

Federal Court of Appeal



Cour d'appel fédérale

Date: 20180720

Dockets: A-63-17

A-97-17

A-103-17

Citation: 2018 FCA 140

**CORAM: WEBB J.A.
GLEASON J.A.
LASKIN J.A.**

BETWEEN:

AFD PETROLEUM LTD.

Appellant

and

**FRAC SHACK INC. and FRAC SHACK
INTERNATIONAL INC.**

Respondents

Heard at Toronto, Ontario, on January 29, 2018.

Judgment delivered at Ottawa, Ontario, on July 20, 2018.

REASONS FOR JUDGMENT BY:

GLEASON J.A.

CONCURRED IN BY:

**WEBB J.A.
LASKIN J.A.**

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REASONS FOR JUDGMENT

GLEASON J.A.

[1] The appellant, AFD Petroleum Inc., appeals from the judgment of the Federal Court in *Frac Shack Inc. and Frac Shack International Inc. v. AFD Petroleum Ltd.*, 2017 FC 104 and from the supplemental judgment of the Federal Court in *Frac Shack Inc. and Frac Shack*

International Inc. v. AFD Petroleum Ltd., 2017 FC 274 (both per Manson, J.). It has also appealed from the Federal Court's costs order (unreported order made in *Frac Shack Inc. and Frac Shack International Inc. v. AFD Petroleum Ltd.*, March 3, 2017, in file T-2149-14).

[2] In the original judgment, the Federal Court found that certain claims in the Canadian Patent No. 2,693,567 (the 567 Patent) owned by Frack Shack Inc. were valid, determined that AFD had infringed some of these claims, issued injunctive relief, awarded Frac Shack an accounting of profits and compensation for use prior to the date the 567 Patent was issued and remitted to the parties the calculation of these amounts. The Federal Court also awarded Frac Shack interest and costs and likewise remitted the amounts payable for them to the parties for calculation. In the supplemental judgment, the Federal Court clarified the accounting method to be used in calculating profits and fixed the sums payable on account of profits and for use (inclusive of interest to the date of judgment) as \$221,786.00 and \$126,037.00, respectively. In its costs order, the Federal Court fixed Frac Shack's costs in the all-inclusive amount of \$163,760.00.

[3] In these appeals, AFD raises numerous grounds, one of which I believe has merit. For the reasons that follow, I would grant the appeals, with costs, on the terms detailed below.

I. The 567 Patent and Relevant Background

[4] It is useful to commence by reviewing the invention that Frac Shack claims in the patent in suit and the portions of the 567 Patent that are relevant to these appeals. The invention relates to a fuel delivery system and method of delivering fuel to equipment used in hydraulic fracking.

[5] Fracking or fracturing involves the pumping of fluids into subterranean wellbores to create pathways to allow oil and natural gas to flow to the surface. It is typically used in those geological formations where traditional horizontal drilling is not possible. Fracking operations generally require multiple pieces of equipment, each of which must be fueled. Prior to approximately 2009, many fracking operations were of relatively short duration and could be completed without the need to stop the equipment for refueling. As the operations became more complex and larger, the need to refuel the equipment before the frack was completed arose with greater frequency. Accordingly, operators increasingly resorted to hot refueling, a practice that involves refueling while the fracking equipment continues to operate. As typically conducted, hot refueling operations require employees to manually attach hoses to the equipment when it is running. The evidence before the Federal Court established that this sort of hot refueling is dangerous and physically demanding work, requiring operators to carry heavy hoses containing fuel and to connect them in confined spaces to equipment that is operating under high pressure. Risks include fire and spills.

[6] The principals of Frac Shack were involved in refueling in the oil and gas exploration industry and noted these hazards when one of their companies was called upon to engage in a hot refueling operation. They developed the system described in the 567 Patent and created their first prototype in January 2010 and a fully operational unit by the summer of that year. They filed the 567 Patent on February 16, 2010. It was published on October 21, 2010 and was issued by the Canadian Intellectual Property Office on September 23, 2014.

[7] AFD, which also operates in the oil and gas exploration refueling business, developed a competing apparatus that it began to use in September 2014 and modified in October of that year. There was evidence before the Federal Court indicating that representatives of AFD had seen the Frac Shack apparatus before AFD developed its competing apparatus.

[8] Turning to the 567 Patent, the specification commences by detailing the risks associated with hot refueling. The inventors then provide a summary of their invention, describing it as both a fuel delivery system and method “for reducing the likelihood that a fuel tank of equipment at a well site during fracturing of a well will run out of fuel”. They continue by noting that the invention comprises:

[...] a fuel delivery system for delivery of fuel to fuel tanks of equipment at a well site during the fracturing of a well, the fuel delivery system comprising a fuel source having plural fuel outlets, a hose on each fuel outlet of the plural fuel outlets, each hose being connected to a fuel cap on a respective one of the fuel tanks for delivery of fuel to the fuel tank; and a valve arrangement at each fuel outlet controlling fluid flow through the hose at the respective fuel outlet. The valve arrangement may be a single valve, for example manually controlled.

[...]

A method is also provided for fuel delivery to fuel tanks of equipment at a well site by pumping fuel from a fuel source through hoses in parallel to each of the fuel tanks; and controlling fluid flow through each hose independently of flow in other hoses.

[emphasis added]

[9] The specification continues by offering a detailed description that makes reference to three figures, depicting an embodiment of the system and of the fuel cap. Of note, the detailed description indicates that the fuel delivery system has an automatically operated valve or valves for controlling fluid levels. Moreover, everywhere in the detailed description where the location

of these valve(s) is discussed, they are described as being located on the fuel outlets from the fuel source. On Figure 1, the only figure that depicts the entire invention, these valves are similarly shown as being situated on the fuel outlets from the fuel source.

[10] The claims are then set out in the succeeding section of the Patent and are 38 in number. There are five independent claims, namely claims 1, 11, 16, 20 and 32. Claims 1, 16, 20 and 32 claim a fuel delivery system whereas claim 11 claims a fuel delivery method. Each of claims 1, 16, 20 and 32 provides that the valve(s) for controlling the fluid flow are located on the fuel outlets from the fuel source. However, the method claim in claim 11 contains no similar restriction. Nor do claims 12 to 15, which depend on it.

[11] As the appellant has challenged the Federal Court's findings made in respect of many of the claims, I have set them out, in their entirety, in the appendix to these reasons.

II. The Judgments of the Federal Court

[12] I turn next to the judgment and supplemental judgment of the Federal Court and outline those portions of the two judgments that are relevant to these appeals.

[13] In the judgment, after reviewing the background and making evidentiary rulings, the Federal Court construed the claims in the 567 Patent. It commenced this analysis by determining the attributes of a person skilled in the art (the POSITA) to whom the 567 Patent is directed. After detailing the conflicting views of the parties' experts on this point, the Federal Court wrote as follows at paragraphs 142 to 144 of its Reasons:

142. I agree with [Frac Shack's experts] that a POSITA would be an individual with an understanding of the hazards associated with refueling fracturing equipment. However, there is no evidence to support their claim that a POSITA must have experience actually refueling fracturing equipment. I disagree with [one of Frac Shack's experts] that any experience with designing fracturing equipment will suffice. The '567 Patent is directed to a fuel delivery system; therefore, a POSITA would have some experience designing fueling equipment for the applications covered by the '567 Patent, namely refueling equipment used in fracturing operations at a well site.

143. Further, I disagree with [AFD's expert] that a POSITA would have a minimum of a post-secondary degree in engineering or a similar field. The evidence of Mr. Reimer, who testified that he sourced many of the components for the AFD Frac Trailer, supports the finding that a POSITA could have significant experience in the oil and gas industry in lieu of post-secondary education.

144. Having considered all the evidence before the Court, I find that a POSITA, in the context of the '567 Patent, would:

- a. have a post-secondary degree in engineering or a similar degree, and some practical experience with fracturing operations, such that he or she had a clear understanding of the hazards associated with fueling and refueling fracturing equipment; or
- b. have no formal degree, but significant (five to ten or more years) experience in the oil and gas industry, and specific experience with the operation and refueling of fracturing equipment, such that he or she had a clear understanding of the hazards associated with fueling and refueling fracturing equipment.

[emphasis added]

[14] The Federal Court then moved on to identify the common general knowledge of the POSITA and concluded at paragraph 154 that he or she would have knowledge that included knowledge about fracking, noting that the POSITA's knowledge would include:

- a. general knowledge of fracturing operations, and the fracturing pad environment;

- b. knowledge of the hazards associated with fueling, particularly the hazards associated with manual hot refueling systems;
- c. general knowledge about Class II fuels; and
- d. knowledge of regulatory requirements associated with transporting and supplying fuel at temporary fueling installations.

[15] Notably, the Federal Court omitted from this rendition any mention of the nature and degree of the POSITA's knowledge regarding the design of fuel systems, even though the Federal Court had identified in paragraph 142 of its reasons that the POSITA would have experience in designing fueling equipment used in fracking operations. This omission is crucial as the degree of such knowledge was central to AFD's allegations regarding obviousness.

[16] After dealing with the attributes of the POSITA and the POSITA's common general knowledge, the Federal Court then moved to construe those portions of the claims that it determined needed construction. Of relevance to these appeals are the terms "automatically operable valves", "automatic fuel delivery" and "fuel cap".

[17] The Federal Court construed automatically operable valves to mean "any valve that is operated remotely via an electric signal" and automatic fuel delivery to mean "fuel delivery that does not require an operator to stand at a fuel tank with a fuel hose – i.e., manually refuel in the hot zone of a fracturing site – and can be delivered by remote control of automatic valves that control fuel flow via hoses attached to the equipment tanks" (Reasons, at para. 169).

[18] The Federal Court construed fuel cap as follows at paragraphs 180-181 of the Reasons:

180. [...] I do not find that the fuel cap must seal to the equipment fuel tank to prevent spills. I find that the term “fuel cap” describes any device that is by some means anchored or secured to the throat of an equipment fuel tank, through which fuel is delivered, and which limits contaminants from entering the tank and prevents fuel spills, under normal operation, through securing the hoses to the equipment tank and positioning the fuel level sensor.

181. Additionally, I do not find that fuel cap is synonymous with the term fuel delivery connection—one only has to read dependent claim 17, which states that fuel caps are a type of fuel delivery connection, to reasonably come to this result.

[19] The Federal Court then moved on to discuss the various challenges to the Patent’s validity that were made by the appellant and concluded that claims 1-6, 16-18, 20-26 and 32-37 were invalid for overbreadth, but that the remaining claims in the 567 Patent were valid.

[20] Two of the Federal Court’s findings on validity are challenged by the appellant: the Federal Court’s determination on obviousness and its determination that the method claims set out in claims 11 to 15 were not overly broad due to their failure to encompass an essential feature of the invention claimed in the Patent, namely, that the valve(s) to control the pressure in the hoses are to be located on the fuel outlets from the fuel source.

[21] Insofar as concerns obviousness, the parties and their experts agreed before the Federal Court that the individual components comprising the 567 Patent were well-known in October 2010 and that all elements except the fuel cap and fuel level sensor could have been readily purchased from well-known supply companies. AFD argued that all the components were being used in their conventional manner and therefore that the invention was obvious. It claimed this was demonstrated by the fact its expert witness was able to come up with a substantially similar

design for a refueling system (although he did not design a fuel cap identical to the one developed by Frac Shack). Frac Shack, for its part, countered that the 567 Patent was an innovative combination of the individual claimed elements and an innovative solution to the problems created by manual hot refueling. Its expert witness expressed the view that the inventive concept was a system and method providing an improvement in refueling operations at fracking sites, increasing safety and efficiency.

[22] The Federal Court preferred the evidence of Frac Shack's expert on the basis that AFD's expert lacked experience with fracturing operations and equipment. The Court determined the state of the art, against which the invention claimed in the 567 Patent is to be measured under the obviousness analysis, was manual hot refueling. It accepted that the innovative concept claimed in the 567 Patent was a system and method for refueling multiple pieces of equipment in remote and semi-permanent well sites that removes the operator from the hot zone. In reaching this conclusion, the Federal Court did not find persuasive the fact that the technology and components employed in the 567 Patent were well-known in October 2010. Instead, the Court based its determination on the testimony of various fact witnesses, who testified that manual hot refueling was the way refuelling was done in the fracking industry prior to the introduction of the parties' refueling apparatuses. The Federal Court determined that the system disclosed by the 567 Patent represented an improvement over manual hot refueling because an operator is not continuously required to be in the dangerous hot zone while refueling is taking place and accordingly held that claims 1 to 15, 19, 27 to 31 and 38 of the 567 Patent were not obvious (Reasons, at paras. 247-249).

[23] Insofar as concerns the overbreadth of claims 11 to 15 of the 567 Patent, the Federal Court rejected AFD's assertion that claims 11 to 15, which refer to the method of fuel delivery, were overly broad for failing to specify the location of the valve arrangement. In so finding, the Federal Court held that:

[...] although there is language in the specification describing where certain of the outlets and valves may preferentially be, there is no indication that they are required to be located at a particular place in the system. A POSITA, with the common general knowledge at the relevant date, would know where to place the valves in order to make the invention work in the manner that the inventor intended, and in a way that is useful. (Reasons, at para. 223)

[24] Turning to infringement, AFD argued before the Federal Court that the competing apparatus it had developed and used at certain customer installations did not infringe the 567 Patent for several reasons. Of relevance to this appeal are two assertions. First, AFD alleged that its apparatus did not employ a fuel cap or fuel delivery connection that would infringe claims 7, 13, 15, 19 (as it depends on either claim 16 or 17) and 38 (as it depends on claim 32). Second, it alleged that its apparatus as modified after October 18, 2014 was manually operated and therefore did not infringe claims 8, 9, 11, 13, 15, 19, 28, 32 (as either dependent on claims 8-9 or 11-26) or 38 of the 567 Patent as it was not automatically operated, as that term is to be understood within the relevant claims in the 567 Patent. The Federal Court rejected these assertions due to the construction it adopted of the terms "automatically operable valves", "automatic fuel delivery" and "fuel cap", set out above.

[25] In result, the Federal Court concluded that between September 23 and October 18, 2014, AFD had infringed claims 7, 8, 9, 11-13, 15, 19, 28, 31 and 38 of the 567 Patent. It also determined that after October 18, 2014 when AFD modified its apparatus to provide for manual

operation of the valves controlling fuel flow, it continued to infringe claims 7, 8, 11, 13, 15, 19, 28, 31 and 38 of the 567 Patent.

[26] Having found infringement of these claims, the Federal Court then considered remedy. Of relevance to this appeal, it held that Frac Shack was entitled to reasonable compensation in respect of activities prior to issuance of the 567 Patent, in accordance with subsection 55(2) of the *Patent Act*, R.S.C. 1985, c. P-4, and to an accounting of AFD's profits for the use of its infringing apparatus subsequent to the grant. The Federal Court rejected AFD's argument that manual hot refueling constituted a non-infringing alternative to use of the AFD Frac Trailer on the basis that manual hot refueling does not provide the benefits of the 567 Patent.

[27] In calculating the reasonable compensation for the pre-grant period, the Federal Court found that the hypothetical negotiation date for commencement of damages based on the royalty that Frac Shack would have earned was September 2014 and accepted Frac Shack's expert's estimated royalty rate of 29% as reasonable on the basis of the evidence and the fact that the commonly considered royalty range is 25% to 33.3%.

[28] In terms of the post-grant accounting for profits, the Federal Court held that gross profits should be calculated using the "declining rate" method of depreciation proposed by AFD's expert and directed the parties to reach agreement based on the Court's directions. The parties failed to reach agreement regarding the amount of gross profits to be paid by AFD to Frac Shack as they disagreed on what the Federal Court meant by instructing them to use the "declining rate" method of depreciation. In its supplemental reasons, the Federal Court held that what it had

meant to direct was that gross profits were to be calculated using the “sum of the digits” method advanced by AFD’s expert, and quantified Frac Shack’s damages utilizing this method in the amount set out above.

III. AFD’s Arguments

[29] With this background in mind, I turn now to detail the various arguments advanced by AFD in this appeal that require consideration.

[30] In respect of obviousness, AFD says that the conclusion of the Federal Court cannot stand as it made reviewable errors in defining the POSITA to whom the 567 Patent is directed and in respect of the extent of the common general knowledge of the POSITA. Characterizing these issues as matters of law to which the correctness standard is applicable, AFD says that the Federal Court’s findings regarding the POSITA are incomprehensible in light of the conflict between paragraph 142 versus paragraphs 144 and 154 of its Reasons. It invites us to declare that the POSITA is a person with skill and experience in designing and manufacturing fuel delivery systems and to remit all issues related to such knowledge as well as the obviousness inquiry to the Federal Court for reconsideration.

[31] As concerns the overbreadth of claims 11 to 15 in the 567 Patent, AFD asserts that the placement of the required valve or valves on the fuel outlets of the fuel source is an essential component of the invention claimed in the Patent and that claims 11 to 15 are overbroad as they make no mention of such placement. In support of this assertion, AFD relies on the following:

- in the summary description of the invention, reproduced at paragraph 8, above, the valve arrangement is described as being “at each fuel outlet”;
- the detailed description of the invention likewise indicates that the valves are located at each fuel outlet on the fuel source in paragraphs 12 and 17 of the 567 Patent;
- all independent claims of the 567 Patent other than the method claims in claims 11 to 15, specify that the valve(s) are located at the fuel outlet from the fuel source; and
- the inventor, Mr. Van Vliet, indicated that he and his fellow inventor had made a deliberate design decision to have the valves controlling fuel flow located at the refueling unit. AFD asserts that this demonstrates that the inventors had discarded any other location from their invention.

[32] AFD also contends that in analyzing these issues the Federal Court conflated the overbreadth and sufficiency analysis in paragraph 223 of its Reasons, cited above.

[33] In regard to the Federal Court’s construction of the term “fuel cap”, AFD raises two issues. First, it claims that while the Federal Court stated that “fuel cap” was not synonymous with a “fuel delivery connection”, the Federal Court made no effort to define the latter or to analyze whether AFD’s adapter was a fuel delivery connection. Second, AFD takes issue with the fact that the Federal Court attributed numerous features and functions to the fuel cap despite the fact that most are not referenced in the claims, disclosure or evidence adduced by Frac Shack. AFD says that the purpose of the fuel cap in the 567 Patent is simply to prevent spills. Since its adapter is incapable of preventing spills in certain circumstances, AFD asserts that the claimed purpose of the fuel cap is not met by its fuel adapter and that, accordingly, its apparatus does not

infringe claims 7, 13, 15, 19 (as it depends on either claim 16 or 17) and 38 (as it depends on claim 32) of the 567 Patent.

[34] As concerns the Federal Court's construction of the terms "automatically operable valves" and "automatic fuel delivery", AFD contends that the Federal Court erred by equating "automatic fuel delivery" with "remote operation". In AFD's submission, this construction conflicts with the fact that both the "automatic" and "manual" embodiments referred to in the disclosure allow for the remote operation of valves, in the sense that an operator need not be present at the location of the valve to physically open or close the valve. AFD suggests that the meaningful distinction between the two embodiments centers on whether an automatic controller or a human operator is responsible for starting and stopping the fuel flow. Thus, according to AFD, a proper construction would be a system in which the valves controlling fuel flow are opened and closed to refill the equipment fuel tanks, without any human intervention. As this component of the AFD Frac Trailer was not used after October 18, 2014, AFD says there was no basis for holding that it had infringed claims 8, 9, 11, 13, 15, 19, 28 and 32 after this date.

[35] AFD also argues that the Federal Court made multiple errors in calculating the relief owed to Frac Shack. Specifically, AFD takes issue with the holdings that manual hot refueling was not a non-infringing alternative, that the date for the hypothetical negotiation for purposes of calculating reasonable compensation for the pre-grant period was September 2014, that a reasonable royalty rate was 29% and that the "declining rate" method of depreciation was a reference to the "sum of the digits".

[36] Finally, while it launched a separate costs appeal, AFD did not advance any argument, either in writing or orally, in support of its contestation of the costs award that is separate from its various challenges to the judgments of the Federal Court on the merits. Thus, the costs appeal stands or falls in accordance with the disposition of the appeals from the judgment and supplemental judgment.

IV. Analysis

[37] As noted, in my view, one of the various arguments raised by AFD has merit; it concerns the Federal Court's definition of the POSITA and the common general knowledge of the POSITA.

A. *Did the Federal Court err in its holding in respect of the POSITA to whom the 567 Patent is directed?*

[38] Turning to the Federal Court's treatment of the POSITA, I disagree with AFD concerning the appellate standard of review to be applied to the impugned findings. Contrary to what AFD asserts, the impugned findings in the instant case regarding the attributes of the POSITA and the extent of the POSITA's common general knowledge are matters of fact or mixed fact and law from which a legal issue cannot be extricated. In accordance with principles of appellate review, such findings may be set aside only if they disclose a palpable and overriding error: *Housen v. Nikolaisen*, 2002 SCC 33, [2002] 2 S.C.R. 235 at paras. 10 and 37.

[39] In *Mylan Pharmaceuticals ULC v. AstraZeneca Canada Inc.*, 2012 FCA 109, 432 N.R. 292, this Court noted that issues of construction are matters of law and therefore reviewable for correctness. However, the Court went on to note at paragraph 20 that:

[...] any assessment of the evidence (concerning the state of scientific knowledge at the relevant time, or how a reasonable POSITA would understand the patent, for example) made by the Judge in the course of reaching his conclusion on the construction of the patent is reviewable for palpable and overriding error.

[40] Similarly, in *Wenzel Downhole Tools Ltd. v. National-Oilwell Canada Ltd.*, 2012 FCA 333, 443 N.R. 173, this Court stated at paragraph 44 that the “weight to be given to the expert evidence as to how particular words would be understood by the POSITA is a question where the trier of facts is entitled to deference.” (See also, to similar effect, *Apotex Inc. v. AstraZeneca Canada Inc.*, 2017 FCA 9, [2017] F.C.J. No. 22 at para. 30 and *Cobalt Pharmaceuticals Company v. Bayer Inc.*, 2015 FCA 116, 474 N.R. 311 at para. 15.)

[41] The impugned findings of the Federal Court with respect to the POSITA are therefore reviewable only if they disclose a palpable and overriding error. In my view, they do contain such an error as the Federal Court made contradictory and irreconcilable findings as to the attributes of the POSITA.

[42] On one hand, in paragraph 142, the Federal Court held that the POSITA to whom the 567 Patent is directed “would have some experience designing fueling equipment for the applications covered by the ‘567 Patent, namely refueling equipment used in fracturing operations at a well site”. However, this experience is entirely omitted from the Federal Court’s conclusion on the attributes of the POSITA and the summary of the POSITA’s common general

knowledge contained at paragraphs 144 and 154 of the Reasons. The statements in paragraph 142 versus paragraphs 144 and 154 are irreconcilable and contradictory as on one hand the POSITA is said to possess experience in design of fuel systems for fracking operations, yet in paragraphs 144 and 154 this experience is omitted from the rendition of the POSITA's attributes. This contradiction discloses a palpable error.

[43] The error is an overriding one as the attributes of the POSITA determine the extent of the POSITA's common general knowledge, which is a key component in the obviousness analysis mandated by the Supreme Court of Canada in *Apotex Inc. v. Sanofi-Synthelabo Canada Inc.*, 2008 SCC 61, [2008] 3 S.C.R. 265. Under that analysis, an invention claimed in a patent will be void for obviousness if it adds nothing to common general knowledge of the POSITA or was obvious to try in light of such common general knowledge.

[44] In the present case, the extent of the POSITA's common general knowledge regarding the design of fuel systems is key to the obviousness analysis as the individual components comprising the 567 Patent were well-known in October 2010 and all elements except the fuel cap and fuel level sensor could have been readily purchased from easily identifiable supply companies. Such knowledge might well render the claimed invention obvious as utilization of existing and well-known technology in a different application from those where it had been previously deployed might not be inventive.

[45] In conducting its obviousness inquiry, the Federal Court did not consider the impact of any knowledge possessed by the POSITA in respect of fuel equipment design on obviousness

and instead focussed its discussion on the fact that the claimed invention represented an improvement in the way in which hot refueling was undertaken. This may well be true, but that does not necessarily mean that the invention claimed in the 567 Patent was not obvious if it would have been obvious or obvious to try for someone with the knowledge of the POSITA in respect of fuel equipment design.

[46] Because the Federal Court did not come to terms with the extent of such knowledge and its impact on the obviousness inquiry, its obviousness findings cannot stand. Given the factually-suffused nature of the obviousness analysis, I believe that the appropriate disposition is to set aside the Federal Court's judgment and supplemental judgment in part and remit all portions of the obviousness inquiry, including the identification of the POSITA and determination of the extent of the POSITA's common general knowledge, to Justice Manson for re-determination. The Federal Court is in a much better position than this Court to make this factually-dependent determination and to ascertain the degree of comparability between the knowledge of AFD's expert (who possessed significant fuel design knowledge) and the knowledge of this sort that the POSITA would possess.

[47] I also underscore, as this Court held in *Zero Spill Systems (Int'l) Inc. v. 614248 Alberta Ltd. (c.o.b. Lea-Der Coatings)*, 2015 FCA 115, 472 N.R. 127, that the obviousness inquiry should be undertaken on a claim-by-claim basis. The Federal Court should bear this in mind in reconsidering the matters remitted to it.

B. *Did the Federal Court err in holding that claims 11 to 15 of the 567 Patent are not void for overbreadth?*

[48] Turning to the overbreadth issues, I disagree with AFD that the Federal Court made a reviewable error in its treatment of this issue.

[49] The notion of overbreadth may encompass either a legal or a factual issue in that the claims of a patent may be broader than the invention disclosed in the specification or may be broader than the invention made. The former is a question of construction (and a matter of law) whereas the latter is a question of fact: *Nova Chemicals Corporation v. Dow Chemical Company*, 2016 FCA 216 at para. 45, 487 N.R. 230; *Farbwerke Hoechst Aktiengesellschaft v. Canada (Commissioner of Patents)* (1965), [1966] Ex. C.R. 91 at pp. 106-107, 31 Fox Pat. C. 64 at pp. 80-81 (Ex. Ct.), aff'd [1966] S.C.R. 604, 50 C.P.R. 220.

[50] Here, AFD principally asserts that the Federal Court erred in its construction of the 567 Patent because it says that the location of the valve(s) on the fuel source is an essential element of the invention claimed in the 567 Patent. AFD asserts that the method claims set out in claims 11 to 15 of the 567 Patent are void for overbreadth as the method claims contain no restriction concerning the location of the valve(s). These are legal issues and thus amenable to review based on correctness.

[51] I agree with AFD that the Federal Court erred in its discussion of this issue but am of the view that this error is of no consequence as the Federal Court was correct in holding that claims 11 to 15 of the 567 Patent are not overly broad.

[52] More specifically, contrary to what the Federal Court stated in paragraph 223 of its Reasons, I disagree that “there is no indication [in the specification] that [the valves] are required to be located at a particular place in the system”. On the contrary, as concerns the fuel delivery system, valve placement is an essential element. This is evident from several portions of the specification and from the claims for the system.

[53] The summary of the invention provided by the inventors in the 567 Patent includes valve placement as an element of the fuel delivery system on par with the other facets of the system invented, describing the system invented as being:

[...] a fuel delivery system for delivery of fuel to fuel tanks of equipment at a well site during the fracturing of a well, the fuel delivery system comprising a fuel source having plural fuel outlets, a hose on each fuel outlet of the plural fuel outlets, each hose being connected to a fuel cap on a respective one of the fuel tanks for delivery of fuel to the fuel tank; and a valve arrangement at each fuel outlet controlling fluid flow through the hose at the respective fuel outlet. The valve arrangement may be a single valve, for example manually controlled.

[emphasis added]

[54] In addition, the detailed description indicates that the fuel delivery system invented has a valve or valves for controlling fluid levels and, in paragraphs 12 and 17 (the two places where valve placement is discussed), provides that the valves are to be located on the fuel outlets from the fuel source. Moreover, each of the independent claims to the fuel delivery system contains a similar stipulation. Thus, valve placement is an essential element for the fuel delivery system described in the 567 Patent.

[55] Despite the error in failing to recognize this, I see no basis for interfering with the Federal Court’s conclusion on the overbreadth issue as the 567 Patent makes it clear that the inventors

invented *both* a method *and* a system and that the method invented is different from and broader than the system that was invented. This is evident from the summary section of the specification, which commences by identifying the invention as being a fuel delivery system and a method (at para. 0003). This section then goes on to describe the invented method in a separate paragraph that contains no mention of valve placement, describing the method in para. 0004 as being:

A method is also provided for fuel delivery to fuel tanks of equipment at a well site by pumping fuel from a fuel source through hoses in parallel to each of the fuel tanks; and controlling fluid flow through each hose independently of flow in other hoses.

[56] Claims 11 to 15 are drafted in accordance with this description of the method. Therefore, as a matter of construction, claims 11 to 15 cannot be said to be overly broad.

[57] Nor do I concur that the Federal Court conflated the sufficiency and overbreadth analysis as a patent claim may be found to not be overly broad if it leaves it open to the POSITA to avoid known unsuitable choices as was held in *Burton Parsons Chemicals, Inc. v. Hewlett-Packard (Canada) Ltd.* (1974), [1976] 1 S.C.R. 555 at pp. 565-566, 54 D.L.R. (3d) 711 at pp. 717-718.

[58] To the extent that AFD attempts to raise a factual error on this point by referring to the design choices made by the inventor, it has raised no palpable and overriding error that would warrant intervention by this Court. Indeed, as Frac Shack notes, the evidence was to the effect that the inventors had considered and designed valves in various locations, including at the fuel tank ends.

[59] Thus, claims 11 to 15 of the 567 Patent are not void for overbreadth. That said, the greater breadth of these claims is a matter that the Federal Court should address in re-conducting the obviousness analysis as the method claims, due to their greater breadth than the fuel delivery system claims, may well be more vulnerable to being found to be obvious.

C. *Did the Federal Court err in its construction of the terms “automatically operable valves”, “automatic fuel delivery” and “fuel cap”?*

[60] Turning to the next issue, construction of a patent is to be undertaken through the eyes of a POSITA, in light of the POSITA’s common general knowledge. As the Supreme Court of Canada noted in *Whirlpool Corp. v. Camco Inc.*, 2000 SCC 67, [2000] 2 S.C.R. 1067 at para. 53:

[...] the patent specification is not addressed to grammarians, etymologists or to the public generally, but to skilled individuals sufficiently versed in the art to which the patent relates to enable them on a technical level to appreciate the nature and description of the invention: H. G. Fox, *The Canadian Law and Practice Relating to Letters Patent for Inventions* (4th ed. 1969), at p. 185. The court, writes Dr. Fox, at p. 203, must place itself

in the position of some person acquainted with the surrounding circumstances as to the state of the art and the manufacture at the time, and making itself acquainted with the technical meaning in that art or manufacture that any particular word or words may have.

[61] Because the Federal Court erred in its determination of the attributes and knowledge of the POSITA, its construction of the impugned terms should be set aside for re-determination as the way the POSITA would understand these terms might well be impacted by his or her knowledge of fuel system design. Once again, the Federal Court, having heard the testimony, is better placed than this Court to address how the POSITA would understand the terms “automatically operable valves”, “automatic fuel delivery” and “fuel cap”. I would therefore set

aside its interpretation of these terms and its finding of infringement, which is premised on the construction of these terms, and remit these issues to the Federal Court for re-determination.

D. *Did the Federal Court err in concluding that manual hot refueling was not a non-infringing alternative?*

[62] Moving on to the issue of non-infringing alternative, in *Apotex Inc. v. Merck & Co., Inc.*, 2015 FCA 171, [2016] 2 F.C.R. 202 at paras. 38-50 (*Lovastatin*), this Court recognized that the presence of a non-infringing alternative will reduce the damages an infringer is liable to pay if the infringer establishes that it could and would have adopted the alternative and that the alternative is economically viable and a true substitute for the product infringed. Similarly, in *Monsanto Canada Inc. v. Schmeiser*, 2004 SCC 34, [2004] 1 S.C.R. 902 at paras. 100-104, the Supreme Court of Canada determined that the presence of a non-infringing alternative will reduce the amount of profits to be disgorged by an infringer.

[63] Whether a suggested alternative meets the requirements for being non-infringing typically involves questions of fact or mixed fact and law from which a pure legal issue cannot be extricated, as this Court noted at paragraph 73 of *Lovastatin*. Such determinations are therefore generally reviewable only for palpable and overriding error.

[64] On this issue, the Federal Court committed no such error as there was more than ample evidence before it to support the conclusion that manual hot refueling was not a true substitute for the Frac Shack apparatus. The evidence established that the apparatus was both designed and shown to be effective in reducing the risks associated with manual hot refueling and thus offered

advantages over manual hot refueling. Moreover, there was no evidence to indicate that AFD clients who contracted for the use of its apparatus would have been equally willing to have allowed AFD to use a manual hot refueling method. AFD's arguments on this point therefore fail as the Federal Court did not commit a palpable and overriding error in concluding that manual hot refueling was not a true substitute for the Frac Shack apparatus.

E. *Did the Federal Court err in determining that the date for the hypothetical negotiation for purposes of calculating reasonable compensation for the pre-grant period was September 2014 or in its selection of a royalty rate of 29% for assessing damages for this period?*

[65] The next two issues raised by AFD are intertwined and involve the assertions that the Federal Court erred in determining that the date for the hypothetical negotiation for purposes of calculating reasonable compensation for the pre-grant period was September 2014 and in its selection of a royalty rate of 29% for assessing damages for this period. I see no error having been committed by the Federal Court on either point.

[66] Under subsections 55(2) and 55(4) of the *Patent Act*, an infringer is liable to pay reasonable compensation for damage sustained by reason of acts committed between the time the patent application is laid open for inspection under section 10 of the *Patent Act* and the date the patent is issued, if those acts would have constituted infringement if committed after the issuance of the patent.

[67] Before the Federal Court, the parties agreed that if the 567 Patent were valid and if AFD were found to have infringed it, Frac Shack would be entitled to a reasonable royalty for use by

AFD of its apparatus prior to September 23, 2014, the date the 567 Patent was issued. The evidence established that AFD used its competing apparatus for 11 days in September 2014, when it used its competing apparatus in connection with refueling contracts in Canada.

[68] In light of these concessions and the evidence before the Federal Court, I see no error in the determination that the royalty period was to commence as of September 2011, as that is when AFD first made use of its competing apparatus to the detriment of Frac Shack. Nor do I see any reviewable error in the Federal Court's selection of the 29% royalty rate – a factual issue – that was amply grounded in the expert evidence Frac Shack filed from its accounting expert.

F. *Did the Federal Court err in holding that the “declining rate” method of depreciation was a reference to the “sum of the digits” method?*

[69] Turning to the last of the issues raised by AFD, I see no error in the Federal Court's having clarified in its supplemental reasons and judgment that what it meant to say was that the sum of the digits method, advocated by AFD's expert, was to be adopted to calculate AFD's profits during the post-grant period.

[70] In its original judgment, the Federal Court stated that the “declining rate” method proposed by [AFD's expert]” was to be adopted. The expert, however, did not propose a “declining rate” method but, rather, the “sum of the digits” method. However, the expert elsewhere in his report referred to something called the “declining balance” method. AFD asserts that the Federal Court adopted the “declining balance” method in its original reasons, was

functus on the issue and therefore could not change its ruling in its supplemental reasons and judgment and opt for the “sum of the digits” method.

[71] I disagree. The Federal Court in its original judgment made a mere clerical error in terminology in describing the method it selected as it explained in its supplemental reasons. Under Rule 397 of the *Federal Courts Rules*, SOR/98-106, it was open to and entirely appropriate for the Federal Court to have corrected this error. There is accordingly no basis for setting aside the Federal Court’s calculations for the amounts to be paid on account of profits.

V. Proposed Disposition

[72] In light of the foregoing, and because the issues of obviousness and infringement may affect the remedies awarded, I would allow, in part, the appeals of the judgment of the Federal Court in *Frac Shack Inc. and Frac Shack International Inc. v. AFD Petroleum Ltd.*, 2017 FC 104 and of the supplement judgment of the Federal Court in *Frac Shack Inc. and Frac Shack International Inc. v. AFD Petroleum Ltd.*, 2017 FC 274 and would allow the appeal of the costs order of the Federal Court (unreported order made in *Frac Shack Inc. and Frac Shack International Inc. v. AFD Petroleum Ltd.*, March 3, 2017, in file T-2149-14).

[73] I would also set aside paragraphs 2 to 7 of the judgment as well as paragraph 2 of the supplemental judgment and the costs order of the Federal Court. I would remit to Justice Manson of the Federal Court the issues of the identification of the POSITA, the extent of the POSITA’s knowledge in respect of fuel delivery system design, obviousness, construction of the terms

“automatically operable valves”, “automatic fuel delivery” and “fuel cap”, infringement and all remedial issues for re-determination in accordance with the reasons of this Court.

[74] As the appellant was largely successful before this Court, I would award AFD its costs of these appeals but would leave to the Federal Court the issue of costs before that Court, which will depend on the outcome of its re-determination of the issues remitted to it.

“Mary J.L. Gleason”

J.A.

“I agree.

Wyman W. Webb J.A.”

“I agree.

J.B. Laskin J.A.”

Appendix

The 567 Patent has 38 claims that read as follows:

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A fuel delivery system for delivery of fuel to fuel tanks of equipment at a well site during fracturing of a well, the fuel delivery system comprising:
 - a fuel source having plural fuel outlets;
 - a hose on each fuel outlet of the plural fuel outlets, each hose being connected to a fuel cap on a respective one of the fuel tanks for delivery of fuel to the respective one of the fuel tanks; and
 - a valve arrangement at each fuel outlet controlling fluid flow through the hose at the respective fuel outlet.
2. The fuel delivery system of claim 1 in which the fuel source comprises at least a fuel source tank and a manifold connected via a line to the fuel source tank, a pump on the line, and some or all of the fuel outlets being located on the manifold.
3. The fuel delivery system of claim 2 in which each valve arrangement comprises a manually operable valve.
4. The fuel delivery system of claim 1 in which the fuel source comprises at least a fuel source tank and at least two manifolds, each manifold being connected via a respective line to the fuel source tank, a pump on each line, and plural fuel outlets being located on each manifold.

5. The fuel delivery system of any one of claims 1-4 in which each fuel cap comprises a breather port.

6. The fuel delivery system of claim 5 in which each breather port comprises a downwardly extending line.

7. The fuel delivery system of any one of claims 1-6 in which each fuel cap comprises a fuel level sensor.

8. The fuel delivery system of claim 7 provided with automatic fuel delivery by:
the valve arrangement comprising an automatically operable valve on each fuel outlet; and

a controller responsive to signals supplied from each fuel level sensor through respective communication channels to provide control signals to the respective automatically operable valves.

9. The fuel delivery system of claim 8 in which the controller is responsive to a low fuel level signal from each fuel tank to start fuel flow to the fuel tank independently of flow to other fuel tanks and to a high level signal from each fuel tank to stop fuel flow to the fuel tank independently of flow to other fuel tanks.

10. The fuel delivery system of any one of claims 1-9 in which each hose is connected to a fuel outlet by a dry connection and to a cap by a dry connection.

11. A method of fuel delivery of fuel to selected fuel tanks of equipment at a well site during fracturing of a well, the method comprising:

pumping fuel from a fuel source through hoses in parallel to each of the fuel tanks;
controlling fluid flow through each hose independently of flow in other hoses; and
automatically controlling fluid flow in each hose in response to receiving signals
representative of fuel levels in the fuel tanks.

12. The method of claim 11 further comprising starting fluid flow to each fuel tank of the selected fuel tanks upon receiving a low fuel level signal related to the respective fuel tank and stopping fluid flow to each fuel tank upon receiving a high level signal related to the respective fuel tank.

13. The method of claim 11 or 12 further comprising preventing spills at each fuel tank by providing fuel flow to each fuel tank through a fuel cap on the fuel tank.

14. The method of claim 13 in which each fuel cap comprises an air vent with a line extending downward.

15. The method of claim 13 or 14 in which each fuel cap comprises a fuel level sensor.

16. A fuel delivery system for automatic fuel delivery to multiple fuel tanks at a work site, comprising:

a fuel source comprising one or more manifolds connectable to one or more fuel source tanks by at least a respective one of one or more fuel lines, and a pump on each fuel line for pumping fuel from the one or more fuel source tanks to the one or more manifolds;

each manifold of the one or more manifolds having multiple fuel outlets, each fuel outlet of the multiple fuel outlets having a hose connection;

plural hoses, each hose of the plural hoses having a first end and a second end and being connected at the first end of the hose to a corresponding one of the multiple fuel outlets and having a fuel delivery connection at the second end of the hose for securing the second end of the hose to a fuel tank to which fuel is to be delivered:

an automatic valve responsive to electronic control signals on each fuel outlet;
a fuel level sensor associated with each fuel delivery connection; and
a controller responsive to signals supplied from each fuel level sensor through respective communication channels to provide control signals to the respective automatic valves.

17. The fuel delivery system of claim 16 in which each fuel delivery connection comprises a cap for a respective one of the fuel tanks to which fuel is to be delivered.

18. The fuel delivery system of claim 16 or 17 further comprising a valve on each fuel outlet for controlling flow from the fuel outlet that is manually operable.

19. The fuel delivery system of claim 16, 17 or 18 set up for delivery of fuel at a well site during fracturing of a well.

20. A fuel delivery system for delivery of fuel to a fuel tank, the fuel delivery system comprising a controller and a fuel source, the fuel source having one or more fuel outlets and for each fuel outlet:

a hose on the fuel outlet, the hose being connected to a fuel cap on a fuel tank for delivery of fuel to the fuel tank, a valve arrangement at the fuel outlet for controlling fluid flow through the hose at the fuel outlet, the valve arrangement comprising an automatically operable valve on the fuel outlet;

the fuel cap including a fuel level sensor; and

the controller being responsive to signals supplied from the fuel level sensor through a communication channel to provide control signals to the automatically operable valve.

21. The fuel delivery system of claim 20 in which the fuel source comprises at least a fuel source tank and a manifold connected via a line to the fuel source tank, a pump on the line, and some or all of the fuel outlets being located on the manifold.

22. The fuel delivery system of claim 20 or 21 in which each valve arrangement comprises a manually operable valve.

23. The fuel delivery system of claim 20, 21 or 22 in which the fuel source comprises at least a fuel source tank and at least two manifolds, each manifold being connected via a respective line to the fuel source tank, a pump on each line, and plural fuel outlets being located on each manifold.

24. The fuel delivery system of any one of claims 20-23 in which each fuel cap comprises a breather port.

25. The fuel delivery system of claim 24 in which each breather port comprises a downwardly extending line.

26. The fuel delivery system of any one of claims 20-25 in which the controller is responsive to a low fuel level signal from each fuel tank to start fuel flow to the fuel tank independently of flow to other fuel tanks and to a high level signal from each fuel tank to stop fuel flow to the fuel tank independently of flow to other fuel tanks.

27. The fuel delivery system of any one of claims 1-10 and 16-26 in which the fuel source comprises multiple fuel source tanks.
28. The fuel delivery system of any one of claims 7-9 or 16-26 further comprising a display receiving information from the fuel level sensors to show a fuel level of each fuel tank being filled.
29. The fuel delivery system of any one of claims 8-9 or 16-26 in which the controller is configured to log fuel requirements of each fuel tank being fueled.
30. The fuel delivery system of any one of claims 1-10 or 16-29 further comprising a first pressure gauge at each fuel outlet upstream of the valve arrangement and a second pressure gauge at each fuel outlet downstream of the valve arrangement.
31. The fuel delivery system of any one of claims 1-10 or 16-30 mounted on a trailer at a well site during fracturing of a well.
32. A fuel delivery system for automatic fuel delivery to multiple pieces of equipment at a work site, comprising:
 - a fuel source comprising one or more manifolds, the one or more manifolds being connectable to a fuel supply;
 - each manifold of the one or more manifolds having multiple fuel outlets, each fuel outlet of the multiple fuel outlets having a hose connection;
 - plural hoses, each hose having a first end and a second end and being connected at the first end of the hose to a corresponding one of the multiple fuel outlets and having a fuel delivery

connection at the second end of the hose for securing the second end of the hose to a corresponding one of the multiple pieces of equipment to which fuel is to be delivered;

an automatic valve responsive to electronic control signals on each fuel outlet;

a sensor associated with each combination of fuel outlet, hose and fuel delivery connection; and

a controller responsive to signals supplied from each sensor through respective communication channels to provide control signals to the respective automatic valves.

33. The fuel delivery system of claim 32 in which the one or more manifolds comprises more than one manifold.

34. The fuel delivery system of claim 32 or 33 in which the controller is configured to log fuel requirements of each piece of the multiple pieces of equipment being fueled.

35. The fuel delivery system of claim 32, 33 or 34 further comprising at least a first pressure gauge associated with each fuel outlet.

36. The fuel delivery system of claim 35 in which the [sic] at least a first pressure gauge at each fuel outlet is located upstream of the automatic valve and a second pressure gauge at each fuel outlet is located downstream of the automatic valve.

37. The fuel delivery system of any one of claims 32-36 further comprising a valve on each fuel outlet for controlling flow from the fuel outlet that is manually operable.

38. The fuel delivery system of any one of claims 32-37 set up for delivery of fuel at a well site during fracturing of a well.

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