Federal Court  Cour fédérale

Date: 20191223

Docket: T-1056-15

Citation: 2019 FC 1606

Ottawa, Ontario, December 23, 2019

PRESENT: Mr. Justice James W. O'Reilly

BETWEEN:

WESTERN OILFIELD EQUIPMENT RENTALS LTD

Plaintiff (Defendant by Counterclaim)

and

M-I LLC

Defendant (Plaintiff by Counterclaim)

AND BETWEEN:

M-I LLC

Plaintiff by Counterclaim

and

FP MARANGONI INC

Defendant by Counterclaim

PUBLIC JUDGMENT AND REASONS

(Confidential Judgment and Reasons issued December 23, 2019)

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I. Overview

[1] The plaintiff (by counterclaim), M-I LLC (M-I), alleges that the defendants, Western Oilfield Equipment Rentals Ltd (Western) and FP Marangoni (FPM), have infringed M-I's patent (Canadian Patent 2,664,173). FPM is a wholly-owned subsidiary of Western. In these reasons, I will generally refer to the defendants (by counterclaim) collectively as "Western" unless the factual context requires otherwise.

[2] M-I maintains that Western has infringed the '173 patent directly and has also induced infringement by others, and seeks damages and compensation. In response, Western asserts that the '173 patent is invalid on numerous grounds, including inutility, insufficiency, anticipation, obviousness, and overbreadth.

[3] I find that M-I has made out its infringement claim. I also conclude that none of the defendants' invalidity allegations are supported by the preponderance of the evidence. M-I is, therefore, entitled to damages and compensation.

[4] After laying out the general facts and background to this action, I will address the following issues:

1. For purposes of construing the '173 patent, who is the person skilled in the art?
2. What is the proper construction of the '173 patent claims in issue?
3. Have the defendants infringed the claims of the '173 patent?

4. Are the claims in issue invalid?

5. What damages and compensation are owed by the defendants to M-I?

[5] In addition to these issues, I include my decision on a motion brought by M-I during the trial under Rule 227.

II. Factual Background

[6] This case relates to a machine called a "shale shaker". Shale shakers are used in the oil and gas industry to remove solids from the drilling fluid that emerges from an active well, so that the fluid can be reused. The solids are the product of the drill bit cutting through rock. They are often referred to as "cuttings." Drilling fluid provides a medium for sending the cuttings to the surface, and helps lubricate the drilling equipment. The combined solid and fluid mixture that comes to the surface at the drill site is called "slurry."

[7] In essence, a shale shaker operates like a vibrating sieve, receiving the slurry and screening out the cuttings within it, leaving the fluid to be captured by tanks below. Since drilling fluid is expensive, the more proficient a shaker is in removing solids, the lower the cost of the drilling operation. The more reusable drilling fluid recovered, the better.

[8] In the mid-2000s, M-I was working on improved shale shaker technology. A mechanical engineer at M-I, Mr Brian Carr, along with 30 other engineers, was involved in researching and developing shakers and screens. At that time, the process at M-I for developing a new product involved a number of successive steps – a feasibility study, detailed design, field testing, and

commercialization. New ideas were presented to M-I's Product Development Council, which determined whether a product would move from one stage to the next.

[9] Mr Carr presented his preliminary idea for a new shaker model to the Council in 2005. One of his ideas was to apply a vacuum to the shaker screen in order to recover more fluid. He made a fuller presentation the following year, describing his objectives as being to remove low-gravity solids from drilling fluid, minimize the amount of drilling fluid left on solids, and recovering drilling fluid before it spilled over the end of the shaker. He expressed his ambitious hope that a product could be commercialized within 18 months.

[10] The Council approved Mr Carr's proposal, giving him 30 days and a dedicated team of 5 or 6 members to develop a feasibility study. That study included assessment of a vacuum-assisted shaker with an integrated vibrating sump and a means of controlling air flow to prevent stalling of solids on the screens. A prototype was built within the same time frame. Mr Carr estimated that he would need another 3 months and a budget of $226,400.00 to continue.

[11] Mr Carr's prototype included a vacuum at the feed-end of the shaker, that is, at the point where the slurry entered the shaker. The shaker had a total of four screens. It was tested under various scenarios – flooding the entry screens with slurry, partially covering the entry screens with slurry, removing the two screens at the discharge end of the shaker so that the vacuum was applied to the two screens at the entry point, applying a steady vacuum, and applying a pulsing vacuum. Overall, the results were positive. The vacuum enhanced the amount of fluid pulled through the screens by 50% and the cuttings coming of the end of the shaker were dryer. One

problem was that the vacuum pulled mist as well as liquid through the screen, which tripped the pump, so a means of separating air from liquid was required. A simple solution of using a "rig-vac", essentially a commercial version of a household wet-vac, was proposed.

[12] At the end of the feasibility stage, Mr Carr recommended moving forward with the vacuum-assisted shaker with field tests to be completed within 5 or 6 months. At that point, on October 1, 2007, M-I filed its provisional patent application. The '173 patent issued on June 16, 2015.

[13] In due course, M-I released a new commercial shaker but it did not include a vacuum system. Still, the '173 patent and its United States counterpart included a vacuum element.

[14] Some six years later, Mr Carr became aware of FPM's Vac-Screen System (VSS), a means of recovering drilling fluid from a shaker through use of a vacuum. Some of his colleagues did not believe it was a viable technology, but considered working with FPM if its technology was patented. There was some ensuing contact between M-I and FP USA, FPM's US affiliate, about this technology.

[15] Mr Calvin Carter, Business Development Manager at M-I, recalled seeing the VSS in 2013, including in Canada. He regarded it as virtually identical to M-I's own "Maximizer" machine, which M-I's subsidiary, M-I Swaco, had an agreement with FP USA to rent out under a 60/40 shared revenue arrangement beginning in 2011 or 2012. They called the system "FP Maximizer." Under the agreement, whichever company supplied the vacuum, the hoses, and the

trays got 60% of revenues and the other company got 40%. This product was never offered in Canada. However, M-I has a licence agreement in Canada with a company called FourK Energy Services for a similar product called the “Scavenger”.

[16] Mr Al Imler, formerly a Western employee, described the origins of the VSS. In 2010, he was working with Mr Dan Pomerleau at a company called EDSI. They noticed that a lot of drilling fluid was flowing over the ends of shakers and set about to solve that problem. They developed a system that consisted of a tray inserted at the discharge end of a shaker with a vacuum applied to the screen. Mr Imler stated that the apparatus of the VSS was “firmly attached” to the shaker; otherwise, it would break. It was essentially part of the shaker. From early on in the development of the VSS, valves were included in order to regulate the amount of suction applied to the screen to prevent stalling.

[17] When EDSI started going out of business, Mr Imler and Mr Pomerleau created FPM as a company devoted to renting out the VSS. Mr Imler was FPM’s Operations Manager. He designed the trays, and was in charge of installing the system. In 2012, FPM was purchased by a holding company called 32 Degrees Capital, which also owned Western (beginning in 2011) and another company called Markwater Handling Systems. FPM continued to rent out the VSS. The following year, Western became the operating arm of the company and rented out the VSS in place of FPM.

[18] Mr Jeff Cooke began working in 2013 for an equipment rental firm called Richfield Equipment Limited (Richfield). According to Mr Cooke, Richfield had an unwritten business

relationship with FPM, which was developing a vacuum system for recovering drilling fluid through screens. At the time, FPM did not have a name for its product, but Mr Cooke began referring to it as the Vac-Screen, a name that stuck. Richfield's work with this product began in late 2010 and ended in March of 2014.

[19] Richfield's role was to install and service the equipment and rent out vacuums and other components as required. It billed the oil companies and then passed along FPM's share once the invoices had been paid. Mr Cooke explained that this billing arrangement simply ensured that Richfield got paid up front.

[20] Within this business relationship, FPM brought in virtually all of the clients. Installation of the VSS included explaining to the crew how the system worked and what their responsibilities were. The system included valves for adjusting the air flow to prevent stalling on the screens, which the drill crew was responsible for controlling. If there was any problem, Richfield would be called in to deal with stalled screens, usually because the rig crews had not followed the initial instructions or needed to be reminded of them.

[21] In essence, the VSS involves an add-on feature for shale shakers available in the market. It involves attaching an additional screen, connected to a vacuum, to the discharge end of a shaker and is intended to remove any remaining liquid adhering to the solids that have already passed along the shaker's screens. The VSS does not itself include a vacuum; rather, it relies on commercially-available equipment to complete the system. According to Mr Cooke, the VSS

includes valves for venting the vacuum to adjust the air flow. Mr Carter testified that the VSS employs a means of controlling air flow by way of what he called a "snorkel valve".

[22] Between them, the defendants (by counterclaim) have offered the VSS for rent in Canada since 2010.

A. *Issue One – For purposes of construing the '173 patent, who is the person skilled in the art?*

[23] The parties do not disagree substantially on the definition of a notional skilled person. M-I's expert, Mr Robert Palmer, described the skilled person as someone with at least five years' experience in the application, operation, and design of shale shakers. (A summary of the experts' qualifications is set out in an Annex.)

[24] Mr Peter Matthews, for Western, stated that the skilled person would have an engineering degree or equivalent, and three years' experience with shakers.

[25] Mr Benard Murphy, another of Western's experts, essentially agreed with Mr Matthews. Mr Murphy regarded the skilled person as being someone who had experience designing manufacturing equipment such as shakers, separators, degassers, and cyclones; someone with a mechanical engineering degree with three or more years of experience in the field, or someone without a degree but possessing more experience in the area.

[26] In my view, the skilled person for present purposes is someone with five years' experience in the application, operation, and design of shale shakers. I do not see the need for the person to have a degree in engineering. The patent relates to a variation on a piece of technology that was well-known and widely-used in the oil and gas industry. The patent is addressed to persons who would be familiar with that technology and would understand the improvements that the patented method and system were intended to provide.

B. *Issue Two – What is the proper construction of the '173 patent claims in issue?*

(1) The '173 Patent

[27] The '173 Patent is entitled "Shaker and Degasser Combination". M-I owns the patent; Mr Carr is the sole named inventor.

[28] The underlying application was filed on October 1, 2007 and was amended on October 2, 2013, January 28, 2014, August 27, 2014, and November 4, 2014. Some claims were added, some were deleted, and some were amended. In addition, some paragraphs were added to the specification. The patent issued on June 16, 2015.

[29] The patent describes the invention as a system for separating components of a slurry. The various elements of the system are listed and include a housing, a basket holding at least one screen, a vibrator coupled to the basket, a sump situated below the basket to collect at least a portion of the slurry passing through the screen, a pressure differential device connected to the sump and providing a pressure differential across the screen, a toggling device for toggling the

pressure differential, a degassing chamber situated between the sump and the pressure differential device, and a conduit connected to the degassing chamber for recovery of the degassed fluid.

[30] The background section of the patent's specification states that the embodiments of the invention "relate generally to shale shakers and screens" and, more specifically, to "a shale shaker having pulse-vacuum assisted screening" and "methods and apparatus for removing entrained gases from a slurry." The background goes on to describe the purpose of drilling fluid in the oil and gas industry, which is primarily to act as a lubricant to cool drill bits. The fluid is conveyed downhole through the drill string and is forced back up to the surface in the annular area between the drill string and the wellbore.

[31] The fluid returns to the surface as a slurry. The patent defines "slurry" as a "mixture of drilling fluid and drill cuttings".

[32] Before the fluid can be reused, the cuttings must be removed from it. That is the role of a shale shaker. Various types of shakers and their components that were known in the prior art are described in the patent.

[33] The patent then points out one of the problems in the prior art equipment. Sometimes the separation of fluid from cuttings is incomplete, meaning that the cuttings are still wet after passing through the shaker. Other equipment, such as a rotating vacuum dryer, then has to be used to remove the remaining liquid.

[34] One means of making shakers more efficient at removing liquids from cuttings, says the patent, would be to apply a pressure differential through the screen. The patent mentions a shaker disclosed in the prior art that in fact uses a pressure differential applied continuously beneath a screen (Hensley, *et al.*). The problem with this technique is that the continuous vacuum may cause cuttings to stick to the screen, preventing fluids from flowing through it. Accordingly, the patent cites the ongoing need for more efficient shakers - with an increased fluid capacity, a higher rate of fluid flowing through the screens, and better fluid removal ability, without hindering the flow of solids across the screens. Further, the patent also cites a need for a means of removing entrained gases from the recovered fluid.

[35] The patented system may also involve using a pressure differential generator that would pull air or vapour through the first screen to "enhance the flow of drilling fluid through the first screen with respect to a second screen" to which no pressure differential was applied. The drilling fluid, and the air or vapour, would be collected in an external chamber connected to the pressure differential generator.

[36] The summary also describes a method for separating components of a slurry by introducing the slurry to the top of a screen and toggling a pressure differential across the screen, either by creating a partial vacuum beneath the screen and intermittently interrupting the vacuum or disrupting the flow of recovered vapour. The invention includes a method by which the slurry is introduced to a shaker containing a first and a second screen. The slurry passes over the first screen where a pressure differential is applied and over a second screen to which no pressure differential is applied.

[37] The patent then goes on to provide detailed descriptions of various shakers, for which rudimentary drawings are provided, and related embodiments of the invention. Most of the evidence in this case related to the shakers depicted in Figures 5, 6, and 7 of the patent.

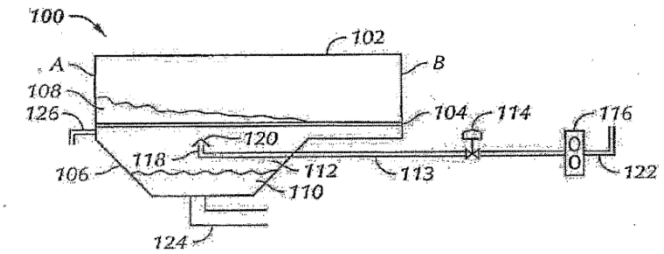

FIG. 5

[38] Figure 5 shows "a simplified flow diagram" for one embodiment of the invention (*ie*, it is not an engineering drawing). The figure shows a basket (102), a screen (104), a sump (106), slurry (108), an inlet (A), and an outlet (B).

[39] The vapour within the sump (112) is connected by way of a conduit (113) and a valve (114) to the pressure differential device (116). The collected vapour could be flared, vented, or recovered by a flow line (122). Fluids (110) would be recovered from the sump by way of a separate flow line (124). The recovered fluid could be degassed by the pressure differential created by the device (116).

[40] Figure 6 also depicts a "simplified flow diagram" for another embodiment of the system. This shaker may include a basket (202), a screen (204), and a sump (206). The slurry (208) is fed

to the inlet of the shaker (A) and the cuttings are collected at the outlet (B). The drilling fluid is recovered in the sump (206). A pressure differential is created by connecting the sump (206) to a degassing chamber (212) and then to a pressure differential device (216) by way of a flow line (213) and valve (214). The differential pressure results in the collection of liquid and vapour in the degassing chamber (212). The vapour can be flared, vented, or recovered by a flow line (222). The liquid can be recovered by another flow line (224) and sent for further processing. The liquid could be degassed by the pressure differential created by the device (216).

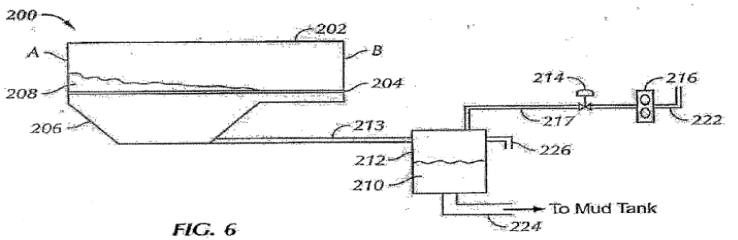

FIG. 6

[41] Figure 7 depicts a vibratory separator including a housing (502), an inlet (504), an outlet (506), and multiple, vertically-stacked screens (508). Pressure differential devices can be placed in various locations, including between the screens and the sump, within the sump, or outside the sump. The apertures of the various screens may vary, for example, by having screens with larger apertures at the top and screens with smaller apertures below. The slurry falls onto the screens and is conveyed to the outlet using vibration and pulse-assisted devices. The patent says that vapours, “including any hazardous gases, (*eg*, hydrogen sulfide (H_2S))” can be extracted by way of a fume hood (516). At that point, the vapours or gases can be treated or vented.

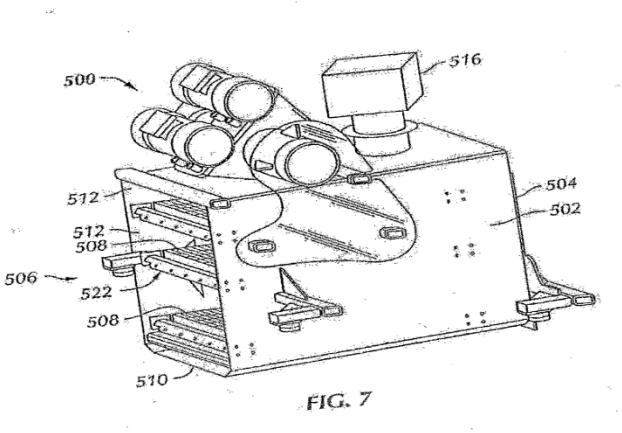

FIG. 7

[42] The collected drilling fluid could then be directed to a containment area for degassing, using devices known in the prior art.

[43] The patent states that the various embodiments relate to shakers having "increased fluid capacity, increased fluid flow-through rates across the screens, and/or improved fluid removal efficiencies". In addition, they may provide shakers with "reduced hazardous vapours in vapour spaces" and permit more efficient separation of entrained gases.

[44] The patent contains 23 claims. The first 18 relate to a method; the remainder to a system.

[45] The method involves introducing a slurry to a shaker containing a first screen and a second screen, flowing the slurry over the first screen, and applying a pressure differential to the first screen, but not to the second screen (claim 1). It includes controlling air flow under at least a portion of the first screen to prevent stalling the slurry on the screen (claim 2) and pulling vapours and fluid through the screen to a degassing chamber (claim 10). The claims include a method in which a pressure differential is also applied to the second screen, but where the

differential is less than that applied to the first screen (claim 3), or even zero (claim 4). The claims include toggling the pressure differential applied to the first screen (claim 5), intermittently interrupting the pressure differential (claim 6), pulsing the pressure differential (claim 7), or applying a third differential to another portion of the first screen (claim 8). They include use of a vacuum external to the shaker (claim 9). In addition, the method includes applying a differential pressure, created by an external device, between an area above the first screen and below the first screen, and applying a different differential pressure to the second screen (claim 11). The method includes the steps in claim 11 where vacuum pressure is applied only to a portion of the first screen (claim 18), or the collected vapour and drilling fluid are sent to a chamber to be separated (claim 16).

[46] The patent also claims a method in which air or vapour, and the drilling fluid, are pulled through the first screen and conveyed to an external chamber where the air or vapour is separated from the fluid (claim 12), including an external degassing chamber (claim 17), even if the vacuum pressure is applied only to a portion of the first screen (claim 18).

[47] The claimed method may also involve the procedures described in claims 10 and 11 where the pressure differential applied to the first screen is intermittently interrupted (claim 13) or pulsed (claim 14), or applied to a first portion of the second screen (claim 15).

[48] The claimed system comprises a first screen with upper and lower sides for separating cuttings from fluids, and a pressure differential generator that pulls air or vapour through the first screen “to enhance the flow of drilling fluid through the first screen with respect to a second

screen", where the generator does not create a pressure differential between an area above and below the second screen (claim 19). It may additionally comprise a sump below the first screen to collect air, vapour, and fluid, and a degassing chamber collecting "all of the air or vapour and the drilling fluid" and removing air or vapour from the fluid (claim 20). The pressure differential generator may be external to the shaker (claim 21) and adjusted to prevent stalling of drill cuttings on the first screen (claim 22). Finally, the systems described in claims 19 and 20 may include a second pressure differential generator connected to a third screen to create a second pressure differential (claim 23).

[49] M-I's expert, Mr Palmer, conceded that claims 1, 11, 16, and 19 of the '173 patent are invalid on the basis of anticipation (see below).

(2) Essential Terms used in the Patent

[50] A number of terms in the patent need to be construed in order to understand the scope of the claims. The patent must be construed according to the understanding of a person skilled in the art, whom I have described above. Construction of the patent is carried out with the benefit of the opinions provided by the parties' experts. The following are the essential terms in issue and my construction of them.

(a) *"Slurry"*

[51] The patent states that, "as used herein", the term "slurry" "refers to a mixture of drilling fluid and drill cuttings".

[52] Western submits that “slurry” is not the same as “wet drill cuttings”, another term used in the patent. Western urges me to conclude that “slurry” is the mixture of drilling oil and drill cuttings that enters the shaker, whereas “wet drill cuttings” is the product that exits the shaker after most of the drilling fluid has been removed.

[53] Western’s experts, Mr Matthews and Mr Murphy, both adopted this distinction. Mr Matthews stated that a “slurry” is a suspension of solids in liquids, but the mixture at the end of the shaker is just wet cuttings. However, Mr Matthews conceded that the inventor of the ‘173 patent provided a definition of “slurry” to be used in construing the patent. Further, Mr Matthews accepted that wet drill cuttings are, indeed, a mixture of drilling fluid and cuttings.

[54] Mr Murphy agreed that a slurry is “a combination of the liquid drilling mud and solid drill cuttings.” However, he was adamant that the combination of fluid and cuttings at the discharge end of a shaker was not a “slurry”, notwithstanding the definition in the patent.

[55] I disagree with Western’s submission that “slurry” does not include wet drill cuttings. When the patent uses the term “wet drill cuttings”, it does so only to highlight the problem with the existing technology. It notes that the separation of drilling fluid from solids “is often incomplete, resulting in wet drill cuttings.” I do not read this statement as contradicting the patent’s definition of “slurry”. It is simply specifying a problem in the prior art.

[56] Accordingly, I agree with M-I’s expert, Mr Palmer, that the patent defines a slurry as a mixture of drilling fluid and cuttings, and that that definition must be used to construe the patent.

The fact that there is a higher proportion of liquid in the substance entering the shaker than in the substance exiting it does not mean that one is slurry and the other is not. Some slurries are just slurrier than others.

(b) *"First Screen"*

[57] In the patent's claims, a pressure differential is applied to a "first screen".

[58] Western argues that "first screen" means the screen closest to the end of the shaker where slurry is introduced. This is consistent, says Western, with the way screens are numbered in various technical documents and with the usage of the term by skilled persons in the industry.

[59] On the question of what is the "first screen," Mr Murphy emphasized what that term means in the industry. In his view, "first screen" means the screen at the input end of a shaker. In his view, since the main purpose of the invention is to increase the flow of liquids through the shaker, this can best be achieved by applying a pressure differential at the input end. Therefore, it would make sense that "first screen" means the first screen the slurry meets.

[60] However, he also stated that his interpretation arose "[w]ithout having read anything in the patent." In other words, he acknowledged, at least implicitly, that the patent might use the term "first screen" in a specific way. Indeed, he ultimately accepted that, in the patent, first screen could be any screen. He originally relied on various statements in the patent confirming his view that "first screen" meant the screen at the input end of a shaker, but all of the references he cited specified the location of the screen that was being referred to. For example, in respect of

Figure 3, the patent describes where the first two screens are and where the last two screens are. That would be a superfluous description if it were clear that a first screen was always positioned at the input end of a shaker.

[61] Mr Matthews testified that "first screen" is always the screen closest to the inlet. Since one of the main objects of the patent is to increase the shaker's capacity, he believed it would make little sense to apply a pressure differential elsewhere than at the shaker's inlet. Applying a pressure differential to the last screen, said Mr. Matthews, would not increase the shaker's capacity to process drilling fluids. However, he conceded that adding a pressure differential to the output screen would increase the flow of drilling fluid through that screen as a percentage of the flow through the input screen. (Mr Murphy held a similar view.) Mr Matthews also accepted that the '173 patent makes clear that a pressure differential can be applied to the screen at the discharge end of the shaker (para 37). Therefore, the term "first screen" cannot refer exclusively to the screen at the input end. In fact, the pressure differential could be applied to any screen. Mr Matthews stated that he had overlooked that part of the patent.

[62] For M-I, Mr Palmer pointed out that the claims require that the shaker have both a "first screen" and a "second screen" (claims 1, 11, and 19). However, there is no requirement that the first screen be closest to the inlet. A skilled person, in Mr Palmer's view, would understand that the key difference between first and second screens is not location but function. For example, in the description of Figure 3, the invention makes clear that a pressure differential could be applied to the screens closest to the inlet, or the screens closest to the outlet, or both (para 37). Wherever

the pressure differential is applied, that is a "first screen" as defined in the patent. Other passages and figures in the patent reinforce Mr Palmer's construction (paras 44, 45, 59, 60, Fig 4, 7).

[63] Mr Palmer also disputed Western's assertion that the prime objective of the patent could be achieved only if a pressure differential were applied to the screen closest to the inlet. According to Western, that objective is to increase a shaker's fluid capacity by drawing a maximum amount of fluid through the screen on the input side. As mentioned, Mr Murphy and Mr Matthews both took that view. But Mr Palmer points to another of the patent's goals – improving fluid removal efficiencies – that would be achieved by applying a pressure differential elsewhere than at the input.

[64] Similarly, Mr Palmer contested Western's construction of claim 19 which contemplates using a pressure differential to enhance the flow of drilling fluid through a first screen "with respect to" a second screen. In Western's view, this claim requires that the flow of drilling fluid be greater through the first screen as compared to the second screen and, since the flow rate will be greater through the screen at the input side of the shaker, that screen must be the first screen. That is not how Mr Palmer read claim 19. In his view, when the claim refers to "enhancing" the flow of drilling fluid, it simply means improving or increasing it. It does not necessarily mean causing the flow through the first screen to exceed that for the second. It foresees elevating the flow rate through the screen receiving a pressure differential as compared to the screen to which no pressure differential is applied. Mr Murphy and Mr Matthews ultimately agreed that adding a pressure differential to the output screen would increase the flow of drilling fluid through that screen as a percentage of the flow through the input screen.

[65] I conclude that the patent uses the term “first screen” not to identify where the screen is positioned, but to specify the place where a pressure differential is applied. The patent makes no assumption about where the first and second screens are in relation to the input and output sides of the shaker. Where it is necessary to make clear which screen is which, the patent specifically tells the reader. For example, in describing one example of how an embodiment of the invention works, the patent uses the terms “first two screens” and “last two screens”, but makes clear that “first and last corresponds to the direction of flow” from the inlet to the outlet, solely to explain that particular example (para 37). In any case, in that embodiment, a pressure differential is applied to one set of screens, or to the other set, or to both. There is no expressed preference for the pressure differential to be applied at the inlet side as compared to the outlet side. The same is true in respect of other embodiments described in the patent (paras 36, para 45).

[66] Accordingly, I cannot conclude that the term “first screen” invariably means the screen closest to the input side of the shaker. The patent clearly contemplates the application of pressure differentials to either the input side or the output side, or both.

[67] Further, the patent does not specify that the slurry is introduced to the “first screen”. For example, claim 1 merely states that a slurry is introduced to a shaker having a first screen and a second screen and that the slurry passes over the first screen. The slurry would pass over both screens in a two-screen shaker, so one cannot assume that the first screen is at the input side.

(c) *"Vapour" and "Hazardous Gases"*

[68] The system described in claim 19 involves applying a pressure differential device to a first screen to pull air or vapour through the screen. The patent explains elsewhere that a pressure differential will pull both liquids and vapours through the screen and send them to a degassing chamber. There, the vapours can be collected and flared, vented, or otherwise recovered (para 52). In one embodiment, a fume hood is attached to the shaker to extract vapours, "including potentially hazardous gases, for example, hydrogen sulfide" (para 56). From there, noxious odors or hazardous gases could be treated (para 57).

[69] Mr Murphy explained that vapour generally refers to a mist of airborne liquid particles. However, he stated that the patent is unclear on this point. Mr Palmer agreed that the terminology in the patent "is a bit confusing", but emphasized that hazardous gases would never be processed through a vacuum pump. Mr Matthews stated that when hazardous gases are present, shakers would simply not be used to process drilling fluid.

[70] On its own, the term "vapour" has a fairly uncomplicated meaning – air or gas containing suspended liquids. Mr. Matthews gave a slightly different definition – "finely divided liquid particles suspended in air". Mr Palmer and Mr Matthews essentially agreed to that point. The complication arises from the patent's apparent use of the term vapour to include hazardous, even deadly, gases. The suggestion in the patent that a fume hood or other form of venting could safely treat toxic gases seems implausible. However, the only reference in the patent to hazardous gases relates to the embodiment depicted in Figure 7, and the patent does not claim

that embodiment. There is nothing in the patent's claims about hazardous gases. Other references to vapours in the patent do not mention hazardous gases (paras 48, 52), but address the possibility of flaring or venting vapours.

[71] Accordingly, I do not read the passage in the patent stating that "vapours, including potentially hazardous gases, for example hydrogen sulfide ("H_2S"), entrained in the drilling fluid" provides a definition of the word "vapour" for all purposes of the patent. A vapour could include a hazardous gas and in that case the vapour would have to be treated with care. But I do not read the patent as stating that vapour always contains dangerous gases. In that section of the patent, the term "vapour" is used in a very particular context of little assistance to a construction of the patent's claims.

[72] The patent refers numerous times to the use of a degasser to separate drilling fluid from entrained gases. For example, it states that some of the embodiments "relate to methods and apparatus for removing entrained gases from a slurry" (para 2). However, contrary to Western's assertion, I do not find those references helpful in interpreting the term "vapour" as it is used in the patent's claims. A vapour is not an entrained gas. Nor is a gas a vapour.

(d) *"Enhancing Flow"*

[73] Claim 19 of the patent encompasses a system in which a pressure differential generator pulls air or vapour through the first screen "to enhance the flow of drilling fluid through the first screen with respect to a second screen," which does not have a pressure differential generator attached. I read this claim as referring to improved flow of fluid through a screen to which a

pressure differential device has been attached as compared to one to which no such device is attached. The experts did not differ in any substantial way on this point.

(e) *"Controlling Air Flow"*

[74] Claim 2 of the patent encompasses a system for applying pressure differential to a screen and controlling the air flow to prevent stalling of the slurry on the screen.

[75] One of the patent's objects is to address the problem of stalling caused by applying a continuous pressure differential to a shaker's screens. The patent refers to Hensley, *et al.*, a patent in which a continuous vacuum is applied from under a shaker screen, resulting in solids sticking to the screen (para 13). The patent expresses the need for a shaker with increased pressure differential so long as the means used do not hinder the flow of solids across the screen (para 14).

[76] With respect to the term "controlling air flow," Mr Murphy suggested that the purpose of this aspect of the invention is to prevent the stalling of slurry on the screen, and that the phrase includes toggling or intermittently interrupting the pressure differential, which are essentially the same thing. Toggling and interrupting the pressure differential are both mentioned specifically in the patent's disclosure. However, the broader term "controlling air flow" is mentioned in claim 2.

[77] The patent describes some of the potential means for preventing stalling. As Mr Palmer noted, the patent refers to "toggling", as well as "pulsing or toggling" effectuated by a valve, and

"manipulating the valve". Mr Matthews testified that there is no difference between pulsing, toggling or intermittently interrupting the pressure differential as a means of controlling air flow to prevent stalling. He noted that the patent mentions a broad range of valves, some suited to binary, on-off applications, and others designed for controlling. Mr. Murphy agreed.

[78] The patent contemplates that a pressure differential could be manipulated to provide additional capacity or to improve liquid recovery (para 37). In either case, the airflow must be controlled to prevent stalling.

(f) *"Conveying All of the Air or Vapour and Drilling Fluid"*

[79] Claim 12 relates to a method of pulling air or vapour and drilling fluid through a screen and conveying all the air, vapour, and drilling fluid to an external chamber where the air or vapour is separated from the fluid. Similarly, claim 20 claims a system in which all the air, vapour, and drilling fluid is sent to a degassing chamber where the air and vapour is separated from the drilling fluid.

[80] Mr Murphy considered the significance of the word "all" in claims 12 and 20. In those claims, "all" of the air or vapour and "all" of the drilling fluid that passes through the screen is sent to a degassing chamber. In Mr Murphy's opinion, the patent relates to a system in which a pressure differential is applied to one section of a shaker and not to another. That means that even if all of the vapour and drilling fluid that reaches the operative screen is sent to a degasser, there could be other harmful free gases discharged at earlier stages of the process that would go untreated. This, in his view, would not make sense. However, as mentioned above, the patent

claims no method for treating harmful gases. The degassing chamber (discussed below) referred to in the claims simply processes air, vapour, and drilling fluid.

[81] The word "all" in these claims distinguishes them from others. For example, claim 10 refers simply to the collection of vapours and drilling fluid through a screen in an external degassing chamber. Collection of "all" air, vapour, and fluid is, therefore, an essential element of claims 12 and 20. However, Mr Matthews rightly points out that there is no description in the patent of an embodiment that would achieve this. Nevertheless, the patent is clear that the pressure differential can be applied to different screens or different sections of the shaker bed. The pressure differential will draw air, vapour, and drilling fluid through the screen. Claim 20 simply requires that "all" of the air, vapour, and drilling fluid that has been collected be directed to an external chamber where air and vapour is separated from drilling fluid.

(g) *"Degassing Chamber"*

[82] The experts agree that a degassing chamber separates air or vapour from drilling fluid. Mr Murphy stated that "[i]f necessary, the entrained gases remaining in the drilling fluid processed by the pulsed-vacuum assisted shaker can be directed to a conventional degasser as is the case with all rigs which have degassers present following a shaker." Mr Palmer and Mr Matthews agreed, but pointed out that the patent does not include any claims relating to the removal of entrained gases from drilling fluid.

[83] Mr Murphy also considered the references to a "chamber" and a "degassing chamber" in the patent. While the latter usually refers to a device designed to remove entrained gases from

the drilling fluid, the only place in the patent where a degasser is present is in respect of Figure 7. There the patent states that the degassing can be performed by "any method known in the art." The description of Figure 6 also includes a degassing chamber, but Mr Murphy believed that the device referred to there was simply the equivalent of a "rig-vac," comparable to a household wet-vac, in which liquid is captured in a holding tank and air is exhausted through the vacuum. He construed "chamber" and "degassing chamber" in the claims as referring to the same thing. Mr Palmer agreed. I support their construction – the chamber is where air or vapour is separated from drilling fluid.

C. *Issue Three – Have the defendants infringed the claims of the '173 patent?*

(1) The Vac-Screen System

[84] The experts relied extensively on the affidavit of Mr Nic Stanton, Manager of Operations for Western, for their understanding of the components and operation of the VSS. Mr Stanton's affidavit is comprehensive, going well beyond what is needed to understand the functioning of the VSS for present purposes.

[85] Mr Stanton began working with the VSS in 2010. He managed the installation, servicing, and removal of the VSS at various sites. In 2013, he became Western's Service Manager, and coordinated Western's VSS operations. In 2014, Mr Stanton assumed his current role as Manager of Operations.

[86] Mr Stanton explained that the two versions of the VSS, the Vertical Vac-Screen System and the Vac-Screen System Plus, are aimed at increasing the amount of drilling fluid captured by shakers. To achieve this goal, the VSS uses vacuum pressure under or after the last shaker screen. In normal operation, the fluid pool would extend up to the last screen of the shaker.

[87] The components of the VSS include a tray mounted under or after the last screen of the shaker to catch drilling fluid, a manifold connecting the tray to the vacuum, a holding tank for the recaptured fluid, a filter to prevent fluid from entering the vacuum, and a vacuum pump. The holding tank includes a diverter plate that directs fluid to the bottom of the tank and away from the vacuum pump. The filter provides additional protection against fluid or vapour entering the vacuum. The manifold is connected to a gate valve allowing for control of the amount of vacuum applied to the tray. The valve is used to reduce the amount of vacuum applied to the screens in order to prevent the cuttings from stalling there. The tray is either mounted under the last screen of a shaker or attached to the outlet end of the shaker. Mr Stanton believed that about two-thirds were attached under the last screen; a third were externally-mounted. However, he had not actually counted. Either way, Mr Stanton confirmed that the VSS is integrated into the shaker.

[88] The VSS has never been used to treat H_2S or any other hazardous gases. It does deal with vapour within the holding tank but Mr Stanton did not believe the strength of the vacuum at the screen would be strong enough to pull vapours through it. However, he conceded he was not an expert on that point.

(2) Have the Defendants Directly Infringed the Patent?

[89] The parties agree that there was no infringement of the claims that were pending before the amendments filed on October 2, 2013. They differ on whether there was any infringement thereafter.

[90] Western argues that M-I has failed to prove infringement because: Western does not sell or rent shakers; the VSS does not apply a pressure differential to a first screen; the VSS does not flow slurry onto the screen where a vacuum is applied; the VSS does not treat vapours or hazardous gases; the VSS is not within a shaker; the VSS does not have a degassing chamber for removing air or vapour from drilling fluid; and the VSS does not pulse, toggle, or intermittently interrupt the pressure differential.

[91] The analysis of infringement flows essentially from the construction of the patent. The experts differ on the question whether Western has infringed the ‘173 patent, or induced infringement, along the same lines as they differed in their construction of the patent.

[92] Given my construction of the patent, I find that Western has infringed and has induced infringement of the ‘173 patent.

[93] Mr Murphy concluded that the VSS does not infringe the ‘173 patent because it processes wet drill cuttings, not slurry; it does not operate on the first screen of a shaker; it does not involve toggling or intermittently interrupting air flow to prevent stalling; it does not pull hazardous

gases through a screen; and it does not include a degassing chamber. I have already addressed and rejected all of these contentions in my discussion on construction. However, I will point out other areas where Mr Murphy disagrees with M-I's expert, Mr Palmer.

[94] Mr Matthews also found that the VSS does not infringe any of the claims of the '173 patent. He opined that the VSS does not apply a pressure differential through a first screen. The VSS treats wet drill cuttings, not slurry. The externally-mounted VSS treats wet drill cuttings that are left over after the shaker has processed the slurry, and cannot be considered to be a first screen. Moreover, the pressure differential is applied to a screen outside the shaker, not within the shaker. There is no evidence that the VSS pulls vapours through the screen. The VSS is not configured to deal with hazardous gases or to separate vapours from drilling fluid. The VSS does not pulse the pressure differential.

[95] Mr Palmer disputes Mr Matthews' interpretation of claim 1. Mr Matthews states that the slurry is introduced to the screen to which the pressure differential is applied. Mr Palmer points out that the claim simply states that the slurry flows over the first screen and that a pressure differential is applied to that screen. I agree with Mr Palmer that the claim does not say that the slurry is "introduced" to that screen. It simply provides that the slurry must flow over the screen to which the pressure differential is applied.

[96] Mr Palmer also disagreed with Mr Murphy's statement that the patented invention requires that sufficient pressure differential is applied to the screen that solids will stick to it. Anything less than that, in his view, would not achieve the objective of enhancing the flow of

drilling fluid through the screen. Mr Palmer points out, correctly in my view, that the flow of drilling fluid through a screen can be enhanced by applying a pressure differential less than what would be required to stall the solids on the screen. Indeed, the premise of the VSS is just that.

[97] Mr Murphy and Mr Matthews both suggested that claim 19 requires that air or vapour, not air and vapour, be pulled through the screen. I agree with Mr Palmer that a more sensible interpretation of claim 19 is that it requires that air, or vapour, or a combination of air and vapour be pulled through the screen.

[98] Mr Matthews also stated that claim 19 must include a shaker and that, therefore, the VSS does not infringe that claim because it is not a shaker. But claim 19, as Mr Palmer observes, does not specifically require a shaker. It describes a system for separating drill cuttings from drilling fluid within a shaker. The system contains two screens with a pressure differential device connected to the first screen to enhance the flow of drilling fluid through that screen with respect to a second screen. This claim describes a system that can be used with a shaker, not a shaker *per se*.

[99] Mr Matthews disagreed with Mr Palmer's description of a degassing chamber and asserted that that description would include an open mud tank into which drilling fluid would be deposited. Air or vapour entering the tank along with the fluid would simply escape into the environment. But Mr Palmer points out the error in that interpretation. The patent requires that the degassing chamber be situated between the pressure differential device and the sump. The

type of mud tank Mr Matthews describes would not work in that scenario because it would be impossible to achieve any kind of vacuum at the screen.

[100] Mr Palmer offered his expert opinion on this question and concluded, based on the documentary record and his own in-person observations, that Western's VSS system infringed the '173 patent including the claims as they appeared on October 2, 2013. Due to problems at the site, when Mr Palmer attended Western's Leduc, Alberta location to witness the Vac-Screen system in operation, it was not fully functional. However, Mr Palmer was able to determine the functioning of the VSS from Mr Stanton's and Mr Bruce's affidavits.

[101] In summary, Mr Palmer described the VSS system as a means of applying a pressure differential under a screen to aid recovery of drilling fluid from the slurry passing across the shaker. The purpose of that system is to improve the recapture of fluid and increase the dryness of drill cuttings. He described the VSS as a retrofitted apparatus attached to an existing shaker. The VSS is solidly mounted to the shaker so that it vibrates at the same frequency as the shaker. The vibrations cause the slurry to move across the screen which separates the fluid from the cuttings.

[102] Mr Palmer points out that the components of a VSS include a tray mounted under or at the end of a shaker screen that is situated at the output end of the shaker. The tray collects the fluid, fine particles, and gases that pass through the screen. The tray is connected to a vacuum pump by means of a manifold and a hose transports the drilling fluid from the manifold to a holding tank where the liquid is separated from gases. The latter are vented away. The vacuum

pump supplies a pressure differential to draw drilling fluid through the screen. The amount of suction applied can be manually adjusted by valves to ensure that the slurry does not stall on the screen.

[103] Mr Murphy disagreed with parts of Mr Palmer's description. First, he said there was no evidence that gases or vapours are pulled through the screen of the VSS. Second, any vapours drawn through the screen would condense and join with the drilling fluid in the holding tank.

[104] I note that, according to marketing materials for the VSS, the system is meant to achieve essentially the same objectives as the '173 patent identifies – to improve the efficiency of separating liquids from cuttings and to increase the rate of flow of liquids through screens.

[105] Mr Palmer discussed the method claims of the patent separately from the system claims. I will follow the same approach.

[106] Mr Palmer proceeded on the assumption, consistent with his own experience and now supported by the evidence at trial, that Western does not own the shakers to which the VSS is attached. Rather, the shakers are owned and operated by drilling companies or operators. Like shakers, the VSS's sole purpose is to process slurry. Mr Palmer describes the VSS as being "semi-autonomous" meaning that, once installed, it operates mainly on its own, except for the introduction of slurry to the shaker, occasional maintenance, and adjustments to the amount of vacuum applied.

[107] In addition to renting out VSSs, Western was involved in installing, servicing, and removing them. In the course of service calls, Western sometimes adjusted the valves to prevent slurry form stalling on the screen. Western also provided written and verbal instructions to drilling contractors on the use of the VSS, including instructions on adjusting the vacuum pressure to prevent stalling. The pressure had to be adjusted according to conditions at the site, particularly the characteristics of the slurry being processed.

[108] In Mr Palmer's opinion, the degassing chamber referred to in the '173 patent is the same as the holding tank in the VSS system. Neither is a true "degasser" which is a particular device used to recover gases entrained within the drilling fluid. Both serve to separate liquids from gases that are pulled through the screen by the pressure differential device.

[109] Others also explained that neither the VSS nor the subject matter of the '173 patent includes a real degasser. Mr Cooke stated that the VSS simply included a chamber where the fluids were recovered and any trace gases emitted from them were vented to atmosphere. Mr Imler testified that this aspect of the VSS could be described as a mud-gas separator.

[110] Based on this analysis, Mr Palmer concluded that the VSS performs the same functions, has the same benefits, and operates in the same fashion as the invention described in the method claims (claims 1, 2, 4, 9, and 10). He found that the VSS:

(i) Applies a pressure differential under a first screen positioned at the outlet end of the shaker;

(ii) Processes a mixture of drilling fluid and drill cuttings, *ie.* slurry;

(iii) Controls airflow to prevent stalling on the screen;

(iv) Applies a pressure differential generated by an external vacuum;

(v) Pulls air, vapour, and drilling fluid through the screen to an external chamber;

(vi) Removes air and vapour from the drilling fluid in the external chamber.

[111] However, Mr Palmer also made clear that Western does not actually perform the method described in those claims because Western is not involved in introducing slurry to the shaker. That is done by drilling contractors. Often, however, when installing or servicing the Vac-Screen, Western was involved in controlling the air flow to prevent stalling.

[112] Therefore, in Mr Palmer's opinion, Western did not directly infringe the method claims of the patent. The question is whether its activities amounted to inducing others, namely, drilling contractors or operators, to infringe the patent when it provided instructions on how to work the method of the '173 patent, an issue I address below.

[113] After considering the evidence and the experts' opinions, I agree with Mr Palmer. The method claims he cites involve introducing a slurry to a shaker with a first and second screen, flowing the slurry over the first screen where a pressure differential is applied, and not applying that pressure differential to the second screen (claim 1). They include controlling the air flow under the first screen to prevent stalling (claim 2), and applying a second pressure differential to the first screen where that pressure differential is zero (claim 4). The pressure differential is created by an external vacuum (claim 9) which pulls vapours and a drilling fluid component of

the slurry to an external chamber (claim 10). The pressure differential can be controlled to prevent stalling on the screen.

[114] Accordingly, the VSS falls within the method claims of the patent.

[115] Mr Palmer went on to consider the system claims of the patent (claims 19, 20, 21, and 22). The question here is whether Western, through its VSS, directly infringed the claims. In Mr Palmer's opinion, the VSS includes all the elements of the system claims. The VSS contains a screen for separating drilling fluid from cuttings; it has a tray (sump) below the screen to collect liquid and gases; the vibrations of the shaker move the slurry across the screen; the liquids and solids are separated by the screen; an external vacuum pump creates a pressure differential to pull liquids and gases through the screen; the pressure differential is applied to only one screen; the pressure differential is adjustable to prevent stalling; a holding tank operates as a degassing chamber; and the tank collects all the gases and liquid from the tray (sump) and vents the gases.

[116] I also agree with Mr Palmer that the defendants have directly infringed the system claims (claims 19, 20, 21, and 22), which do not require the step of introducing slurry to the shaker. They require a first screen for separating drilling fluid from cuttings, with a pressure differential configured to pull air or vapour through the first screen to enhance the flow of drilling fluid through that screen with respect to a second screen to which no pressure differential is applied (claim 19). They include a sump beneath the first screen to collect air, vapour, and drilling fluid passing through it, with the sump connected to a pressure differential generator and an external chamber where air and vapour would be removed from the drilling fluid (claim 20). The pressure

differential generator could be external to the shaker (claim 21). The air or vapour pulled through the screen could be adjusted to prevent stalling of drill cuttings on the screen (claim 22).

[117] Therefore, I find that the defendants have infringed the patent's system claims. However, they have not directly infringed the method claims.

(3) Have the Defendants Induced Infringement by Others?

(a) *Western's Business Relationships*

[118] In 2010, Western began a business relationship with FPM. FPM contacted Western seeking a vacuum component for its drilling fluid recovery system, the VSS. The two companies worked together renting out the VSS for a little over a year and then cut ties. FPM marketed the VSS and Western supplied the required vacuum units and hoses. FPM provided the trays, screen, wedges, clamps, manifold, and valves. Western serviced the VSS about once a week.

[119] Western resumed a relationship with FPM in 2012 after both firms had been acquired by 32 Degrees Capital. By 2012, FPM had grown, had its own field personnel and vacuums. So Western's role changed, too. It continued supplying additional vacuums to FPM when needed, but also marketed the VSS and provided more field personnel. By 2014, FPM employees came to work for Western. FPM continued to exist, but it did not carry on business.

[120] Western frequently provided reports to its clients on how much drilling fluid was recovered through use of the VSS, as compared to what would have been lost without it.

[121] Mr Stanton did not believe Western distributed written operating instructions on drill sites in the 2010-2011 timeframe, although he thought FPM and Richfield may have. He may have received the written version that FPM had prepared. Some instructions were developed for use of the vacuums Western supplied. Some were glued to the vacuums themselves, but these tended to fall off; others may have been handed to drilling contractors.

[122] When the VSS was installed at a site, Western employees often had to instruct the rig hands on how to operate it – discharging the vacuum, daily maintenance, operating the valves, and so on. They would typically stay on site until the well was drilled to ensure that the VSS was functioning properly and making any necessary adjustments.

[123] I note that during discoveries, Western provided answers to undertakings to the effect that "zero instruction was given to rig crews regarding installation of the Vac-Screen System." In particular, Western maintained that no one instructed rig crews on how to adjust the vacuum on the VSS. Mr Stanton testified that both of those representations were false. Western started providing its own written VSS operating instructions to its field hands in 2014 – they were not distributed outside the company. Since 2014, Western has generally done all its own rig-ins and rig-outs. Mr Stanton noted that when companies try to install the VSS themselves, they often make mistakes and Western has to make a service call to correct them.

[124] Mr Stanton was aware that Richfield had written operating instructions for the VSS, but he doubted they were always left on site.

(b) *Inducement*

[125] Inducement requires proof of the following: (1) direct infringement by a third party; (2) the defendant influenced the third party to the point that the infringing act would not have occurred without that influence; and (3) the defendant knew that its influence would bring about the infringing act (*Corlac Inc v Weatherford Canada Ltd*, 2011 FCA 228 at para 162).

[126] Western maintains that M-I has failed to show any direct infringement by any third parties. No representatives of any drilling companies were called as witnesses by M-I to support its inducement allegations. Further, Western submits that M-I has failed to show any influence by Western over the drilling companies who rented the VSS. While Western may have given some instructions to rig hands on how to operate the VSS, this amounted to no more than obvious directions to adjust the vacuum pressure to prevent stalling. Finally, Western argues that it could not have knowingly induced others to commit an infringing act because, during the relevant timeframe, M-I's patent had not actually issued. In addition, prior to October 2013, when the claims were amended, Western did not instruct anyone to toggle or intermittently interrupt the pressure differential as the pre-amended claims required.

[127] M-I submits that, but for the actions of Western, the '173 patent would not have been infringed by third parties. Western "rented, supplied, installed, initialized, and maintained the VSS" and instructed crews in its operation and maintenance, including how to adjust the pressure differential.

[128] I find that M-I had made out the three-part test for inducement, as follows.

[129] First, the drilling companies who operated the VSS units rented from Western directly infringed the ‘173 patent by working the claimed method. As discussed above, the VSS itself comes within the method claims, the only absent step being the introduction of slurry to the shaker. The drilling companies performed that essential step bringing their conduct directly within the method claims.

[130] Second, without Western’s activities, no direct infringement would have occurred. The evidence shows that Western not only pitched the VSS to its clients, it installed, serviced, and maintained the VSS, and provided oral and written instructions on the operation of the VSS over the years, including directions on how to adjust the vacuum pressure according to conditions at the well site. Without these actions, third parties would not have practiced the method claimed in the ‘173 patent.

[131] Mr Imler testified that written instructions were always given to drilling contractors and members of the crew about how to operate and maintain the VSS. Maintenance included adding oil to the vacuum pump and draining the filters. In addition, the system had to be monitored regularly to ensure that the flow across the screens was continuous and cuttings were not stalling. On installation, FPM personnel would set the valves and stay on site until drilling began to ensure that the system was operating properly. At the early stages, the valves had to be adjusted frequently according to the conditions, often once or twice an hour. After that, rig crews were

responsible for making the necessary adjustments according to the instructions they had received.

[132] Written instructions, according to Mr Cooke, were always left with the drilling crew and copies were left on site. He authored those instructions and showed them to Mr Pomerleau at FPM for his input. The instructions made clear that the correct amount of vacuum to be applied had to be adjusted regularly according to conditions within a narrow range of settings. The starting point was a vacuum equivalent to 3 inches of mercury. In his view, written instructions were always needed because rig crews were transient. Mr Imler, of FPM, confirmed that FPM's instructions originally came from Mr Cooke. FPM simply put its logo on Mr Cooke's instructions. Later, Western used the same instructions.

[133] Finally, Western (and its experts) has misunderstood the third branch of the test for inducement. It does not require the alleged inducer to know that the actions of the third party amount to infringement. That would require a legal analysis of the patent's claims. What is required is knowledge on the inducer's part that the influence it wields will cause the third party to carry out the acts that amount to infringement. In other words, the alleged inducer simply has to know what the third party is likely to do in response to its influence. It will fall to the Court to determine whether those acts are infringing.

[134] Here, the drilling companies worked the claimed method, Western applied influence to the point that there would have been no infringement without it, and Western knew what the

drilling companies would do in response to its influence. The test for inducement of the method claims is therefore made out.

(4) Common Design

[135] Given my conclusions on direct infringement and inducement, it is unnecessary to address M-I's allegation that Western entered into a common design with others to infringe the patent.

D. *Issue Four – Are the claims in issue invalid?*

(1) Inutility

[136] Western argues that all of the claims of the patent are invalid for inutility because Mr Carr had failed to demonstrate the utility of his claimed invention as of the filing date of the patent application. Western points to the difficulties that Mr Carr encountered during his 2006 testing – the sump was too small, liquid was drawn into the vacuum, the holding tank was too small, and the break valve was too difficult to manipulate. In reality, says Western, Mr Carr's system could operate for no more than a few minutes. In Mr Matthews' opinion, the system devised by Mr Carr was "entirely useless and would not be used on any rig".

[137] Western also submits that the utility of Mr Carr's putative invention could not have been soundly predicted based on his limited testing. While Mr Carr may have known how to address the problems he encountered, there is no information in the patent that discloses those problems or assists the skilled person in solving them. In addition, the patent does specify the amount of

the desired pressure differential, the size of sump required, the need for a means of preventing fluid from entering the vacuum, the size of chamber needed, the controls needed to set the pressure differential, or how a pressure differential could be applied only to a portion of a screen. Moreover, Western notes that Mr Carr did not do any testing of a system involving applying a pressure differential at the discharge end of the shaker, or of a configuration along the lines of Figure 6 in the patent.

[138] In addition, Western maintains that some of the embodiments described in the patent are inoperable (*eg*, Figure 5). In particular, the patent does not describe the means needed to prevent liquid from causing the pump to fail or the need for a holding tank or reservoir.

[139] I disagree with Western's submissions on inutility. First, the focus must be on the claims, not on embodiments that are not claimed or simplified flow diagrams in the patent. Second, a claim will not be found to lack utility for failure to mention a component that a skilled person would recognize as necessary, such as a valve to regulate the flow of liquid through a conduit. Third, the fact that Mr Carr did not initially arrive at a prototype that could immediately be commercialized does not mean that his testing did not reveal a useful invention. Fourth, one of the main problems that Mr Carr encountered, fluid entering the vacuum, was specifically mentioned in the patent's discussion of Figure 5 and solved by way of an external chamber that is included in the claims and reflected in Figure 6. Based on Mr Carr's testing, he had a sound basis for a prediction that the external chamber would solve the problem.

[140] As discussed earlier, Mr Carr's results were promising in terms of increasing the fluid capacity of the shaker and the drying of cuttings. In my view, they were sufficient to demonstrate the utility of the invention and the basis for a sound prediction of utility. While Mr Carr did not specifically test the application of a pressure differential at the discharge end of a shaker, his testing protocol simulated that arrangement. As Mr Palmer noted, Mr Carr's testing permitted him to evaluate the effect of applying a pressure differential at different points along the length of the shaker. This enabled him to evaluate the system's ability to minimize fluid retention on the cuttings, one of explicit objectives of the testing.

(2) Insufficiency

[141] Western argues that the '173 patent fails to define the alleged invention and to describe how it works. It relies on Mr Murphy's opinion, according to which a skilled person would have trouble making the invention work because the figures provided in the patent are deficient. In particular, it is not clear from them how to prevent fluid from failing the vacuum, how big the sump and the conduits need to be, or how much pressure should be applied. Further, the patent does not explain that a pressure differential is applied to one screen and not another; there is no description in the patent of how air flow is controlled; the nature of the degassing chamber is not explicitly set out; and the idea of conveying "all" the air, vapour and drilling fluid to an external chamber is not fully described.

[142] In addition, Western submits that some of the language in the patent is ambiguous. It refers to terms such as "vapour," "degassing chamber," and "first screen."

[143] I disagree with Western's submissions on insufficiency and ambiguity.

[144] As Mr Palmer explains in his report and testimony, all of the alleged insufficiencies relate to issues that the skilled person would readily solve based on knowledge of the equipment described in the patent and common general knowledge about how devices such as pumps, trays, vacuums, valves, and degassers work. The patent does not describe any inventive components to the claimed method and system; it relates to the combination of well-known and well-understood devices that can be put to use in optimizing the recovery of drilling fluid. Accordingly, the figures in the patent show how the components can be arranged, and does not describe the specifications for them.

[145] As for ambiguity, I have addressed Western's submissions in my construction of the patent. I did not find the terms to be ambiguous.

[146] Finally, Western argues that the inventor had a duty to describe the best mode of putting the invention into practice, citing s 27(3)(c) of the *Patent Act*, RSC 1985, c. P-4. However, that provision relates solely to machines and, as I understand the patent, it claims a method and a system, not a machine.

(3) Anticipation

[147] A patentee merits a monopoly only when the claimed invention is truly new, useful, and unobvious. Generally, an invention cannot be considered new if it had already been publicly disclosed and the disclosure provided enough information to enable a skilled person to use it.

The parties agree that a patent is invalid for anticipation if a single publication or a public use of the claimed invention discloses that invention in a manner than would enable a skilled person to make and practice it without undue burden. In my view, Western has largely failed to prove anticipation. There is no prior art reference that contains the subject matter of the ‘173 patent. Some contain some elements of the claimed method and system; some could be modified, adapted, or reconfigured to resemble the claimed invention; others would have to be completely reworked to be put to use as a means of treating drilling oil and cuttings.

[148] In my discussion of the prior art below, I agree with Mr Palmer’s opinions on anticipation; his analysis was consistently thorough, balanced, and practical. As will be seen, only one of the prior art references (Derrick) discloses an invention falling within the claims of the ‘173 patent. As Mr Palmer concluded, Derrick anticipates claims 1, 11, 16, and 19 rendering them invalid.

[149] Western’s expert, Mr Murphy, reviewed in detail a number of prior art references and opined that the subject matter of the ‘173 patent was both anticipated by earlier inventions and was rendered obvious by them.

[150] Mr Murphy was provided a book of prior art references, all patents, prepared by counsel for Western. He did not conduct a search of what he considered to be relevant prior art. In his testimony, he described the prior art as “wahoo” – I took this to mean, in Mr Murphy’s Texan vernacular, that some of the references were old, obscure, and on the fringe of the subject matter of the patent. Still, even though some of the prior art was hard to understand, Mr Murphy was

able to determine how the patented equipment was meant to operate and found that a skilled person would have been able to make and practice the inventions. The real question, in his view, was whether any one or more of the references disclosed the invention claimed in the ‘173 patent.

[151] Mr Murphy also described work that he had personally conducted on the Derrick shaker with a vacuum differential device.

[152] In response to Mr Murphy’s opinion, M-I’s expert, Mr Palmer, also carried out a detailed analysis of all the prior art references cited by Mr Murphy. Mr Palmer grouped the prior art into four sets according to their shared characteristics, as follows.

(a) *Group One – Hensley (2005) and Derrick (2005)*

[153] This group is comprised of shakers for separating drilling fluid and cuttings. Mr Murphy referred to Hensley as a partially-enclosed shaker system, which includes two screens and a pressure differential device connected to one of the screens. Wet cuttings that do not pass through the screens are then sent to a dryer, to which another pressure differential device is connected. Mr Murphy conceded that a skilled person would have difficulty working Hensley because the patent is unclear about how the vibrations would function. He also admitted that Hensley is unlike the ‘173 patent because it is meant to be an integrated system, without an external chamber.

[154] Mr Palmer describes Hensley as a vibratory shaker containing multiple screens across which slurry moves as a result of the vibrations. It includes a pressure differential to enhance the flow of fluid through the screens. The unit includes a dryer for removing additional drilling fluid.

[155] In Mr Palmer's opinion, Hensley does not anticipate the '173 patent because it applies a continuous pressure differential over all of the screens, not a variable pressure differential under one screen and not the other or others. Mr Murphy noted that Hensley could include additional screens to which no pressure differential would be applied. Mr Palmer concluded that it is not clear from Hensley whether a pressure differential would be applied to any additional screens, and, in any event, the entire system would have to be enclosed to keep it under vacuum.

[156] Mr Murphy also noted that Hensley contemplates a pressure differential under the shaker screens and positive pressure applied to the dryer belt. But Mr Palmer pointed out that this is not the same as applying a pressure differential to one shaker screen and not the other. The dryer belt is not a shaker screen.

[157] Mr Palmer also observed that Hensley does not involve any means of controlling air flow to prevent stalling. While, as Mr Murphy noted, Hensley does refer to the possibility of synchronizing the pressure differential with the rate of vibration of the shaker, with pressure varying at different locations on the screens, the patent does not provide a means for doing so. In Mr Palmer's view, it would be virtually impossible to achieve a pressure differential that varied 1800 times per minute, a common rate of vibration on a shaker, and, even if that were possible, the pressure differential achieved would likely have little effect.

[158] Finally, Mr Palmer pointed out that Hensley does not incorporate a degassing chamber to remove air or vapour from the drilling fluid.

[159] Similar to Hensley, Derrick describes a vibrating shaker for removing drilling fluid from a slurry by means of suction applied beneath the screen.

[160] Mr Murphy described Derrick as relating to a shaker for extracting drilling fluid from a slurry with a pressure differential being applied below one or more of the screens. He found that Derrick includes a means of pulsing the pressure differential to prevent stalling on the screens, and contemplates applying different degrees of vacuum to different screens.

[161] Mr Murphy worked at the Derrick company at a time when it was testing vacuum-assisted shakers similar to the equipment described in the Derrick reference. The following summary is based on Mr Murphy's current memory of what was tested.

[162] The first test, in 2003, involved a single-screen shaker with a vacuum under the screen bed. The vacuum could be pulsed intermittently. The test discovered that vapour was being pulled into the vacuum which could have resulted in the vacuum failing.

[163] The second test, in 2004, involved a three-screen shaker with a vacuum attached at the discharge end. Again, the vacuum could be pulsed. This time, however, a holding tank was introduced to capture liquid and moisture. The test showed that the best results were achieved by applying the vacuum for four seconds and then releasing it for one second.

[164] The third test, in late 2004, involved a four-screen shaker with a vacuum chamber under the discharge end of the screen bed. This arrangement improved the dryness of the cuttings. In addition, to prevent liquid from entering the vacuum, a cyclone separator was introduced between the shaker and the vacuum.

[165] Apparently, a fourth test was carried out in respect of a three-screen shaker with three vacuums, but Mr Murphy was not present for that one. It is shown, however, in Fig. 1 of the Derrick patent.

[166] Mr Murphy conceded that his evidence about the Derrick testing is based solely on his current memory of it – he has no notes and Derrick refused to provide any documentation relating to it. The testing was, and remains, confidential.

[167] In Mr Palmer's view, the Derrick patent contemplates stalling of the slurry on the screen and then using pneumatic pressure, along with the vibrations of the shaker, to unclog the screen. It does not teach a method of controlling air flow to prevent stalling. Mr Palmer disagreed with Mr Murphy's description of this function as a pulsing or toggling of the pressure differential. Rather, he saw Derrick as addressing how to remedy, not prevent, stalling.

[168] Further, Mr Palmer noted that Derrick does not deal with conveying air, vapour, and fluid to an external chamber for separation, or with a degassing chamber. While Derrick incorporates a cyclone separator, its function is to separate drilling fluid and solids from air or vapour; it does

not remove air or vapour from the fluid. The fluid goes in one direction while air and vapour goes in another.

[169] M-I concedes that Derrick discloses some aspects of the claims of the ‘173 patent, namely, a shaker with first and second screens and a sump, with a pressure differential applied to the first screen and not the second. However, Derrick does not teach how to control air flow to prevent stalling. Accordingly, Mr Palmer accepted that some claims of the ‘173 patent – claims 1, 11, 16, and 19 – are anticipated by Derrick; the remainder are valid.

[170] With regard to the testing of Derrick shakers described by Mr Murphy, the evidence is insufficient to determine whether there was any anticipation. There is no documentation to corroborate Mr Murphy’s memory. In any case, neither the testing nor the results were made public.

[171] Accordingly, Mr Palmer did not regard Hensley and Derrick as disclosing or enabling the subject matter of the ‘173 patent, except in respect of claims 1, 11, 16, and 19.

(b) *Group Two – Vasshus (2006), Manuel (1988), and Schellstede (1987)*

[172] This group comprises devices for separating drilling fluid from cuttings by way of rotating filter belts; they are not vibratory shakers.

[173] Vasshus discloses a means of introducing slurry to a moving belt and allowing the liquid to flow through the belt with the remaining slurry stalled on the belt until it falls off. Mr Murphy

noted that the rotating belt could be replaced by fixed, vibrating screens. Mr Murphy describes Vasshus as a shaker and degasser for use in separating drilling fluid from cuttings that includes a pressure differential device that can apply a vacuum to one screen and not to another. The pressure differential can be intermittently interrupted by the use of valves.

[174] Mr Murphy accepted that Vasshus distinguished his machine from a shale shaker. In addition, Vasshus designed a fluid-tight system that collects some vapours and releases others into the atmosphere. Mr Murphy believed that, with substantial modification by a very capable and inventive engineer, Vasshus could be converted into a shaker.

[175] Mr Palmer conceded that Vasshus contemplated the possibility of using vibrating screens, but he noted that Vasshus did not teach a skilled person how to achieve that arrangement. It would require, in Mr Palmer's view, considerable inventive ingenuity. Further, Vasshus took pains to distinguish his invention from conventional vibratory shakers.

[176] Mr Palmer also pointed out that Vasshus does not comprise any, let alone multiple, screens. Mr Murphy noted that Vasshus includes a preliminary sieving element to which no pressure differential is applied. However, Mr Palmer describes that element primarily as a distribution plate that serves to spread drilling fluid over the filter belt, not as a screen that separates fluid from cuttings.

[177] Mr Palmer also noted that Vasshus does not involve applying a particular pressure differential to one screen and not to another. Rather, it is based on the use of a single pressure

differential within the fluid-tight unit. While the diagrams in Vasshus might suggest otherwise, those diagrams, according to Mr Palmer, are mislabelled.

[178] In addition, Mr Palmer disagrees with Mr Murphy about the possibility of varying the pressure differential within the Vasshus unit. Mr Murphy cites the reference to an interruption of the pressure differential as including toggling the air flow. However, Mr Palmer points out that the purpose of the valve in question is to shut off the connection between the sieving unit and the separation unit in case of failure. It is not meant to permit ongoing control of air flow. Nor does it use air flow as a means of preventing the stalling of slurry. Instead, Vasshus relies on stalling to ensure that slurry sticks to the sieve until it drops off.

[179] Like Vasshus, Manuel does not relate to a vibratory screen shaker; it uses a rotating belt instead. However, unlike Vasshus, Manuel does vibrate. But its vibrations are comparatively mild – they do not assist in moving slurry across the belt but merely aid in the removal of liquid.

[180] Mr Murphy described Manuel as a combination of a vibrating moving-belt shaker and a separate degasser, and which also includes two vacuum sections that interact with the belt.

[181] Again, there are no first, second, or other screens in Manuel; there is a single, rotating belt. A vacuum is applied under the belt to keep the slurry in place, which is, stalled on the belt. The pressure differential is continuous, not adjustable.

[182] Manuel does not include an external degassing chamber. It contemplates an internal chamber incompatible with a shaker.

[183] These features led Mr Palmer to find that Manuel does not disclose the subject matter of the ‘173 patent.

[184] Schellstede is another moving-belt filter system, not a vibratory shaker. It does not include multiple screens. While it employs suction to a portion of the belt, it does not contemplate easy changes in the pressure differential, and does not address the issue of stalling, except to the extent that it suggests that the belt should be washed to remove stuck solids. Essentially, the movement of drill cuttings depends on their being stalled on the belt.

[185] Mr Murphy described Schellstede as an apparatus applying vacuum pressure to sections of a screen belt. The liquid passing through the screen is then degassed, and the solids, air, and vapour can be separated from the liquid.

[186] Mr Palmer points out that Schellstede does not involve an external degassing chamber. The degasser is inside the unit, which would not be possible in a vibrating shaker. Schellstede discloses use of sieving system that uses a vacuum; however, the purpose of that system is not to separate drilling fluid from cuttings, but to recover water or diesel fluid.

[187] Mr Palmer concluded that Schellstede does not disclose or enable the claims of the ‘173 patent.

(c) *Group Three – Logue (1949), Ennis (1975), Bongert (1976), Cook (1989), and Fast (1990)*

[188] These references relate to technologies not employed in separating drilling fluids from cuttings. Rather, they relate primarily to devices for removing liquids from solids, such as coal, iron ore, or peat, in order to recapture the solids. By contrast, the thrust of the '173 patent and similar technologies is to recover the liquid, not the solid.

[189] The systems in this group operate by forming a cake of solid material after extracting the liquid from a combination of liquid and solids. Their potential application to the recovery of drilling fluid from slurry seems remote.

[190] Mr Murphy described Logue as a shaker containing multiple screen sections with a pressure differential device that could be operated intermittently to prevent stalling. It also includes a chamber for separating liquids from gases. The Logue patent does not mention its application to drilling fluid, but Mr Murphy believed that a skilled person would understand that the invention could be adapted to that use. Even though the invention was "very crude," Mr Murphy found that Logue anticipates the method and system claims of the '173 patent.

[191] In Mr Palmer's opinion, Logue relates to a means of applying suction to a screen to cause the solid material above the screen to stick and form a cake. The goal is to cause the solids to adhere to the screen by stalling it. Logue employs mild vibrations to move the cake forward and backward across the screen, which is a different role than is performed by the high G-force

vibrations in a shaker. The latter is used primarily to aid separation and moves the slurry in a steadily forward motion.

[192] Moreover, according to Mr Palmer, Logue uses a single screen that would not be suitable for a shaker and aims at stalling solids on the screen by way of a continuous vacuum. Logue contemplates changing the vacuum strength according to the characteristics of the material being treated or to prevent clogging, but it does not disclose ongoing adjustments to the air flow during operations. In Mr Palmer's opinion, Logue does not anticipate the '173 patent because it does not disclose a shaker for separating drilling fluid from cuttings; it would not be effective for separating drilling fluid from cuttings; it does not have first and second screens; it does not control air flow to prevent stalling (just the opposite); and it does not include an external degassing chamber to which air, vapour and liquid are pulled.

[193] Mr Murphy describes Ennis as a device for separating liquids from solids using a vibrating screen deck and a pressure differential device whose force can be adjusted. He concluded that Ennis anticipates claims 1, 2, 9, 15, 19, and 22.

[194] Mr Murphy notes that Bongert mentions that the use of a vacuum to pull liquid through a screen was already known. Bongert itself relates to a vibratory device that moves material across a filter belt and allows liquid to pass through it. Vacuum can be applied to portions of the screen to remove liquid, the force of which can be adjusted. The remaining solids can be treated with an additional vacuum to separate any remaining air and liquid. Mr Murphy stated that, with

modifications, Bongert could be used to process drilling fluid. He concluded that Bongert anticipates claims 1, 2, 3, 10, 9, 10, 11, 13, 14, 15, 16, 19, 21, 22, and 23.

[195] Mr Palmer characterized Logue, Ennis, and Bongert as dewatering technologies whose objective and operation is significantly different from that of shakers directed to the separation of drilling fluids and cuttings.

[196] In Mr Palmer's view, like Logue, neither Ennis nor Bongert anticipates the '173 patent because they do not disclose a shaker for separating drilling fluid from cuttings; they would not be effective for separating drilling fluid from cuttings; they do not vary the pressure differential under the screen; they do not control air flow to prevent stalling (just the opposite); and they do not include an external degassing chamber to which air, vapour and liquid are pulled.

[197] Mr Murphy describes Cook as a vacuum-assisted vibrating shaker for separating liquids and solids. To prevent stalling, Cook uses a perforated sheet that makes contact with the filter and is flexed against it by way of an intermittent pressure differential. A vacuum can also be applied to the filter to increase the flow of liquid through it. The liquid, air, and vapour are separated in a holding tank.

[198] Mr Palmer described Cook as a "solvent washing system" which, like the other technologies in this category, focusses on recovering solids, not liquids. In his view, Cook does not anticipate the '173 patent for the same reasons that Logue does not.

[199] Fast, according to Mr Murphy, discloses a moving-belt system for separating liquids from solids. The liquids and solids that do not pass through the screen immediately move on to a section where a vacuum is applied, and the air, vapour, and liquid collected is then sent to a separation chamber.

[200] Mr Palmer noted that Fast is directed at separating liquids other than drilling fluids from solids. In his view, Fast is not anticipatory because it does not disclose a shaker for separating drilling fluid from cuttings; it would not be effective for separating drilling fluid from cuttings; it does not control air flow to prevent stalling (just the opposite); it does not vary the pressure differential; and its collecting tank serves to settle out solids from liquids, which would not be possible with drilling fluid.

(d) *Group Four – Rischer (2004)*

[201] According to Mr Murphy, Risher provides a device for removing fluids from drill cuttings that is meant to be placed next to a shaker. Risher employs a cylindrical screen onto which a slurry would fall and a pressure differential device would assist in separating the liquid from the solids. The vacuum is connected to a separator for collecting vapour and separating the liquid from the air. In its commercial form, Risher is called a "Rotovac." The '173 refers to this device in its description of prior art (para 11).

[202] In Mr Palmer's view, Risher is a dryer that does not anticipate the '173 patent because it does not disclose a shaker; it does not vibrate; it does not have first and second screens; it does not control air flow to prevent stalling; and it does not separate air or vapour from drilling fluid.

(4) Obviousness

[203] A patentee merits a monopoly only when the claimed invention is truly new, useful, and unobvious. The approach to the question of obviousness is well-known (*Apotex v Sanofi-Synthelabo Canada* [2008] 3 SCR 265).

[204] Western argues that the subject matter of the ‘173 patent is obvious in light of the state of the art at the time. For the reasons below, I disagree.

(a) *The Skilled Person*

[205] I have already set out above the parties’ positions on the qualities of the person skilled in the relevant art. I defined that person as someone with five years’ experience in the application, operation, and design of shale shakers.

(b) *Common General Knowledge*

[206] Mr Murphy understood that the common general knowledge of the person skilled in the art included familiarity with the equipment commonly used in the industry – mud gas separators, degassers, secondary dryers, cyclones, rig vacuums, and, of course, shakers. With respect to shakers, the skilled person would know about the use of one or more screens or, alternatively, filter belts. He or she would understand that the application of a pressure differential under a screen could increase the flow of liquid through the screen, and that the amount of pressure applied would be adjustable.

[207] The skilled person would also be aware of the products on the market, including patented machinery. He or she would know how to research patent literature. The skilled person would be familiar with the regulations and safety implications involved in treating free and entrained gases.

[208] Mr Palmer took some issue with Mr Murphy's description of the common general knowledge. He agreed that the skilled person would be aware that applying a pressure differential to a screen would result in an increase in the flow of liquid through the screen, but not that this would be true no matter what screens were used or what the consistency of the slurry was. Further, the skilled person would not be aware that the pressure differential could cause stalling of solids on the screen, or that the air flow should be controlled in order to prevent stalling.

[209] Mr Palmer also clarified that a skilled person would realize that not all methods of separating liquids from solids were interchangeable. For example, the skilled person would realize that multiple screens were to be preferred over single screens, and over filter belts.

[210] Regarding the adjustment of the pressure differential, Mr Palmer stated that the common general knowledge of the skilled person would not include an understanding that it would be necessary to adjust the differential to prevent stalling. Nothing in the prior art, including Derrick and Hensley, addresses this issue.

[211] I find that Mr Palmer's description of the common general knowledge is more complete and accurate.

(c) *The Inventive Concepts*

[212] The question is whether the inventive concepts of the '173 patent represent an advance over the common general knowledge possessed by the skilled person and reflected in the relevant prior art.

[213] Mr Murphy opined that there are no differences between the state of the art and the inventive concepts of the '173 patent. Indeed, he believed there to be nothing truly inventive in the patent.

[214] Still, Mr Murphy grouped the claims of the patent into three categories corresponding with the potential inventive concepts he identified – first, those dealing with a pressure differential applied to one screen and not to another (claims 1, 2, 4, 8, 9, 11, 15, 18, 19, 21, and 23); second, those dealing with controlling air flow (claims 2, 5, 6, 7, 13, 14, and 22); and third, those addressing the combination of a pressure differential and a degassing chamber (claim 10, 12, 16, 17, and 20).

[215] For the first category, Mr Murphy articulated the inventive concept as being the application of a pressure differential to one screen and not to another, or to one portion of the screen deck and not to another. Echoing his opinion on construction of the term "first screen," and his understanding that the main purpose of the patent was to enhance the flow of liquid

through the screen deck, he believed the skilled person would understand that the pressure differential would be applied at the input end of the shaker. Further, that person would understand that a filter belt could be used instead of a screen.

[216] In Mr Murphy's opinion, this inventive concept was already set out in numerous of the prior art references, including Hensley, Derrick, Logue, Bongert, Ennis, Vasshus, Manuel, Schellstede, Fast, Cook, and Risher.

[217] In respect of the second category of claim, Mr Murphy explained that the inventive concept included the notion of applying a pressure differential to one screen and not to another, but added the idea of controlling the air flow by adjusting the pressure differential. In his view, the purpose of controlling air flow was to prevent stalling of the slurry on the screen. A skilled person would know that pressure differential devices always have control valves that can be used to adjust the amount of pressure applied. The inventive concept of this group of claims, according to Mr Murphy, was already disclosed in numerous prior art references, including Hensley, Derrick, Logue, Bongert, Ennis, Vasshus, Cook, Risher, and Manuel. Therefore, in his view, there was no real difference between the state of the art and this group of claims in the patent. Were there any difference, Mr Murphy concluded that the skilled person would be capable of overcoming them and arriving at the claimed invention.

[218] With respect to the third group of claims, Mr Murphy regarded them as relating to a combination of a pressure differential device with some other device capable of separating gases and air from liquid. In his view, this arrangement was already disclosed in the prior art, including

Derrick, Longue, Ennis, Vasshus, Cook, Manuel, Schellstede, and Fast. Further, the skilled person would be aware of the components of vacuums used on a rig, including the holding tanks used for separating gases, even entrained gases, from liquids. Accordingly, there was nothing in the patent's claims, according to Mr Murphy, that represented an advance over the state of the art, or, at least, nothing that the skilled person could not easily overcome.

[219] Mr Murphy went on to set out how each of the prior art references corresponded with the claims of the '172 patent.

[220] As mentioned, Mr Palmer accepted that claims 1, 11, 16, and 19, which were included in Mr Murphy's first group, were invalid.

[221] With respect to claims in the second group, Mr Palmer conceived their inventive concept as being the control of air flow to prevent stalling. He regarded Mr Murphy's opinion as being open to all means and purposes of controlling air flow, not just those aimed at preventing the stalling of slurry on the screen. In Mr Palmer's view, a skilled person would understand that the control of air flow was meant to prevent the slurry from stalling. The prior art, according to Mr Palmer, generally relies on a constant pressure differential that is not adjustable. Nor do those references discuss controlling air flow to prevent stalling. Indeed, in some of the references, stalling is desired in order to allow the solids to form cakes after liquids have been removed from them. That is particularly true in the prior art references that rely on filter belts.

[222] Mr Palmer opined that none of the prior art discloses a vibratory shaker for separating drilling fluid from cuttings that include a means of preventing stalling of slurry on the screens. He agreed that Derrick is a vibrator shaker that applies different or no pressure differentials across screens, and that the pressures can be toggled, but that that strategy is not aimed at preventing stalling of the slurry. Mr Palmer concluded that none of the prior art discloses controlling air flow to prevent stalling; nor would that technique be obvious to the skilled person.

[223] In respect of the third group of claims, the experts all agree that a degassing chamber is a device that separates air or vapour from drilling fluid. The ‘173 patent (claims 12 and 20) contemplates the collection of air or vapour and fluid in an external chamber where the air or vapour is separated from the fluid. Mr Palmer did not regard the prior art references cited by Mr Murphy (Derrick, Logue, Ennis, Vasshus, Cook, Risher, Manuel, Schellstede, and Fast) as encompassing vibratory shakers for separating liquid from solids in a slurry.

[224] Further, Logue and Risher do not address separating air or vapour from fluid. Manuel and Schellstede use an internal, not an external, degasser, which would not be suitable for a shaker. Ennis and Cook use a similar process, not suitable for use with drilling fluid. Vasshus and Fast use a device that is not a shaker. The Derrick shaker does not convey all the air, vapour, and fluid to an external chamber for separation.

[225] Overall, Mr Palmer concluded that Mr Murphy’s opinion was not supported by the relevant prior art. That art does not disclose shaker systems that would be useful for separating liquids from solids in a slurry. Rather, that art discloses dewatering or solvent washing systems

that do not use vibration, do not move the slurry across screens, do not have separate screens, and do not convey all the air or vapour and fluid to an external degassing chamber where they are separated.

[226] Accordingly, in Mr Palmer's opinion, with which I agree, claims 2 to 10, 12, 13 to 15, 17, 18, and 20 to 23 are all valid.

(5) Claims Broader

[227] Western argues that the patent's claims are both broader than the invention disclosed in the patent and broader than the invention that was actually made.

(a) *Claims Broader than Disclosure*

[228] Western accepts that this issue turns largely on questions of construction, which I have addressed above. In that vein, it submits that the patent's original specification does not treat "first screen" as anything other than the screen at the input side of the shaker; that "controlling air flow" means toggling or intermittently interrupting the pressure differential; that "vapour" means hazardous; that the patent does not include a means of separating mist from drilling fluid; there are no embodiments showing how "all" the air, vapour, and drilling fluids pulled through a first screen are treated. In Western's view, these shortcomings of the patent indicate that the claims are not supported by the disclosure.

[229] I have rejected each of these assertions in my construction of the patent. It follows that I disagree with Western's allegation that the claims are broader than the disclosure.

(b) *Claims Broader than Invention*

[230] Western argues that the patent's claims surpass what Mr Carr had actually invented. Western points to three areas of concern. First, Mr Carr's intention was to apply a pulsed pressure differential to a shaker, not to apply an adjustable pressure differential. Second, Mr Carr did not contemplate placing a pressure differential only under the screen at the discharge end of the shaker. Third, Mr Carr never considered a means of separating air and vapour from drilling fluid. Mr Matthews identified these three issues after having read materials provided to him by counsel. He did not read the full transcript of Mr Carr's discovery evidence; nor did he have an opportunity to listen to Mr Carr's testimony at trial.

[231] During discovery, Mr Carr stated that he considered pulsing, an intermittent pressure differential, and a continuous pressure differential. His testing included a continuous air flow, as well as pulsing, and varying the pressure differential by adjusting the regulator valve.

[232] Mr Carr also testified that he did consider applying a pressure differential to a screen at the discharge end of the shaker. His testing, described above, specifically simulated that scenario.

[233] Finally, Mr Carr described the problems that he had with drawing too much fluid into the vacuum line, which caused the pump to fail. He foresaw two possible solutions – increasing the

size of the sump or using an external containment tank. The former solution was thought to be unfeasible, so the latter was chosen.

[234] Therefore, I see no factual basis for Western's allegation that the patent's claims are broader than Mr Carr's invention.

(6) Lack of Reasonable Inferability

[235] Western submits that the '173 patent was amended after the original patent application was filed and that new subject matter was added; that subject matter, says Western, could not reasonably be inferred from the original specification and drawings filed, thereby contravening s 38.2(2) of the *Patent Act*, RSC 1985, c. P-4 and Rule 181 of the *Patent Rules*, SOR/96-423. Western argues that the question to be answered is whether a skilled person reviewing the patent application as originally filed would have reasonably inferred the new subject matter.

[236] At trial, I ruled that the factual circumstances surrounding the amendments were not relevant to this issue. It is a matter of logic, not fact, whether the amendments are reasonably inferable.

[237] Western relies on the evidence of Mr Matthews who noted that the patent's specification and claims originally provided only for toggling, pulsing, or intermittently interrupting the pressure differential, not the more general concept of "controlling air flow." Further, Western contends that the '173 patent, once amended, proposed a broader meaning to "first screen" that was not present in the original application. Together, maintains Western, the amendments

introduced concepts that could not reasonably have been inferred from the patent application as filed.

[238] M-I concedes that there is little Canadian law on the point.

[239] As mentioned earlier, Mr Matthews concluded that Western could not have infringed or induced infringement of the claims originally filed on October 1, 2007 because those claims all required toggling of the pressure differential which the VSS does not do. The claims were amended on October 2, 2013 to add new claims 25 to 44, leaving the original 24 claims intact. The specification was also amended by removing one paragraph and slightly amending another.

[240] The new claims included method claims not contained in the original claim set. The new claim 25 included a reference to the application of a pressure differential to a first portion of the "first screen." New claim 33 added the concept of "controlling air flow" to prevent stalling of the slurry on the screen.

[241] The October 2, 2013 claims were amended again on January 28, 2014. By this amendment, the original 24 claims were removed and replaced with claims 25 to 44 from the October 2, 2013 claim set. The claims were renumbered as claims 1 to 20. These claims remained in place until amended on August 27, 2014.

[242] The August 27, 2014 amendments altered claims 1, 8, 10, and 17. Amended claim 1 required that the shaker have a first and a second screen – the pressure differential would be

applied to the first screen and not to the second screen. Amended claim 8 introduced an external vacuum. Amended claim 10 included the application of a second, different pressure differential to the second screen. Amended claim 17 required that the system have a first screen to which a pressure differential was applied in order to enhance the flow of drilling fluid through that screen with respect to a second screen. It also added an external chamber for collecting air, vapour, and drilling fluid. In addition, paragraphs 16A and 16B were added to the specification. These paragraphs describe the method in claim 1 and the system in claim 17.

[243] Two relatively minor amendments to correct errors were made on November 4, 2014. Claim 13 was amended to change “a second screen” to “the second screen.” Claim 15 was made dependent on claim 14, rather than claim 10. And a new paragraph was added to the specification (para 16C) to correspond with claim 10.

[244] The patent was amended again on December 19, 2014. Numerous claims were renumbered, claims 10 and 19 were amended slightly, and three new claims were added – claims 2, 12, and 20. Further minor amendments were made on February 20, 2015. The patent issued in this form on June 16, 2015.

[245] Mr Matthews found that, for a number of reasons, the claims of the issued patent and paragraphs 16A to 16C are not reasonably inferable from the original patent application. First, he points out that the original application (and the priority applications) referred to toggling a pressure differential and toggling was an element of all of the claims. It is not part of any of the independent claims in the issued patent.

[246] Second, Mr Matthews described the added paragraphs 16A to 16C as inconsistent with the original depictions in the patent. The new paragraphs relate to the application of a pressure differential to the first screen and not applying a pressure differential, or applying a different pressure differential, to the second screen. These paragraphs do not mention pulsing the pressure differential, even though one of the problems to which the patent was aimed was the prevention of stalling.

[247] Third, according to Mr Matthews, the original patent application used the term "first screen" the way a skilled person would – it referred to the screen closest to the input side of the shaker. However, paragraphs 16A to 16C refer to "a first screen" and "a second screen" inviting the possible interpretation (the one on which M-I relies in construing the patent) that a first screen might be elsewhere than at the input end. This interpretation, says Mr Matthews, is at odds with the remainder of the patent and with the patent's stated purpose of increasing the fluid capacity of the shaker. Increased fluid capacity can only be achieved by placing a pressure differential device under the screen closest to the input.

[248] Fourth, the amended claims and paragraphs 16A to 16C appear to Mr Matthews to contemplate degassing only the drilling fluid coming through the screen to which the pressure differential is applied. In his view, that would make no sense and Mr Carr surely did not envision that scenario when he filed his patent application.

[249] Fifth, Mr Matthews notes that Figure 5 of the patent shows only a single screen; a shaker of that design could not have separate zones of pressure differential. Mr Carr was not able to build a version of Figure 5.

[250] I am not persuaded by Mr Matthews' analysis. I will address each of his points.

[251] First, while toggling was indeed an essential element of the original claims (and for that reason, Western did not infringe them), the original specification contemplated something broader. Paragraph 34 mentioned pulsing and toggling, but it went on to refer to the fact that "[m]anipulating the valve by opening and/or closing the valve, at least partially, may disrupt the flow of vapour from the sump, thereby affecting the pressure differential." The concept of controlling air flow, not just pulsing and toggling, is reasonably inferable from this passage.

[252] Second, while pulsing is not specifically mentioned in paragraphs 16A to 16C, other parts of the specification make clear that the pressure differential would have to be varied in order to prevent stalling. For example, paragraph 33 mentions changing the pressure differential so that solids can be conveyed across the screen unhindered "thereby avoiding solids accumulating or sticking on the screen, and thus not preventing fluid flow through the screen".

[253] Third, Mr Matthews repeats his construction of "first screen" and the purpose of the patent. I have already addressed that construction. Mr Matthews did not realize that his construction was inconsistent with paragraph 37 of the patent as filed.

[254] Fourth, as discussed earlier, the degassing chamber referenced in the patent is simply a device for separating air and vapour from drilling fluid. It is not a conventional degasser. If it were, Mr Matthews' observation about degassing only a portion of the recovered fluid might well have been valid.

[255] Fifth, Figure 5 is not a depiction of a working shaker; it is a simplified flow diagram to show the arrangement of the various components of the system.

[256] Accordingly, the concepts of "first screen" and "controlling air flow" that appear in the amendments as of October 2, 2013, were either already present in, or can be reasonably inferred from, the original patent application.

E. *Issue Five – What damages are owed by the defendants to M-I?*

[257] The parties agree that damages should be calculated on a reasonable royalty basis – the royalty amount that the parties would likely have agreed on if they had negotiated a licensing arrangement at the relevant time, *ie* at the time of first infringement.

[258] M-I is also seeking reasonable compensation for infringement, also on a reasonable royalty basis, during the pre-issuance phase of the patent beginning on October 2, 2013 when the patent was amended to include the claims that ultimately became part of the issued patent.

[259] Western argues that M-I is not entitled to a reasonable royalty because it had available non-infringing alternatives to the patented technology that it could have used instead of paying a

royalty to M-I. Western also submits that no compensation should be payable for the period between October 2, 2013 and August 27, 2014 because the patent's claims during that timeframe referred to the application of a pressure differential to the "first portion" of the "first screen" – it did not refer to the application of a pressure differential to a first screen and not to a second screen. Western points out that FPM ceased VSS rentals in 2013, so no damages should be awarded against it. Western also says there were also differences between the claims as amended on August 27, 2014 and the claims that issued on June 16, 2015. Finally, Western submits that if M-I is entitled to a reasonable royalty it should not exceed 7.4%.

[260] I disagree with Western. It did not have available a true non-infringing alternative to the VSS. A non-infringing alternative is one that is a true substitute for the apparatus in question, is economically viable, is available in sufficient quantities, and would actually have been sold by the infringer (*Apotex Inc v Merck & Co*, 2015 FCA 171 at paras 73-74).

[261] Western claims it had two non-infringing alternatives to the VSS – a compressor that creates a pressure differential across a screen and discharges drilling fluid into a mud tank, and a mini-shaker situated at the end of a shaker to dry wet cuttings.

[262] With respect to the compressor, Mr Stanton testified that it had been tried, but there was no actual product available on the market that would be suitable for this purpose, and none had been put into use either by Western, FPM, or FPM USA. As for the mini-shakers, these would essentially operate like drying shakers that remove some drilling fluid but the fluid requires further processing to remove fine particles. This equipment, according to Mr Stanton, is

substantially more expensive than the VSS; Western does not manufacture or offer its customers mini-shakers.

[263] The evidence does not show that Western had a non-infringing alternative to the VSS. Mr Palmer's opinion confirmed this, as did Mr Tate.

[264] I also disagree with Western that the VSS did not infringe the claims as they appeared on October 2, 2013. I have already concluded that subsequent amendments to the patent did not introduce new subject matter. Accordingly, the operative date for calculating reasonable compensation is October 2, 2013. Mr Palmer confirmed that the VSS infringed the patent's claims as of October 2, 2013.

[265] I also disagree with Western on the amount of a reasonable royalty. I find that a reasonable royalty would be [redacted].

[266] A number of factors are relevant to the calculation of a reasonable royalty (*Jay-Lor International Inc. v Penta Farm Systems Ltd*, 2007 FC 358 at paras 159-173). The parties and their respective experts agree that the most important indicator of a reasonable royalty is a comparable licensing arrangement. The evidence was focussed primarily on licenses that could be considered comparable.

[267] Western's expert, Ms Melanie Russell, conducted a review of a number of licensing arrangements involving different parties and products, which led her to conclude that a reasonable royalty was somewhere between 4.8% and 10%, the mid-point being 7.4%.

[268] M-I's expert, Mr Michael Tate, found that the most comparable license was between M-I and FourK Energy Services for the very invention in issue here at the relevant time, with a royalty rate of [redacted]. The agreement was entered into on September 1, 2014.

[269] I disagree with Ms Russell's conclusion because none of the licensing arrangements she relied on was truly comparable to the hypothetical M-I/Western contract. Each of them included additional terms, conditions, or variables that would not be present in the hypothetical contract and which skewed the royalty rates in a downward direction. For example, Ms Russell referred to licensing agreement that included a royalty rate of 1.3%. However, that contract was not an arm's length transaction, included compensation based on a percentage of gross revenues, and offered the licensor a product purchase arrangement at a low markup. The royalty rate did not sufficiently reflect the actual terms of the license; it was not comparable to the simple royalty arrangement that Western and M-I would have negotiated. It is unnecessary to review all of the proxy licenses that Ms Russell considered but they all had features that made them questionable comparators.

[270] Ms Russell also assumed that Western would have paid no more than [redacted] and that it could not afford [redacted]. These assumptions were not supported by evidence, and contradicted the reality of the M-I/FourK agreement.

[271] Western, while recognizing that Mr Tate was the more experienced expert on license rates and royalties, disputed his conclusion on numerous grounds. In my view, Western's submissions do not detract from the soundness of Mr Tate's analysis.

[272] I agree with Mr Tate's conclusion that a reasonable royalty rate would be [redacted] based on the actual contract between M-I and FourK Energy Services for use of the patented method and system at the relevant time. Mr Tate also considered the importance of the technology to M-I, the benefits of the technology to customers, the absence of non-infringing alternatives, the imminence of M-I's entry into the Canadian market with a competing product, the size of Western's market share (24%), and the profits Western had generated from the technology over the years. Since M-I had an exclusive licencing agreement with FourK (excepting M-I's entry into the market), a new license with Western would have required M-I to renegotiate its agreement with FourK, the result of which would likely be a reduction of the royalty and a diminution of M-I's revenue from that source. It would be unwilling to risk further loss of revenue by accepting a low royalty rate from Western.

[273] These factors led Mr Tate to conclude that M-I would have expected, and Western would have paid, a royalty of [redacted]. Western may have had to increase the prices it was charging its customers in order to cover this royalty, but there was no evidence that it could not do so. In fact, the evidence shows that Western generated substantial revenues from the rental of the VSS and users realized considerable savings; customers would be motivated to pay more to rent the VSS.

[274] The opening position of M-I in its negotiation with FourK was that the royalty should be [redacted]. That figure was based on an agreement in the US between M-I's subsidiary, M-I Swaco, with FP USA to rent out a similar product called the system "FP Maximizer" under a 60/40 shared revenue arrangement beginning in 2011 or 2012. Under the agreement, whichever company supplied the vacuum, the hoses, and the trays got 60% of revenues and the other company got 40%. This product was never offered in Canada.

[275] Countering M-I's suggestion of a [redacted] royalty, FourK offered [redacted]. Ultimately, the parties agreed on [redacted].

[276] The FourK license is the best indicator of the royalty M-I would have accepted and Western would have paid. It was a contract relating to the patent in issue in respect of similar products at the relevant point in time.

[277] Admittedly, there are some factors that would have put downward pressure on the royalty rate. The license would permit use of the method and system of the patent, but it would not include a transfer of technology. The license would be non-exclusive (given FourK's presence in the market) and limited to Canada.

[278] However, there would also be factors pressing in an upward direction. The patented method and system had significant advantages over other options and there were no non-infringing alternatives available. Since M-I was potentially entering the market with its own product, it would have sought a sizable royalty from Western as a competitor. It would have also

sought to replace the revenues it would have lost in a renegotiation of the arrangement with FourK. There was significant demand for the VSS and Western generated substantial profits from it. It would have been motivated to continue and was well-positioned in the market to do so. The reasonable royalty rate would be based on the assumption that the patent was both valid and infringed. There would have no such assumption in respect of the FourK/M-I contract.

[279] Overall, I am satisfied that the [redacted] royalty suggested by Mr Tate is appropriate. The parties agree on the royalty base on which to calculate compensation and damages, and I need not rule on that issue.

III. Motion under Rule 227

[280] At trial, M-I became concerned that Western was relying on documents that had not been produced to M-I, suggesting that Western's affidavits of documents may have been inaccurate and incomplete. M-I brought a motion under Rule 227 to sanction Western's conduct. M-I characterized Western's actions as an abuse of process and sought costs in the amount of $45,500.00 to compensate it for having to call additional evidence, and an order to strike Western's defence to inducement.

[281] Having reviewed the evidence and circumstances, I am satisfied that M-I should succeed on the motion, and that costs in the amount of $10,000.00 should be payable forthwith by Western to M-I.

A. *Background*

[282] In 2018, counsel for M-I met with Mr Cooke (of Richfield) and Mr Imler (formerly of Western). Mr Cooke provided M-I written instructions for the VSS that had been circulated to third parties. M-I produced the document to Western.

[283] On October 5, 2018, a few weeks before trial, Western produced additional documents, including the contractual terms between FPM and its customers. At trial, during cross-examination, counsel for Western presented Mr Cooke with a document that had not previously been produced, and indicated that there were other such unproduced documents that he proposed to use in cross-examination. I ordered Western immediately to produce the documents on which it intended to rely. Western provided seven previously-unproduced documents. I also ordered Western to conduct a full search for any additional relevant documents and to produce a further affidavit of documents.

B. *The Issue*

[284] M-I requests an order striking Western's inducement defence and for the payment of substantial costs by Western forthwith.

[285] Western submits that there is no basis on which its defence to inducement should be struck, and that there is no factual basis for M-I's request for $45,500.00 in costs.

[286] M-I submits that Western's affidavits were inaccurate or deficient in the following respects:

- Mr Doug Bruce, Western's affiant, swore that a diligent search of Western's and FPM's records had been conducted and appropriate inquiries had been made of others;
- Mr Bruce swore that his affidavit contained all relevant documents in the possession, power, or control of Western and FPM; and
- Mr Bruce swore that he had listed and described all the relevant documents that were in the possession, power, or control of Western and FPM.

[287] Western contends that Mr Bruce and others at Western were not aware of the relevance and significance of the documents that they failed to produce until October 2018. Yet, at trial, counsel conceded that the documents were, indeed, relevant.

[288] Nevertheless, the previously-unproduced documents related to a live issue in the case (inducement) and included information that contradicted Western's evidence on discovery and answers to undertakings. In particular, the new documents showed that Western had provided written instructions to its customers for the VSS.

[289] Mr Bruce was requested to appear for further cross-examination on his affidavit. I have read the transcript of that cross-examination and am satisfied that counsel for Western

improperly attempted to frustrate the purpose of having Mr Bruce provide further evidence that would potentially assist M-I.

[290] Also as mentioned above, it came to light during the trial that certain answers to undertakings that had been provided by Mr Bruce on the same issues were, according to Mr Stanton, incorrect.

C. *Conclusion*

[291] I am satisfied that, for strategic purposes, Western failed to discharge its responsibility to produce relevant documents on which it intended to rely. It offered no explanation that would suggest otherwise.

[292] However, I am not satisfied that the circumstances justify striking Western's defence or that the amount requested in costs is justified. Nevertheless, I believe a meaningful sanction is justified. Western's failure to honour its obligation to product relevant documents disrupted the trial, and required additional discovery, as well as written and oral submissions on the motion. I will set costs in the amount of $10,000 payable forthwith.

IV. Conclusion and Disposition

[293] I find that Western has induced infringement of the method claims of the patent and has directly infringed the system claims. I also find that Western has failed to establish that the patent's claims are invalid (except for claims 1, 11, 16, and 19). Western is liable to M-I for

compensation and damages based on a royalty of [redacted] as applied to the royalty base agreed on. Should the parties require the Court's assistance in calculating compensation, damages, costs, or interest, a motion to that effect will be entertained and disposed of within a reasonable time from the date of this judgment.

JUDGMENT IN T-1056-15

THIS COURT'S JUDGMENT is that:

1. The defendants by counterclaim, Western and FPM, have infringed or induced infringement of claims 2, 4, 9, 10, 20, 21, 22, of the '173 patent;
2. Claims 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 20, 21, 22, and 23 of the '173 patent are valid;
3. The defendants by counterclaim are enjoined from infringing or inducing others to infringe the claims of the '173 patent;
4. The defendants shall deliver up all materials in their power, possession or control that come within the injunction;
5. The defendants are liable for compensation and damages based on a [redacted] royalty calculated on the agreed-on royalty base, plus pre-judgment interest, post-judgment interest, and taxes;
6. The defendants are liable to M-I for costs; and
7. On Motion under Rule 227, costs in the amount of $10,000.00 should be payable forthwith by Western to M-I.

"James W. O'Reilly"
Judge

Annex A

Patent Act, RSC, 1985, c P-4	*Loi sur les brevets*, LRC (1985), ch P-4
Application for Patents	Demandes de brevets
Specification	Mémoire descriptif
27(3) The specification of an invention must	**27**(3) Le mémoire descriptif doit
…	[…]
(c) in the case of a machine, explain the principle of the machine and the best mode in which the inventor has contemplated the application of that principle; and	c) s'il s'agit d'une machine, en expliquer clairement le principe et la meilleure manière dont son inventeur en a conçu l'application;
Amendments to specifications and drawings	Modification du mémoire descriptive et des dessins
Restriction on amendments to specifications	Limite
38.2(2) The specification may not be amended to describe matter not reasonably to be inferred from the specification or drawings as originally filed, except in so far as it is admitted in the specification that the matter is prior art with respect to the application.	**38.2**(2) Le mémoire descriptif ne peut être modifié pour décrire des éléments qui ne peuvent raisonnablement s'inférer de celui-ci ou des dessins faisant partie de la demande, sauf dans la mesure où il est mentionné dans le mémoire qu'il s'agit d'une invention ou découverte antérieure.

Patent Rules, SOR/96-423	*Règles sur les brevets*, DORS/96-423
Amendments to add matter	Modifications visant l'inclusion d'autres matières
181. No person shall amend the specification or drawings to describe or add matter not reasonably to be inferred from the specification or drawings as originally filed.	**181.** Il est interdit de modifier le mémoire descriptif ou les dessins faisant partie de la demande pour décrire ou ajouter des éléments qui ne peuvent raisonnablement s'en inférer.

Annex B

Summary of the experts' qualifications

M-I

Robert Palmer

Mr Robert Palmer is M-I's validity and infringement expert. He holds a Scotec Certificate in Mechanical and Production Engineering. He is a consultant providing independent services for oilfield solids control solutions and applications. He has worked in design, development, manufacture, repair, maintenance and sales of drilling equipment.

Michael Tate, BBA (Finance), MSc (Industrial Administration)

Mr Michael Tate is M-I's damages expert. He is the Vice President of Charles Rivers Associates, where he focuses on strategy, licensing and valuation in intellectual property matters. He has served as an expert witness and consultant in a wide range of matters, including matters in the oil and gas industry.

Western Oilfield Equipment Rentals and FP Marangoni

Ms Melanie Russell (BCom)

Ms Russell is Western and FP Marangoni's damages expert. She has taught business valuations and related topics at universities and professional organizations, and has published various articles on the topic. She runs a preparatory course for students taking their CBV national Membership Entrance Examination. Ms Russell has previously testified as an expert in business valuation and quantification of damages.

Mr Benard Murphy

Mr Benard Murphy is one of Western and FP Marangoni's validity and infringement experts. He completed three years of a four-year program in Pneumatic and Fluidics. He has also taken courses in drilling fluid engineering, drilling engineering, and products & sales. Mr Murphy has designed cyclones, vibratory shakers and other solids handling equipment.

Mr Peter Matthews

Mr Peter Matthews is one of Western and FP Marangoni's validity and infringement experts. He has worked extensively with shaker technology in solids control, and drilling fluids processing. He has held several positions in which he was responsible for fluid treatment operations, solids control and waste management.

FEDERAL COURT

SOLICITORS OF RECORD

DOCKET:	T-1056-15
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PLACE OF HEARING:	CALGARY, ALBERTA
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DATED:	DECEMBER 23, 2019

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