensel Downhole Tools Ltd v National-Oilwell Canada Ltd*, 2011 FC 1323, 401 FTR 74. This case establishes that where a member of the public could inspect and analyze an invention, the patent maybe anticipated. Whether that possibility exists depends on what information was available; the number of times, and the nature of, the inspections; the availability of someone prepared to describe the invention; and the opportunity to inspect the inner workings. Even Warren admitted that merely seeing the steel box did not allow one to know its inner workings.

[301] Bowden testified that the box was locked, that he disconnected hoses, and that it was not possible to see inside the device or observe its inner workings. While he explained the operation generally to Union Pacific to obtain their consent to testing the invention, there is no evidence that it was anything more than a general description. Wooley confirmed that nothing Bowden said or did would have enabled a Skilled Person to know how the invention worked.

[302] There was no unconditional sale of the product prior to the relevant date. Nothing contradicts Bowden's evidence that the agreement with Union Pacific was to test the device and that only after it was tested did Union Pacific agree to pay for the use during the test period. An *ex post*

facto payment without prior obligation to pay is not sufficient to constitute a sale before the relevant date.

[303] It is well established that prior use that is experimental is not prior use (*Conway v Ottawa Electric Railway Co* (1904), 8 Ex CR 432 at 442-443 (Ex Ct Can)).

[304] Even the Defendants' own witnesses acknowledge that testing was necessary to determine if the invention worked. The absence of a confidentiality agreement with Union Pacific is not fatal. Although there was no evidence as to either industry practice or corporate understanding, Bowden's actions to keep the invention from being observed or disclosed is consistent with his intent to keep it confidential. There is no suggestion that Union Pacific thought that the testing was not confidential nor is there evidence of enabling disclosure during the test period.

[305] The Defendants advance the theory that testing ended on either March 6 or April 15, 1992. The March 6 theory is unsupported by facts and does not appear in any contemporaneous documents, such as the Bates File, as a date of any significance.

[306] The April 15 date is an arbitrary choice by the Defendants because it benefits them. The Bates File, as noted earlier, refers to "about April 15" and "about two months ago" (written June 19, 1992). Bowden's evidence is that April 19 is the end date for testing and other than the Defendants' allegation that this date was picked to avoid the consequences from a bankruptcy, there is insufficient evidence to undermine Bowden's evidence on this point.

[307] The Defendants claim that the invention became obvious by virtue of the limited disclosure made by Bowden to the supervisors and drillers at the test sites. There is no evidence that these people found the invention to be obvious. One may ask rhetorically, if it was so obvious, why companies like Union Pacific did not build their own device and not pay for the rental of the Wildcat?

[308] Therefore, I find that the Defendants have not established anticipation by prior disclosure nor obviousness on the same basis.

(3) Obviousness (Absence of Inventiveness)

[309] Section 28.3 of the *Patent Act* provides for the requirement that patent not be obvious:

28.3 The subject-matter defined by a claim in an application for a patent in Canada must be subject-matter that would not have been obvious on the claim date to a person skilled in the art or science to which it pertains, having regard to	28.3 L'objet que définit la revendication d'une demande de brevet ne doit pas, à la date de la revendication, être évident pour une personne versée dans l'art ou la science dont relève l'objet, eu égard à toute communication :
(a) information disclosed more than one year before the filing date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant in such a manner that the information became available to the public in Canada or elsewhere; and	a) qui a été faite, plus d'un an avant la date de dépôt de la demande, par le demandeur ou un tiers ayant obtenu de lui l'information à cet égard de façon directe ou autrement, de manière telle qu'elle est devenue accessible au public au Canada ou ailleurs;
(b) information disclosed before the claim date by a person not mentioned in paragraph (a) in such a manner that the	b) qui a été faite par toute autre personne avant la date de la revendication de manière telle qu'elle est devenue accessible

information became available to au public au Canada ou ailleurs.
the public in Canada or
elsewhere.

[310] Obviousness through public use has been dealt with in the earlier section on Anticipation.

The present issue is that the 313 Patent lacked inventiveness. The relevant date for this consideration is April 19, 1992 – one year prior to the filing/claim date.

[311] The test for obviousness, as laid down in *Sanofi* at paragraph 67 is as follows:

67 It will be useful in an obviousness inquiry to follow the four-step approach first outlined by Oliver L.J. in *Windsurfing International Inc. v. Tabur Marine (Great Britain) Ltd.*, [1985] R.P.C. 59 (C.A.). This approach should bring better structure to the obviousness inquiry and more objectivity and clarity to the analysis. The *Windsurfing* approach was recently updated by Jacob L.J. in *Pozzoli SPA v. BDMO SA*, [2007] F.S.R. 37 (p. 872), [2007] EWCA Civ 588, at para. 23:

In the result I would restate the *Windsurfing* questions thus:

- (1) (a) Identify the notional “person skilled in the art”;
- (b) Identify the relevant common general knowledge of that person;
- (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
- (3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;
- (4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?
[Emphasis added.]

It will be at the fourth step of the *Windsurfing/Pozzoli* approach to obviousness that the issue of “obvious to try” will arise.

[312] At paragraphs 68-69 of *Sanofi*, the Supreme Court discussed the “obvious to try” factor as part of the fourth step in the inquiry.

i. When Is the “Obvious to Try” Test Appropriate?

68 In areas of endeavour where advances are often won by experimentation, an “obvious to try” test might be appropriate. In such areas, there may be numerous interrelated variables with which to experiment. For example, some inventions in the pharmaceutical industry might warrant an “obvious to try” test since there may be many chemically similar structures that can elicit different biological responses and offer the potential for significant therapeutic advances.

ii. “Obvious to Try” Considerations

69 If an “obvious to try” test is warranted, the following factors should be taken into consideration at the fourth step of the obviousness inquiry. As with anticipation, this list is not exhaustive. The factors will apply in accordance with the evidence in each case.

1. Is it more or less self-evident that what is being tried ought to work? Are there a finite number of identified predictable solutions known to persons skilled in the art?
2. What is the extent, nature and amount of effort required to achieve the invention? Are routine trials carried out or is the experimentation prolonged and arduous, such that the trials would not be considered routine?
3. Is there a motive provided in the prior art to find the solution the patent addresses?

[313] The Supreme Court added to the inquiry, at paragraphs 70-71, that the history of the invention, the time, money and effort in research are elements to also be considered.

[314] The inventive concept of Claims 1 and 11 of the 313 Patent is the automatic control of the rate of release of the drill string in a directional well based on changes in drilling fluid pressure. Claim 14's inventive concept is the combination of drilling fluid pressure and weight on bit as control parameters such that either or both can be used to control the rate of release of the drill string. This is largely admitted by the two experts. The difference between the two experts is whether it was obvious given the prior art to modify the devices in the existing art (the Satellite patent or the Bear device and Robinson patent) to become a pressure-sensing automatic driller.

[315] The Defendants postulate that a Skilled Person would be motivated to merely add to the operation of the existing Satellite Autodriller (patent of Bowden's father using WOB), the drilling fluid pressure parameter.

[316] A significant difficulty with the "obviousness" analysis is that it is so easy in hindsight to find an invention obvious. Such analysis invites the question – if it was so obvious, why was it not done before?

[317] As discussed earlier, the prior art cited did not anticipate the 313 Patent. Likewise, in regard to obviousness, the prior art was completely different from the inventive concepts of Claims 1 and 11.

[318] There is no reference in Bowden Sr's patent or the Robinson patent of a replacing WOB sensor with some other sensor much less any reference to using a fluid pressure parameter.

There is nothing in the Brett/Warren Paper, the Le Compte patent, the Hobhouse patent or the Dillon patent suggesting or pointing to creating an automatic driller which responds to drilling fluid pressure from a mud motor. References to pressure and mud pumps do not point the way to the invention.

[319] Despite the existence of these patents for some considerable time, for example, the Dillon patent since 1935, no one did or even came close to what Bowden invented. It is difficult to see how the Bowden invention could have been so obvious in light of what actually happened rather than what could have happened.

[320] In much the same way, the prior art is different from the inventive concept of Claim 14. The differences between the Brett/Warren Paper and the Hobhouse patent have already been discussed. I cannot see how Warren could rely on such prior art as a basis for concluding that the Patent was obvious. In fairness, Warren admits to the need for the invention and that Bowden provided the first commercial solution for a need that everyone acknowledged – to have such automatic control of drilling directional wells. Even Warren, who worked in the field, researched and prepared learned papers on the subject, did not come up with the 313 Patent invention.

[321] Given the need and the commercial advantage of the invention, if it was so obvious in a field as rich and energetic as oil production with so many well-trained people, it is strange that it was not invented before.

[322] I accept Wooley's evidence on the issue and the evidence of history and reality (rather than hindsight) to conclude that the Defendants have not made out the allegation of obviousness. The success of the Wildcat (and even Pason's success) supports the conclusion that the invention was not so obvious that a Skilled Person could readily have developed the patented invention.

[323] Lastly on this issue, the Defendants claim obviousness on other Claims but these Claims are dependent on Claims 1, 11 and 14. Since the controlling Claims are not obvious, the dependent claims are likewise not obvious.

(4) Inutility

[324] By definition, s 2 of the *Patent Act*, an invention is "any new and useful art". Section 27(3) of that Act stipulates the patent specification requirements and provides that the patent specification must "correctly and fully describe the invention and its operation or use as contemplated by the inventor".

[325] The late Justice MacKay in *Wellcome Foundation Ltd v Apotex Inc* (1991), 47 FTR 81, 39 CPR (3d) 289 (FCTD), held that there may be inutility where the patent claims (1) a process that does not in fact work in accordance with the promise made in the specification or (2) a process that would work but has no reasonable prospect of commercial or industrial application.

[326] Given the evidence as to the operation of the Wildcat and the Pason AutoDriller, and the finding of infringement, the challenge of "inutility" has a false ring.

[327] There are two specific areas of inutility claimed, the second being the more serious. The first is that in respect of Claims 2, 3, 4, 9, 10, 12, 13, 14 and 15, there is a conflict in the Claims because there is no description of how to resolve conflicting signals from the parameters and a failure to state that the connections in the Patent should be in series.

[328] Wooley opines that there is no such conflict or absence of description. More particularly, a Skilled Person would be able to resolve any conflict and that the preferred embodiment shows how any conflict is resolved. Warren essentially agrees. Therefore, this challenge of inutility is not made out.

[329] The second aspect of the inutility challenge is the confusion in Claims 9 and 10 between increase and decrease in pressure and the response thereto inhibited by the drill string controller. As described, Claim 9 (and its dependent Claim 10) will not work.

Claim 9 reads:

9. An automatic drilling system for automatically regulating the releasing of the drill string of a drilling rig during the drilling of a borehole, comprising:
 - a drilling fluid pressure sensor;
 - a bit weight sensor;
 - a drilling fluid pressure regulator responsive to changes in drilling fluid pressure for outputting a signal representative of those changes;
 - a bit weight regulator responsive to changes in bit weight for outputting a signal representative of those changes;
 - a first relay connected to said drilling fluid pressure regulator, said first relay responsive to the output signal of said drilling fluid pressure regulator to supply a first drill string control signal at an output thereof;
 - a second relay connected to said bit weight regulator, said first relay responsive to the output signal of said bit weight regulator to supply a second drill string control signal at an output thereof;

a relay selector connected to said first and second relay to select any one of said first drill string control signal, said second drill string control signal, and both of said first and second drill string control signals to control the release of said drill string; and

a drill string controller coupled to said first and second relays wherein when said first drill string control signal represents a decrease in drilling fluid pressure, said drill string controller increases the rate of release of said drill string controller and when said first drill string control signal represents an increase in drilling fluid pressure, said drill string controller increases the rate of release of said drill string, and further wherein when said second drill string control signal represents a decrease in bit weight, said drill string controller decreases the rate of release of said drill string and when said second drill string control signal represents an increase in bit weight, said drill string controller decreases the rate of release of said drill string.

[330] The problem is that the word “increased” appears where the word “decreased” should have been used and *vice versa*. There is no issue that if the correct term was inserted, there would be no allegation of inutility.

[331] The troubling aspect of the issues surrounding Claims 9 and 10 were touched on by Justice Hughes in *Pason Systems Corp v Canada (Commissioner of Patents)*, 2006 FC 753, 54 CPR (4th) 40 where he granted judicial review of the Commissioner of Patent’s decision to permit amendment to these Claims to correct the erroneous words. The application to the Commissioner for amendment came during the course of this litigation when the Defendants squarely put this matter of inutility on this specific grounds. The Plaintiffs proceeded by way of *ex parte* application to the Commissioner. The Defendants point to the Plaintiffs’ action, both as an admission of inutility and as improper conduct potentially disentiing the Plaintiffs from equitable relief. Justice Hughes was highly critical of the Plaintiffs.

[332] I share Justice Hughes' "criticism of Plaintiffs' counsel's conduct". In the midst of litigation, to proceed *ex parte* to undermine another party's allegation is deserving of this Court's criticism.

[333] The difference between this Court's situation and that of Justice Hughes is that this Court has to decide on the merits of the inutility argument and in that regard it has expert evidence not available to Justice Hughes.

[334] On the merits, both parties acknowledge that the slip in language easily occurs. Indeed each side, both in writing and orally, made the slip of "increase" for "decrease" and vice versa. Experts made the error, knowledgeable corporate witnesses did too.

[335] However, the issue is not whether the slip is understandable from time to time but whether a Skilled Person would be misled or confused by the admitted error in Claims 9 and 10.

[336] Wooley opined that a Skilled Person would see the error and make the necessary corrections; and would not be confused or misled. Warren all but admitted the same. Even a judge hearing this case could see the error and make the correction.

[337] Therefore, there is no basis established for a finding of inutility on this ground.

[338] As to the suggestion that there should be some further consequences because of counsel's attempt at *ex parte* amendment. I note that counsel on both sides are of high reputation and among the finest in their fields. Litigation is neither a stroll in the park nor a dash down a dark alley in a

sketchy neighbourhood. It was inappropriate to proceed as was done but I see no merit in dealing further with counsel's role on this issue or on others which may have occurred on both sides.

(5) Overbreadth

[339] A patent cannot claim more than what was invented. Also, a patent cannot claim more than what was disclosed in the specification.

[340] The Defendants' allegation of overbreadth in respect of Claims 14 and 15 are the same as the allegation of conflict as made in respect of Inutility.

For the same reasons, the Defendants have not made out this allegation.

D. Deemed Abandonment

[341] The principal point alleged by the Defendants is that the Patent is invalid and void having been deemed permanently abandoned pursuant to s 73(1)(a) of the *Patent Act* by reason of the failure to reply in good faith to the CIPO Examiner's requisition. That requisition of June 9, 1998 issued pursuant to Rule 29 of the *Patent Rules*, SOR/96-423 [*Patent Rules* or the Rules], which reads:

an identification of any prior art cited in respect of the corresponding United States and European patent applications and the patent numbers, if granted.

[342] David Aitken, Canadian counsel on the 313 Patent prosecution and an experienced intellectual property lawyer, responded on September 17, 1998:

In response to the requisition pursuant to Section 29 of the *Patent Rules*, Applicant advises that the corresponding United States case has issued as U.S. 5,474,142. We enclose a copy of the computer

database printout for this patent showing the references cited. A corresponding EPO case has been filed but no action has yet been taken and no search report received.

[343] The printout referred to listed the references cited by the USPTO. The Defendants claim that the references cited to the USPTO were not complete and did not comply with US disclosure requirements.

[344] The Defendants further contend that the phrase “no search report received” in respect of the European patent application was not correct. On September 30, 1994, an international search report [ISR] was generated and sent by the USPTO to the European Patent Office [EPO] for purpose of the Patent Cooperation Treaty [PCT] application underlying the European patent application. The ISR referred to 11 documents considered to be relevant to the PCT application.

(1) US Proceeding

[345] US law requires, on a continuing basis, disclosure to the USPTO of all information known to be material to patentability. The Defendants say that because Bowden intentionally violated this obligation and because CIPO relies on these US disclosure requirements in examining the corresponding Canadian patent application, by the failure to disclose known prior art to the USPTO, there was a failure to reply in good faith to the Canadian examiner.

[346] The US law is Rule 56 of the *Consolidated Patent Rules*, 37 CFR § 1.56 (2013) USPTO Rules and the interpretation of US law is supported by Professor Lisa Dolak (the Defendants’ expert):

§ 1.56 (portions)

(1)(a) [...] Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section ...

(b) [...] information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

[347] The US law is that failure to disclose material prior art references in violation of the disclosure obligation, combined with intent to deceive, can have severe consequences including patent invalidity and disciplining proceedings against practitioners.

[348] The US law and its high controversial concept of “fraud on the patent office” needs to be contrasted with the Canadian law. Section 73 of the Canadian *Patent Act* requires a good faith response to a requisition from one examiner, rather than the free standing duty as described in US law.

[349] It is not accurate to say or suggest that Canada does not have a duty of candor – it is just not of the same nature as the US principle. The question is “good faith in respect of what?” In Canada

the good faith and duty of candor is in response to a question or inquiry. The response has to be fair and responsive, but it need not respond beyond that which is requested (see *GD Searle & Co v Novopharm Ltd*, 2007 FC 81, 56 CPR (4th) 1 and *Lundbeck Canada Inc v Ratiopharm Inc*, 2009 FC 1102, 79 CPR (4th) 243).

[350] In *Bourgault Industries Ltd v Flexi-Coil Ltd* (1999), 86 CPR (3d) 221, 87 ACWS (3d) 355 (FCA), the Court rejected the concept that the duty of candor goes beyond compliance with the *Patent Act*.

[351] The Court has considerable difficulty with the Defendants' premise underlying its allegation of breach of the s 73(1)(a) good faith obligation. The Defendants rely on the theory that Bowden was acting dishonestly, fabricating dates of use and hiding public disclosure. A part of the theory is that Bowden, having received the Bates Letter and knowing Bates could not file a US patent application because of the questions raised by the Bates Letter, then went off to retain Comuzzi to prosecute the patent and hide the Bates Letter. The Defendants have not been able to establish this theory of the case.

[352] There is no finding by a US court that there has been any failure to disclose which results in invalidity of the US patent. Absent such a finding, it is not for this Court to make a finding of that nature except in accordance with Canadian legal principles.

[353] The Defendants' allegation is also dependent on the theory that the CIPO depended on the USPTO prior art disclosure. The Defendants' expert in this area Peter Ebsen (a retired CIPO

examiner) produced internal CIPO flow charts to establish this dependency. He also spoke to the necessity of reliance on the US disclosure due to inadequate government funding of CIPO to be able to carry out the necessary work to examine prior art, hence the reliance on the USPTO.

[354] Ebsen's evidence was significantly undercut by two very experienced witnesses – Robert Mitchell, a patent and trade mark agent of considerable experience in private patent practice and Peter Davies, a senior official at CIPO and subsequently the Chair of the Patent Appeal Board. Where their evidence conflicts with Ebsen's, I prefer their evidence as it is forthright, understandable, broadly based, experiential and more consistent with the legislation and rules and regulations governing Canadian patents. Ebsen relied on a number of facts to support his opinion, many of which were not established.

[355] The legislation and rules and regulations (including the Manual of Patent Office Practice) do not contemplate this extra-territorial reliance. Davis, who was in a position to know, had never even heard of the flow charts on which Ebsen relied.

[356] The manner in which a Canadian examiner cites prior art against an application is through an office action. The term "cited against an application" means cited in an office action. The experts agree on this point.

[357] As Mitchell confirmed, the term "prior art cited", as used in the examiner's requisition, meant the prior art reviewed by an examiner and applied against a foreign application. It does not mean any prior art listed in a search report; nor does it mean all the prior art of which an applicant is

aware. Davies confirmed that in Canada an examiner is not permitted to ask an applicant for all such prior art.

[358] This expert evidence sets the context in which to assess Aitken's response to the examiner. Aitken provided the examiner with exactly what was requested – the identification of the prior art cited in respect of the corresponding US application.

[359] Mitchell confirmed that Aitken's response was appropriate and accurate. Even Ebsen finally had to admit that the response was complete and accurate. It should be made clear that the issue was never Aitken's good faith or honesty – that was a given – it was rather the good faith of the ultimate client in the US that was a concern.

[360] Therefore, it is difficult to see any merit to the Defendants' complaint that there had been a breach of the Canadian legal requirements of the Act or Rules. There is no requirement to go beyond answering that which is asked or requested.

[361] The above conclusion is sufficient to dispose of the allegation of improper disclosure with respect to the US proceeding. The US doctrine of fraud on the USPTO or inequitable conduct is not relevant here. There were US proceedings on this issue but they do not govern this Court's conclusions.

[362] The Defendants led the evidence of Professor Dolak on US law, specifically disclosure obligations and inequitable conduct as well as on USPTO administrative procedure. With respect,

the evidence was not generally helpful because the relevant context is Canadian procedure. The application of US law was largely irrelevant.

[363] Professor Dolak was not able to address the specifics of the materiality of prior art. Her evidence did not and could not touch on Canadian law and practice. Her evidence was based on a number of assumed facts which were not proven including that Comuzzi did not have the Bates Letter. It was in fact faxed to him during the course of patent application preparation and this fact alone put paid to the Defendants' thesis.

[364] Despite the not so veiled invitation of the Defendants to have this Court go down the US route of "inequitable conduct", I will not do so. The Canadian legislation is clear, the obligation is to respond directly and honestly. The US principle is highly unsatisfactory, not supported by Canadian principles or practice, and has been described by US witnesses as a "mess".

(2) Re: European Proceeding

[365] Pason also alleges that the response to the Canadian examiner was inaccurate in respect of the EPO "... no action has yet been taken and no search report is received". The resolution of this issue is tied into the arcane world of international patent practice.

[366] The operative date for consideration of the good faith response is Aitken's letter of September 17, 1998. By that time, the following relevant events had occurred:

- A PCT application – April 19, 1994;

- ISR regarding the PCT application mailed by the USPTO – September 30, 1994
(this document was prepared by the same US examiner handling the Bowden patent application);
- Pro forma letter from the EPO re PCT application – November 29, 1994;
- International Preliminary Examination Report [IPER] issued – January 5, 1995; and
- European application came into existence – October 5, 1995.

[367] In response to the Canadian examiner's requisition, Makay (Comuzzi's associate handling the Bowden patent application) examined his files. There was no examination by a European patent examiner, no search report and to Makay's knowledge, no search had been conducted by the EPO.

[368] Makay did not search for the ISR concluding that nothing in the PCT file was beyond what was in the US case which was handled by the same examiner. Nothing was added to the prior art. The EPO pro forma letter did not trigger, at least in Makay, a need to search the PCT file.

[369] Makay believed that his response to Aitken, which was passed on to the Canadian examiner, was accurate.

[370] The evidence is that Aitken understood that there was no report issued by the EPO based on a search conducted by an EPO examiner. Makay had not seen nor was there any EPO search report citing prior art.

[371] Aitken testified that he did not know about the ISR. However, the issue is not based on his personal good faith but on that of his client. More germane is Aitken's evidence that had he known of the ISR, he would not have considered it a European search report. Further, it is a report that does not cite prior art which was the subject matter of the requisition.

[372] The pertinent issue is not just whether Makay or Aitken intended to mislead but whether given the documents available, they ought to have produced them or ought to have known to produce them.

[373] The resolution of that issue lies in the expert evidence. Ebsen takes the same far reaching approach to disclosure that he took in respect of the US prior art disclosure. For the same reasons, that opinion is not accepted.

[374] Varco's experts, Mitchell and Davies, opine that the response in respect of the European proceedings was also accurate and complete. Mitchell conceded that he might have provided the prior art citations in the ISR.

[375] The real issue is whether there was an absence of "good faith" in responding to the examiner. This is both a subjective and an objective evaluation. There is nothing in the evidence to suggest that either Makay or Aitken personally and subjectively acted contrary to the good faith obligation.

[376] Although some may argue that more information should have been provided, I am not convinced, based on the context of the requisition (prior art cited) and the weight of the opinion evidence, that objectively the response to the Canadian examiner was inaccurate.

(3) Determination

[377] Whatever the perspectives, there was no absence of good faith in the response to the requisition. The most that could be said is that there was disagreement about how much information should have been provided.

[378] Pason's premise is that Bowden was on a deliberate path to mislead and that those working with him, either knowingly or otherwise, participated in that misleading. That premise has not been established.

[379] Any issues of non-compliance with foreign laws should be resolved in those jurisdictions, particularly where there is, as here, compliance with Canadian law.

[380] On this ground, I find no basis to conclude that the 313 Patent is invalid by reason of abandonment.

E.. Conclusion

[381] As is apparent, this Court concludes:

- (a) that the Defendants infringed the Plaintiffs' 313 Patent; and
- (b) that the 313 Patent is valid.

[382] As a result, the Plaintiffs are entitled to remedies as discussed in the following section.

VII. REMEDIES

A. Overview

[383] The Plaintiffs have claimed various remedies for infringement:

- interim, interlocutory and permanent injunction to enjoin infringement, and/or enjoin, inducing or procuring others to infringe and enjoining the manufacture, the use, the exportation, the distribution, the offer for sale and sale, and the offering for rent and renting of the Pason AutoDriller;
- an order for the delivery up or destruction of all infringing products under the Defendants' possession, custody or control;
- damages or an accounting of profits made by the Defendants in Canada and other countries – the Plaintiffs elect on accounting;
- pre-judgment and post-judgment interest;
- costs; and
- further and other relief.

[384] The Supreme Court in *Monsanto Canada Inc v Schmeiser*, 2004 SCC 34, [2004] 1 SCR 902 at paragraph 100 [*Monsanto*], outlined the basic approach for compensation in a patent infringement case; damages or an accounting of profits:

100 The Patent Act permits two alternative types of remedy: damages and an accounting of profits. Damages represent the inventor's loss, which may include the patent holder's lost profits from sales or lost royalty payments. An accounting of profits, by

contrast, is measured by the profits made by the infringer, rather than the amount lost by the inventor. ...

[385] The Plaintiffs calculate the compensation as follows:

- Disgorgement of Pason's profits = 52,881,374
- Plaintiffs' lost profits/reasonable royalty = 20,641,463
- Reasonable royalty only = 16,600,276

The Defendants, on the other hand, say:

- Disgorgement = 0 (equitable remedy should not be granted)
- Cost profits/reasonable royalty = 2,268,000 to 1,409,000 (with approximately 400-300 thousand added for foreign sales)
- Reasonable royalty = 851,000 to 658,000

B. Expert Witnesses

[386] Before turning to the specific heads of relief, it is necessary to comment on the expert evidence presented and more particularly on the experts themselves. Unlike the experts on the liability phase who were credible and acted in accordance with the experts' obligation to assist the Court (although the Court preferred Wooley over Warren, this is no adverse reflection on Warren as an expert), the Court was faced with a very different situation in respect of the financial experts.

[387] David Hall, the Plaintiffs' lead financial expert, was the managing director of the Denver office of Alvarez & Marsal with 22 years' experience in forensic accounting. He has been involved in the companion US case. I found Mr. Hall to be credible, diligent and independent. His testimony was forthright, non-argumentative, and objective. His opinion evidence was of considerable help to

the Court. I preferred his opinion and his background work to that of the Defendants' two experts, William Dovey and Brian Van Uden.

[388] Dovey's evidence was in marked contrast, in quality, to that of Hall. While a court should be cautious in being influenced by other court's comments on an expert's work in unrelated cases, it is telling that Dovey has earned qualitative criticism from the Federal Court, the Ontario Superior Court of Justice and the Alberta Court of Queen's Bench (see *Dableh v Ontario Hydro* (1993), 67 FTR 241, 50 CPR (3d) 290 (FCTD); *PreMD Inc v Ogilvy Renault LLP*, 2010 ONSC 7141, 90 CPR (4th) 344; *Deer Creek Energy Ltd v Paulson & Co*, 2008 ABQB 326, 170 ACWS (3d) 66).

[389] While the applicable judges' comments speak for themselves, those observations are consistent with what I observed in this case. Despite the comments in the Canadian Institute for Chartered Accountants [CICA] document "Standard Practices for Investigative and Forensic Accounting Engagement" [Standards Practice Document] that practitioners should obtain independent legal advice on the state of the law and that practitioners should evaluate the reasonableness and consistency of all estimates and assumptions, Dovey did none of this to any real extent.

[390] The same criticisms of Dovey's approach in the other cases can be made in the present case. Dovey did not do what practitioners should, failed to maintain independence and failed to put forward evidence which could materially assist the Court.

[391] The Court's concern for Van Uden's evidence is not nearly as serious as its concerns about Dovey. However, a significant part of Van Uden's evidence related to the royalty rate which should be used in the hypothetical negotiation of a royalty as a basis for a damages award. In that regard, Van Uden relied on a US theory that the starting point should be a 25% rate from which he discounted various factors to arrive at a "royalty rate".

[392] What was troubling is that Van Uden did not refer in his written or oral evidence to a decision of the United States Court of Appeals for the Federal Circuit, *Uniloc USA Inc et al v Microsoft Corporation*, 632 F (3d) 1292 (2011) which not just undercut , but destroyed this 25% rule at paragraph 14:

This court now holds as a matter of Federal Circuit law that the 25 percent rule of thumb is a fundamentally flawed tool for determining a baseline royalty rate in a hypothetical negotiation. Evidence relying on the 25 percent rule of thumb is thus inadmissible under *Daubert* and the Federal Rules of Evidence, because it fails to tie a reasonable royalty base to the facts of the case at issue.

[393] It is not just that the 25% rule is not sustainable – a decision this Court would reach on its own – it is that the rule was a central plank in Van Uden's evidence, that he continued to rely on it in direct evidence. Only when challenged, did he acknowledge that the legal basis for the rule had been reversed. He knew about the decision; his counsel knew, opposing counsel knew (even this Court knew about the decision) but Van Uden failed to disclose this material fact until forced. He in fact hung on to the 25% rule even after its destruction in law.

[394] The absence of candor with this Court, the use of a legally infirm rule and the continued reliance on it, significantly impairs the witness' credibility and any weight which can be given to his evidence.

C. Accounting for Profits

[395] The Court has a discretion to award either damages pursuant to s 55 of the *Patent Act* or an accounting for profits pursuant to s 57.

[396] The premise for an accounting of profits is that a defendant, due to its wrongful conduct, has improperly received profits which should accrue to the plaintiff.

[397] There are several objectives which are served by this particular remedy. It restores the plaintiff to the position "but for" the infringement; it deprives the wrongdoer of its ill-gotten gains; it deters the defendant and, potentially as important, it deters others from infringement, both specifically and generally. On this last point, this remedy makes the "risk-reward" calculation of knowing (or ought to know) infringement more risk oriented and serves the purpose of preservation of the purposes of the *Patent Act*.

[398] The equitable remedy acts as a deterrence tool and a mechanism for restorative justice in the commercial world.

[399] In this regard, I adopt the reasoning of Justice Zinn in *Monsanto Canada Inc v Rivett*, 2009 FC 317, [2010] 2 FCR 93 [*Rivett*], both in regards to the proper principles and purposes of this equitable remedy as well as the method of calculation to be used.

[400] The deterrent effect of disgorgement over the usual remedy of damages is clearly highlighted in this case. Accepting the Plaintiffs' figures (as I do), the Defendants would keep \$30,000,000 (approximately) in profit which they would never have earned except for the infringement. There would be little or no deterrent effect if all that an infringer had to do was pay damages and pocket the remainder of profits. The risk/reward calculation would emphasize the reward.

[401] As held in *Laboratoires Servier v Apotex Inc*, 2008 FC 825, 332 FTR 193, a plaintiff has to show some basis for the exercise of this equitable relief. It must be more than bare infringement (see *Janssen-Ortho Inc v Novopharm Ltd*, 2006 FC 1234, 57 CPR (4th) 6 at 55).

[402] In this case, I find that the Plaintiffs have shown a significant basis for this relief for the reasons in the following paragraphs.

[403] There has been no inequitable conduct by the Plaintiffs sufficient to disentitle them to equitable relief. The amendment to Claims 9 and 10 have been dealt with earlier. The response to the CIPO requisition has been found to comply with Canadian law. The US law suit is irrelevant to the availability of the equitable relief. The Plaintiffs did nothing to delay or frustrate this trial.

[404] This case involves just two competing products. The Defendants admit that without these features of the Pason AutoDriller (which the Court has found are infringing), it would not have any such sales. The weight of the evidence is that each Pason sale is one that would, in all probability, have gone to the Plaintiffs. Any customer seeking the same directional drilling capability would have bought one or other of the parties' products. Therefore, there is no other market distractions (packaging, brand recognition, etc.) which make this relief difficult or unworkable.

[405] There is no customer evidence that the choice of the Pason AutoDriller was driven by those features that distinguish Pason, its product and its service from that of the Plaintiffs. This is not a consumer product where functionality is not necessarily the controlling purchase factor. This is equipment which is either needed or not and if needed, there were only two real sources of supply.

[406] The Defendants deliberately targeted the Wildcat product. It modelled some of its outputs on Wildcat data as earlier described. It pursued the fulfilment of the same market demand from the same customer base.

[407] In so doing, Pason also knew that it was at patent risk. It had been warned by its Canadian patent agent Leier that there was a significant risk of patent infringement and that only a defence of invalidity would save it. Yet Pason did not even inquire further as to infringement or invalidity nor did it attempt to negotiate some arrangement with the patent holder.

[408] It knew or ought to have known of the risk of infringement and of the potential disgorgement remedy. It took the calculated business risk to proceed in any event. Having taken the risk, it is only equitable that it face the full consequences.

[409] When Pason commenced its infringement, the Plaintiffs, run by Prejean, was a much smaller organization compared to Pason. The prospect of Pason knowing that it had this market power and that it could “steamroll” over its competition cannot be discounted.

[410] As said above, the Defendants took a business risk – one which they have lost. It would be inequitable for it to be allowed to profit from its calculated misdeeds.

Therefore, the remedy of disgorgement of profits is the appropriate remedy in this case.

D. Calculation of Pason Profit

[411] The calculation of Pason’s profit has been made easier by the parties’ agreement as to Pason’s revenues and Pason’s incremental profit margins. The calculation of Pason’s rental revenues (gross rental revenues) from rentals in Canada is \$61,721,183. The parties settled on a profit margin for in Canada Pason AutoDriller rentals of 73.5% to produce net profit of \$45,365,070.

[412] As indicated earlier, Pason earned revenue from its foreign subsidiaries in the nature of mark-up on sales of the Pason AutoDriller and a share in Pason AutoDriller rentals paid to its foreign subsidiaries. The mark-up in place from 2003 to end of 2007 was 40% after which Pason

AutoDrillers were shipped to subsidiaries at cost. The total of mark-ups on sales to the USA, Australia and Mexico was \$2,514,860.

[413] The share of rentals from its Mexican and Australian subsidiaries was \$64,073 and \$81,864 respectively. There is no claim for damages or profits from rentals in the USA.

[414] With respect to South America, the rental revenues to Pason from 2004 to 2009 were \$6,069,385 to which is applied the agreed profit margin in this instance of 80%.

[415] Therefore, Pason's profits from its exports to the USA, Mexico, Australia and South America is \$7,516,305 which is to be added to the \$45,365,070 in paragraph 411.

E. Proper Approach to Disgorging Profit

[416] As Justice Zinn held in *Rivett*, the proper approach in this type of circumstance is the "differential profit approach" which requires the Court to compare the profits made by the infringer that are attributable to the invention and the profits that the infringer would have made if he had used the best non-infringing option.

[417] This approach requires the Court to look at six (6) factors:

- (1) Causal connection: there must be a causal connection between the profits made and the infringement;
- (2) Gross profits from infringement: this is based on calculating the gross revenues from infringement and deducting the incremental costs of earning that revenue;

- (3) Non-infringing option: whether such option exists;
- (4) Disgorgement: absent a non-infringing option, the gross profits as per (2) are paid to the patentee;
- (5) Gross profits from non-infringement: this factor is only relevant if there is a non-infringing option.
- (6) Disgorgement (net): this factor is only relevant where there is a difference between the gross profits of infringement and the gross profits of non-infringement.

[418] Applying these factors to the facts of this case:

- (1) There is a clear causal connection between the Defendants' infringement and its profits. The Court has found, and the Defendants largely admit (assuming that the Pason AutoDriller infringes), that but for the infringing portions of the Pason AutoDriller, there would have been no product and more importantly no profit. It was the infringement which gave Pason a product which it could sell – it was the *sine qua non* of Pason's profits from its AutoDriller.
- (2) The gross profits from infringement are largely agreed to (except regarding foreign revenues) and are \$52,881,374.
- (3) There is no non-infringing option. The Court has found that the Pason AutoDriller with either algorithm infringes. The changes to Algorithm 2 were immaterial in terms of distinguishing between the AutoDriller first offered and the AutoDriller using the second algorithm. Therefore, there is no non-infringing product either by Pason or anyone else.

- (4) Disgorgement: based on the above, the gross profits from infringement are to be paid over to the Plaintiffs.

[419] The Defendants advance, through Dovey, the theory that between factors 2 and 3, one adds in “apportionment” which generally acts as a reduction in the gross profit calculation by adding in non-infringing features to the calculation. On Dovey’s theory one adds in (a) market related factors (size and presence in the market), (b) service related factors (strength of repair and customer service), (c) performance related factors (details of various performance parameters), and (d) other product related factors.

[420] Dovey justifies this novel approach on the basis of his reading of *Rivett*, which he says he followed. In reaching this conclusion, he sought no legal advice despite the provisions of the CICA Standard Practices Document directing practitioners to do so. Even if the document had not done so, any careful expert would have done so since the expert is not qualified to deal with matters of law.

[421] The proper place to consider non-infringing features is in the analysis of “causal connection” because the Supreme Court of Canada in *Monsanto* has stated that “the inventor is only entitled to that portion of the infringer’s profit which is causally attributable to the invention” (*ibid* at para 101).

[422] The determination of this causal connection depends on the facts of each particular case. In the present case, there has been no evidence that anyone acquired the Pason AutoDriller due to the factors which Dovey says should reduce the amount of profit attributable to the invention. The

weight of the evidence is that “but for” the infringing qualities of the Pason AutoDriller, Pason would have earned nothing.

[423] Dovey’s approach leads to the bizarre result that, according to Dovey, only 5% of the profits from the Pason AutoDriller were caused by the invention. The conclusion is so inconsistent with the overall evidence in this case that the Court can attribute no credibility to this conclusion or the manner in which Dovey reached the conclusion.

[424] Dovey’s approach to apportionment is inconsistent with the purposes of the equitable principles underlying disgorgement in that it undermines any deterrent effect. His approach is tantamount to rewarding the person who unlawfully uses an item for its stellar unlawful use – one keeps the bulk of the ill-gotten gains because they did it so well; the bank robber is rewarded for the heist because he used a high end getaway car or invested the money more effectively.

[425] Dovey’s analysis of the factors which he used in his apportionment exercise ignores the “but for infringing, no sales” element; does not consider the Plaintiffs’ service factors; was not based on objective evidence from third parties and relied exclusively and without critical analysis on what he was told by the Defendants.

[426] Therefore, the Plaintiffs will be entitled to an order for disgorgement of profits of \$52,881,374 as well as any additional profits earned since the calculation was made.

F. Alternative Remedies

[427] The Court, having concluded that disgorgement of profits is the appropriate remedy, will briefly address the other compensation theories advanced.

(1) Damages

[428] There is no question that, having found infringement of a valid patent, the Plaintiffs are entitled, at a minimum, to damages. The Plaintiffs have advanced two theories of damages:

- (1) profit on lost sales it would have earned had there not been infringing sales by the Defendants plus a royalty on the infringing sales that the infringer made which the patent holder would not have made (see *AlliedSignal Inc v Du Pont Canada Inc* (1998), 142 FTR 241, 78 CPR (3d) 129 (FCTD) [*AlliedSignal*], and *Jay-Lor International Inc v Penta Farm Systems Ltd*, 2007 FC 358, 59 CPR (4th) 228) [*Jay-Lor*]).
- (2) receipt of a reasonable royalty only on all sales made by the infringer.

[429] There are four issues between the parties in respect of this form of compensation:

- (1) the sales which would have been achieved by Varco (the Plaintiffs' position is that this is based on 77,979 rental days versus the Defendants' estimate of 27,465 rental days);
- (2) the relevance of price erosion;
- (3) the reasonable royalty rate – (the Plaintiffs advance 20% versus the Defendants' 4%); and
- (4) the applicability of apportionment.

[430] In estimating the Plaintiffs' lost profit from lost rental days, Hall's opinion was based on the following facts or assumptions which are supported by the facts established in this case:

- the Wildcat is the commercial embodiment of the 313 Patent;
- there is a strong demand for the patented features, particularly the ability to control the drill string based on pressure;
- customers demanded the patented featured automatic driller because it increases the effectiveness and efficiency of the drilling process over WOB drillers;
- Varco had the ability to manufacture additional Wildcats to meet significant additional demand;
- many of the Pason AutoDriller customers were also customers who rented the Varco Wildcat; and
- much of the Pason AutoDriller revenue was generated as a result of the market share of EDRs on drilling rigs.

[431] In calculating Varco's "but for" rental days, Hall assumed that the market was a two-supplier market for multi-parameter autodrillers; a fact found by the Court.

[432] Hall recognized that due to Pason's EDR, it had a certain marketing advantage. As such, he assumed that Varco would not have achieved the same number of rentals as Pason. This in no way detracts from the notion that every sale/rental by Pason is an infringing sale/rental which would not have been achieved but for infringement.

[433] What Hall recognized is that, absent infringement, Varco's sales would have continued to increase at a compound annual rate of 73% from 2004 to 2006 after which it reached a "steady state" reflective of the total autodriller rental market (Varco/Pason Canadian rental days for the period of 2007 to September 2010).

[434] I accept Hall's conclusion that the Wildcat sales in the early years to 2001 when Prejean turned his attention to the Canadian market should be discounted from any assumptions as to the market. Those early years are not a valid starting point from which to establish a steady market.

[435] The calculations of Varco's lost profits from lost rental days and the calculations are set forth in Exhibits 583 and 579. It is not the Court's intention to quibble with the calculations (that lie in the hands of the expert and have not been shown to be erroneous). The real issue is the methodology used.

[436] The Court finds the methodology used to be reasonable, more reasonable than that used by Dovey. The Defendants cross-examined around the edges but did not undermine the basis of Hall's work. It must be borne in mind that these figures are estimates and the Court takes a broad view of them. The estimates are reasonable and therefore sufficient for the purposes of calculating damages.

[437] The Defendants estimates suffer the problems already outlined with respect to Dovey's opinion. He relied on numbers not proven and on assumptions not supported by the facts.

[438] The accuracy of some of Dovey's underlying data was never proven. For example, he calculated the parties' relative share of the Canadian market based on information from Pason's annual reports without establishing the accuracy thereof or doing any due diligence in this regard.

[439] Dovey, in estimating Varco's "but for" rental days, assumed that the Wildcat had no competitive advantage over WOB only autodrillers. This assumption is so inconsistent with the evidence that this error, compounded with the other problems the Court has found with Dovey's expert opinion, significantly undermines any opinion given.

[440] The Court, faced with the contrasts between the two expert opinions, must accept that Hall is more reasonable, more consistent with the evidence and therefore is to be preferred.

[441] The issue of price erosion is based on the notion that a patentee in response to infringement by its competitor will lower its own prices to address the infringing competition. *AlliedSignal* confirms that a patentee is entitled to the profit it lost, both on the sales it actually made and on the sales it would have made at the selling price it would have charged "but for" the infringing product.

[442] Hall calculated Varco's lost profits arising from price erosion at \$3,584,037. In so doing, he relied on three assumptions clearly established in the evidence:

- Varco lowered its price to retain and attract customers in response to the Pason AutoDriller competition;
- rental rates were an important factor for customers; and

- Varco's bundling strategy lowered its effective autodriller system rate 10% to 20% on some of its rentals.

[443] The bundling strategy was an offering whereby the Wildcat was included with other products/services; sometimes at a rate less than a stand alone rental of the Wildcat. The Court has some concern that while some element of bundling might have occurred in any event as a marketing tool (bundling as a marketing tool is sufficiently public and notorious for a court to acknowledge its existence generally), there is no evidence to rebut the reasonableness of Hall's assumption. Dovey offered no opinion on the average rental price Varco would have charged. The Court therefore accepts it as a reasonable assumption in these circumstances.

[444] In addition to the lost profit on sales the Plaintiffs would have made, the Plaintiffs claim a reasonable royalty on sales which it would not have made, or alternatively in the royalty stand alone scenario, the Plaintiffs would have been entitled to a reasonable royalty on all sales made by Pason.

[445] As held in *AlliedSignal* at paragraph 199:

199 A reasonable royalty rate is "that which the infringer would have had to pay if, instead of infringing the patent, [the infringer] had come to be licensed under the patent": ... The test is what rate would result from negotiations between a willing licensor and a willing licensee.

[446] In *AlliedSignal*, the reasonable royalty was calculated on the basis of the plaintiff's incremental profits before tax. However, in *Jay-Lor*, Justice Snider rejected *AlliedSignal*, and found that the anticipated profits approach was to be preferred.

[447] In the present case, Hall concludes that the reasonable royalty rate is 20% whereas the Defendants' experts (Dovey and Van Uden) settle on 4%.

[448] The problem presented for the Court is that Hall largely followed the *AlliedSignal* factors and approach whereas the Defendants' Van Uden (the substantive expert on royalty calculations) did not apply the *Jay-Lor* anticipated profits approach but utilized the 25% Rule (earlier mentioned) and his "analytical approach".

The Court is in no position to embark on an anticipated profits consideration in accordance with *Jay-Lor* as there is no evidentiary basis for it.

[449] Therefore, the Court must choose between the two experts' approaches. For the following reasons, the Court accepts the Plaintiffs' approach and the 20% royalty rate as the most reasonable rate on the evidence before it.

[450] The exercise of the "royalty rate" is a hypothetical assumption of a negotiation between willing parties. The premise is flawed, particularly in this case, because there are only two parties, direct competitors and no evidence of what advantage the Plaintiffs would see in negotiating a rate, when, but for infringement, the Defendants would have no competing product. There is an air of unreality in the whole exercise.

[451] In considering the competing expert evidence, the Court has already commented on its general preference for Hall's expertise and opinions. In the present exercise, Hall analyzed the issue from the perspective of each party. He recognized Pason's market strength and the reliance the

Plaintiffs had on this single product. His conclusion that the Plaintiffs would need a substantial royalty before it would conclude an agreement is entirely reasonable.

[452] Hall considered what incremental profit rate the Plaintiffs would likely need and that a 20% royalty fell within a reasonable range.

[453] In considering Pason's position in any negotiation, Hall factored in the substantial profits it earned from the Pason AutoDriller and the importance that the infringing product played in Pason's world. He considered Pason's public statements as showing a focus on generating revenue through additional products. He considered the additional profits Pason could expect to earn from other products over and above operating margins. Hall concluded that at a 20% royalty, Pason was splitting its 39% excess profit on Pason AutoDriller rentals which he considered a reasonable course of action.

[454] Hall also took into account the 13 factors affecting a reasonable royalty set out in *AlliedSignal*. These factors, combined with analysis of the profit differential Pason would have achieved, showed that a 20% royalty rate was a reasonable result.

[455] Hall then applied the rate to international sales.

[456] Finally, Hall examined the impact of that royalty rate on Pason's operating margin and noted that Pason would still have an incremental profit of 53% and a 19% increase in profit over Pason's 34.8% operating profit.

[457] The Court concludes that Hall's approach, the factors he considered and his ultimate conclusions are reasonable in the circumstances and more reasonable than those of the Defendants' experts.

[458] A fundamental and overriding flaw in the Defendants' experts' opinion (Van Uden) is the use of the 25% Rule. The 25% Rule was the starting point for the analysis of the royalty rate. It is a Rule developed by Robert Goldscheider, an academic in the United States.

[459] Van Uden accepted the premise and validity of the 25% Rule without establishing before this Court why it was an acceptable rule of any sort, much less why it should be a starting point in this case. On that basis alone, the Court would have rejected Van Uden's opening premise.

[460] The US Court of Appeals for the Federal Circuit has rejected the validity of the 25% Rule. There is no reason for this Court to adopt this American academic premise when the American courts have rejected it for good reason.

[461] Despite the Defendants' submissions, the Federal Court has never considered, much less adopted, the Rule. Neither *AlliedSignal* nor *Jay-Lor* considered the 25% Rule.

[462] This Court does not accept the 25% Rule. Its validity was not established in evidence here; the Rule does not consider the circumstances of each case and is simply an arbitrary number. The Court need not comment further on the merits of how the Rule was applied.

[463] Having started from an unsustainable starting point, the rest of the Defendants' expert evidence and conclusions fall apart. The Court is not prepared to accept the Defendants' thesis of the royalty rate nor the rate itself.

[464] Finally, the Defendants claim that some form of apportionment should be made. While apportionment may be a relevant factor in considering lost profit, there is an insufficient evidentiary basis to apply it in this case, as referred to earlier in these Reasons.

[465] The overwhelming evidence is that "but for" the infringement, Pason would not have had any sales of the Pason AutoDriller. Advantages in market factors, service and performance factors or any other factors do not overcome or diminish the centrality of infringement.

[466] In addition, apportionment, as applied by the Defendants' experts, leads to the ludicrous result that only 4% of Pason's AutoDriller profits was caused by the infringement.

[467] Therefore, there is no basis for reducing the compensation due to the Plaintiffs by reason of some application of the apportionment factors relied on by the Defendants' expert.

[468] Therefore, in the alternative, the Plaintiffs should be awarded loss profits/reasonable royalty of \$20,641,463 or as further alternative, a reasonable royalty of \$16,600,276.

[469] The Plaintiffs asked for exemplary/punitive damages. Had the remedy been restricted to normal damages, I would have awarded exemplary/punitive damages because of the deliberate infringement carried out in the face of advice from Leier and recklessness as to the consequences.

[470] However, exemplary/punitive damages are equitable relief. The equitable principles have already been embodied in the disgorgement of profits remedy and further equitable relief is unwarranted.

VIII. COSTS

[471] In awarding costs to the Plaintiffs, the Court has taken account of the difficulty of the case, its complexity and length. It is particularly mindful of the Defendants' shifting theories adding complexity and the Defendants' allegations against the Plaintiffs and some of their witnesses that they were deceitful, dishonest and had engaged in various forms of mischief and skulduggery. Such unsubstantiated allegations are deserving of the Court's censure in the form of costs.

IX. CONCLUSION

[472] The Plaintiffs are entitled to:

- (a) a declaration that the Defendants have infringed the Plaintiffs' valid 313 Patent;
- (b) an order for an accounting of and disgorgement of profits currently set at \$52,881,374;
- (c) a permanent injunction and other injunctive relief on terms to be addressed in separate submissions;

- (d) an order directing the delivery up to the Plaintiffs or the destruction upon oath of all infringing products in the possession, custody or control of the Defendants on further terms to be addressed in separate submissions;
- (e) pre and post judgment interest to be calculated; and
- (f) costs of this action pursuant to Column V of the Court's Tariff.

"Michael L. Phelan"

Judge

Ottawa, Ontario
August 12, 2013

SCHEDULE ASUMMARY OF THE INVENTION

In accordance with the present invention, an automatic drilling system controls the drill string of a drilling rig in response to any one of, any combination of, or all of drilling fluid pressure, bit weight, drill string torque, and drill string RPM to automatically release the drill string of the drilling rig during the drilling of a borehole. The automatic driller includes a drilling fluid pressure sensor, a bit weight sensor, a drill string torque sensor, and a drill string RPM sensor. The sensors output signals representing drilling fluid pressure, bit weight, drill string torque, and drill string RPM to a drilling fluid pressure regulator, a bit weight regulator, a drill string torque regulator, and a drill string RPM regulator, respectively.

The regulators receive their respective signals to measure changes in those signals and produce an out put signal representative of any changes. Specifically, the drilling fluid pressure regulator measures changes in drilling fluid pressure and outputs a signal representing those changes. The bit weight regulator measures changes in bit weight and outputs a signal representing those changes. The drill string torque regulator measures changes in drill string torque and output a signal representing those changes. The drill string RPM regulator measures changes in drill string RPM and outputs a signal representing those changes.

Each of the regulators attaches to a relay which is responsive to that regulator output signal to supply a drill string control signal to a drill string controller. The relays connect in series so that all the regulators may be utilized concurrently to provide a drill string control signal to the drill string controller via their respective relays. Furthermore, the relays attach to relay selectors which switch the relays on and off to permit an operator of the automatic driller to select which one of or which combination of the regulators are to control the drilling operation.

The drill string controller attaches to the relays to receive a drill string control signal from the regulator or regulators controlling the drilling operation. Illustratively, when the relay connected to the drilling fluid pressure regulator receives a decrease in drilling fluid pressure signal, it supplies a drill string control signal that operates the drill string controller to effect an increase in the rate of release of the drill string. Conversely, an increase in drilling fluid pressure results in the relay supplying a drill string control signal that operates the drill string controller to effect a decrease in the rate of release of the drill string.

If, however, the relay connected to the bit weight regulator receives a decrease in bit weight signal, it supplies a drill string control signal that operates the drill string controller to effect an increase in the rate of release of the drill string. Conversely, an increase in bit weight results in the relay supplying a drill string control signal that operates the drill string controller to effect a decrease in the rate of release of the drill string.

Alternatively, when the relay connected to the drill string torque regulator receives a decrease in drill string torque signal, it supplies a drill string control signal that operates the drill string controller to effect an increase in the rate of release of the drill string. However, an increase in drill string torque results in the relay supplying a drill string control signal that operates the drill string controller to effect a decrease in the rate of release of the drill string.

Finally, if the relay connected the drill string RPM regulator receives an increase in drill string RPM signal, it supplies a drill string control signal that operates the drill string controller to effect an increase in the rate of release of the drill string. Conversely, a decrease in drill string RPM results in the relay supplying a drill string control signal that operates the drill string controller to effect a decrease in the rate of release of the drill string.

It is, therefore, an object of the present invention to provide an automatic driller capable of automatically controlling the release the drill string of a drilling rig in response to changes in any one of, any combination of, or all of drilling fluid pressure, bit weight, drill string torque, and drill string RPM.

Still other objects, features, and advantages of the present invention will become evident to those skilled in the art in light of the following.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view depicting a typical drilling rig controlled by the automatic drilling system according to the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 1 illustrates a typical drilling rig controlled by the automatic drilling system of the present invention. Drilling rig 10 may be utilized to drill vertical, directional, and horizontal boreholes. Derrick 20 supports drill string 21 within borehole 86 utilizing drawworks 22. Drawworks 22 includes drilling cable drum 26 and drilling cable anchor 27 having drilling cable 28 strung there between. Rollers 29 and 30 mount onto derrick 20 to wind cable 28 about travelling block 31, thus suspending drill string 21 from derrick 20. Brake 32 controls the release of cable 28 from drum 26 to adjust the vertical position of drill string 21 with respect to derrick 20.

Rotary table 24 drives drill string 21 to rotate drill bit 23, thereby drilling borehole 86. Additionally, drill string 21 includes mud motor 85 which allows directional and horizontal boreholes to be drilled. To drill borehole 86 into formation 87, rotary table 24 may drive drill string 21 to rotate drill bit 23, or mud motor 85 may rotate drill bit 23, or drill string 21 and mud motor 85 may be used in tandem. However, during a typical drilling operation, mud motor 85 drives drill bit 23 only at the directionalization point of borehole 86 in order to ensure a precise borehole angle, while drill string 21 drives drill bit 23 during straight line drilling.

Pump 25 pumps drilling fluid (i.e. mud) into drill string 21 via drilling fluid line 88, where it travels down drill string 21 to mud motor 85 and drill bit 23. The drilling fluid drives mud motor 85, provides pressure within drill bit 23 to prevent blowouts, and carries drilled formation materials from borehole 86.

Drawworks 22 must adjust drill string 21 vertically along derrick 20 in order to retain drill bit 23 "on bottom" (i.e. on the bottom of borehole 86) and maintain the progression of borehole 86 through formation 87. As long as drill string 21 maintains sufficient and constant pressure on drill bit 23, drill bit 23 will gouge borehole 86 from formation 87 at an optimal rate of penetration chosen based on the composition of formation 87. Rates of penetration vary from as little as four feet per hour to as much as one hundred and eighty feet per hour. If, however, drawworks 22 did not adjust drill string 21, drill bit 23 would rise "off bottom" (i.e. off the bottom of borehole 86) and the progression of borehole 86 through formation 87 would cease. Accordingly, brake 32 must be manipulated to permit drum 26 to release cable 28 and adjust drill string 21, thereby providing the constant pressure on drill bit 23 required to maintain the optimal rate of penetration.

To maintain drill bit 23 "on bottom" and, thus, the optimal rate of penetration, automatic driller 33 connects to brake handle 208 via cable 207 to regulate the release of cable 28 from drum 26. Automatic driller 33 senses when drill bit 23 is "off bottom" and manipulates brake 32 to release cable 28 and lower drill string 21 until drill bit 23 is again "on bottom". Automatic driller 33 determines when drill bit 23 is "off bottom" by measuring drilling fluid pressure, bit weight, drill string torque, and drill string revolutions per minute (RPM). Drilling fluid pressure sensor 34, bit weight sensor 35, torque sensor 36, and RPM sensor 37 mount onto oil drilling rig 20 to provide signals representative of drilling fluid pressure, bit weight, drill string torque, and drill string RPM to automatic driller 33. Additionally, drilling fluid pressure gauge 80, drill string weight gage 81, drill string torque gauge 82, and drill string RPM gauge 83 mount on drilling rig 10 to register the respective signals produced by drilling fluid pressure sensor 34, bit weight sensor 35, torque sensor 36, and RPM sensor 37 for the drilling rig operator. Automatic driller 33 may be programmed to utilize any one of the above measurements, any combination of the above measurements, or all of the above measurements to regulate brake 32 and, thus, the position of drill bit 23 within borehole 86.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An automatic drilling system for automatically regulating the release of the drill string of drilling rig during the drilling of a borehole, comprising:

a drilling fluid pressure sensor;

a drilling fluid pressure regulator coupled to said drilling fluid pressure sensor, said drilling fluid pressure regulator measuring changes in drilling fluid pressure and outputting a signal representing those changes;

a relay coupled to said drilling fluid pressure regulator, said relay responsive to the output signal of said drilling fluid pressure regulator to supply a drill string control signal at an output thereof; and

a drill string controller coupled to said relay wherein a decrease in drilling fluid pressure results in said relay supplying a drilling string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in drilling fluid pressure results in said relay supplying a drill string control signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

2. The automatic drilling system according to claim 1, further comprising:

a bit weight sensor;

a bit weight regulator coupled to said bit weight sensor, said bit weight regulator measuring changes in bit weight and outputting a signal representing those changes;

a relay coupled to said bit weight regulator, said relay responsive to the output signal of said bit weight regulator to supply a drill string control signal at an output thereof; and

said drill string controller coupled to said relay wherein a decrease in bit weight results in said relay supply a drill string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in bit weight results in said relay supplying a drill string control

signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

3. The automatic drilling system according to claim 1, further comprising:

a drill string torque sensor;

a drill string torque regulator coupled to said drill string torque sensor, said drill string torque regulator measuring changes in drill string torque and outputting a signal representing those changes;

a relay coupled to said drill string torque regulator, said relay responsive to the output signal of said drill string torque regulator to supply a drill string control signal at an output thereof; and

a drill string controller coupled to said relay wherein a decrease in drill string torque results in said relay supplying a drill string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in drill string torque results in said relay supplying a drill string control signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

4. The automatic drilling system according to claim 1 further comprising:

a drill string RPM sensor;

a drill string RPM regulator coupled to said drill string RPM sensor, said drill string RPM regulator measuring changes in drill string RPM and outputting a signal representing those changes;

a relay coupled to said drill string RPM regulator, said relay responsive to the output signal of said drill string RPM regulator to supply a drill string control signal at an output thereof; and

a drill string controller coupled to said relay wherein an increase in drill string RPM results in said relay supplying a drill string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in drill string RPM results in said relay supplying a drill string control signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

5. The automatic drilling system according to claim 1 wherein said drilling fluid pressure regulator, comprises:

a Bourdon tube coupled to said drilling fluid pressure sensor to measure changes in drilling fluid pressure;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in drilling fluid pressure measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting to said relay a signal representative of changes in drilling fluid pressure.

6. The automatic drilling system according to claim 2 wherein said bit weight regulator, comprises:

a Bourdon tube coupled to said bit weight sensor to measure changes in bit weight;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in bit weight measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting a signal to said relay representative of changes in bit weight.

7. The automatic drilling system according to claim 3 wherein said drill string torque regulator, comprises:

a Bourdon tube coupled to said drill string torque sensor to measure changes in drill string torque;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in drill string torque measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting a signal to said relay representative of change in drill string torque.

8. The automatic drilling system according to claim 4 wherein said drill string RPM regulator, comprises:

a Bourdon tube coupled to said drill string RPM sensor to measure changes in drill string RPM;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in drill string RPM measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting a signal to said relay representative of changes in drill string RPM.

9. An automatic drilling system for automatically regulating the releasing of the drill string of a drilling rig during the drilling of a borehole, comprising:

- a drilling fluid pressure sensor;

- a bit weight sensor;

- a drilling fluid pressure regulator responsive to changes in drilling fluid pressure for outputting a signal representative of those changes;

- a bit weight regulator responsive to changes in bit weight for outputting a signal representative of those changes;

- a first relay connected to said drilling fluid pressure regulator, said first relay responsive to the output signal of said drilling fluid pressure regulator to supply a first drill string control signal at an output thereof;

- a second relay connected to said bit weight regulator, said first relay responsive to the output signal of said bit weight regulator to supply a second drill string control signal at an output thereof;

- a relay selector connected to said first and second relay to select any one of said first drill string control signal, said second drill string control signal, and both of said first and second drill string control signals to control the release of said drill string; and

- a drill string controller coupled to said first and second relays wherein when said first drill string control signal represents a decrease in drilling fluid pressure, said drill string controller increases the rate of release of said drill string controller and when said first drill string control signal represents an increase in drilling fluid pressure, said drill string controller increases the rate of release of said drill string, and further wherein when said second drill string control signal represents a decrease in bit weight, said drill string controller decreases the rate of release of said drill string and when said second drill string control signal represents an increase in bit weight, said drill string controller decreases the rate of release of said drill string.

10. The automatic drilling system according to claim 9, further comprising:

- a drill string torque sensor;

- a drill string RPM sensor;

a drill string torque regulator responsive to changes in drill string torque for outputting a signal representative of those changes;

a drill string RPM regulator responsive to changes in drill string RPM for outputting a signal representative of those changes;

a third relay connected to said drill string torque regulator, said third relay responsive to the output signal of said drill string torque regulator to supply a third drill string control signal at an output thereof;

a fourth relay connected to said drill string RPM regulator, said fourth relay responsive to the output signal of said drill string RPM regulator to supply a fourth drill string control signal at an output thereof;

said relay selector further connected to said third and fourth relays to select any one of said first, second, third, and fourth drill string control signals, a combination of said first, second, third, and fourth drill string control signals, and all of said first, second, third, and fourth drill string control signals to control the release of said drill string; and

said drill string controller coupled to said third and fourth relays wherein when said third drill string control signal represents a decrease in drill string torque, said drill string controller increases the rate of release of said drill string and when said third drill string control signal represents an increase in drill string torque, said drill string controller decreases the rate of release of said drill string, and further wherein when said fourth drill string control signal represents an increase in drill string RPM, said drill string controller increases the rate of release of said drill string and when said fourth drill string control signal represents a decrease in drill string RPM, said drill string controller decreases the rate of release of said drill string.

11. A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure;

producing a signal in response to changes in drilling fluid pressure, said signal representing the changes in drilling fluid pressure;

relaying said signal to a drill string controller; and

controlling said drill string controller to increase the rate of release of said drill string when said signal represents a decrease in drilling fluid pressure and to decrease the rate of release of said drill string when said signal represents an increase in drilling fluid pressure.

12. The method according to claim 11 further comprising the steps of:
measuring drill string torque;

producing a signal in response to changes in drill string torque,
said signal representing the changes in drill string torque; and

relaying said signal to a drill string controller;

controlling said drill string controller to increase the rate of release of said drill string when said signal represents a decrease in drill string torque and to decrease the rate of release of said drill string when said signal represents an increase in drill string torque.

13. The method according to claim 1 further comprising the steps of:
measuring drill string RPM;

producing a signal in response to changes in drill string RPM,
said signal representing the changes in drill string RPM;

relaying said signal to a drill string controller; and

controlling said drill string controller to increase the rate of release of said drill string when said signal represents an increase in drill string RPM and to decrease the rate of release of said drill string when said signal represents a decrease in drill string RPM.

14. A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure and bit weight;

producing a first signal in response to changes in drilling fluid pressure, said first signal representing the changes in drilling fluid pressure;

producing a second signal in response to changes in bit weight,
said second signal representing the changes in bit weight;

selecting any one of said first signal, said second signal, and both said first and said second signals to control the release of said drill string; and

relaying said selected signal or signals to a drill string controller which regulates the release said drill string in response to said selected signal or signals.

15. The method according to claim 14, further comprising the steps of:

measuring drill string torque and drill string RPM;

producing a third signal in response to changes in drill string torque, wherein said third signal represents the changes in drill string torque;

producing a fourth signal in response to changes in drill string RPM, wherein said fourth signal represents the changes in drill string RPM;

selecting any one of said first, second, third, and fourth signals, a combination of said first, second, third, and fourth signals, and all of said first, second, third, and fourth signals to regulate the release of said drill string; and

relaying said selected signal or signals to a drill string controller which regulates the release said drill string in response to said selected signal or signals.

FEDERAL COURT

SOLICITORS OF RECORD

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**PUBLIC VERSION OF THE
CONFIDENTIAL REASONS
FOR JUDGMENT:** PHELAN J.

DATED: August 12, 2013

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