

Federal Court



Cour fédérale

Date: 20231107

**Dockets: T-1420-18
T-567-20**

Citation: 2023 FC 1486

Ottawa, Ontario, November 7, 2023

PRESENT: The Honourable Madam Justice McVeigh

Docket: T-1420-18

BETWEEN:

NCS MULTISTAGE INC.

**Plaintiff/
Defendant by Counterclaim**

and

**KOBOLD CORPORATION, KOBOLD
COMPLETIONS INC. AND 2039974
ALBERTA LTD.**

**Defendants/
Plaintiffs by Counterclaim**

Docket: T-567-20

AND BETWEEN:

NCS MULTISTAGE INC.

**Plaintiff/
Defendant by Counterclaim**

and

PROMAC INDUSTRIES LTD.

**Defendant/
Plaintiff by Counterclaim**

Table of Contents

I.	Introduction.....	4
II.	Background.....	7
	A. Pleadings and History of the Proceeding	7
	B. Trial	10
	C. Technical Background.....	11
III.	Issues.....	13
	A. Common and Legal Issues	13
	B. NCS Patents.....	15
	C. Kobold Patents	20
	D. Analytical Framework.....	22
IV.	Evidence.....	23
	A. Fact Witnesses.....	23
	B. Expert Witnesses	26
V.	Legal Principles	33
	A. Claim Construction	33
	B. Validity.....	42
	C. Infringement.....	75
VI.	Summary of Prior Art	75
	A. NCS’s 676 and 652 Patents.....	75
	B. NCS’s 907 and 026 Patents.....	78
	C. NCS’s 704 Patent	80
	D. Kobold’s 571 Patent.....	84
VII.	Common Issues	87
	A. The POSITA.....	87
	B. CGK	92
	C. Interpreting Terms in Common.....	100
VIII.	Claims Construction.....	142
	A. NCS’s 676 Patent	142
	B. NCS’s 652 Patent	174
	C. NCS’s 907 Patent	197
	D. NCS’s 026 Patent	226
	E. NCS’s 704 Patent	243
	F. Kobold’s 571 Patent.....	273

IX.	Validity	283
A.	NCS's 676 Patent	283
B.	NCS's 652 Patent	313
C.	NCS's 907 Patent	336
D.	NCS's 026 Patent	370
E.	NCS's 704 Patent	377
F.	Kobold's 571 Patent.....	409
X.	Infringement.....	433
A.	Kobold's 571 Patent.....	433
XI.	Other Legal Issues.....	438
A.	Induced Infringement	438
B.	Common Design.....	439
C.	Does the Agreement affect this action?.....	439
D.	Estoppel, Acquiescence, and Other Doctrines	440
XII.	Remedies.....	440
XIII.	Costs	442
A.	The Law on Costs.....	442
B.	Submissions and Considerations	445
C.	Decision as to Costs	448
XIV.	Conclusion.....	449
	APPENDIX A.....	452
	APPENDIX B	490
	APPENDIX C	493
	APPENDIX D.....	512

JUDGMENT AND REASONS

I. Introduction

[1] This action and counter-action pertain to a number of patents (seven, now reduced to six) relating to tools and sleeves used to drill multistage horizontal oil wells for hydrocarbons. The Plaintiff and Defendant by counterclaim, NCS Multistage Inc [NCS], and the Defendants and Plaintiffs by counterclaim, Kobold Corporation, Kobold Completions Inc, and 2039974 Alberta Ltd (collectively, “Kobold”), and Promac Industries Ltd [Promac] (collectively, the “Defendants”), provide equipment to the oil and gas industry for hydraulic fracturing.

[2] NCS sued the Defendants for infringement of the following of NCS’s patents (collectively, the “NCS Patents”). As well, NCS claimed induced infringement and infringement by common design:

- Canadian Patent No. 2,693,676 [676 Patent or 676];
- Canadian Patent No. 2,820,652 [652 Patent or 652];
- Canadian Patent No. 2,738,907 [907 Patent or 907];
- Canadian Patent No. 2,766,026 [026 Patent or 026]; and,
- Canadian Patent No. 2,820,704 [704 Patent or 704].

[3] In response, Kobold asserted that NCS’s patents were invalid, and counter-sued claiming that NCS infringed Kobold’s Canadian Patent No. 2,856,830 [830 Patent or 830] and Canadian

Patent No. 3,027,571 [571 Patent or 571]. Kobold subsequently abandoned its action for infringement of the 830 Patent.

[4] Due to the complexity of this case, the number of patents at issue and the detailed submissions of the parties, these reasons are lengthy. First, there is a description of the complex history of this matter, followed by a note on the trial. Next, briefly is set out the nature of each patent and the relevant claims at issue. Finally, a list of the issues decided, and then the witnesses who appeared as part of this trial and their backgrounds is provided.

[5] It is necessary to comment on the number of issues raised in these actions. I am mindful of a similar discussion by Justice Locke:

[9] Before continuing, I feel compelled to say a few words about the lack of wisdom of raising so many issues on appeal, especially so many issues that are so factually suffused, without due attention to the standard of review on such issues. Firstly, the appellants' approach suggests that they themselves cannot identify any issues that are particularly strong. This suggestion was compounded at the hearing of the appeal when, despite the Court's suggestion that the appellants focus on their strongest points, the appellants insisted on addressing all of the issues raised in their memorandum of fact and law. Not only did this approach miss an opportunity to highlight certain of the issues, but it also prevented the appellants from delving deeper into points that might have merited more discussion. In addition to hurting the appellants' own case on appeal, this approach also made unnecessary additional work for the Court and delayed the release of this decision...

Western Oilfield Equipment Rentals Ltd v M-I LLC, 2021 FCA 24 at para 9 [*Western Oilfield*].

[6] A helpful combination of some of the experts' primers on fracking tools and methods will be found in Appendix A. Excerpts of all *Patent Act* sections referenced will be found in

Appendix B. Any Figures referenced from the patents at issue or the prior art will be found in Appendix C. The Joint Statement of Issues will be found in Appendix D.

[7] The Joint Statement of Issues provided to this Court on December 21, 2021, contained 128 separate issues, many with their own sub-issues. After closing submissions, the parties had narrowed the scope of claims at issue down from approximately 145 claims across seven patents to approximately 123 claims at issue across six patents, still with 128 separate issues.

[8] There is no doubt this case is deeply complicated and highly technical – it has been referred to by counsel as “perhaps the most complex intellectual property matter before the Federal Court” and “more patent construction than most judges engage in during their entire judicial career.” There is no way to be certain, but I am inclined to agree with counsel’s sentiment. I am, as Justice Locke was, of the opinion that putting all these issues before the Court was an unwise litigation strategy.

[9] Lest this become a trend for this Court, or for the parties before it, I feel compelled to state that, in my view, putting these countless issues before the Court for simultaneous determination was detrimental to the aims of the parties in presenting the most clear and effective arguments. It is also contrary to the general principle of this Court to secure the just, most expeditious and least expensive outcome of every proceeding.

[10] This manner of presenting a case is akin to trial by everything but the kitchen sink. It unnecessarily obscured the points made by each party, took the parties’ and experts’ time and focus away from the determinative issues.

II. **Background**

A. *Pleadings and History of the Proceeding*

(1) ***The Parties***

[11] NCS and Kobold are competitors in the oilfield services industry; they provide equipment to the oil and gas industry for hydraulic fracturing [fracking].

[12] Promac provides custom machining services, primarily to businesses in the oil and gas industry. Promac primarily machines components for subsurface equipment, including sliding sleeves and components for tools. Relevant here, Promac manufactured sleeves and tools for Kobold.

[13] A Bottom Hole Assembly [BHA] typically has one or more “packers”, used to isolate different zones of the wellbore, and perform other operations such as opening sleeves or perforations through the casing.

[14] The NCS Patents, reviewed in further detail below, can be broken down into three groups: (1) downhole tools (the 676 and 652 Patents), (2) methods of shifting frac sleeves (the 907 and 026 Patents), and (3) frac valves (the 704 Patent). The NCS and Kobold Patents are reviewed in greater detail below. The 571 Patent owned by Kobold can likewise be described as a downhole tool.

(2) *The Actions*

[15] On July 24, 2018, NCS filed its Statement of Claim for Court File T-1420-18, commencing a patent infringement action against Kobold in respect of the NCS Patents. Kobold commenced its counterclaim by filing its initial Statement of Defence and Counterclaim on July 12, 2019, including allegations of impeachment respecting the NCS Patents and infringement of Kobold's 571 Patent.

[16] On May 21, 2020, NCS filed its Statement of Claim for Court File T-567-20, commencing an infringement action based on common design against Promac. On July 22, 2020, Promac filed its Statement of Defence and Counterclaim, including claims impeaching the NCS Patents.

(3) *2015 Lawsuit and Settlement Agreement*

[17] There was a previous lawsuit [T-1942-15] filed for infringement between the two parties in 2015, when NCS sued Kobold (operating as a prior Kobold company named Kobold Services Inc) for infringement of the 907 Patent and the 676 Patent. The action was brought with respect to Kobold's G3 technology. After several years of negotiation, the parties ultimately settled the dispute by way of a Settlement Agreement dated January 7, 2016 [Agreement]. NCS alleges that further infringement occurred after the Agreement was entered into by the parties. Kobold disputes what the agreement covered and there was extensive evidence led regarding the negotiation between the parties as to the agreement.

(4) *Alberta Court of King's Bench Action*

[18] There is currently other litigation stemming from the Agreement ongoing between the parties at the Alberta Court of King's Bench. Kobold began the manufacture and sale of a technology known as the G5 Sleeve. The parties dispute whether NCS was aware of this during their settlement negotiations. Regardless, the Alberta Court of King's Bench action stems from NCS's belief that the G5 Sleeves breach the settlement agreement.

[19] In that matter, NCS brought an application for an interlocutory injunction, which was ultimately dismissed by Justice Horner on June 21, 2018: *NCS Multistage v Kobold Corporation*, 2018 ABQB 485. The question on that matter was whether the G5 Sleeve is of the "general design" of the G3 Sleeve as outlined in the Settlement Agreement. Justice Horner, in dismissing the injunction application, found that there was no clear breach but that serious issues about the scope of the Agreement are present in view of the evidence of the negotiations leading up to the Agreement that was submitted by Kobold. The matter is presently stayed pending the outcome of this litigation.

[20] A related dispute at the time of the trial is in the Alberta Court of King's Bench between Kobold, Kicking Horse Oil & Gas Ltd [Kicking Horse], and a number of third parties including RM Engineering Inc [RM Engineering]. This dispute relates to claims in product liability. Though NCS is not party to that dispute, it submits that the facts are at least somewhat relevant to the instant case as it pertains to the allegedly infringing technology having been used on Kicking Horse well sites as well, and providing evidence with respect to Kobold's control over

wellsite operations. In addition, the President of RM Engineering, Ian Ross, was a witness in this trial and felt constrained in his answers given the ongoing litigation.

(5) ***Ongoing Federal Action***

[21] On April 6, 2020, Kobold brought an action in this court against NCS for infringement of its Canadian Patent No. 2,919,561 relating to its invention for a Tension Release Packer for a BHA. This action was being litigated at the time of the trial. In September 2021, NCS brought a motion for summary judgment seeking dismissal of the action. This motion was dismissed by Justice Zinn on December 17, 2021: *Kobold Corporation et al v NCS Multistage Inc*, 2021 FC 1437.

(6) ***Appeal of Constructive Trust Amendment***

[22] Finally, NCS is appealing the decision of Justice Manson in *NCS Multistage Inc v Kobold Corporation*, 2021 FC 1395. In that decision, Justice Manson affirmed the decision of Prothonotary Ring in the underlying action of this matter, where she denied NCS's motion to amend its pleading to include an allegation of constructive trust. The Federal Court of Appeal granted NCS's motion to stay the appeal proceedings pending the issuance of the judgment in the present action: *NCS Multistage Inc v Kobold Corporation*, 2022 FCA 42.

B. **Trial**

[23] Throughout the trial the Plaintiff brought several motions, on which orders were rendered during the trial so I will not include further discussion on those motions.

[24] The Plaintiff provided five fact witnesses: Robert Nipper, Marty Stromquist, John Ravensbergen, Ian Ross, and Richard Finney, and two expert witnesses: Doug Lehr and Dr. Rex Mennem. The Defendants provided four fact witnesses: Shawn Deugo, Per Angman, Tom Watkins, and Chris Baudistel, and three experts: Michael Chambers, Sean David, and Dr. William Fleckenstein. I note that all the Defendants retained the same counsel.

[25] The trial was originally scheduled to proceed in-person; however, due to a spike in cases of COVID-19 in December 2021 and January 2022 the bulk of the trial was conducted virtually, with the exception of closing arguments. I wish to commend counsel for their flexibility in this, as it was by this flexibility and ingenuity that they were able to make their cases effectively in a manner unaffected by the changing circumstances.

C. Technical Background [see also: technical primers Appendix A]

[26] Fracking is a method of extracting oil and gas from beneath the earth's surface. Hydrocarbons such as oil and natural gas are contained in underground formations. In order to access these hydrocarbons and bring them to the surface, a well is drilled. However, the formation may require additional treatment, such as "fracking" to stimulate the extraction of the hydrocarbons. This typically involves pumping large amounts of fluid at high pressure into the well.

[27] These formations may require horizontal drilling to allow the formation to be stimulated with multiple stages. The two forms of multistage horizontal stimulations are "Perf and Plug" and "Frac Sleeves." Frac sleeves can actuate with balls dropped from the surface or with tools run on coiled tubing, which open the sleeves and allow the formation to be stimulated either

down the coiled tubing or by pumping the stimulation fluid at high pressure down the annulus of the coiled tubing.

[28] Well treatment may be done in stages in order to selectively treat different zones of the formation. To do so, a completion tool, referred to as a BHA, can be run into the wellbore.

(1) *Well Drilling and Completion*

[29] Casing is joined together to run from the surface to a well's total depth. When several joints of casing are connected, this is often referred to as a "string" of casing.

[30] As explained by Mr. Chambers, Kobold's expert, in the late 1980's many wells began to be drilled horizontally. Horizontal drilling exposed more of the formation but also allowed the driller to intersect natural fractures in the rock which could transport oil and gas to the wellbore. Canada has since seen a movement from vertical to horizontal drilling.

[31] Where the well has low permeability (known as "tight"), it will require stimulation to produce oil and gas. Rocks such as tight sandstone, carbonate, or shale require fracturing using large volumes of water and/or proppant to keep the created fracture open.

[32] Mr. Lehr, NCS's expert, explains that fracking involves injecting fluids under high pressure through perforations in the casing and into the rock formations to create new fractures in the rock.

(2) *Tools and Sleeves*

[33] Two critical terms in this decision are “tools” and “sleeves.” As noted by the experts, tools refer to devices that perform an intended function in a wellbore. This may refer to a single function, or multiple functions. Multiple tools together, chosen for a specific job, form a BHA. The BHA is assembled at the well site by threading the tools together. For example, perforating guns and abrasive jet perforation devices are tools that are run downhole to achieve perforation. Sliding sleeves are a tubular that is covered by at least one more tubular which can slide along the length of the first tubular.

III. Issues

[34] I have divided the issues into three categories: Common and Legal Issues, NCS Patents, and Kobold Patents.

[35] Even though some issues were worded differently between the parties’ closing submissions, pleadings, and the Joint Statement of Issues, the issues listed below in this section fully encompass the issues left to decide at the end of the trial. Further note should be taken that not all issues will be addressed, only those found to be determinative or of particular significance to the matter at hand. Where issues are not addressed in the analysis, there are brief reasons in the appropriate sections for why they were not addressed.

A. Common and Legal Issues

[36] While it is rare for cases involving multiple patents to have common issues between the patents and other legal issues, the remarkable similarity between the patents at issue,

resemblance of the submissions between the parties, and (mostly) general agreement between the experts, it is a better use of resources to consolidate like issues to avoid unnecessary duplication. As will be discussed in the analysis, the Common Issues are replicated issues arising from each patent.

[37] The Common Issues are as follows:

- A. What is the person of skill in the art [POSITA] relevant to the NCS and Kobold patents?
- B. What is the common general knowledge [CGK] relevant to the NCS and Kobold patents?
- C. What construction do I adopt of relevant claim terms repeated among multiple patents?

[38] The Legal Issues raised by the parties include whether Kobold induced Promac to infringe NCS's Patents, whether "common design" is a viable cause of action under Canadian patent law, if the Agreement affects this action, if NCS is estopped by *res judicata* or any equitable remedy from asserting infringement claims and misrepresentation and Patent ownership. Some of these and other legal issues raised were addressed and some are not in the legal analysis. As previously mentioned, where issues were raised and are not addressed in the analysis, there are brief reasons in the appropriate sections for why they were not addressed.

B. NCS Patents

(1) ***The 676 Patent***

[39] In the context of stimulation operations within a wellbore (fracturing or fracking), debris is a common problem. The 676 Patent relates to a downhole tool assembly with debris relief, and a method for using it for completing a well. The debris relief features, including forward and reverse circulation pathways, allow it to be used in solids-laden environments.

[40] Canadian Patent No. 2,749, 636 [636 Patent] is a forced division of the 676 Patent and relates to multi-function valves for downhole assemblies and pressure equalization assemblies comprising such valves.

[41] The independent claims are Claims 1, 18, and 34.

[42] The Joint Statement of Issues suggests Claims 1-34 are at issue. In their closing submissions, the Plaintiff maintains this is the case, though the Defendants only frames Claims 1-32 as being at issue. As they were all argued at trial, and given the parties appear at odds about which claims are still at issue, I will construct Claims 1-34.

[43] The following specific allegations are levied against the claims of the 676 Patent:

- A. Anticipation: Claims 1, 4, 8-12, and 18-31;
- B. Obviousness: Claims 1-32;
- C. Overbreadth: Claims 1-32; and,

D. Inutility: Claims 1-32.

[44] NCS alleges the Defendants infringed Claims 1-32 of the 676 Patent.

(2) *The 652 Patent*

[45] The 652 Patent discloses the same invention as the 676 Patent, directed at downhole tools and debris relief therein.

[46] The 652 Patent is a forced division of the 636 Patent and relates to downhole assemblies that include a debris relief passageway within a J-slot and methods of using the assemblies to improve stimulation operation in a debris-laden environment.

[47] The Joint Statement of Issues suggests Claims 1-26 are at issue. In their closing submissions, the Plaintiff maintains this is the case, though the Defendants only frames Claims 4 and 6-26 as being at issue. As they were all argued at trial, and given the parties appear at odds about which claims are still at issue, I will construct Claims 1-26.

[48] The following specific allegations are levied against the claims of the 652 Patent:

- A. Anticipation: Claims 1, 4, 6, 8-10, 13, 19, 20, 22, and 24;
- B. Obviousness: Claims 4 and 6-26;
- C. Overbreadth: Claims 4 and 6-26;
- D. Inutility: Claims 1-26;

- E. Insufficiency: Claims 1-26;
- F. Ambiguity: Claims 19-23;
- G. Double Patenting: Claims 1-18 and 24-26; and,
- H. Prior Disclosure: Claims 1-26.

[49] NCS alleges the Defendants infringed Claims 4 and 6-26 of the 676 Patent.

(3) ***The 907 Patent***

[50] In the context of an oil or gas well, it is common for the sleeve to shift in order to enable or disable flow from varying portions of the assembly. The 907 Patent claims a system and method for a shifting sleeve in stimulation operations within a wellbore in which a ported tubular provides selective access to the adjacent formation through, among other means, being opened or isolated.

[51] The parties agree on Claims 1-28 being at issue for the 907 Patent, and this is also reflected in the Joint Statement of Issues. I shall construct all 28 claims.

[52] The following specific allegations are levied against the claims of the 907 Patent:

- A. Anticipation: Claims 16-23;
- B. Obviousness: Claims 1-28;
- C. Overbreadth: Claims 1-28;

- D. Inutility: Claims 1-28;
- E. Insufficiency: Claims 1-28; and,
- F. Ambiguity: Claims 22, 23, and 26-28.

[53] NCS alleges the Defendants infringed Claims 1-3-, 8-10, 12-18, and 20-28 of the 907 Patent.

(4) *The 026 Patent*

[54] The 026 Patent discloses the same invention as the 907 Patent (i.e. it is a forced division), directed at methods of shifting frac sleeves to open one or more ports in a tubular.

[55] The Defendants and the Joint Statement of Issues suggest Claims 1-14 are at issue. In their closing submissions, the Plaintiff frames Claims 1-14 and 24-26 as being at issue. I take it this must be a typo, as there are only 14 claims in the 026 Patent, and I will only construct those 14 claims.

[56] The following specific allegations are levied against the claims of the 026 Patent:

- A. Anticipation: Claims 1, 2, 6, 7, 11, and 12;
- B. Obviousness: Claims 1-14;
- C. Overbreadth: Claims 1-14;
- D. Inutility: Claims 1-14; and,

E. Insufficiency: Claims 1-14.

[57] NCS alleges the Defendants infringed Claims 1 and 6-14 of the 026 Patent.

(5) ***The 704 Patent***

[58] The 704 Patent claims a valve for the fracturing of a wellbore. The valve comprises a tubular mandrel and a frac window. A valve may be closed to prevent fluid communication from the tubing string out the frac window, or opened to enable this. This tool may be installed in a downhole tool which has a perforation device, and can be used with either one or two sealing elements.

[59] There was some back and forth regarding the invention story of this patent, but it will have no material impact on the issues at hand.

[60] The Joint Statement of Issues suggests Claims 1-30 are at issue. In their closing submissions, the Plaintiff suggests Claims 1-26 and 28-30 are at issue, and the Defendants frame Claims 1-16, 18-23, and 28-30 as being at issue. As only Claims 1-23 and 28-30 were argued at trial, and given the parties appear at odds about which claims are still at issue, I will construct Claims 1-23 and 28-30.

[61] The following specific allegations are levied against the claims of the 704 Patent:

A. Anticipation: Claim 1;

B. Obviousness: Claims 1-30;

- C. Overbreadth: Claims 1-30;
- D. Inutility: Claims 1-30;
- E. Insufficiency: Claims 1-30;
- F. Ambiguity: Claims 4, 5, 10, 18, and 21; and,
- G. Double Patenting: Claims 1-30.

[62] NCS alleges the Defendants infringed Claims 1-16, 18-23, and 28-30 of the 704 Patent.

C. *Kobold Patents*

(1) *The 830 Patent*

[63] The 830 Patent claims an apparatus for a downhole tool with a shock-absorbing sleeve, particularly for use in absorbing or dampening the effects resulting from the actuation of a shifting sleeve during downhole operations.

[64] The action regarding infringement of this patent is no longer being pursued.

(2) *The 571 Patent*

[65] The 571 Patent describes a shock-absorbing dampening system for a sliding sleeve that uses viscous dampening to control the speed of the sleeve and is titled “Downhole Tool Having a Shock-Absorbing Sleeve.” The inventors of the 571 Patent are Per Angman, Kevin Graf, Chris Baudistel, and Mark Andreychuk.

[66] The 571 Patent was filed on July 10, 2014, and has a priority date of July 10, 2013. It is not in dispute that it is a voluntary divisional the 830 Patent.

[67] Kobold called Mr. Angman as a fact witness and he explained the 571 Patent invention background. Kobold also called Dr. Fleckenstein as its expert and NCS called Dr. Mennem. I note that the Court struck portions of Dr. Mennem's report related to measurements taken by Mr. Watson. Mr. Finney also acted as a fact witness for NCS. He is NCS's VP of manufacturing and explained the LP3 sleeve that is alleged to infringe the 571 Patent.

[68] Kobold is only alleging that those embodiments without a seal are infringed.

[69] The Joint Statement of Issues suggests Claims 1-27 are at issue. In their closing submissions, NCS argues Claims 1-16 are at issue. Kobold argues across all the issues that Claims 1-27 are still at issue. Out of an abundance of caution, I will construct Claims 1-27.

[70] The following specific allegations are levied against the claims of the 571 Patent:

- A. Anticipation: Claims 1-3, 25, and 27;
- B. Obviousness: Claims 1-27;
- C. Overbreadth: Claims 1-27;
- D. Inutility: Claims 1, 25, and 27;
- E. Insufficiency: Claims 1, 24, 25, and 27;

F. Ambiguity: Claims 1, 6, and 25-27; and,

G. Double Patenting: Claims 1-27.

[71] Kobold alleges NCS infringed Claims 6, 11, 12, and 16 of the 571 Patent.

D. Analytical Framework

[72] Below is an outline of the framework of the analysis:

- A. Evidence: A discussion of the Fact and Expert Witnesses whose submissions were heard and received, including issues with the evidence from those witnesses;
- B. Legal Principles: An overview of all the legal principles required to reach a conclusion in this case;
- C. Summary of Prior Art: Given there is repetition and overlap in prior art for each patent there is a general summary of the applicable prior art for each patent with references back to those summaries;
- D. Common Issues: the Common Issues are addressed as outlined in the Issues section above;
- E. Claims Construction: A claim-by-claim construction for each patent, bearing in mind the weight of the evidence and the Common Issues findings;
- F. Validity: A patent-by-patent analysis for each head of validity issues raised, following the order laid out in the Issues section above;
- G. Infringement: For claims that survive the validity analysis, there is a fact-specific analysis of whether or not the valid claims have been infringed by the other party; and,
- H. Other Issues: The various other issues are dealt with.

[73] Following this analysis are the findings on Remedies and Costs, followed by the Conclusion, and Judgment.

IV. **Evidence**

A. *Fact Witnesses*

[74] The Court had the benefit of helpful fact witnesses, all of which were found to be credible.

(1) ***Fact Witnesses for NCS***

(a) *Robert Nipper*

[75] Robert Nipper was the Chief Executive Officer of NCS Multistage, LLC, the publicly traded parent company of the Canadian NCS Multistage Inc. He is listed as an inventor on the 676, 652, 907, and 026 Patents.

(b) *Marty Stromquist*

[76] Marty Stromquist is a co-founder of NCS Multistage, LLC, serving variously as Chief Operating Officer from 2010-2015, Chief Technology Officer in 2016, and President from 2016-2020. His practical experience is extensive, lacking a formal education is of no discernible disadvantage to him in the oil and gas industry. He worked for a number of companies that are mentioned in this trial as well as doing his own start up companies. Mr. Stromquist is presently a director of NCS Multistage, LLC. He is listed as an inventor on four of the five patents asserted

by NCS: the 676, 652, 907, and 026 Patents. Mr. Stromquist negotiated with Kobold on behalf of NCS regarding the previous patent dispute between the parties.

(c) *John Ravensbergen*

[77] John Ravensbergen is an engineer and the Chief Technology Officer of NCS Multistage, LLC, having previously served in Research and Development and as Engineering Manager. He joined NCS in 2011, and previously worked for a firm called “Baker Hughes” from 2010-2011, and before that at a firm called “BJ Services” beginning in 1996. He is listed as an inventor on the 704 Patent, and is additionally an inventor of over 100 patents.

(d) *Ian Ross*

[78] Ian Ross is the President and one of the founders of RM Engineering. Mr. Ross has experience relevant to this trial because he was on a job site where Kobold tools and sleeves were sold to be installed in a well for a company called Kicking Horse [See: history of proceedings section; actions].

(e) *Richard Finney*

[79] Richard Finney is the Vice-President of Manufacturing at NCS Multistage, LLC, handling matters related to supply chain, maintenance, and repair operations.

(2) *Fact Witnesses for Kobold and Promac*

(a) *Shawn Deugo*

[80] Shawn Deugo currently serves as technical support for Promac; previously, he was General Manager of Promac for several decades. Additionally, he was Promac's corporate representative during the discovery process. His knowledge relates to the nature of the services that Promac provides. Mr. Deugo has done manufacturing for both NCS and Kobold in the past as well as numerous other oil and gas related companies.

(b) *Per Angman*

[81] Per Angman is one of the founders of Kobold, and a listed inventor on the 571 Patent. He possesses a master's degree in mining engineering, and has worked on designing tools in the oil industry for several decades. Prior to founding Kobold in 2007, Mr. Angman was chief engineer for 15 years at Tesco Corporation where he worked on their casing drilling technology. At Tesco, Mr. Angman was involved in the design and development of downhole tools.

(c) *Tom Watkins*

[82] Tom Watkins is the Chief Technology Officer at Advance Upstream. He has prior experience with BJ Services [BJ] (which, as noted, became part of Baker Hughes), and, while there, was involved in a project called the "OptiPort Sleeve."

(d) *Chris Baudistel*

[83] Chris Baudistel is the President of Kobold Completions Inc, and was until recently the General Manager of all three Kobold Defendants. He was also Kobold's corporate representative during discovery. Prior to working at Kobold, Mr. Baudistel worked with Mr. Angman at Tesco Corporation from 2001 until 2008. At this point Mr. Baudistel joined Kobold, where he worked as Manager of Operations for many years.

B. *Expert Witnesses*

[84] The Parties had many disputes regarding specific evidence from and general credibility of each expert. Despite these disputes, I found all the experts credible and helpful to the court. There were issues regarding experts co-mingling claims construction issues with validity issues, and using disclosure improperly. I will address particular issues with the experts' evidence after discussing their qualifications.

(1) *Experts for NCS*

(a) *Dr. Rex Mennem*

[85] Dr. Rex Mennem holds a PhD in Mechanical Engineering from Purdue University. He is currently the founder and principal of Touchstone Technology Services LLC, which provides technical and management consulting to companies in the oil and gas industry. Prior to forming Touchstone, Dr. Mennem worked at Schlumberger from 2004 to 2020 in engineering.

[86] Dr. Mennem was qualified as an expert in the design, development and operation of downhole equipment and completion accessories in the oil and gas industry, including but not limited to sliding sleeves. He offered evidence on the 571 Patent.

(b) *Mr. Doug Lehr*

[87] Mr. Lehr is an engineer with over 40 years of experience in designing tools for oil and gas applications. He holds a Bachelor of Science in Mechanical Engineering from the University of Texas, as well as an MBA in Finance and Marketing from the University of Houston.

[88] He is the Founder and Principle of Integris Technology Services LLC, a consultancy offering services in litigation consulting, product and system development, failure analysis and design assurance in the oil and gas industry. Previously, he worked at Baker Hughes in various roles for 10 years, and spent more than 15 years at BJ Services.

[89] Mr. Lehr was qualified as an expert in the engineering, design and operation of tools for oil and gas applications, including but not limited to downhole tools and sleeves for use in hydraulic fracturing. He offered evidence on the validity and infringement of the NCS Patents.

(c) *Issues Regarding Mr. Lehr's Opinions*

[90] One quirk I must have regard for throughout this decision and in reviewing the evidence is Mr. Lehr's tendency, both in his reports and in testimony, to rely upon the disclosure in the patents when interpreting claims. This is not in and of itself a problematic practice, but Mr. Lehr repeatedly misuses the disclosure in ways that artificially expand the scope of the claims he

interprets. NCS relies on Mr. Lehr's interpretations during their construction submissions, and by extension throughout their remaining submissions regarding the patents.

[91] The clearest example, which will be analyzed in depth later in this decision, is Mr. Lehr's construction of the term "comprising." In his construction, Mr. Lehr suggested the use of this term in the 676 Patent referenced an open-ended portion of the patent's disclosure using similar non-exhaustive language such as "will typically include" or the inclusion in the disclosure of the ability to make "modifications to the specified devices and the arrangement of the assembly." He further attempts to construe claims which use this recursively non-exhaustive language by suggesting elements which are absent in a claim can be included by extrapolation because the non-exhaustive nature of "comprising" permits any element captured in the CGK, necessary or otherwise, to be included in the claim by virtue of this non-exhaustive language. While a specific discussion on the use and interpretation of non-exhaustive language follows later in this decision, this is a firm example of misusing language in the patent disclosure to expand the interpretation of the claim beyond the invention being claimed.

[92] Mr. Lehr frequently relies on the CGK to add elements to claims by extrapolation. In addition to being improper, this brings greater scrutiny to Mr. Lehr's description of the CGK. It is fair to characterize his description of the CGK as pessimistic. While the other experts were in agreement on the broad strokes of the CGK with respect to the NCS Patents, Mr. Lehr took several positions which appeared at odds with expertise and historical facts. One such example was Mr. Lehr's position that downhole tools would often get stuck in deviated wells (particularly in coiled tubing operations) due to debris issues, and that operators were not using coiled tubing for fracturing operations because they were afraid of getting stuck. To the contrary, fracturing

using coiled tubing conveyed tools has been used for about 25 years, and was a proven technology by the year 2000. This method was used when it met the operators' needs and budget. Mr. Lehr's opinions call into question his description of the CGK.

[93] For these reasons, I am forced to give less weight to Mr. Lehr's opinions regarding the construction of relevant claim terms, the CGK, and the claims themselves, as well as NCS's reliance on them. I will conduct my own construction of the relevant claim terms, the CGK, and the claims themselves to maintain as much fairness to the parties as possible, while considering and weighing each expert's opinions throughout this decision.

(2) *Experts for Kobold*

(a) *Mr. Michael Chambers*

[94] Mr. Chambers holds a Bachelor of Science degree in Petroleum Engineering from Texas A&M University. He has over 35 years of experience as an engineer, manager and consultant in the oil and gas industry. Mr. Chambers has authored over a dozen publications and has given numerous industry presentations. He holds four patents in the United States related to oil and gas technology.

[95] Mr. Chambers was qualified as an expert in wellbore completions engineering in the oil and gas industry, including the design and supervision of completions operations such as perforating, shifting sleeves, and fracturing, as well as the tools and technology used to carry out such operations. He offered evidence on the validity and infringement of the NCS Patents.

(b) *Mr. Sean David*

[96] Mr. David is a professional engineer with over 18 years of experience, including as a well-site supervisor. He was the expert for the Defendants in the Alberta Injunction application. He was qualified as an expert mechanical engineer with expertise in drilling, completions and production operations as well as tool design, and with specific experience in managing fracturing operations and selecting tools for coil tube fracturing involving shiftable sleeves. He offered evidence on the validity and infringement of the NCS Patents.

(c) *Dr. William Fleckenstein*

[97] Dr. Fleckenstein is a professional engineer with a PhD in petroleum engineering from the Colorado School of Mines. He is currently also a professor at the Colorado School of Mines and teaches a course that involves educating students on sleeves, slips, packers, J-profiles and other subject matter that is directly relevant to the issues in dispute in this action. He also has significant experience working in the oil and gas industry, and is a named inventor on two patents relating to sliding sleeves. He offered evidence on the validity and infringement of the 571 Patent.

[98] Dr. Fleckenstein was qualified as an expert in fracturing operations, including the design of sliding sleeves.

(d) *Alleged Issues Regarding Kobold's Experts*

[99] Throughout the trial, NCS raised numerous issues with Kobold's experts. NCS repeatedly impugned the impartiality and independence of Kobold's experts, asserting that no weight or consideration should be given to their evidence for a variety of reasons mostly related to their independence and objectivity. These issues largely apply to Mr. Chambers' and Mr. David's evidence.

[100] One such issue concerned a shop tour that Mr. David and Mr. Chambers took of Kobold's facilities along with counsel for Kobold and other Kobold representatives. During trial, NCS raised concerns about the purpose of the tour after learning that Mr. David and Mr. Chambers attended the tour together and were given a demonstration and explanation from Kobold engineers about the functioning of Kobold's technology. This tour had been disclosed in Mr. David's expert report but not in Mr. Chambers'. NCS brought a motion seeking further disclosure from Kobold about the purpose and the events of the shop tour. I granted the motion in part, requiring disclosure of any communication between counsel for Kobold and Mr. David with respect to the shop tour but did not find the tour tainted the experts in any way or that Counsel was unethical in the situation.

[101] NCS raised another issue with Mr. David and Mr. Chambers with respect to the 676 Patent and the search terms they used when searching for the relevant state of the art. NCS argued that the Court must refrain from relying on the testimony of Mr. David and Mr. Chambers because it was unclear which search terms had been provided to them by Kobold's counsel and which they had searched for independently.

[102] I accept that it is preferable for experts to search for material independently and not to be exclusively guided by counsel; however, the fact that some material relevant to determining may have been provided by counsel does not necessarily render expert evidence wholly inadmissible: *Excalibre Oil Tools Ltd v Advantage Products Inc*, 2016 FC 1279 at para 152, aff'd 2009 FCA 121.

[103] Moreover, it is not clear that Kobold overstepped the bounds of permissible involvement, nor do any concerns arise about the objectivity of Kobold's experts. NCS had every opportunity to test the foundation of the experts' opinions and was fully able to cross-examine the witnesses. The Supreme Court in *White Burgess Langille Inman v Abbott and Haliburton Co*, 2015 SCC 23 at paragraph 61 explicitly rejected the suggestion that "an expert lacks the threshold qualification ... simply because the expert relies on the work of other professionals in reaching his or her own opinion." I therefore decline to assign no weight to Kobold's experts.

[104] NCS has also raised a concern regarding Dr. Fleckenstein's analysis with respect to infringement, anticipation, obviousness, and double patenting. NCS submits that Dr. Fleckenstein does not and did not understand the basic principles of claim construction – in particular his understanding of claim dependencies and how limitations in dependent claims narrow the scope of the claim.

[105] I do not share the same concerns as NCS regarding Dr. Fleckenstein and do not find his analysis to be fundamentally flawed. Dr. Fleckenstein refused to read in later, limiting claims into earlier claims, which in my view is not an error but instead a correct recognition of claim differentiation: it is impermissible to import limitations from dependent claims into the prior

claims. Although Dr. Fleckenstein did not explicitly state that dependent claims narrow the scope of a claim, he understood and acknowledged that dependent claims act as limitations.

[106] NCS raised in cross-examination of Dr. Fleckenstein issues regarding his revenue sharing with a University for a series of patents. Dr. Fleckenstein no longer does this “business”. It was clear at the trial that this was not a consideration at all and did not “taint” his expert opinion. I do not find Dr. Fleckenstein’s expert evidence of any less weight than Dr. Mennem’s.

V. Legal Principles

A. Claim Construction

[107] Claim construction is a question of law for the judge that precedes the consideration of validity or infringement: *Whirlpool Corp v Camco Inc*, 2000 SCC 67 at paras 43, 49, and 61 [*Whirlpool*].

[108] The construction exercise is guided by the following principles:

- A. Claims should be viewed through the eyes of the POSITA as of the relevant date, having regard to the CGK: *Whirlpool* at paras 45, 53-56; *Free World Trust v Electro Santé Inc*, 2000 SCC 66 at paras 44, 51-54, 58 [*Free World Trust*]; *Tearlab Corporation v I-MED Pharma Inc*, 2019 FCA 179 at para 32 [*Tearlab*]; *Consolboard Inc v MacMillan Bloedel (Sask) Ltd*, [1981] 1 SCR 504 at 521 [*Consolboard*].
- B. In reaching a purposive construction, the Court must identify elements of the invention as essential or non-essential. Only the former falls within the legal protection of the patent: *Whirlpool* at paras 45, 49; *Free World Trust* at paras 31, 52, 55-57; *Tearlab* at para 31. The SCC tells us that purposive construction entails determining what an essential element of the claim is. If the patentee cannot show that a claim element is not essential it is presumed to be essential: *Pollard Banknote*

v BABN tec, 2016 FC 883 para 74 [*BABN*]. If an essential element can be substituted for or omitted from the alleged infringing method or device there is no infringement but if a non-essential element is substituted then infringement may still occur: *Free World Trust* at para 31.

- C. The SCC has made clear that purposive construction applies to both infringement and validity: *Whirlpool* at para 49.
- D. Construction should begin with the language of the claims, read in an informed and purposive way with a mind willing to understand, paying close attention to the purpose and intent of the author, and the context and use to which the words of the claims are being put: *Whirlpool* at paras 49, 50; *Free World Trust* at paras 31, 39-40, 50-51, 58-60; *Tearlab* at para 31.
- E. If the language of the claims is ambiguous when read in context, the whole of the specification should be considered to ascertain the nature of the invention, but not to unduly enlarge or narrow the scope of the claims: *Whirlpool* at para, 51-52; *Free World Trust* at para 32; *Tearlab* at para 33; *Mylan Pharmaceuticals ULC v Eli Lilly Canada Inc*, 2016 FCA 119 at paras 39-43 [*Mylan*]; *Hospira Healthcare Corporation v Kennedy Trust for Rheumatology Research*, 2020 FCA 30 at paras 21-22 [*Hospira*].
- F. Extrinsic evidence going to the inventor's actual intent is irrelevant: *Free World Trust* at paras 61-67; *Bombardier Recreational Products Inc v Arctic Cat, Inc*, 2018 FCA 172 at paras 22-23.
- G. The construction of the claims should be neither benevolent nor harsh, but should instead be reasonable and fair to both the patentee and the public, promoting fairness and predictability: *Whirlpool* at para 49; *Free World Trust* at paras 31, 41-43; *Tearlab* at para 33; *Consolboard* at 520.
- H. The SCC has rejected using the vague notion of the "spirit of the invention" to reach a purposive construction. Such construction does not promote predictability. Claim language is paramount to construe the patent, and the SCC noted that adhering to the language of the claims promotes the public notice function: *Free World Trust* at para 50.
- I. To reach a purposive construction, the Court must direct itself to the words of the claims interpreted in the context of the patent specification as a whole: *Whirlpool* at para 49. The Court must look to the specification for meaning of a word before resorting to a "dictionary approach": *Whirlpool* at para 52. This does not mean that

the Court is to ignore the ordinary rules of grammar and syntax: *ABB Technology AG v Hyundai Heavy Industries Co*, 2015 FCA 181 at para 45 [*ABB Tech*]. The Court must remain vigilant, when using the patent specification to understand the words of the claims, to not use the specification to unduly enlarge or contract the scope of the claims: *Tearlab* at para 33 [Emphasis added].

- J. The words chosen by a patentee will be read in the sense the patentee is presumed to have intended; however, if a patentee inadvertently creates a limitation in the claims, it is a self-inflicted wound: *Free World Trust* at para 51.
- K. The relevant date for claim construction is the date of publication, or the priority date if it is based on a foreign patent application: *Whirlpool* at para 56; *Free World Trust* at paras 31, 52-55.

(1) ***Claim Differentiation***

[109] The concept of claim differentiation is an assumption against redundancy between patent claims. The idea presumes that when patent claims are drafted, each claim has a different scope so as not to be redundant with another. In *Camsco Inc v Soucy International Inc*, 2019 FC 255 [*Camsco*], Justice Locke explained claim differentiation as it applies to dependent claims as follows:

[103] It is well understood that where one claim differs from another in only a single feature it is difficult to argue that the different feature has not been made essential to the claim. It follows from this that a dependent claim, which incorporates all of the elements of the independent claim on which it depends, will generally be construed more narrowly than the independent claim: [*Halford* at para 90]. The limitations of the dependent claim are generally not read into the independent claim: *Halford* at para 93. Moreover, the independent claim should not be construed in a manner that is inconsistent with the dependent claim: *Halford* at paras 91, 95.

[Emphasis added]

[110] This Court has explained claim differentiation as a “contextual method of interpretation”:
Bauer Hockey Ltd v Sport Masko Inc (CCM Hockey), 2020 FC 624 at para 68 [Bauer 2020].

[111] The rebuttable presumption of claim differentiation can be applied to a claim and its dependent claim as well as between independent claims: *Camsco* at paras 103, 186-190. Claim differentiation can assist when determining if an element is essential. For example if one claim differs from another in only a single feature it is difficult to argue that the different feature is not essential to the claim: *Whirlpool* at para 79. There is a presumption that if different words are used, they are used to distinguish features and not to express synonyms: *ABB Technology AG v Hyundai Heavy Industries Co, Ltd.*, 2013 FC 947 at para 29, aff'd 2015 FCA 181.

(2) *Use of File Histories*

[112] 'File wrappers' refer to evidence found within the prosecution history of a patent. File wrapper estoppel is a doctrine, often confusing in its application in Canada, which states that patentees may be precluded from recapturing ground conceded during negotiations with the Patent Office. The Supreme Court of Canada in *Free World Trust*, held that there is no doctrine of file wrapper estoppel in Canada and that the prosecution history pertaining to a patent is extrinsic evidence that generally cannot be considered in construing the patent.

[113] That said, amendments to the *Patent Act* in 2018 introduced Section 53.1 of the Act, which provided a statutory exception to this common law prohibition. It permits "written communications" between the patentee and the Patent Office during prosecution of the patent to be relied on in litigation to rebut representations made by the patentee during the action or proceeding about construction of a claim in the patent.

(3) ***The POSITA***

[114] In order to construe the claims in issue, the Court must first define the POSITA. The POSITA is a “hypothetical person possessing the ordinary skill and knowledge of the particular art to which the invention relates, and a mind willing to understand a specification that is addressed to him”: *Free World Trust* at para 44.

[115] The POSITA may be a team of people, rather than a single individual: *Teva Canada Limited v Janssen Inc*, 2018 FC 754 at para 66 [*Teva FC 2018*], aff’d 2019 FCA 273. The POSITA has qualities of a competent technician, like deduction and dexterity, but lacks inventiveness and imagination: *Whirlpool* at para 74; *Hospira* at paras 79-80. They are reasonably diligent in keeping up with advances in the field to which the patent relates: *Whirlpool* at para 74.

(4) ***CGK***

[116] The CGK is the knowledge generally known by the POSITA: *Free World Trust* at para 44; *Apotex Inc v Sanofi-Synthelabo Canada Inc*, 2008 SCC 61 at para 37 [Sanofi]; *Bell Helicopter Textron Canada Limitée v Eurocopter, société par actions simplifiée*, 2013 FCA 219 at para 65 [Bell Helicopter]; *Mylan* at para 24.

[117] It does not amount to all information in the public domain, but is not limited to information that is written down: *Bell Helicopter* at para 64; *Ciba Specialty Chemicals Water Treatments Limited v SNF Inc*, 2017 FCA 225 at para 37 [*Ciba*]; *Novopharm Limited v. Janssen-Ortho Inc*, 2007 FCA 217 at para 25 [*Novopharm*]. It has been described as the information that

a POSITA would become aware of and accept as a “good basis for further action”: *Mylan* at para 24. The CGK undergoes continuous evolution and growth: *Novopharm* at para 25.

[118] The relevant date for assessing the state of the CGK for the purposes of claim construction is the date of the publication and for the purposes of assessing obviousness the critical date is the claim date: *Camsco* at para 135.

(5) ***Purposive Construction and Distinguishing Essential Elements between Claim Construction and Invalidity***

[119] Claim elements are presumed to be essential and the party alleging otherwise has the onus to establish they are not: *MediaTube Corp v Bell Canada*, 2017 FC 6 at para 33 [*MediaTube*]. In reaching a purposive construction of the claims, the Court, with assistance of the skilled reader, will identify the particular words or phrases in the claims that describe what the inventor considered to be “essential” of their invention: *Whirlpool* at paras 45, 49. If an element is essential and an alleged infringer successfully substitutes that element for another, it will have successfully evaded the patentee’s monopoly and there will be no patent infringement.

[120] Throughout this action, a frequent issue that arose was confusion between essential elements as it pertains to claim construction and essential elements as they pertain to the overbreadth and utility analysis. Kobold’s approach to construction and several portions of the experts’ evidence on occasion confuse essential elements between these contexts. Although it is understandable that experts are inclined to indicate that the claim will not operate, in my view it is inappropriate to discuss whether the claims are operable or overbroad when construing the claims. This is because issues pertaining to whether the claims work relate to validity, which is

an issue for consideration subsequent to construction: see *Janssen-Ortho Inc v Canada (Minister of Health)*, 2010 FC 42.

[121] Whether or not the invention practically works as claimed is only relevant insofar as construction requires a determination of whether a claim element is essential or non-essential: *Free World Trust* at para 55. A claimed element will be non-essential if its variant does not affect the working of the invention: *Free World Trust* at para 55.

[122] In its written closing submissions, Kobold sets out the law of overbreadth as follows:

389. There is no specific method for the assessment of overbreadth. Usually, a finding of overbreadth flows from the fact that an essential element of the invention is missing from the claims. However, the search for the missing essential element must not morph into an inquiry into the achievement of the invention's objectives.

390. The determining that a feature of an invention is essential is a distinct exercise for the purpose of overbreadth than for the purpose of claim construction. For overbreadth, the focus is not whether omitting or changing the feature avoids the Claim (as it is for claim construction), but rather whether that feature is so key to the invention described in the disclosure that a Claim that omits it encompasses embodiments that were not contemplated in the disclosure.

[123] Kobold recognizes, based on the Federal Court of Appeal's guidance in *Seedlings Life Science Ventures, LLC v Pfizer Canada ULC*, 2021 FCA 154 at paragraphs 51-54 [*Seedlings FCA*], that ascertaining essential elements as they pertain to overbreadth is a distinct exercise from claim construction. This same logic applies to the utility analysis: a party should not preemptively look to inutility and then conclude that an invention provides no utility as it is missing basic structural components when construing the claims.

[124] Counsel for Kobold also explained the following in closing:

Claim construction says is [*sic*] essential elements is about what needs to be there to infringe, what are they claiming, what do they think was the important part of their invention and what are they fencing off.

When you're dealing with overbreadth, you're looking at what was essential to the way the invention worked...

Transcript, 1 March 2023 NCS Volume 23

[125] Despite the recognition of this distinction in the law, Kobold's construction frequently conflates essential elements as they pertain to overbreadth with essential elements at the construction stage. This confusion appears to stem from a failure to account for the purposive construction approach that *Whirlpool* establishes.

[126] In *Western Oilfield*, the Court of Appeal explained the following:

[129] The concept of Claim invalidity for overbreadth (or overclaiming) arises from the combination of the requirements that a patent specification (i) correctly and fully describe the invention (see subsection 27(3) of the *Patent Act*), and (ii) include "Claims defining distinctly and in explicit terms the subject matter of the invention for which an exclusive privilege or property is claimed" (see subsection 27(4)). One may also consider overclaiming as a natural consequence of the bargain theory of patent law as described in *Free World Trust*, at paragraph 13: "[i]n return for disclosure of the invention to the public, the inventor acquires for a limited time the exclusive right to exploit it." If a patent claims more than it describes, or more than the inventor has made, it gives the patentee more than the bargain entitles them to. Such a Claim violates the bargain and is therefore invalid.

[127] An example best demonstrates *how* and *why* Kobold conflates the essential element analysis. In closing, Kobold's counsel explained with respect to the 676 Patent, "[y]ou can't read

the equalization valve into those earlier claims to save them. If the inventor wanted to include it, it needed to put the valve in those claims. It's essential.”

[128] The jurisprudence is clear that the essential element determination asks distinct questions for the purposes of claim construction and for invalidity. At the construction stage, the Court is following *Whirlpool's* direction regarding substitutability in light of a purposive reading of the patent and its claims. In contrast, when conducting an overbreadth analysis “the focus is not whether omitting or changing the feature avoids the claim (as it is for claim construction), but rather whether that feature is so key to the invention described in the disclosure that a claim that omits it encompasses embodiments that were not contemplated in the disclosure”: *Seedlings FCA* at para 54. In my view, at the overbreadth stage, the Court is asking whether the claim is missing a necessary element that goes to the very core of the described invention.

[129] Therefore, if the invention requires a specific element in order to function, that element must be found within the claim, unless on a purposive construction the POSITA would understand that the element is inherently found within the claim.

[130] It appears part of this conflation stems from the use of the word “comprising,” which shall be addressed in full later.

[131] Finally, I note that the Court's determination of essential elements is imperative and may be determinative of infringement findings. Recent commentary by Ron Dimock has noted, “[s]ince the decision in *Free World Trust* and the imposition of a one-size-fits-all purposive construction, patentees have been rightly concerned about ensuring that a claim is read as

broadly as possible for infringement purposes while, at the same time, avoiding invalidity attacks”: Ronald E Dimock et al, “Protection Against Infringement of Patents in Canada” (2021) 36 Canadian Intellectual Property Review at 58, online: <https://ipic.ca/cipr/protection-against-infringement-of-patents-in-canada-2021-36-1.htm> [Dimock 2021]; see also *Les Laboratoires Servier v Apotex Inc*, 2019 FC 616 at para 205. The Court is alive to the delicate balance that patent drafters seek in light of the one-size-fits-all construction for invalidity and infringement.

[132] This balance is relevant to the essential elements analysis as it pertains to construction and invalidity. As highlighted by Dimock 2021, in *Bombardier Recreational Products Inc v Arctic Cat*, 2017 FC 207 [Bombardier FC 2017], there was no doubt that an engine cradle was essential to the working of a functional snowmobile. However, Dimock 2021 notes “it is another matter entirely to say that the element is essential to the claims of the patent or the invention claimed.” Therefore, how patent drafters choose to encapsulate a patent’s essential elements will be pertinent to the Court’s construction and infringement analyses.

B. Validity

(1) *Anticipation*

[133] In order to be patentable, an invention must be new in the sense that it has not been previously disclosed to the public. If an invention has previously been disclosed, then the invention has been anticipated by the prior disclosure. Subsection 28.2 of the *Patent Act* provides that claimed inventions must not be anticipated.

[134] The Federal Court of Appeal jurisprudence directs that, together, sections 28.2, 28.3, and 58 of the *Patent Act* must be assessed on a claim-by-claim basis: *Zero Spill Systems (Int'l) Inc v Heide*, 2015 FCA 115 at para 83 [*Zero Spill*].

[135] Pursuant to s 43(2) the starting presumption is that an issued patent is valid. The burden is on the party who claims invalidity based on anticipation to prove its allegation on the balance of probabilities: *Angelcare Canada Inc v Munchkin, Inc*, 2022 FC 507 at para 287 [*Angelcare*].

[136] Anticipation is not to be construed from a mosaic of documents or disclosure but should instead be found in a single disclosure: *Beloit Canada Ltd v Valmet Oy*, [1986] FCJ No 87, 8 CPR (3d) 289 (CA) at 294 [*Beloit*].

[137] *Sanofi* is the leading Canadian authority on anticipation and obviousness, which adopted the two-part analysis of the House of Lords in *Synthon BV v SmithKline Beecham plc*, [2005] UKHL 59 (UK HL) [*Synthon*]: *Zero Spill* at para 85. At paragraphs 28 and 31-37, *Sanofi* establishes two requirements to prove anticipation: disclosure and enablement by a single prior art. Disclosure and enablement are different concepts, each of which has its own rules and must be satisfied to succeed in raising a defence of anticipation: *Synthon* at para 28.

[138] The disclosure assessment requires “the prior art document must disclose subject matter which, if performed, would necessarily result in infringement of the patent being challenged”: *Eli Lilly and Company v Apotex Inc*, 2009 FC 991 at para 393, aff'd 2010 FCA 240.

[139] In *Sanofi*, the Supreme Court explains that a prior publication must meet every essential element of the claim. Relying on *Synthon*, Justice Rothstein commented:

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

[140] Enablement asks “whether a [POSITA] would have been able to perform the invention”: *Eli Lilly* at para 241; *Sanofi* at para 26. Once the prior art establishes the disclosure requirement, it is assumed that the person skilled in the art would be willing to make trial and error assumptions: *Sanofi* at para 27.

[141] *Hospira* at paragraph 74 makes clear that “[w]hat must be enabled are the essential elements of claimed invention in issue, not the particular experiments disclosed in the ... patent.”

[142] When considering novelty, the Court must properly construe the claim and its essential elements: *Eli Lilly* at para 397. If the single prior art reference fails to disclose or enable the essential elements of the claim, the patent claim is not anticipated: *Apotex Inc v Shire LLC*, 2021 FCA 52 at para 36 [*Shire*].

[143] In *Sanofi*, the Supreme Court outlined a non-exhaustive list of factors to be considered in the enablement analysis:

1. Enablement is to be assessed having regard to the prior patent as a whole including the specification and the claims...

2. The skilled person may use his or her CGK to supplement information contained in the prior patent. CGK means knowledge generally known by persons skilled in the relevant art at the relevant time.
3. The prior patent must provide enough information to allow the subsequently claimed invention to be performed without undue burden. When considering whether there is undue burden, the nature of the invention must be taken into account... If inventive steps are required, the prior art will not be considered as enabling. However, routine trials are acceptable and would not be considered undue burden... experiments or trials and errors are not to be prolonged even in the fields of technology in which trials and experiments are generally carried out...
4. Obvious errors or omissions in the prior patent will not prevent enablement if reasonable skill and knowledge in the art could readily correct the error or find what was omitted.

Sanofi at para 37

(2) ***Obviousness***

[144] The test for obviousness comes from s 28.3 of the *Patent Act*.

[145] Obviousness may be raised as a defence where the claimed subject matter is obvious in light of the “State of the Art”: *Angelcare* at para 360. The Court is not concerned with novelty as a stand-alone ground of invalidity but “if a patent does not contain something new, there can be no invention”: *Ciba* at para 48.

[146] The statutory requirement that an invention not be obvious is set out in section 28.3 of the *Patent Act*. The Supreme Court set out the four-step approach to this obviousness analysis in *Sanofi* at paragraph 67:

- A. Identify:
 - i. The notional “person skilled in the art”;
 - ii. The relevant CGK of that person;
- B. Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
- C. Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;
- D. Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

[147] The obviousness inquiry is flexible, contextual, expansive, and fact-driven: *Apotex Inc v Pfizer Canada Inc*, 2019 FCA 16 at paras 39, 41. It should be undertaken on a claim-by-claim basis: *AFD Petroleum Ltd v Frac Shack Inc*, 2018 FCA 140 at para 47; *Shire* at paras 26, 55; *Zero Spill* at paras 83, 95.

[148] The test should be applied to the combination of the elements of the invention as a whole rather than each element of the invention and a segmented approach to the analysis should be avoided: *Teva FC 2018*; *Amgen Inc v Pfizer Canada ULC*, 2020 FCA 188 at paras 8-9.

(a) *The Inventive Concept*

[149] The inquiry into the inventive concept follows from and is informed by the claim construction, but is a discrete exercise: *Shire* at paras 68, 75, 93; *Tearlab* at para 76. The focus should be on the claims of the patent: *Tearlab* at para 78; *Ciba* at paras 72-75, 77; *Shire* at para

68. The inventive concept of each claim must be determined rather than the inventive concept of the patent as a whole, although the claims may be linked by an overarching inventive concept, which is generally found in the independent claims: *Shire* at paras 69, 86-90, 100.

[150] If the inventive concept is not readily discernable from the claims themselves, recourse may be had to the specification to determine it: *Sanofi* at para 77; *Bell Helicopter* at para 124; *Shire* at paras 68 and 74. The inventive concept of the claims should not be restricted by the content of one specific embodiment: *Tearlab* at para 79.

[151] The Federal Court of Appeal has generally held that it is not materially different from determining the “solution taught by the patent,” and has suggested that its use as an analytical tool should be limited: *Tearlab* at paras 76-77; *Ciba* at paras 76-77; *Bristol-Myers Squibb Canada Co v Teva Canada Limited*, 2017 FCA 76 at paras 64-69, 75 [BMS].

(b) *Differences from the Prior Art*

[152] The third step of the *Sanofi* test requires a comparison between the inventive concept and the prior art: *Ciba* at para 59. The prior art is broader than the concept of the CGK. It can comprise any publicly available teaching, however obscure or not generally accepted: *Mylan* at para 23; *Ciba* at paras 47, 50-59. The prior art is not limited to that which would have been uncovered by the POSITA conducting a reasonably diligent search: *Hospira* at paras 83-87. The cumulative effect of multiple pieces of the prior art should be considered in the obviousness analysis: *Tearlab* at paras 73, 81; *Ciba* at para 60.

[153] However, obviousness is not determined by reference to the prior art at large. The party alleging obviousness must point to one or more elements of the prior art, or a combination of pieces of prior art, which make the impugned invention obvious: *Ciba* at para 60. The differences between the inventive concept and the prior art should be assessed as of the claim date: *Ciba* at paras 57-58.

[154] Justice Manson has relied on *Sanofi* to state that the prior art should be given the same purposive construction as claims, from the perspective of the POSITA with a mind willing to understand: *Biogen Canada Inc v Taro Pharmaceuticals Inc*, 2020 FC 621 at para 170 [*Biogen FC*].

(c) *Obvious to Try*

[155] At step four of the test in *Sanofi*, the question is whether the difference between the inventive concept and the prior art can be bridged by the POSITA using their CGK: *Ciba* at para 68. This question is assessed objectively and purposively, with regard to the problem addressed by the patent: *Shire* at para 103. When assessing this question it is important to guard against the application of hindsight to bridge the gap: *Bridgeview Manufacturing Inc v 931409 Alberta Ltd (Central Alberta Hay Centre)*, 2010 FCA 188 at para 50 [*Bridgeview*].

[156] At paragraph 68 of *Sanofi*, the Supreme Court held that the “obvious to try” test may be appropriate in circumstances where advances are often obtained through experimentation: see also *Shire* at para 104; *Hospira* at para 88.

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

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

[158] Another important factor may arise from considering the actual course of conduct that culminated in the making of the invention. It is true that obviousness is largely concerned with how a skilled worker would have acted in the light of the prior art. However, this is no reason to exclude evidence of the history of the invention, particularly where the knowledge of those involved in finding the invention is no lower than what would be expected of the skilled person.

[159] Not every case requires the “obvious to try” test, and it should be applied contextually: *BMS* at paras 59-62. To satisfy the test, there must be evidence to show on a balance of probabilities that it was more or less self-evident to try to obtain the invention. The mere possibility that something might turn up is not sufficient: *Sanofi* at para 66; *Hospira* at para 88; *Shire* at para 105. It is not a requirement that what is being tried ought to work, although that is a factor to be considered: *Hospira* at para 90. The test does not broaden the scope of the obviousness inquiry into an invention-overall analysis: *Shire* at para 105.

[160] In considering the first factor of the “obvious to try test,” it is not self-evident that what is being tried must work just because the methods used to obtain the invention were known. To establish obviousness, it would need to be self-evident to the POSITA that the methods should be applied in light of the prior art and the CGK: *Sanofi* at para 85.

[161] The Federal Court of Appeal noted that the actual course of conduct leading to the invention is essentially an elaboration of the second factor: *BMS* at para 44. In considering the actual course of conduct of the inventor, the invention being reached quickly, easily, directly, and relatively inexpensively may suggest a finding of obviousness unless the skill of the inventor was above that of the POSITA. By contrast, the investment of extensive time, money, and effort may suggest an invention was not obvious, particularly if the knowledge of the inventor exceeds that of the POSITA: *Sanofi* at para 71.

[162] When considering the third factor, the prior art and CGK should provide the POSITA a specific motivation to pursue the invention: *Sanofi* at para 90.

(3) ***Overbreadth***

(a) *Generally*

[163] In *AstraZeneca v Apotex Inc*, 2017 SCC 36 at paras 45-46 [*AstraZeneca*], the Supreme Court of Canada held that “overpromising is a mischief” and as such “[a]n overly broad Claim may be declared invalid.”

[164] The specification requirements in the *Patent Act*, subsection 27(3) provide the legislative framework for overbreadth considerations. The scope of a monopoly “must be commensurate” with the invention: *Seedlings Life Science Ventures, LLC v Pfizer Canada ULC*, 2020 FC 1 at para 167 [*Seedlings FC 1*]. Otherwise, inventors obtain something more than what they have invented and deserve.

[165] “A claim is overbroad where it fails to claim an essential element of the invention made or disclosed”: *MIPS AB v Bauer Hockey Ltd*, 2018 FC 485 at para 247 [*Bauer 2018*]. In *Bauer 2018*, Associate Chief Justice Gagné explained the overbreadth analysis as follows:

[245] The Claims of a patent may not exceed the invention made by the inventor(s), or the invention described in the specification. The nature of the invention made is a question of fact. What was disclosed is a question of law turning on a construction of the disclosure and a determination of what it says. In both cases, a comparison must be made with the Claims of the patent to determine if the breadth of the Claims exceeds either what the inventor(s) actually did or what the disclosure actually says (*Pfizer Canada Inc v Canada (Health)*, 2008 FC 11 at paras 45-46).

[166] In *Western Oilfield* at paragraphs 128-130, the Court of Appeal explains that there are two ways a patent claim can fail for overbreadth: first, the patent can be broader than the invention disclosed in the specification; or second, the patent can be broader than the invention made by the inventor.

[167] Although there is no specific analysis that a court must follow, generally a claim will be overbroad where it fails to effectively claim an essential element of the invention made or disclosed. However, this Court has warned against the analysis morphing into an inquiry into the

achievement of the invention's objectives: *Seedlings FC I* at para 173. In *Seedlings FCA*, the Court of Appeal explained the essential element consideration as follows:

[54] It is apparent that determining that a feature of an invention is essential is a distinct exercise for the purpose of overbreadth than for the purpose of claim construction. For overbreadth, the focus is not whether omitting or changing the feature avoids the Claim (as it is for claim construction), but rather whether that feature is so key to the invention described in the disclosure that a Claim that omits it encompasses embodiments that were not contemplated in the disclosure.

[Emphasis added and internal citations omitted]

(b) *Overlap with Other Grounds of Invalidity*

[168] All parties have noted that while invalidity grounds such as overbreadth can share an overlap with other grounds of invalidity, it is its own distinct ground of invalidity that should be considered separately: *Western Oilfield* at para 130.

[169] As a preliminary matter, NCS has raised concerns in relation to Kobold's utility and overbreadth arguments. NCS alleges that Kobold has, in respect of the 652 Patent, conflated the overbreadth and inutility analysis by presenting indistinguishable arguments respecting both issues.

[170] Counsel for Kobold explained that their experts' approach to overbreadth and utility overlaps because the factual matrix on these grounds are the same.

[171] According to *Western Oilfield* the Court should proceed with the overbreadth analysis separately from other grounds of invalidity: *Western Oilfield* at para 130; see for example *Angelcare* at para 449.

[172] Accordingly, the overbreadth and utility concerns will be determined separately, irrespective of whether the factual matrix is similar.

(c) *A Comment on Utility and Overbreadth*

[173] As previously noted, overbreadth is frequently raised alongside other invalidity grounds: *Seedlings FCA* at para 52. However, the Federal Court has made clear that overbreadth can exist as an independent ground of validity: *Seedlings FCA* at para 50.

[174] Kobold combines its arguments on utility and overbreadth, which although acceptable, has led to confusion here.

[175] Kobold argues that the 704 Patent describes a “very specific valve arrangement to shift a tool between perforating and fracturing modes.” In Kobold’s view, there are three main components at the core of the fracturing valve described in the 704 Patent – a tubular with an integral wedge structure, a lower seal, and an equalization plug. Kobold’s position can be summarized as follows: the 704 Patent Claims have no ability to fracture, despite the claims being directed at a fracturing valve. Specifically, Kobold alleges the 704 Patent is overbroad on the following grounds:

- A. Claims 1-10, 11-15, and 16-23 do not include the essential components of a wedge, lower seal, and an equalization plug (i.e. fail to include the structural components that are essential of a fracturing valve);
- B. Claims 28-30 fail to include the structural components necessary to perform the claimed methods;
- C. Claims 1-6, 8-23, and 28-30 fail to include an alignment mechanism;
- D. Claims 28-30 fail to specify how the mandrel is held stationary.

[176] In addition, Kobold also alleges Claim 10 is invalid for inutility as it does not direct the skilled person to an operable embodiment.

[177] Though the argument is not clear, I infer that its counsel and experts do not explicitly address the question of “whether the utility was either demonstrated or soundly predicted based on the information and expertise available by the filing date”: *AstraZeneca* at para 255. The Defendants’ position is that the 704 Patent Claims lack utility, irrespective of the filing date. As in, the basic components of a fracturing valve are missing that the 704 Patent needed to claim and therefore the invention fundamentally does not work. Because the claims fail for overbreadth, Kobold argues that the claims also fail to provide utility.

[178] In sum, Kobold’s arguments are twofold. First, the 704 Patent is altogether missing the necessary components to function as a fracturing valve (i.e. invalid for overbreadth). Second, and because it is missing essential elements, the 704 Patent directs the skilled person to make embodiments that do not work (i.e. invalid for inutility).

[179] NCS rejects Kobold's position, alleging that Kobold's utility and overbreadth allegations arise from the "tortuous, non-purposive construction put forward by [Kobold's] experts."

[180] In NCS's view, Kobold mistakenly construes the claims such that Kobold's construction renders the claims inoperable. At paragraph 12 of *Burton Parsons Chemicals Inc v Hewlett-Packard (Canada) Ltd*, [1976] 1 SCR 555 [*Burton Parsons*], the patent specified that the cream was to be "compatible with normal skin"; all of the essential elements required to make the cream were properly claimed. The Court concluded that it would be obvious to the skilled person that the cream should not be "made up with ingredients that are toxic or irritating or are apt to stain or discolour the skin."

[181] *Henriksen* similarly iterates that a patent need only describe the invention in a way that permits the skilled reader to work it. *Delp v Fresh Headies Internet Sales Ltd*, 2011 FC 1228 [*Delp*], held that the patent at issue claimed an invention over a new method, relying on both *Burton Parsons* and *Henriksen*. At paragraph 18 of *Delp*, the Federal Court concluded that "the skilled person would be capable of working the invention by the described method without adding any inventive ingenuity to the exercise, and indeed, the patent expressly contemplates the application of some practical skill depending on the nature of the plant material being utilized."

[182] This line of jurisprudence, inclusive of *Burton Parsons*, is distinguishable for two reasons. First, in *Burton Parsons* all possible embodiments worked and the essential elements were claimed; the issue was that one embodiment was incompatible with skin. Second, in *Burton Parsons* the patent explicitly specified that the materials should only be used as compatible with

human skin. Fundamentally, this jurisprudence differs because it does not deal with circumstances where essential elements are allegedly missing.

[183] This is a subtle distinction, made further confused by the fact that Kobold argues inutility and overbreadth together throughout this matter.

[184] Despite NCS's protestations about Kobold's approach to utility and overbreadth arguments, it is understandable, given the fact that there "is little helpful discussion in the jurisprudence as to how a feature should be assessed for essentiality for the purposes of overbreadth": see *Seedlings FCA* at para 54. But the jurisprudence is clear that overbreadth remains an independent ground of validity: *Seedlings FCA* at para 50.

[185] The distinction between utility and overbreadth is paramount here. A claim will lack utility if "[t]here is evidence of lack of utility of some of the area covered": *Merck & Co Inc v Apotex Inc*, 2010 FC 1265 at para 495 [*Merck & Co*]. A review of the jurisprudence that deals with inoperable embodiments indicates that the Federal Courts have largely approached this issue by construing the claims as excluding the inoperable species: see for example *Merck & Co; Burton Parsons*. Therefore, claim construction is often determinative of whether the claim covers an area that lacks utility.

[186] Whereas, overbreadth issues cannot be dealt with in construction nor will the Court's construction of the claims affect whether the claims are overbroad. Overbreadth asks a fundamentally different question than utility: the Court determines whether an essential element (i.e. a feature so key to the invention described) is omitted from the claim. The Court does not

turn its mind to this question when construing the claims because construction sets the fences down and does not look to whether the claims will function.

[187] NCS attempts to work around the utility issues by indicating that all of Kobold's utility allegations fail to include the CGK. This created further difficulty for the Court's analysis as Kobold's experts did not directly address whether the allegedly missing elements form part of the CGK. All the Court was left with was Mr. Lehr's testimony that these components form part of the CGK and inferences from Kobold's experts that indicate they do not.

[188] Accordingly, Kobold's inutility and overbreadth allegations will be dealt with separately and in light of the above review of the law.

(4) ***Ambiguity***

[189] The rationale underpinning ambiguity is that the patent must give adequate notice to the public as to what is claimed to belong to the patentee: *Western Oilfield* at para 121. Otherwise, the domain said to belong to the patentee is unclear.

[190] Most recently, the Federal Court of Appeal explained the concept of ambiguity and when a court can find ambiguity in *Pharmascience Inc v Bristol-Myers Squibb Canada Co*, 2022 FCA 142 [*Bristol-Myers*]. There, Justice Locke summarized:

[61] The basis for invalidity due to ambiguity is that the patent must give adequate notice to the public as to what activities are claimed as exclusive to the patentee. A Claim may be invalid for ambiguity if it uses language that is avoidably ambiguous or obscure. However, a Claim is likely not invalid if the phrase in issue "can be interpreted using grammatical rules and common

sense.” A Claim that can be interpreted in more than one way, such that it would be impossible for the skilled person to know in advance whether or not something would be within the claims, is ambiguous. However, a Claim is not invalid simply because it is not a model of concision and lucidity.

[Citations omitted]

[191] As such, the jurisprudence establishes that a Defendant has a steep hill to climb where ambiguity is alleged. It is only when a purposive construction fails that a party will be able to show a claim is ambiguous. Although *Pfizer Canada Inc v Canada (Minister of Health)*, 2005 FC 1725 at para 53 [*Pfizer 2005*], says that “ambiguity is truly a last resort, rarely, if ever, to be used,” this is not an absolute bar on its application.

(5) *Sufficiency*

[192] Sufficient disclosure in a patent is a precondition to granting a patent and a fundamental principle of the patent system: *Teva Canada Ltd v Pfizer Canada Inc*, 2012 SCC 60 at paras 31, 34 [*Teva*]. The quid pro quo underlying the system is that, in exchange for exclusive rights in a new and useful invention, the invention must be sufficiently disclosed so that society can benefit from the knowledge. An insufficient disclosure invalidates the entire patent: *Teva* at paras 32-35.

[193] The first step in the analysis is to determine the nature of the invention: *Teva* at para 53. The entire patent must be considered, not just a particular claim, as a patent is generally granted for one invention: *Teva* at paras 54-60. It is possible for claims in a patent to disclose separate inventions, but this issue must be considered on a case-by-case basis: *Teva* at para 64.

[194] The second step is to determine whether the disclosure in the patent is sufficient. The claims and disclosure must allow the POSITA to produce the invention using only the instructions contained in the specification and define the precise and exact extent of the privilege being claimed: *Consolboard* at 520-521; *Teva* at paras 49-52, 69-74, 83; *Hospira* at para 101; *Idenix Pharmaceuticals, Inc v Gilead Pharmasset LLC*, 2017 FCA 161 [*Idenix*] at para 18.

[195] While a patent will not be found invalid for insufficient disclosure where routine experimentation is required of the POSITA, the disclosure will be insufficient if the specification requires a problem to be solved: *Idenix* at para 19; *Teva* at paras 75-80.

[196] Sufficiency is assessed at the filing date: *Teva* at para 90; *Idenix* at para 46.

[197] Unlike in an anticipation analysis, the prior art's cumulative effect can be reviewed and considered: *Ciba* at para 60; *Wenzel Downhole Tools Ltd v National-Oilwell Canada Ltd*, 2012 FCA 333 at para 87 [*Wenzel*].

(6) *Utility*

[198] Section 2 of the *Patent Act* establishes that an invention must be useful.

[199] In assessing utility, courts should undertake a two-part analysis: *AstraZeneca*. First, the Court should identify the subject matter of the invention as claimed in the patent. Second, the Court should determine whether the subject matter is useful, in the sense that it is capable of a practical purpose.

[200] In principle, utility should be assessed on a claim-by-claim basis: *Seedlings FC 1* at para 150. Different claims can have different utilities, and assessing utility on a claim-by-claim basis recognizes this: *Teva Canada Limited v Novartis Pharmaceuticals Canada Inc*, 2016 FCA 230 at para 23. However, this Court has previously adopted a “global” approach where the parties have not raised any meaningful distinction between the utility of each Claim: *Seedlings FC 1* at para 150.

[201] The *Patent Act* does not prescribe the degree or quantum of utility required nor that every potential use come to fruition: *AstraZeneca* at para 55. Rather, a single scintilla of utility will suffice.

[202] The utility of an invention must be established by either demonstration or sound prediction as of the filing date: *Sanofi*.

[203] The Court can find utility by looking to demonstration before the patent filing date. However, utility of a patent does not have to be demonstrated in the patent description: *Eli Lilly Canada Inc v Novopharm Limited*, 2010 FCA 197 at para 74. Utility can be demonstrated by tests.

[204] Fulsome testing is not required if the patent’s utility can be soundly predicted based on available information and expertise: *Apotex Inc v Wellcome Foundation Ltd*, 2002 SCC 77 at paras 56-66 [*Wellcome Foundation*]; *Apotex Inc v Astrazeneca Canada Inc et al*, 2017 FCA 9 at paras 98-99. The policy rationale underpinning the “sound prediction” model is the need for early disclosure of new and useful inventions even before the utility is verified through testing.

This effectively avoids clutter in the public domain while still granting monopoly rights for early disclosure of new and useful inventions: *Wellcome Foundation* at para 65.

[205] In *Teva Canada Innovation v Pharmascience Inc*, 2020 FC 1158 at para 875, aff'd 2022 FCA 2 [*Teva Canada Innovation*], Justice Kane succinctly summarized the law for sound prediction. She reviewed the jurisprudence and concluded that where a patent relies on a sound prediction for utility, it must satisfy three requirements:

- A. A factual basis for prediction;
- B. An articulable and sound line of reasoning from which the derived result can be inferred from the factual basis as of the date of the patent application; and,
- C. Proper disclosure inclusive of a full, clear, and exact description of the nature of the invention and the manner in which it can be used.

Teva Canada Innovation at para 875; *Pharmascience Inc v TevaCanada Innovation*, 2022 FCA 2 at para 4

(a) *Inoperable Embodiments*

[206] An “inoperable embodiment” is a manifestation of a patented invention that can physically be made, but is not useful for its intended purpose.

[207] The law of inoperable embodiments, when it comes to utility, is fact-specific and requires the Court to consider the factual matrix carefully: *Canadian Patent Law Benchbook*, 4th ed, DM Cameron ed, (Toronto: Thomson Reuters, 2022) at 169 [*Canadian Patent Law Benchbook*].

[208] As a general principle, a claim will not be found to lack utility if it includes an inoperable embodiment where it is obvious to the POSITA that the particular embodiment should be avoided: see for example *Burton Parsons* at 563.

[209] However, if the claim positively points to an embodiment that does not work, the claim will be invalid even if the POSITA would know not to use the embodiment: *Airseal Controls Inc v M & I Heat Transfer Products Ltd*, 1993 CarswellNat 391, 53 CPR (3d) 259 (Fed TD), aff'd 1997 CarswellNat 1912, 77 CPR (3d) 126 (Fed CA).

[210] In *Excalibre Oil Tools Ltd v Advantage Products Inc*, 2016 FC 1279 [*Excalibre*], Excalibre argued that Claim 1 of the patent at issue was invalid because it failed to disclose a useful invention. The patent failed to disclose a useful invention because Claim 1 did not provide a means to actuate the jaw. Counsel for Advantage Products attempted to argue that a claim does not need to disclose everything for the invention to work, relying in part on *Burton Parsons*. Justice Manson rejected Advantage Products' argument and explained:

[254] ... An inventor or patentee cannot excuse inoperable Claims to an invention or claim too broadly beyond the invention disclosed and hope to sustain validity of that claim—overly broad, poorly drafted Claims cannot be encouraged or condoned.

[211] Thus, in *Excalibre*, the Court found Claim 1 lacked utility because the invention was inoperable without an ability to actuate the jaw. This demonstrates the way in which the inoperable embodiment analysis will turn on the specific circumstances and claim construction.

(7) ***Double Patenting***

[212] The inventor is only entitled to “a patent for each invention”: *Whirlpool* at para 63. This proposition is established by s 36(1) of the *Patent Act*:

Patent for one invention only

36 (1) A patent shall be granted for one invention only but in an action or other proceeding a patent shall not be deemed to be invalid by reason only that it has been granted for more than one invention.

Brevet pour une seule invention

36 (1) Un brevet ne peut être accordé que pour une seule invention, mais dans une instance ou autre procédure, un brevet ne peut être tenu pour invalide du seul fait qu’il a été accordé pour plus d’une invention

[213] The Supreme Court explains that where a subsequent patent is issued with identical claims, there is an “improper extension of the monopoly”: *Whirlpool* at para 63. To determine whether double patenting has occurred, the Court looks to the claims and not the disclosure because the claims define the monopoly: *Whirlpool* at para 63.

[214] There are two types of double patenting: identical or conterminous double patenting, and obviousness double patenting.

[215] Before turning to the legal analysis, it is necessary to review the underlying rationale of double patenting, given the parties have raised nuanced divisional double patenting arguments. An inventor cannot improperly extend its domain to receive more than the claimed invention: *Whirlpool* at para 63. However, it is worth noting that the rationale for double patenting with respect to divisional applications has shifted over time with amendments to the *Patent Act*.

[216] Under the old *Patent Act*, RSC 1970, c P-4 [*PA 1970*], the concern underpinning double patenting was that an inventor could serve to extend the life of the previous patent. Under the *PA 1970*, s 48 provided that the term of a patent was:

Term of Patent

48 The term limited for the duration of every patent of invention issued by the Patent Office under this Act the application for which patent is filed after the 1st day of August 1935, shall be seventeen years from the date on which the patent is granted and issued.

R.S., c. 203, s. 49(1).

[Emphasis added]

Durée du brevet

48 La durée de tout brevet d'invention délivré par le Bureau des brevets conformément à la présente loi et pour lequel la demande est déposée après le 1er août 1935, est limitée à dix-sept ans à compter de la date à laquelle le brevet est accordé et délivré.

S.R., c. 203, art. 49(1).

[Je souligne]

[217] This demonstrates that under the *PA 1970*, the patent monopoly was granted from the date of issuance not from the date of filing. The current *Patent Act*'s interpretation provisions, found in section 2, provide that the claim date "means the date of a Claim in an application for a patent in Canada, as determined in accordance with s 28.1." Subsection 28.1(1) provides:

Claim date

28.1 (1) The date of a Claim in an application for a patent in Canada [pending application] is the filing date of the application, unless

(a) the pending application is filed by

(i) a person who has, or whose agent, legal representative or predecessor in title has, previously regularly filed in or for Canada an application for a patent disclosing the subject matter defined by the claim, or

(ii) a person who is entitled to protection under the terms of any treaty or convention relating to patents to which Canada is a party and who has, or whose agent, legal representative or predecessor in title has, previously regularly filed in or for any other country that by treaty, convention or law affords similar protection to citizens of Canada an application for a patent disclosing the subject matter defined by the claim;

(b) the filing date of the pending application is within twelve months after the filing date of the previously regularly filed application; and

(c) the applicant has made a request for priority on the basis of the previously regularly filed application.

Date de la revendication

28.1 (1) La date de la revendication d'une demande de brevet est la date de dépôt de celle-ci, sauf si :

a) la demande est déposée, selon le cas :

(i) par une personne qui a antérieurement déposé de façon régulière, au Canada ou pour le Canada, ou dont l'agent, le représentant légal ou le prédécesseur en droit l'a fait, une demande de brevet divulguant l'objet que définit la revendication,

(ii) par une personne qui a antérieurement déposé de façon régulière, dans un autre pays ou pour un autre pays, ou dont l'agent, le représentant légal ou le prédécesseur en droit l'a fait, une demande de brevet divulguant l'objet que définit la revendication, dans le cas où ce pays protège les droits de cette personne par traité ou convention, relatif aux brevets, auquel le Canada est partie, et accorde par traité, convention ou loi une protection similaire aux citoyens du Canada;

b) à cette date, il s'est écoulé, depuis la date de dépôt de la demande déposée antérieurement, au plus douze mois;

c) le demandeur a présenté, à l'égard de sa demande, une demande de priorité fondée sur la demande déposée antérieurement.

[218] Accordingly, “evergreening” of time is no longer a concern in this context because a divisional patent has the same filing date as its parent patent. In *Glaxosmithkline Inc v Apotex Inc*, 2003 FCT 687 (CanLII) at paragraph 89, [2003] FCJ No 886 (QL) [*Glaxosmithkline*] [*Glaxosmithkline* cited to FCT], Justice Kelen noted this and explained that the concept of “evergreening” no longer applies in the context of divisional patents, as no additional protection

is gained by the existence of the second patent. However, the Court found that the “sin of double patenting” had not evaporated: *Glaxosmithkline* at para 89.

[219] Although the extension of time is no longer a divisional double patenting concern, there remains other policy concerns. In *Hospira* at paragraph 99, the Court of Appeal highlights that a divisional patent may improperly expand the scope of the monopoly where the divisional patent is broader without including an inventive difference.

[220] The “sin of double patenting” continues to exist because there is still a violation in the patent bargain. Patents encourage disclosure, thereby maintaining societal interest in inventors sharing their inventions with society. In return, the inventor receives a period of exclusivity. A divisional patent that is the same as its parent patent or obvious violates the patent bargain because society receives nothing in exchange for the disclosure. The inventor increases its monopoly for nothing in return.

[221] There are practical considerations as to why double patenting in the divisional context continues to exist. For example, if one patent of the two patents in a divisional context is found invalid, a question arises of whether the divisional should be able to continue to exist. Further, an inventor cannot have exclusive rights to the same invention twice.

[222] Therefore, double patenting in the divisional context continues to be an exercisable ground of invalidity, though the Court has recognized this analysis is somewhat more of an “academic” exercise: *Bauer 2018* at para 302.

[223] Identical or conterminous double patenting “occurs when the claims of the second patent are outright “identical or coterminous” to the first”: *Mylan* at para 23.

[224] In determining whether obviousness-type double patenting has occurred, the question that the Court must ask is whether there is any inventive difference between the relevant claims.

[225] In *Bauer 2018* at paragraph 296, the Court phrased this inquiry aptly as, “does the second patent merely add non-inventive bells and whistles to the first patent?”

(a) *Forced or Voluntary Divisional?*

[226] Typically, where a divisional patent is a “forced” divisional, it will be sheltered from double patenting invalidity arguments pursuant to the rationale in *Consolboard* at 536-537.

[227] However, a question arises as to what constitutes a forced divisional patent. I will first attempt to answer that question.

[228] *Consolboard* at 536-537 established the principle that forced divisional applications are immune to double patenting arguments. There, the Supreme Court of Canada explained:

As I noted earlier, the appellant originally filed a single patent application for letters patent, but was required by the Commissioner of Patents to divide his application into two parts. It may be open to question whether the Commissioner of Patents should have split off the wafers and treated them as the subject of a separate patent but in my view a patentee is not to be prejudiced by enforced divisional applications. If patents are granted on divisional applications directed by the Patent Office, none of them should be deemed invalid, or open to attack, by reason only of the grant of the original patent. (See *J. R. Short Milling Company*

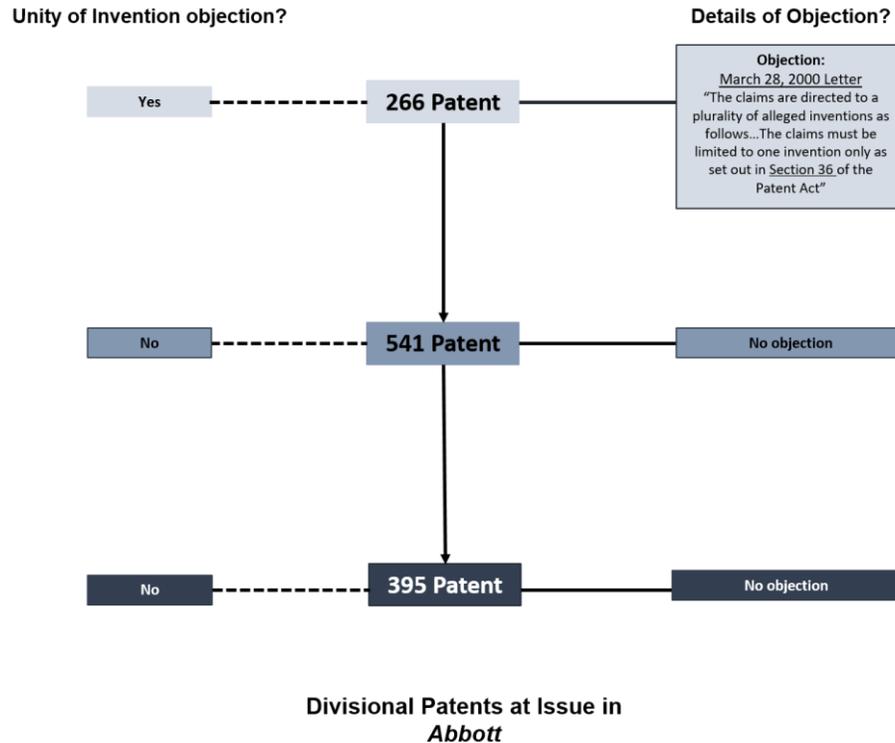
(Canada) Limited v. George Weston Bread and Cakes Limited et al.[23] at p. 82; Fox Canadian Patent Law and Practice, supra, at p. 270. Accordingly, this challenge to the validity of the patents fails.

[Emphasis added]

[229] Accordingly, there is an important legal distinction between forced and voluntary divisional patents. A forced divisional patent arises where the Patent Office directs the inventor to divide, whereas an inventor who freely divides the surplus invention creates a voluntary divisional.

[230] As succinctly noted by NCS, there is a divergence in the case law in what type of direction from the Patent Office constitutes a forced divisional and a voluntary divisional.

[231] In *Abbott Laboratories v Canada (Minister of Health)*, 2009 FC 648 at paragraph 193 [Abbott FC], Justice Heneghan held where a patent can trace its origin back to a forced divisional application, it would be “unfair and inequitable to find that the [divisional patent] should be invalidated, only because the [a]pplicants followed the directions of the Commissioner.” In *Abbott FC*, Abbott applied for an order prohibiting the Minister of Health from issuing a Notice of Compliance to Sandoz Canada Inc, until the expiry of Patent 2,386,527 [527 Patent]. The patents at issue in that case were as follows:



[232] In relation to double patenting, two issues arose in *Abbott FC*. First, whether the 395 Patent is invalid for double patenting over the 266 Patent. Second, whether the 395 Patent should be invalid for double patenting over the 541 Patent. On the first issue, Justice Heneghan held:

[193] I am satisfied that the ‘395 Patent should not be found invalid for double patenting over the ‘266 Patent. The Applicants provided evidence to show that claims respecting the improved taste profile were divided out of the ‘266 Patent at the request of the Commissioner of Patents. That was an administrative action lying within the mandate of the Commissioner of Patents. In my opinion, it would be unfair and inequitable to find that the ‘395 Patent should be invalidated, only because the Applicants had followed the directions of the Commissioner.

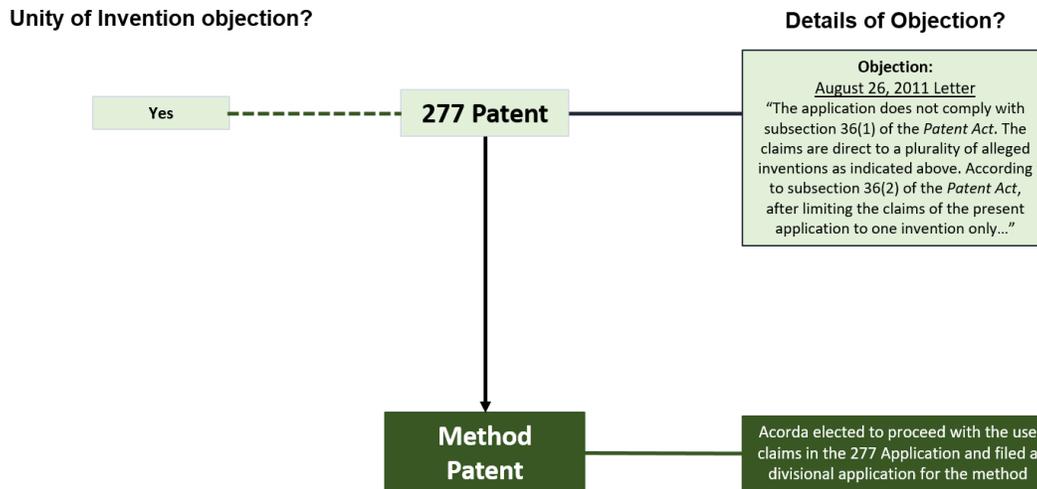
[Emphasis added]

[233] However, on the second issue, Justice Heneghan said the 395 Patent was not immune from double patenting attacks because Abbott voluntarily divided it from the 541 Patent. Both

parties appealed the Federal Court decision to the Federal Court of Appeal: see *Sandoz Canada Inc v Abbott Laboratories*, 2010 FCA 168 [*Abbott FCA*]. The subject of that appeal and cross-appeal was the allegation of obviousness in respect of the 266 patent and the Notice of Allegation date: *Abbott FCA* at paras 7-8. The Federal Court of Appeal found the Federal Court erred by applying the wrong date on which the allegations in the NOA were assessed. There was no discussion of divisional patents, nor did the Federal Court of Appeal deal with forced or voluntary divisional patents.

[234] Accordingly, per the approach in *Abbott FC*, where an inventor can demonstrate that the examiner raises a unity of invention objection, and the divisional patent can be connected to the objection, the divisional patent will be considered forced, such that it will have protection from double patenting attacks.

[235] More recently, Justice Manson commented on this issue in *Biogen FC. Biogen FC* involved Patent 2,562,277 [277 Patent], where the Plaintiff alleged the Defendants, Taro Pharmaceuticals Inc and Pharmascience Inc, infringed the 277 Patent. Acorda Therapeutics Inc [Acorda] licenced the 277 Patent to Biogen International, who in turn authorized Biogen Canada Inc to use and sell the invention claimed in the 277 Patent. The Defendants denied infringement and alleged the patent was invalid for lack of patentable subject matter, anticipation, and obviousness. During the prosecution of the 277 Patent, the Patent Commissioner objected to the claims as filed for being directed to a plurality of inventions. Acorda elected to proceed with the “use” claims in the 277 Application and file a subsequent divisional application for the “method” claims. The patents at issue were as follows:



**Divisional Patent at Issue in
*Biogen***

[236] Double patenting was not directly at issue in *Biogen FC*, however, Justice Manson remarked on Biogen’s reliance on the statement that the divisional application was forced. Justice Manson commented that this was an overstatement because the August 26, 2011. Office Action was an objection and not a rejection by way of a “final action.” Accordingly, Justice Manson concluded that Acorda’s election was voluntary because it could have advocated for the method to be a part of the claimed use invention of the 277 application.

[237] *Biogen FC* was appealed to the Federal Court of Appeal on an unrelated issue: *Biogen Canada Inc v Pharmascience Inc*, 2022 FCA 143 [*Biogen FCA*]. The Federal Court of Appeal did not comment on double patenting nor did they engage with forced divisional patents.

[238] *Biogen FC* therefore takes a different approach than *Abbott FC*. NCS argues that because *Abbott* “squarely dealt with a double patenting attack” and follows *Consolboard*, it is more persuasive on what constitutes a forced divisional application.

[239] However, Kobold raises an important point: at the time *Consolboard* was decided the *PA 1970* applied, which had a different section for divisional applications. The *Patent Act* has since been amended so that there are two subsections: 36(2) where an applicant limits the claim themselves (i.e. voluntarily); and 36(2.1) where an applicant limits the claim due to direction of the Commissioner (i.e. forced). Subsection 36(2) of the *PA 1970* instead provided:

Divisional applications

(2) Where an application describes and Claims more than one invention the applicant may, and on the direction of the Commissioner to that effect shall, limit his Claims to one invention only, and the invention or inventions defined in the other claims may be made the subject of one or more divisional applications, if such divisional applications are filed before the issue of a patent on the original application; but if the original application becomes abandoned or forfeited, the time for filing divisional applications terminates with the expiration of the time for reinstating or restoring and reviving the original application under this Act or the rules made thereunder.

Demandes divisionnaires

(2) Si une demande décrit et revendique plus d'une invention, le demandeur peut et, selon les instructions du commissaire à cet égard, doit restreindre ses revendications à une invention seulement, et l'invention ou les inventions définies dans les autres revendications peuvent faire le sujet d'une ou de plusieurs demandes divisionnaires, si ces demandes divisionnaires sont déposées avant la délivrance d'un brevet sur la demande originale ; mais si la demande originale a été abandonnée ou si elle est déchue, le délai pour le dépôt des demandes divisionnaires se termine à l'expiration du délai fixé pour le rétablissement ou la restauration et remise en vigueur de la demande originale aux termes de la présente loi ou des règles établies sous son autorité.

[240] In contrast to this language, sections 36(2) and 36(2.1) read as follows:

Divisional applications

Limitation of Claims by applicant

(2) Where an application [original application] describes more than one invention, the applicant may limit the Claims to one invention only, and any other invention disclosed may be made the subject of a divisional application, if the divisional

Demandes divisionnaires

Demandes divisionnaires

(2) Si une demande décrit plus d'une invention, le demandeur peut restreindre ses revendications à une seule invention, toute autre invention divulguée pouvant faire l'objet d'une demande divisionnaire, si celle-ci est déposée avant la délivrance d'un brevet sur la demande originale.

application is filed before the issue of a patent on the original application.

Limitation of Claims on direction of Commissioner

(2.1) Where an application [original application] describes and Claims more than one invention, the applicant shall, on the direction of the Commissioner, limit the Claims to one invention only, and any other invention disclosed may be made the subject of a divisional application, if the divisional application is filed before the issue of a patent on the original application.

Idem

(2.1) Si une demande décrit et revendique plus d'une invention, le demandeur doit, selon les instructions du commissaire, restreindre ses revendications à une seule invention, toute autre invention divulguée pouvant faire l'objet d'une demande divisionnaire, si celle-ci est déposée avant la délivrance d'un brevet sur la demande originale.

[241] Kobold argues that the difference in language between subsections 36(2) and 36(2.1) of the *Patent Act* indicates that the former applies to voluntary amendments, whereas the latter applies to a forced divisional.

[242] There has been secondary source commentary on the issue of forced divisional patents. Donald H MacOdrum, *Fox on the Canadian Law of Patents*, 5th ed (Toronto: Thompson Reuters, 2022) [*Fox on Patents*] has also briefly touched on the scope of forced divisional patents. *Fox on Patents* queries whether the specific choices made by an inventor with respect to division is exempt from the protection that a forced divisional provides:

Query whether there are limits to the principle stated in the above quotation. In *Consolboard*, the issue was whether a Claim to a waferboard was patentably distinct from a Claim to a wafer. The Patent Office concluded they were separate inventions and required limitation to one invention. The Supreme Court concluded that the applicant should not be prejudiced by that decision even if it was wrong. However, in issuing a requirement that the application be limited to one invention, the Patent Office may not direct the applicant as to how many divisional applications to file nor as to how to frame the Claims of the divisional applications. If double patenting arises not due to the Patent Office's determination that the two claimed subject matters are separate inventions, but as

a result of choices by the applicant as to the framing of the claims, query whether a double patenting objection should be precluded?

Fox on Patents at §11:16 [Emphasis added]

[243] Although this commentary does not directly pertain to the distinction between forced and voluntary divisional patents, it does suggest that there may be some limitation to the immunity provided by *Consolboard*.

[244] In sum, there is divergence in the case law as to what constitutes a voluntary or forced divisional patent. The approach in *Abbott FC* suggests that where an inventor can trace the origin of the divisional back to the forced divisional application it will be immune from double patenting attacks. Whereas *Biogen FC* suggests that something more than a mere unity of invention objection from the patent examiner is required in order for the divisional application to constitute a forced divisional application.

[245] The preferred approach is an informed middle ground. Where an inventor can trace the origin of the divisional back to a direction of the Commissioner, it will be immune from double patenting attacks. However, where a voluntary divisional has been made by the applicant, at their cores the divisionals must disclose different inventions to avoid double patenting attacks. An applicant should not be penalized for electing for a divisional, but such an election should not be a mere attempt to secure the claims and take advantage of the earlier priority date of the parent patent.

C. Infringement

[246] The person alleging infringement bears the burden of proving infringement on a balance of probabilities: *Monsanto Canada Inc v Schmeiser*, 2004 SCC 34 at para 29 [*Monsanto*].

[247] The Supreme Court has explained that a patent holder has the right to full enjoyment of the monopoly granted by the patent: *Monsanto* at para 34. Any act that interferes with the full enjoyment of the monopoly is prohibited. Analysis of infringement flows from the construction of the patent: *Western Oilfield Equipment Rentals Ltd v M-I LLC*, 2019 FC 1606 at para 91.

[248] Infringement will be established where one valid claim of a patent is infringed: *Arctic Cat Inc et al v Bombardier Recreational Products*, 2016 FC 1047; *MIPS AB v Bauer Hockey Ltd et al*, 2018 FC 495 at para 179. All of the essential elements of the asserted claims must be found in the alleged infringing product: *Free World Trust* at paras 31, 68; *Angelcare* at para 154.

VI. Summary of Prior Art

[249] A more fulsome analysis of the prior art for the purposes of anticipation and obviousness will be conducted as part of the validity analysis later in this decision. For now is a summary of the prior art relevant to a specific patent:

A. NCS's 676 and 652 Patents

[250] Seven distinct sets of prior art are relevant to the 676 and 652 Patents, as well as a provisional application. These are:

- A. Mandrell Pioneer Application WO 2007/035745 and Provisional Applications 60/718,481 and 60/728,182 (collectively, the “Pioneer Application”);
- B. Gazda’s US Patent 4,750,560 [Gazda];
- C. Howell’s US Patent 7,510,017 [Howell];
- D. Tolman’s US Patent 6,520,255 [Tolman];
- E. Milner’s US Patent 5,813,456 [Milner];
- F. Troche’s US Patent 2,157,153 [Troche]; and,
- G. Haliburton’s US Patent 6,474,419, SPE 60709, SPE 94098, SPE 107060, SPE 122949, and brochure H05111 (collectively, “Cobra”).

[251] The Pioneer Application is an application for a “well treatment device, method, and system” published on March 29, 2007. It claims priority to US Provisional Application 60/718,481 and 60/728,182. The embodiment described includes a compression packer that is longitudinally operable with a J-profile, a “slip ring” to hold the J-pin to the J-profile in the mandrel, a ported member above the packer, an equalization valve for equalizing pressure above and below the packer, and a locator assembly. It also describes a “jetting tool” which it suggests is commonly known in the art which can replace the ported sub, as well as a top cup that may be removed. Methods for treating the well are also described. Mandrell’s Provisional Application includes more detailed drawings of the BHA components in the Pioneer Application. The drawings in the Provisional Application are indicated as NCS drawings from 2004-2006. The figures I refer to in the Provisional Applications and the 745 Patent are quite similar, but for readability the higher quality figures from the 745 Patent are found in Appendix C.

[252] Gazda's US Patent 4,750,560 discloses a "device for reasonably connecting well tools" and was issued on June 14, 1988. It outlines connectors for releasably connecting well tools together through the use of a control slot and a control pin to control the relative upward and downward movement. The control slot is "a continuous zig-zag slot having short and long legs and advancing about the connector" while the pin "is carried on a ring which is free to rotate as the pin follows the control slot in response to the control slot moving up and down." The control slot and control pin are a J-profile and J-pin, respectively.

[253] Howell's US Patent 7,510,017 describes an invention for "sealing and communicating in wells" and was issued on March 31, 2009. It discloses a downhole tool which includes a resettable packer assembly and equalization valve above the packer (collectively referred to as a "conductor seal system"), as well as a connector to permit electrical or optical communication through the valve. The packer is actuated with a J-slot profile in the inner main body, while the lug is carried by a lug ring with inwardly extending lugs in the carrier body which slide in the J-profile to actuate the packer element. It is worth noting that Mr. Lehr discusses in his responding report a patent numbered "US 3,513,017" issued on March 31, 2009, and allegedly held by Howell. The patent with this identification is neither held by Howell, issued on March 31, 2009, or in any way relevant to this matter. This was not specifically addressed by the parties, but I understand him to mean Howell's US Patent 7,510,017.

[254] Tolman's US Patent 6,520,255 is an invention for a "method and apparatus for stimulation of multiple formation intervals" and was issued on February 18, 2003. It discloses apparatus and methods of perforating and treating multiple intervals of a well by deploying a BHA having a perforating device, a sealing device, and a means of pressure equalization such

that perforation and fracturing can be completed in a single trip. The patent describes that parts in the assembly can be swapped out with other components, and that a skilled person would be able to add additional components to the tool string depending on the application.

[255] Milner's US Patent 5,813,456 describes a "retrievable bridge plug and retrieving tool" and was issued on September 29, 1998. It teaches that fluid is circulated between the tool and annulus through bypass or equalizing ports, and that circulation can be done down the tubing and up the annulus or in reverse.

[256] Troche's US Patent 2,157,153 was issued on May 9, 1939, and disclosed a traditional J-profile and pin combination. Clearance in the J-slot is provided to prevent binding due to debris.

[257] Haliburton's Cobra systems are examples of the use of known BHA components in a pre-2010 perf and frac system. The collection of Cobra documents describe a BHA that can include a mechanical set packer, abrasive jet perforator, equalizing valve, and reciprocating J-slot. This BHA can be run on coiled tubing. The collection also described methods for positioning the BHA across the lowest zone, setting the packer, cutting perforations, pumping frac treatment down an annulus, and moving the BHA to the next zone.

B. NCS's 907 and 026 Patents

[258] Four distinct sets of prior art are relevant to the 907 and 026 Patents. These are:

A. Otis B Shifting Tool [Otis B];

- B. Patel's US Patent 6,024,173 [Patel];
- C. SPE 50655; and,
- D. BJ's US Patent 6,613,321, US Patent 8,695,716, US Provisional Application 61/228,793, Canadian Patent 2,730,695, SPE 143250 & the BJ Ported Collars "What Up?" Presentation (collectively, "OptiPort").

[259] None of the parties or experts submitted a specific Otis B patent for review, but purely from the expert reports the Court understands the Otis B is one of the most well-known shifting tools that has been around since the 1970's. Both Mr. Lehr and Mr. David outlined that Otis B provides a method of shifting fracture sleeves where a shifting tool with a recess in a sleeve is deployed downhole on wireline. As Otis B passes through a sliding sleeve, it automatically engages with the sliding portion, shifts it, and disengages as it reaches the other end of the sleeve travel. Otis B has spring loaded dogs that "expand into a recess or inner profile in the housing of a sliding sleeve, and can engage the top or bottom edge of the sleeve, or a profile on the sleeve itself."

[260] Patel's US Patent 6,024,173 describes an "inflatable shifting tool" and was issued on February 15, 2000. It can be described as follows: the valve operator (#34) has a smooth profile and with downward force the valve operator shifts downwards and causes the ball valve to rotate which opens up the wellbore to fluid below the valve. The tool assembly on the coiled tubing (#42) has an inflatable packer (#46) and a bullnose (#48) that finds the top of the ball valve. The fluid that is pumped down the coiled tubing inflates the inflatable packer through the ports (#56) and it engages the valve operator. The bull nose retracts when the fluid enters leaving a gap between the valve operator and the bottom of the tool assembly. When the fluid is stopped it leaks out of the ports (#56 and #58) which causes the inflatable packer to deflate. The figure

shows a bullnose but other depth locators are also suggested in the patent as well as in Figure 1 when spring loaded collets can be used to shift a tool when they locate a profile in a sleeve.

[261] SPE 50655 is a paper titled “History of and Applications for a Coil-Tubing-Conveyed, Inflatable, Selective Injection Straddle Packer.” It was presented in October 1998 by representatives from Baker Oil Tools, and details the history of coiled tubing conveyed, inflatable, selective stimulation tools between 1995 and 1998.

[262] The BJ OptiPort Sleeve has many patents and applications related to it, namely US Patent 6,613,321, US Patent 8,695,716, US Provisional Application 61/228,793, and Canadian Patent 2,730,695. A description of how it operates is contained in a presentation given by BJ titled, the “What Up?” Presentation and later detailed by SPE 143250. The pertinent date of availability is approximately August 2010, and the documents were created for BJ. On page 10 of the presentation, a BJ ported collar is shown that contains a housing with an axial bore, as well as a sliding sleeve inside the port. There are ports shown in the diagram, as well as smaller ports that allow for a pressure differential to be created above and below the sleeve. Mr. Ravensbergen explained that page 10 shows the ported collar that became known as the OptiPort. Although the ported collar and the OptiPort are technically different sleeves, the schematic representation contained what eventually became known as the OptiPort. Even NCS does not contest that the “What Up?” Presentation contains the OptiPort Sleeve and simply refers to the diagram as the “OptiPort Sleeve.”

C. NCS's 704 Patent

[263] Eight distinct sets of prior art are relevant to the 704 Patent. These are:

- A. NCS's 676, 652, 636, and 619 Patents (collectively, the "676 Patent Family");
- B. Sherman's Canadian Patent 2,683,432 [Sherman];
- C. SPE 130689;
- D. Eslinger's US Patent 6,776,239 [Eslinger];
- E. Maier's US Patent 6,474,419 [Maier];
- F. Pioneer Application;
- G. Haliburton's H03297 [SurgiFrac]; and,
- H. Costley's US Application 2004/0084187 [Costley].

[264] As explained by Mr. Lehr, the 676 Patent Family describes a "multi-function valve that provides multiple flow paths, an equalizing plug, and a forward stop flow valve that enables the multi-function valve's use below an abrasive perforating device." The 676 Patent Family is the collection of identical / nearly identical patents related to the 676 Patent, and also includes the 652 Patent. As these are at issue, I shall decline to summarize further and let the claims construction for these patents inform the prior art for the 704 Patent.

[265] Sherman is a patent owned by Trican and is titled: "Flow-Actuated Pressure Equalization Valve for a Downhole Tool." It was filed on October 23, 2009. Sherman teaches a pressure activated equalization valve (i.e. not a mechanically actuated fracturing valve). Sherman teaches flow diverters. Specifically, Mr. Chambers outlined that Sherman "depicts a shuttle used as a pressure equalization valve, where the uphole portion of the shuttle (210) has an angled face for

diverting flow down a tubing string out through flow ports, and the downhole portion of the shuttle (213) acts as an equalization valve plug.”

[266] SPE 130689 is a paper authored by Weatherford engineers J. Thompson and M.M. Tomich in 2010, titled “Selective Fracturing of a Series of Perforations in a Horizontal Well Using a Resettable Straddle System.” The paper presented the use in 2009 in Redwater Operations Area of Alberta of a “straddle system they called a Jet Pack straddle system” on coiled tubing that allows for setting it across the zone, fracturing, unsetting the straddle, circulating the well clean and providing for the possibility of moving it further up hole to treat the next set of perforations. In SPE 130689, the fracturing wedge is attached to the equalization plug.

[267] Eslinger was filed on February 19, 2002 and issued on August 17, 2004. It is titled “Tubing Conveyed Fracturing Tool and Method” and is owned by Schlumberger. Eslinger discloses a tool assembly that is run on coiled tubing that contains packers, a fracturing port, a fluid transfer (or equalizing) port, and anchors. The fracturing port can be opened by aligning ports on inner and outer mandrels, and can be closed by misaligning those ports. The alignment is effectuated by manipulating and moving the tubing string. Eslinger’s valve is moved by applying a push or pull to the inner tubular member. A “spring assisted medium” is used to actuate the valve.

[268] Maier was filed October 4, 1999, and issued November 5, 2002. It describes a “packer with equalizing valve and method of use.” Mr. David relies on Maier to indicate that a “plug that seals upward is also disclosed.” Mr. Chambers does not address the Maier patent. Mr. Lehr

explained, and I accept, that the Maier patent contemplates running a BHA on casing that has already been perforated and therefore does not disclose an invention for jet perforation and fracturing in a single trip.

[269] The Pioneer Application here is the same as discussed above at paragraph 251.

[270] SurgiFrac refers to a brochure that outlines Haliburton's SurgiFrac method, which is based on a "patented method that combines hydrojetting and fracturing techniques." The 704 Patent explicitly references the SurgiFrac method in the background section:

Various techniques for fracturing that do not require removal of the downhole tool following perforation have been developed. For example, in the Sugrifrac technique, perforating is carried out through a downhole tool having a jet perforation device with nozzles. Perforation is then followed by pumping a fracturing treatment down the coiled tubing, out of the jet perforation nozzles and into the formation, without the need to remove the downhole tool to the surface between perforation and fracturing. Because the diameter of the jet perforation nozzles is small, a large pressure differential exists between the interior of the tubing string and the formation, making it challenging to pump treatment fluid at high enough pressure to overcome the pressure differential...

[271] Mr. Chambers explained that the SurgiFrac treatment is pumped down the coiled tubing and out of the jet nozzles on the abrasive jetting device. The Haliburton Brochure explains that in "the SurgiFrac process, sand-laden fluid [is] pumped through a Hydra-Jet™ tool [that] impinges on the formation creating a cavity. As the cavity is formed, pressure on the bottom of the cavity increases, eventually initiating a fracture."

[272] Costley discloses a method and apparatus for cleaning a fractured or otherwise treated perforated casing interval between spaced packers to permit repositioning or removal of the

apparatus. NCS emphasizes that Costley discloses a tool to fracture in perforations in casings that are pre-existing and that the tool is not suitable for use in horizontal wellbores. However, I do not accept this evidence as the Costley description explains that the packer in the invention is designed for “employment in wells having wellbore sections that are oriented vertically, that are highly deviated from the vertical, or may be oriented horizontally” [Emphasis added]. I do accept Mr. Lehr’s skilled person reading, which explains that Costley is a packer with integral bypass valves for treating multiple zones in a well that have been previously treated. His reading is consistent with the disclosure of Costley.

D. *Kobold’s 571 Patent*

[273] Six distinct sets of prior art are relevant to the 571 Patent. These are:

- A. Szarka’s US Patent 4,949,788 [Szarka];
- B. Mills’ US Patent 5,513,703A [Mills];
- C. Ravensbergen’s Canadian Patent 2,730,695 [Ravensbergen];
- D. Getzlaf’s Canadian Patent 2,738,907C [Getzlaf];
- E. Desranleau’s Canadian Patent 2,810,423 [Desranleau]; and,
- F. King’s Canadian Patent 2,860,317 [King].

[274] Szarka’s US Patent 4,949,788 describes “well completions using casing valves” and was published on August 21, 1990. It is a casing tool apparatus which includes a sliding sleeve,

movable between a first position for blocking housing communication ports and a second position for uncovering the housing communications ports.

[275] Mills' US Patent 5,513,703A details "methods and apparatus for perforating and treating production zones and otherwise performing related activities within a well" and was published on May 7, 1996. This was identified as US Patent 5,513,703A in Dr. Mennem's report, but it was not made explicitly clear that the 703A Patent is a continuation, at least in part, of Mills' co-pending application 08/163,824 which had been filed December 8, 1993, at the time. It describes the use of shaped charges or other means for perforating a well conduit, such as a casing string which is anchored within the wellbore by a column of cement in the annulus between the casing string and wellbore.

[276] Ravensbergen's Canadian Patent 2,730,695 was published on April 19, 2011 and is titled "Multi-Zone Fracturing Completion." John Ravensbergen is an inventor on the Ravensbergen and he was also an inventor on the 704 Patent. The Ravensbergen Patent is the Canadian patent that is part of the OptiPort Patent Family. The background explains that the invention relates to a downhole tool for ported completion that can be employed for fracturing in multi-zone wells. Ravensbergen describes an annular valve, with a sliding sleeve located in the annular space. I agree with NCS that Ravensbergen discloses a sleeve with an annular chambers, such that the annular space has different widths, where the annular space is filled with grease.

[277] Getzlaf's Canadian Patent 2,738,807C discloses "tools and methods for use in completion of a wellbore" and was published on April 24, 2012. It describes methods for shifting sliding sleeves which are incorporated in a tubing string using a releasable restraining mechanism and

grease in the annual spaces of the sliding sleeves, and opening or closing over ports for either allowing or preventing the movement of fluid between the tubing string and the formation.

[278] Desranleau was published on March 29, 2012, and is titled, “Delayed opening wellbore tubular port closure.” It describes a timing device, which includes a mechanism to delay the opening of the port after the sleeve has been actuated to shift. Desranleau discloses a hydraulic chamber sealed and filled with compressible or incompressible fluid. Desranleau is aimed at delaying the opening of a port covered by a sleeve to avoid pressure lost through that port before such pressure loss is desired.

[279] King was filed in Canada on January 16, 2013, and is titled “Hydraulic shock absorber for sliding sleeves.” It discloses two sliding sleeves – one that covers a port and one that acts as a shock absorber assembly for the first slide. The summary of the invention explains that the fluid in the cavity in the shock absorber sleeve can be a gas, an incompressible fluid or grease. King’s “Background of the Invention” explains the problem that the invention is trying to resolve as follows:

One issue with this system is that the acceleration and abrupt deceleration of the sliding sleeve as it hits a travel stop has created stress failures in the coiled tubing or related fittings adjacent the packer that grabs the sliding sleeve.

...

What is needed and provided by the present invention is a hydraulic shock absorber for a sliding sleeve that does not reduce drift and that addresses the stress failure in the coiled tubing and associated components from shock loading at the end of the movement of the sliding sleeve.

VII. Common Issues

[280] The patents NCS claim to be valid are all interrelated, intended for the same use and purpose. Kobold's 571 Patent likewise seems intended for a similar use and purpose as NCS's collection of patents. As will be discussed shortly, they all use similar language, require an identical POSITA, and have similar CGK. The common items will be consolidated where possible.

A. The POSITA

(1) *The NCS Patents*

[281] The experts were in general agreement regarding the skilled person for the 676 Patent. There were, however, some differences, which are outlined in detail below. As noted by NCS, although there are some differences in opinion, these are relatively minor disagreements that do not have a material impact on the analysis. I provide specific comments as they pertain to specific patents throughout the analysis.

[282] The experts broadly agreed that the skilled person would have a minimum of five years of experience in well operations engineering for oil and gas applications. Disagreement between the experts largely pertained to the type of engineering degree that would be required for a POSITA.

[283] Mr. Lehr opined that the skilled person for the 676 Patent would have education or experience in mechanical engineering and downhole tools applications. In his view, the POSITA would possess a Bachelor of Science Degree in either Mechanical Engineering, Engineering

Mechanics, or Aerospace Engineering, coupled with at least five years of experience designing downhole tools for oil and gas applications and on-the-job experience using such tools in an oilfield. As an alternative to the on-the-job experience, the skilled person could have five years of experience designing downhole tools supported by a team of individuals.

[284] Notably, Mr. Lehr's POSITA does not include a petroleum engineer, unless they also have one of the other degrees he specifies. However, he did acknowledge under cross-examination that if the skilled person consists of a team, a petroleum engineer could be a part of that team.

[285] One of Kobold's experts, Mr. Chambers, disagrees with Mr. Lehr that additional education in a relevant technical discipline would not compensate for less experience in the relevant field. Similarly, Mr. David echoes Mr. Chambers' view, explaining that, in the absence of a formal education, a minimum of ten years of onsite supervision in the following areas would compensate:

- A. Onsite supervision of well operations;
- B. Experience planning and supervising hydraulic fracture operations, including completions technology selection;
- C. Fracturing design;
- D. Service rig/coil tubing operations; and,
- E. Experience designing or selecting bottom BHAs for well operations.

[286] Given the subject matter of these patents, I prefer Mr. Chambers' and Mr. David's definition on this point and include individuals with a petroleum engineering degree. As Kobold points out, Mr. Lehr's position is contradicted by the experience and background of the inventors of the NCS Patents. For example, Mr. Stromquist does not have formal post-secondary education and his knowledge of tools and tool design is based on his years of experience working with coil tubing tools and other factors as set out in the above paragraph.

[287] With respect to the 676 Patent, I find that the POSITA would possess a Bachelor of Science Degree in either Mechanical Engineering, Engineering Mechanics, or Petroleum Engineering. Further, the POSITA would have at least five years of experience designing downhole tools for oil and gas applications, as well as on-the-job experience using such tools in an oilfield or have a team of individuals with applications experience.

[288] As well, the skilled person would have experience with different types of tools for use downhole in the completion of a wellbore, which would include perforation devices and packers. Where the POSITA does not have a formal education, at least ten years of onsite supervision of well operations for hydraulic fracture operations and designing, and selection downhole applications for use in well operations supported by a team with design experience with formal education. The experience would include the planning and supervision of hydraulic fracture operations.

[289] The experts mostly agreed that the skilled person for the 652 Patent is the same as the 676 Patent.

[290] In the view of Mr. Lehr, the skilled person for the 907 Patent is the same as the 676 Patent, with the addition that the skilled person would also have experience designing downhole sliding sleeves. Mr. Lehr did not make it clear how this is distinguished from his suggestion in the 676 Patent that they have experience designing downhole tools. Mr. David noted that the POSITA is generally the same, but would also be aware of the use of sleeves with ports in fracturing operations and the means used to shift these sleeves as outlined in more detail. Mr. Chambers is of a similar opinion to Mr. Lehr, and overall, my analysis for the POSITA for the 907 Patent is no different than the 676 or 652 Patents.

[291] The experts also agreed that the POSITA for the 026 Patent is the same as that of the 907 Patent. This makes sense, given that both of these patents comprise the same disclosure, same inventors, and same filing and publication dates. The parties explicitly agreed that the POSITA for the 704 Patent should be the same as the other NCS Patents.

[292] Overall, my analysis for the POSITA for the NCS Patents aligns with the general agreement of the experts. Accordingly, the skilled person would have education or experience in mechanical engineering and downhole tool application. The skilled person would possess a degree in Mechanical Engineering, Engineering Mechanics, or Petroleum Engineering. They would also have between two and five years of experience in downhole tools (including design experience) or a team of individuals with applications experience.

(2) ***Kobold's 571 Patent***

[293] The parties have, in broad strokes, a general agreement regarding the POSITA of the 571 Patent. There were two points of disagreement with respect to the skilled person: first, whether

the skilled person would specifically hold a petroleum degree; and, second, whether the skilled person would exclude those with experience operating downhole tools.

[294] Dr. Mennem, NCS's expert, submits that the skilled person would have a Mechanical Engineering degree with at least two years of design experience. Although, Dr. Mennem says that the POSITA could also include a skilled draftsman with at least five years of design experience, who worked under the supervision of an engineer. His POSITA does not specifically include or exclude a petroleum degree.

[295] In Dr. Fleckenstein's view, the POSITA would have a bachelor's or master's degree in petroleum, mechanical, or related engineering, with at least two to five years of petroleum experience designing and/or operating downhole tools. The POSITA would also have an understanding of downhole conditions pertinent to setting and unsetting tools in a pressurized environment and a working knowledge of fluid.

[296] Dr. Mennem conceded on cross-examination that the skilled person could include a petroleum engineer. Kobold also points out that two of its experts, Mr. Chambers and Dr. Fleckenstein, have petroleum engineering degrees. Kobold further relies on the fact that SPE papers were relied on throughout this litigation to provide background on the technology at issue – wherein SPE stands for the “Society of Petroleum Engineers.”

[297] Overall, I agree with Kobold that the evidence indicated a petroleum engineer would be included in the POSITA definition for the 571 Patent.

[298] Kobold also disagrees with Dr. Mennem's statement that the 571 Patent is addressed to persons "involved in the design and manufacture of such tools or sub-assemblies, as opposed to persons who would only be using these tools or sub-assemblies in the field." Dr. Fleckenstein explained that the POSITA would have an understanding of downhole conditions pertinent to setting and unsetting tools in a pressurized environment and a working knowledge of fluid rheology. In addition, Kobold also highlights the fact that the 571 Patent includes method claims.

[299] Again, I agree with Kobold that the skilled person would not entirely exclude experience with the operation of downhole tools and would not limit the POSITA only to the design and manufacture of downhole tools. For this same reason, the POSITA would not include a draftsman as they would lack the required operational experience.

[300] Accordingly, the POSITA would be a person having a bachelor's or master's degree in petroleum, mechanical, or related engineering. This skilled person would also have at least two years of experience either designing or operating downhole tools. Importantly, they would have an understanding of downhole conditions regarding using tools in a pressurized environment, as well as a working knowledge of fluid rheology.

B. CGK

[301] As with the POSITA, there was a general consensus on the CGK with slight variations throughout. With this in mind, it makes sense to consolidate the CGK and apply it throughout the analysis but keeping in mind the different dates at issue in the different patents.

[302] It is important to consider the role of CGK. By necessity, the CGK will inherently be incorporated throughout a patent, making its description imperative to the construction analysis. As in the *Burton Parsons* case, an allegedly ambiguous claim to use salts in a product was not ambiguous because a POSITA would know from the CGK to not use toxic salts. However, if some component within the CGK is considered an essential element, or necessary for the claim to function, it cannot simply be “read in” no differently than an essential element in a legal test cannot simply be imported from the general knowledge because a party suggested “everyone knows it.” Claims that might otherwise be ambiguous can be rescued by the CGK, but the CGK cannot rescue a component of a claim that is missing entirely.

(1) ***The NCS Patents***

[303] All of the experts provided technical primers that establish the CGK for each of the NCS Patents. Mrs. David’s and Lehr’s are found at Appendix A, I have excluded Mr. Chambers’ primer only because it is a lengthier version. The experts generally agree on the contours of the CGK for the NCS Patents as set out in their primers. The CGK for each patent will be assessed as of the publication date: *Free World Trust* at para 54. For reference, the dates of publication for the NCS Patents are:

- A. 676: July 23, 2010;
- B. 652: July 23, 2010;
- C. 907: July 12, 2011;
- D. 026: July 12, 2011; and,

E. 704: January 10, 2015.

[304] With respect to the 676 Patent, the experts agree that these BHA can be run into the wellbore in a number of ways including wireline, slickline, jointed tubing, coil tubing or pipe.

[305] Mr. Chambers disagrees with Mr. Lehr that as of early 2010, there were limited methods to alleviate or remove debris and that these methods tend to be simplistic. Mr. Chambers opines that there were many known and effective debris relief methods taught in the art prior to 2010, including methods to circulate and reverse circulate fluid, drilling holes in J-slots, and providing relative clearance between a J-slot and a J-pin.

[306] I agree with Mr. Chambers that at the relevant time, there were many known and effective debris relief methods taught in the art prior to 2010, including methods to circulate and reverse circulate fluid, drilling holes in J-slots, and providing relative clearance between a J-slot and a J-pin.

[307] Mr. Chambers also disagrees with Mr. Lehr's assertion that as of 2010, downhole tools would often get stuck in deviated wells (particularly in coiled tubing operations) due to debris issues, and that operators were not using coiled tubing for fracturing operations because they were afraid of getting stuck. Mr. Chambers is of the view, and I agree, that fracturing using coiled tubing conveyed tools has been used for about 25 years. Coiled tubing was a proven technology by the year 2000, and was used when it met the operators' needs and budget.

[308] Regarding operators choosing not to use coiled tubing in fracturing operations for fear of the downhole tools getting stuck due to debris issues, this is really a question of whether this

issue remained a problem without a solution at the relevant time. Though there is no doubt downhole tools on occasion were getting stuck, Mr. Chambers provided information that coiled tubing was indeed being used at the time, and debris relief mechanisms of varying kinds were employed. I find that coiled tubing was used at this time, and debris relief mechanisms were being used to combat this issue.

[309] Mr. Lehr's position is that explosive perforating guns [perf guns] bring intrinsic safety risks. That said, there is no doubt that perf guns were part of the CGK. While Mr. Lehr is correct about safety risks in the perf guns, I find that these risks are just one of many when extracting hydrocarbons using hydraulic stimulation and general oil field operation.

[310] The experts do not differentiate the CGK for the 652 Patent from that of the 676 Patent. Neither Mr. Chambers nor Mr. David differentiated the CGK for the 907 or 026 Patents from the 676 Patent. Mr. Chambers likewise did not differentiate the CGK for the 704 Patent. Mr. Lehr had a minor addition for the 907 Patent, and both he and Mr. David had additional notes for the 704 Patent.

[311] In the view of Mr. Lehr, in addition to being familiar with the technical primer provided in his report, the skilled person for the 907 Patent would also be familiar with the components and principles of the 676 Patent. In addition, he suggests the CGK for the skilled person for the 907 Patent would also comprise downhole hydraulic principles. The technical primer in question was the foundation upon which his POSITA and CGK opinions were based, so it is unclear how these are material additions to the CGK as opposed to restatements of the CGK for the 676 and 652 Patents.

[312] Regarding the 704 Patent, Mr. Lehr believes the skilled person would be familiar with the components and principles of the 676 Patent in addition to being familiar with the technical primer provided in his report. As with his comments on the 907 Patent, it is unclear how this materially changes the CGK from the previous patents.

[313] Mr. David specified that the skilled person would be aware of common perforating and fracturing techniques, as well as the devices and BHA assemblies used. This would be inclusive of jet perforation devices, valves (including ball drops), equalization valves, sealing devices, and mechanical casing collar locators [MCCL] amongst others. This also appears to be a restatement or summarization of the previous discussion on CGK.

[314] The CGK with respect to the NCS Patents includes the following:

- A. Knowledge of the downhole environment in a wellbore, including the debris present in the environment due to perforation, fracturing, and other stimulation or completion operations;
- B. Methods for completing open hole and cased wellbores, including multi-zone completions (such as plug and perf) and single zone completions (such as abrasive jet perf and frac, and sliding sleeves or other devices in the casing that could be opened, closed, and have stimulation fluid pumped through them). This would also include knowledge of the tools commonly used for these types of operations, and knowledge that several single zone completions could be performed in a single tool trip downhole for efficient multi-zone treatment;
- C. Methods and tools used for fracturing, including fracking down coiled tubing, down the annulus between the tool string and the wellbore casing, and down both simultaneously;
- D. Monitoring pressure in the coiled tubing (commonly referred to as a “dead string” or a “dead leg”) while fracking down the annulus (and vice versa);

- E. Modifying a downhole tool, otherwise known as a bottom hole assembly [BHA], for the intended purpose on a particular job. This would include making modifications to the tool to adjust for the downhole environment in a wellbore, as discussed above, and for potential tool erosion. As well as the order of the devices on the BHA. CGK would include typical components (devices) that would make up a modular BHA, such as tubulars and mandrels, including telescoping tubulars and mandrels, which may be used to align and misalign ports;
- F. Alignment mechanisms to keep telescoping tubulars from rotating relative to each other, such as a pin on one tubular sliding in a groove on the other tubular;
- G. J-slots and auto-J/continuous J-profiles to actuate different tool functions;
- H. Clutch/rotator rings to hold a J-pin, which rotate while the J-pin slides in the J-profile;
- I. Sealing devices such as mechanical set packers, inflatable packers, and cup packers;
- J. Valves/plugs to control fluid flow and open or close fluid passageways within the tool and between the tool and the wellbore annulus, such as ball valves, check valves, and equalizing valves;
- K. Perforation devices, including abrasive jet perforating devices;
- L. Locators such as mechanical casing collar locators;
- M. Anchors, such as mechanical slips;
- N. Frac ports and valves for fracturing down coiled tubing;
- O. Fluid diverters of varying shapes;
- P. The use of coiled tubing, jointed tubing, and other types of tubing strings to run the BHAs downhole in the wellbore; and,
- Q. Reverse circulation.

- R. The skilled person would be familiar with fracturing ports and valves. The CGK would include knowing how a fracturing valve functions and the components that are required for it to function. For a fracturing down the tubing, the skilled person would know that there needs to be some type of port or valve in the tubing string to allow fluid to exist adjacent the zone of interest to apply the fracturing treatment.
- S. Familiarity with wedge shaped deflection plugs would also form part of the CGK. For example, the skilled person would have been aware of patents such as CA 2,683,432, US 2004/0084187, and a Weatherford tool.

(2) ***Kobold's 571 Patent***

[315] The parties are, generally, in broad agreement regarding the CGK for the 571 Patent. However, Dr. Mennem takes a narrower approach to the CGK, unlike Dr. Fleckenstein who takes a broader scope.

[316] Dr. Mennem set out the CGK as of July 10, 2013 (the priority date), July 10, 2014 (the filing date), and January 10, 2015 (the date the 571 Patent opened to public inspection). Neither expert highlighted any changes in the CGK from 2013 to 2015.

[317] Both parties agree that the CGK would include concepts taught via a mechanical engineering degree, as well as concepts relating to oil and gas drilling operations, well completion, fracking, and sliding sleeve sub-assemblies and systems incorporating them. In addition, the CGK would include different types of restraining or locking mechanisms, including those incorporated into known sliding sleeve subassemblies. The following would broadly make up the CGK:

- A. Tensile and pressure-induced stress, and conducting calculations thereof, as well as knowledge of materials intended to withstand pressures and stresses;

- B. Design and methods of using o-rings, chevron seals and other types of seals;
- C. Design and methods of using internal and external threading to connect disparate pieces of an assembly or sub-assembly;
- D. Methods of using set screws to rotationally lock pieces of an assembly or sub-assembly in place;
- E. Methods of shifting assemblies and sub-assemblies, including particular shifting tools such as the Model B Otis shifting tools, as well as the energy mechanism used; and,
- F. Basic principles of damping to restrain the vibratory motion of an assembly or sub-assembly.

[318] The skilled person would have an understanding that dampening devices generate an opposite force to the downward force. Dampening can include mechanical dampening, viscous dampening, friction dampening, or a combination. The POSITA would know that there are no fluids that are actually completely incompressible but some are treated as such when the amount of compressibility is negligible.

[319] I accept Dr. Fleckenstein's submission that the skilled person would know that greases are lubricants made from a mixture of thickening agents and a liquid base lubricant. Further, in the industry, the skilled person would know that greases are "shear thinning" materials, meaning that grease has an initial high viscosity that lowers as the grease is sheared. Dr. Fleckenstein also explained that the skilled person would be familiar with the commonly used grease consistency classification, established by the National Lubricating Grease Institute [NLGI].

[320] A point of contention was whether the CGK would include familiarity with industrial shock absorbers. Dr. Mennem posited that it would include familiarity with industrial shock absorbers and how they work, which Dr. Fleckenstein disagrees with. Dr. Mennem explained that a mechanical engineer would have knowledge of shock absorbers via their school curriculum, even if they were not taught how to apply that in the oil and gas industry context. Dr. Fleckenstein explained that although industrial shock absorbers are used in a variety of industries, he was unaware of any being sold for use in downhole environments. He specified that shock subs and hydraulic subs used in downhole environments are designed specifically for that use because of the unusual environment that downhole tools are used in.

[321] I agree with Dr. Fleckenstein that the CGK would not broadly extend to familiarity with industrial shock absorbers. This is because the POSITA is not limited only to mechanical engineering, which Dr. Mennem says teaches industrial shock absorbers. However, the CGK would include the variety of shock and hydraulic subs used in downhole environments.

C. *Interpreting Terms in Common*

[322] For the same reason that a common POSITA and CGK should be used for this analysis, the use of several terms in common between the patents should be interpreted the same way. This is unless there are explicit reasons individual terms should be interpreted differently in one patent from the others. Where there are reasons to the contrary they shall be noted, but it would be inconsistent for patents on the same subject matter issued in similar times with the benefit of shared inventors, a common POSITA, common CGK, and common prior art to use the same term with different implied meanings.

[323] As not all claims in each patent are at issue, where I specify terms arise it must be noted I am only indicating which claims at issue contain certain terms unless stated otherwise.

(1) *Comprising*

[324] Comprising is used in:

- A. 676's independent Claims 1, 18, and 34, and dependent Claims 3, 5, 7, 12, 13, 15, 19, 21, 22, and 27;
- B. 907's independent Claims 1 and 16, and dependent Claims 2, 9, 10, 14, 15, 17, 18, 26 and 27;
- C. 026's independent Claim 1, and dependent Claims 7-9, and 12;
- D. 652's independent Claims 1, 4, 14, 18, 19, and 24, and dependent Claim 26;
- E. 704's independent Claims 1, 11, 16, and 24, and dependent Claims 14 and 15; and,
- F. 571's dependent Claim 6.

[325] It also arises in the independent claims of Kobold's 571 Patent, but those claims are no longer at issue.

[326] The term "further comprising" is used in:

- A. 676's dependent Claims 16, 17, 23-25, and 28-33;
- B. 907's dependent Claims 3, 8, 13, and 21-25;
- C. 026's independent Claim 1 and dependent Claims 11, 13, and 14;

- D. 652's dependent Claims 9, 10, 12, 13, 16, 17, and 20;
- E. 704's dependent Claims 4, 7, 10, 15, 19-23, and 28-30; and,
- F. 571's dependent Claim 16.

[327] Both parties agree that the jurisprudence establishes that comprising has been interpreted by its ordinary meaning, i.e. "including but not limited to": see for example *Nova Chemicals Corporation v Dow Chemical Company*, 2016 FCA 216 at paras 81-82 [*Nova 2016*]; *Purdue Pharma v Canada (Attorney General)*, 2011 FCA 132 at para 23 [*Purdue*].

[328] However, how the parties interpret the law differs. NCS further expands and explains that claims do not need to include elements that are within the CGK. Whereas, Kobold takes a stricter approach that everything that is necessary for the functioning of the claim must be stated within the claim. I note that NCS alleges that Kobold's experts were improperly told by counsel how to construe the word "comprising." NCS argued that the experts strayed too far into the role of an advocate, and in effect, became a conduit for Kobold's counsel to make arguments.

[329] I have no concerns about the substantive and objective opinions of Kobold's experts with respect to their instructions of the word "comprising." As noted in *dTechs EPM Ltd v British Columbia Hydro and Power Authority*, 2023 FCA 115 at paras 33-34 [*dTechs*], counsel are frequently and extensively involved in drafting expert reports and guiding the experts through the report creation process. "Comprising" is a term of art commonly found in patent drafting. It does not strike me as unheard of for counsel to inform their experts of the use of this term and to provide legal guidance on its meaning.

[330] In cross-examination, Mr. Lehr indicated that comprising meant “consisting of, but not necessarily limited to the following.” When construing the 676 Patent Claims, Mr. Lehr understood “comprising” to mean that the claims could include additional components or features. Mr. Lehr relied on “comprising” to “aid in focusing the skilled [person’s] attention on the invention made, disclosed, and claimed.” NCS contends that Kobold’s experts take a non-purposive approach to “comprising” and adopt a construction that Kobold’s counsel told them to take.

[331] In response to Mr. Lehr’s opinion, Mr. Chambers generally agreed with Mr. Lehr that comprising means the assembly can include components not explicitly listed in the claim. He goes on to say Counsel told him it is construed as “‘including, but not limited to’ and that if the claim requires a specific element in order to function, that element must be found within the claim. In other words, essential elements must be claimed.” He said a POSITA would give that definition to comprising.

[332] Mr. David construed comprising as “including, but not limited to.” It is not a means by which an inventor can read essential elements into a claim when they are not specifically included.

[333] Kobold suggested that, where an invention requires a specific element to function, that element must be found within the claim, relying on *Johnson & Johnson Inc v Boston Scientific Ltd*, 2008 FC 552 at para 213 [*Johnson & Johnson*]. They reviewed some cases concerning the interpretation of “comprising” and provided *Merck Sharp & Dohme Corp. v Wyeth LLC*, 2021 FC 317 [*Wyeth*], where this Court interpreted the word “comprising” when used in a claim to be

non-exhaustive. This could mean several variations of the claim could be covered by the patent monopoly, but the scope of the monopoly “could grow over the life of the ... patent” as new variations are discovered: *Wyeth* at para 66. Patentees cannot claim an indefinite scope of its monopoly by using non-exhaustive or ambiguous language to include necessary parts of their claim by extrapolation.

[334] In *Nova 2016*, the Federal Court of Appeal heard similar arguments concerning the construction of “comprising” either being exhaustive or open-ended. Justice De Montigny wrote in the unanimous decision that the trial judge did not err in their decision when they interpreted “comprising” within its ordinary meaning of “including but not limited thereto”: *Nova 2016* at paras 81-83. Their interpretation allowed a finding of infringement because “comprising” did not mean the presence of elements other than the listed essential elements escaped the bounds of the claim.

[335] I am inclined to take the approach of Justice Gauthier in *dTechs*, recognizing that interpreting “comprising” as a term of art in claim drafting was outside the expertise that any of the experts were qualified on; its interpretation may refer to expert evidence, but will be construed within the context of these patents based on this Court’s own analysis. While it would not make sense to blindly apply an interpretation from another case to these patents, similar cases may be instructive.

[336] Kobold relies on its “comprising” construction to maintain that “essential elements must be claimed”: *Johnson & Johnson* at para 213. However, in my view, *Johnson & Johnson*

properly draws the distinction between essential elements at the claim construction phase and the invalidity stage.

[337] In light of these considerations, I must agree with the interpretation in *Nova 2016*, and warn that using “comprising” and like terms in a claim is a double-edged sword. Used properly, it may protect essential elements while not artificially limiting the scope of a claim. However, the same interpretation must prohibit its use so as not to artificially inflate the scope of a claim. “Comprising” must mean that the listed element would be an essential element but that other non-essential elements could be added. The presence of a non-essential element does not escape an inclusive claim, but the lack of an essential element cannot be rescued by an inclusive claim. To suggest otherwise would be to have no “fence” around a claim, allowing patentees to add whichever essential element is convenient for their claim at the time. If, during the validity analysis, the patentee is attempting to read in a necessary component for the invention to function, the invention cannot be saved from overbreadth based on the word “comprising.”

(2) ***Sliding Member***

[338] Sliding member is used in 676’s independent Claim 1 and dependent Claims 2, 4, 7, and 9.

[339] There is agreement between the experts that a “sliding member” is either an MCCL, a J-slot, or an equalization valve.

[340] Mr. Lehr construed “sliding member” as not being limited to one device. This would seem to be a construction that would favour a defence to an inutility or overbreadth argument so will not be considered in the construction exercise.

[341] He also explained that dependent Claims 2, 4, 8, and 9 claim narrower embodiments of the “sliding member” of Claim 1, including an “equalization valve plug” in Claim 9. Mr. Lehr opined that, where Claim 1 broadly states a “sliding member,” the skilled person would include any type of sliding member from the CGK. The “sliding member” in Claim 1 is broad and should not be limited to only an MCCL, a J-slot, an equalization valve, and an equalization plug. To do so would be a violation of claim differentiation where the narrower dependent claims’ limitations are read into the independent, broader claim.

[342] Despite what would seem to be agreement amongst experts, Kobold alleges that Mr. Lehr changed his construction during his testimony. He included drag blocks, clutch rings, or external housings as “sliding members,” which were not described in his reports. Nor are those new additions described in any of the patent claims as sliding members.

[343] Technically Mr. Lehr is correct that, in the CGK, a number of sliding members existed. However, the 676 Patent does specify the sliding members in their embodiments as an MCCL, auto-J profile, and an equalization valve. Given the agreement amongst experts in their reports, and my findings above, I accept that this is the construction of a sliding member.

(3) *Operatively Assembled, and Operatively Associated*

[344] Though the terms “operatively assembled” and “operatively associated” are constructed together there is disagreement between experts on whether there is a difference in their construction. I will construct them together and then determine if there is a difference.

[345] The term “operatively assembled” appears in 676’s Claims 1, 33, and 34. Mr. Lehr was not asked to construct 33 and 34 and when asked in cross would not expound on his construction, which he restricted to Claim 1.

[346] Mr. David states that “operatively assembled” would normally mean “two distinct items assembled together such that the functioning of one item produces a direct effect on the other. In other words, the two items do not operate as mutually exclusive of each other. For two items to be operatively assembled it should not suffice that they are simply connected to one another (i.e. just assembled).” Rather the functioning of one directly affects or produces an output in the other.

[347] For example, the handle of a screwdriver is operatively assembled with the shank and the tip/blade. Turning the handle turns the tip, and if something stops the tip from turning then the handle will not turn either.

[348] He explains that with Claim 34 when operatively assembled takes on its ordinary meaning, which is when the jet-perforating device is operatively assembled to the forward flow-stop valve, which is an integral component of the multifunction valve. This same multifunction valve is operatively assembled to the sealing device as it is necessary to close the multifunction

valve by inserting the plug and bonded seal in the lower mandrel to seal above and below the device.

[349] In his responding report Mr. Lehr summarizes “operatively assembled” to mean that the “two components are part of overall assembly and that each component can perform their intended downhole function.” He confirms at para 57 of his construction that he “confused ‘operably associated’ to mean that ‘the two components are associated together so that they operate in a complimentary manner’.” In cross-examination, Mr. Lehr said:

I think the issue here is the teaching of the patent, and it's trying to teach about the difference between merely being **assembled** into the same downhole tool, **operatively assembled** and being able to perform functions versus **operatively associated**.

So if you have a downhole tool and you have these two devices, and they are assembled in, somehow into the same downhole tool, not necessarily directly connected to each other, but assembled into the same downhole tool, then they are **operatively assembled**. They are going to be going into the wellbore, they are going to be performing functions in the wellbore while the downhole tool is in the wellbore. That kind of thing.

Trial Transcript Day 7 (January 20), Page 26, Lines 11-24
[Emphasis added]

[350] This construction offered by Mr. Lehr does not seem to differentiate between operatively assembled and assembled.

[351] Mr. Chambers agrees with Mr. Lehr that according to Claim 1 the fluid jet perforation device and resettable sealing device are two items that are “operatively assembled.” As well, he agrees with Mr. Lehr that the fluid jet perforation device and resettable sealing device are included as part of the overall assembly, but that is by virtue of the fact that Claim 1 is directed

to “an assembly” that comprises those two components not that operatively assembled and assembled are the same.

[352] As a term, “operatively assembled” can be understood in its ordinary meaning in the context of Claims 1, 33, and 34. I accept Mr. David’s position that “operatively assembled” and “assembled” have two different meanings. The 676 Patent uses the two terms throughout the claims and uses the terms in the same claim to import different meanings. The term “operatively assembled” means a device on the tool string that must be capable of operation to allow the jet perforation device to operate. In Claim 1, the device is a resettable sealing device, in Claim 33 the device is a forward flow-stop valve and tubing string, and in Claim 34 the device is a multi-function valve. In Claims 33 and 34, the claims direct where on the string the devices should be assembled. Operatively assembled in Claim 1 does not tell the POSITA in what position it is on the string nor does the word assembled when used indicate what position it should be on the tool string. Operatively assembled does not mean they have to be assembled side by side but it needs to be in a certain position on the string in order to operate the particular device of the claim.

[353] There is general agreement between the experts on the construction of operatively associated. Operatively associated means two components are associated such that they operate in a complimentary manner. Both Mr. Chambers and Mr. Lehr’s construction agree, as do I, that the sliding member in Claim 1 needs to be operatively associated with the sealing device for use in actuation of the resettable sealing device.

[354] In summary, “operatively assembled” is constructed to mean devices are assembled together (but not necessarily side by side) on a tool string on a downhole tool. The term

“assembled”, the experts agree is a collection of parts belonging to a larger device. No order is directed and the devices have no relation to another unless they are operatively assembled or operatively associated. “Operatively associated” means two components are associated such that they operate in a complimentary manner.

(4) *Debris Relief Passageway*

[355] 676’s Claims 1, 3, 5, 7, 15, 18, 27, and 34 claim a “debris relief passageway.”

[356] Fundamentally, the debris relief passageways allow debris into the tool and then flush the debris through apertures. Both Mr. Lehr and Mr. David similarly construed “debris relief passageway” as a general term for a space where debris can move. Mr. Lehr described debris as including sand, proppant and/or formation debris. There is no disagreement between the experts on what debris is and how a POSITA would describe debris and therefore accept Mr. Lehr’s description. Mr. Lehr also describes “passageway” from the POSITA’s perspective as “a space, slot, chamber, hole, groove or other similar feature that allows the debris to pass along and/or through it.” Again, this is consistent with how the other experts describe it.

[357] Mr. Lehr goes further than the other experts and uses the summary of the invention under the heading of sealing device and page 38 of his Report’s first volume and says the patent discloses “debris relief apertures” as debris relief passageways as seen in the 676 Patent’s Figures 6B and 6C. He references that the depiction of the device in the patent disclosure is mistaken and the debris relief aperture should be number 38 and not 35.

[358] Mr. Lehr describes the debris relief passageway as “holes through the sliding member or larger apertures in the sliding members.” I caution that he pluralizes sliding members to indicate there is more than one sliding member in the claim. As constructed above, there are many kinds of sliding members but in Claim 1 it indicates a singular sliding member that is associated with the debris relief passageway, and in Claim 5 (dependent on Claim 4) it again is a single sliding member that being specifically a J-profile. Claim 7 (also dependent on Claim 4) specifies a clutch ring is the debris relief passageway as does Claim 15 (dependent on Claim 14 and is plural debris relief passages but singular sliding member) as examples of the patent teaching it is a singular sliding member that is the debris relief passageway.

[359] In closing submissions, NCS states that it is “important to interpret debris relief apertures/passageways and flow paths in light of the inventive concept taught by the 676 Patent.” However, NCS does not provide any jurisprudence or logical reason in support of this position. In light of this, NCS has not established that the Court should construe “debris relief passageway” to align with Mr. Lehr’s inventive concept taught by the 676 Patent.

[360] In my view, the inventive concept analysis is best left to the obviousness section. This is especially so here, where there is dispute over the appropriate inventive concept. I am mindful that patent specifications cannot be used to “enlarge the scope or contract the scope of the claim as written”: *Whirlpool* at para 52. In my view, interpreting claims in light of the inventive concept taught by the 676 Patent has the potential to also enlarge or contract the scope of the claim.

[361] Mr. Chambers constructs “a debris relief passageway” as an opening (such as a hole or a channel) or other pathway through which solid debris and/or fluid can pass, and provides the ability to flush the tool to clear debris.

[362] Mr. David indicates “a debris relief passageway is a passageway where debris can move.”

[363] In my view, it is not necessary to rely on the disclosure, as “debris relief passageway” is clear from the claims themselves. I note that Justice Locke explained when the disclosure should be referred to in *Camso* at para 104:

[104] In construing the Claims of a patent, recourse to the disclosure portion of the specification is (i) permissible to assist in understanding the terms used in the claims, (ii) unnecessary where the words are plain and unambiguous, and (iii) improper to vary the scope or ambit of the claims: *Mylan* at para 39.

[364] Mr. Lehr’s pluralization of sliding members is nowhere to be found in the claims, and it cannot be justified that several different claims reference a singular sliding member explicitly but are supposed to be read as several members because the disclosure expands the narrow claim. Thus, a debris relief passageway should be understood as an opening in or through a single sliding member that provides the ability to flush the tool to clear debris.

[365] In Claim 18, which is a method claim, the debris relief passageway must be operatively associated with a sealing device. The circulating fluid from the wellbore annulus must go through the debris relief passageway on the tool assembly. The debris relief passageway in Claim 27 has the flowable solids circulated to the surface through a debris relief passageway

which also is the method in Claims 25 and 26. The Court interprets this to mean debris relief passageways have fluids that can go up and down the tool string.

[366] The debris relief passageway in Claim 3 is named as being one or more apertures through the locating members that allow fluid and debris through the MCCL so debris does not settle on the locating members. Similarly, in Claim 5 it says the debris relief passageway is one or more debris discharge ports through the J-profile to permit discharge of debris when the slidable pin moves in the J-slot. In Claim 7, the debris relief passageway is a clutch ring that permits the debris to be discharged around the pin when the J-slot slides. Claim 15 is identical to Claim 7 but refers to the assembly in Claim 14 whereas in Claim 7 it refers back to Claim 4. Claim 17 does not use debris relief passageway but it says it has one or more apertures in the locating members to allow passage of fluid and debris through the MCCL to prevent the debris settling on the locating members.

[367] I will use Mr. Chambers' construction "a debris relief passageway as an opening (such as a hole or a channel) or other pathway through which solid debris and/or fluid can pass, and provides the ability to flush the tool to clear debris."

[368] To be operably assembled with the sealing device would mean the debris relief passageway does not need to be in contact with the sealing device but that they operate together.

(5) *Debris Relief Flowpath*

[369] NCS's 676 Patent's Claim 8 uses "debris relief flowpath" separately from a debris relief passageway. Remembering that Claim 1 does include a debris relief passageway, claim

differentiation suggests the debris relief flowpath is something different. This is consistent with the claim's equalization valve permitting a constant fluid communication between the tubing string and wellbore annulus as this is a debris relief flowpath rather than a passageway.

[370] Both Mr. Chambers and Mr. Lehr distinguish a debris relief flowpath from a debris relief passageway. Mr. Lehr's distinction is that, while a passageway would be a "space, slot, chamber, hole, groove or other similar feature that allows the debris to pass along and/or through it," a flowpath is bigger than a passageway and allows "fluid to travel through it until it reaches a passageway." Mr. Chambers' explanation aligns with Mr. Lehr's, and I accept Mr. Lehr's construction of this term.

(6) ***(Resettable) Sealing Device***

[371] It must be noted that both "resettable sealing device" and "sealing device" are used interchangeably throughout the patents, and I accept that they must be interchangeable terms. A sealing device that cannot be reset would have little practical value. Mr. Lehr explains that the 676 Patent description sets out various "sealing devices" that are known in the art, including "inflatable packers, compressible packers, bridge plugs, friction cups, straddle packers and others."

[372] Mr. Chambers says resettable sealing devices are described in the patent to permit hydraulic isolation of portions of the wellbore and to maintain the position of the tool assembly downhole. Mr. Chambers said this would include inflatable packers, compressible packers, bridge plugs, friction cups, and straddle packers. In Mr. Chambers' view, resettable refers to the ability to set the sealing device, unset it, and then set it again in a new position or the same

position in the wellbore more than one time. This would exclude some packers (inflatable packers and cup seals) listed by Mr. Lehr as not being able to make a workable tool.

[373] Similarly, Mr. David says the disclosure states suitable devices as including inflatable packers, compressible packers, bridge plugs, friction cups, straddle packers and others. He also explains that a POSITA would not use inflatable packers and cup seals, as this would be an unworkable tool as only a compressible packer would work.

[374] Here, it is necessary to refer to the disclosure to understand the term “resettable sealing device.” The 676 Patent at page 8 lists some examples of sealing devices as bridge plugs, friction cups, inflatable packers, compressible sealing element, yet it does acknowledge “modifications to the specified devices and the arrangement of the assembly may be made in accordance with the degree of variation and experimentation typical in this art field.”

[375] There is some disagreement between the experts of what resettable sealing devices could work in this patent but that is not related to construction. A POSITA would know which of the resettable sealing devices would be best used in the situation if not specified in the claim itself. With all the experts’ evidence, I construct a “resettable sealing device” as a device that permits hydraulic isolation of portions of the wellbore that also maintains the position of the tool assembly downhole. It can be set and unset to move the downhole assembly within the wellbore.

(7) Mechanical Casing Collar Locator and Locating Members

[376] As seen above in the construction of “sliding member,” the mechanical casing collar is included as a type of sliding member. Several claims across the patents mention an MCCL. In

676's Claims 2 and 16 the sliding member is identified as the sliding member to be used, and oriented such that the "mechanical casing collar locator having outwardly biased locating members slidable against the casing and engageable with a casing collar to verify the downhole location of the tool assembly prior to actuation of the sealing device."

[377] The experts agreed that the POSITA would be familiar with an MCCL. It is a device that allows wellbore operators to locate a BHA at specific locations within the wellbore. The outward locating members (fingers) slide along the inside of the casing until they find a casing collar and then they snap into the collar. From the surface, the operator will know if using coil tubing that it is in a collar gap. Tally sheets (or other methods) will allow the operator at the surface to know where the downhole tool is. When the perforating or other work is done in that section of casing the MCCL can be pulled out of the casing collar and again the locating members will slide along the inside until the next casing collar connector is found where they will snap into place again and this change of weight will be registered at the surface.

[378] The experts agree that what the patent labels as outward bias locating members are what is known as fingers or dogs in the industry. The experts indicate that a POSITA would understand that the MCCL has locating members (fingers) that snap into the casing collar.

[379] The experts differ in how they construe Claims 3 and 17 [676 Patent]. Both Claims 3 and 17 state outright a requirement of "one or more apertures through the locating members" of the MCCL to allow passage of fluid and debris. Both of Kobold's experts construed this term as meaning apertures in the MCCL fingers and not through the cavity underneath the fingers. NCS and Mr. Lehr believe that the debris relief apertures do not literally need to be through an

individual locating member. As such, NCS maintains that Kobold's experts ignored the teaching of the patent and the intent of the inventors.

[380] Regarding the debris relief aperture placement, Mr. Lehr relies on the patent's disclosure which explains Figure 6B is a "diagram of the J-profile applied to the sealing assembly mandrel shown in Figure 5." Mr. Lehr states that item #38 in Figure 6B is an example of a debris relief passageway. The description indicates debris relief apertures are present at various locations within the J-profile to permit discharge of settled solids.

[381] Mr. Lehr opined that the 676 Patent teaches prevention of debris accumulation in the cavity beneath each MCCL finger, as well as debris relief from use of the apertures in the locating members themselves. NCS argues that the patent does not need the debris relief apertures literally through an individual location member (fingers) rather than the locating members collectively.

[382] Mr. David and Mr. Chambers in their construction suggested the apertures are in the MCCL fingers. Contrary to Mr. Lehr they said the apertures could not refer to the cavity underneath the fingers. NCS alleges Kobold's experts took this approach to avoid the infringement allegations.

[383] When I construct this term in Claims 3 and 17 together I find the language clear and unambiguous in the same construct as Mr. David and Mr. Chambers. The apertures are through the locating members (fingers) of the MCCL. This construction also aligns with the construction

of the terms in Claims 2 and 16. The claim says exactly that, and does not say the cavity beneath the locating members (fingers) apertures are in the MCCL as suggested by the Plaintiff.

[384] I note in the detailed description at page 15 line 4 they are called fingers and are #61 on the figure. I do not understand the Plaintiff's argument that the patent does not literally mean the aperture is through the locating member (finger). The apertures can be one or more, as the patent says, and they would be through all the locating members (fingers). I do not understand the reference collectively when it is not in the patent, but a POSITA would understand that all the aperture(s) in the locating arms would collectively prevent accumulation of settled debris against the locating members (fingers).

[385] Similarly, the summary of the invention also describes the apertures as "through the locating members," which denotes the same meaning as Kobold's experts' construction.

[386] At page 15 line 3 the detailed description calls them the location arms (fingers) of the MCCL rather than calling them the location arms. In this description it reads "Further, another slot within the outer surface of the mandrel extends across each cavity such that fluid may enter each cavity from the wellbore annulus. Once assembled, a fluid pathway extends between the wellbore annulus to the cavity beneath each finger, and through the cavity to the tubing string. Accordingly, this permits flushing of fluid past the finders during operation. This open design minimizes the risk of debris accumulation adjacent the resilient element."

[387] In Mr. Lehr's examination in chief, he refers to Figure 7 and embodiment of the MCCL. He says they are simple devices that can be bought off the shelf but that you cannot buy one that

is prepped for “active debris relief” such as the one shown in Figure 7 and confirms that #61 is the finger and mentions it is also called a “dog.” As seen above, it is also called a locating member.

[388] Mr. Lehr talks about the resilient member (#62) that he calls leaf spring which is biasing the locating member (#61) outwards. The locating member is in a cavity (pocket) that, if it were clogged, the locating member would not be able to collapse into the pocket when it needs to collapse while it slides along the internal diameter of the casing before the locating member (finger) expands into the casing joint gap. On page 47 line 11 of his report, he says “or there is also another aspect, which is talked about in the patent, where you would put apertures through finger 61 to prevent an accumulation of debris on the outside of 61.” I find that this conforms exactly to what the other experts say as well as my construction that the patent Claims 3 and 16 mean that the aperture(s) are through the locating members (fingers) #61 and this allows fluid/debris to flow through the MCCL to prevent debris from settling against the locating members.

[389] Mr. Lehr mentions in his report that the patent refers to the debris relief apertures as #35 but that is a mistake and would be readily recognized as such by a skilled person and they would know that it should read “debris relief apertures #38.”

[390] I construe the MCCL and locating members as being a device that allows wellbore operators to locate a BHA at specific locations within the wellbore consisting of one or more outward locating members (fingers), which slide along the inside of the casing until they find a casing collar and then they snap into the collar. There are one or more apertures through the locating members which are adapted to allow passage of fluid and debris.

(8) **Auto-J Profile**

[391] An “auto-J profile” can be found in Claims 4, 5, 6, 12, 13, and 14 of the 676 Patent.

Auto-J profiles and its variations are found in several of the other patents at issue.

[392] In Mr. Lehr’s Infringement Report, he describes an auto-J profile as follows:

The two basic types of J-profiles are the L or “straight” J and the auto-J. In the straight-J-profile, the pattern of the slot resembles the capital letter “L” with the long “leg” aligned with the longitudinal axis. The second leg is oriented at roughly 90° to the first slot. There usually exists a short third slot connected to the second slot, and oriented at roughly 90° to it, which runs parallel to the first slot, in which a J pin can reside during running of the sealing device in the wellbore. The third short slot would be parallel to the axis of the long slot and be co-parallel with it.

Mr. Lehr Infringement Report at para 161

[393] The experts agreed that the terms “auto-J profile,” “J-profile,” “J-slot,” and “J-pin” are interchangeable in meaning in the context of the 676 Patent, and I accept that they are continually interchangeable between the other patents and prior art. There was also general agreement that a “J-profile” is a reference to the “zig zag” shape of the J track that the pin travels in.

[394] NCS again criticizes Kobold’s experts’ construction, suggesting that there “is further reason to suspect [Kobold’s] experts’ opinions in this respect are not their own demonstrated in respect of this aspect of the 676 Patent.” At para 322 of their closing submissions, NCS alleges the similarity in Mr. Chambers’ and Mr. David’s reports suggests their opinions are not their own, but that of the Defendants’ counsel. However, as already explained, I do not share the same view as NCS. Kobold’s experts gave the Court no reason to distrust their construction and NCS

had every opportunity in cross-examination to show any flaws or issues with Kobold's experts' respective constructions.

[395] There was disagreement between the experts on the meaning of "wherein the sliding member is an auto-J profile." Mr. Chambers and Mr. David opine that the J-slot assembly is limited to a stationary pin design or single piece J-slot groove. Mr. Lehr disagrees with this construction.

[396] Figure 6B of the 676 Patent is of an auto-J:

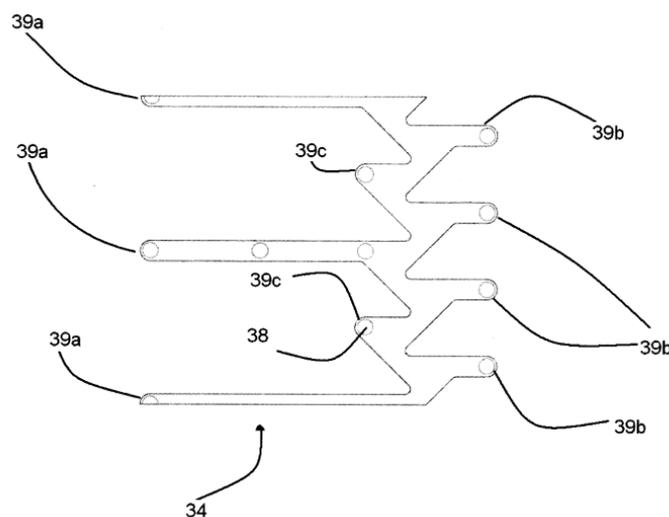


Figure 6b

[397] Claim 4 indicates that it is dependent on Claim 1 and that the sliding member is an auto-J profile that is slidable against a pin to actuate the sealing member.

[398] Mr. Lehr disagrees that the 676 Patent is limited to a stationary pin design or single piece J-slot groove. He says that the J-slot in the patent could include a J-pin and components holding

the pin rotating as well as multi-piece tubulars. Mr. Lehr says that a POSITA would know such modifications and are well within the CGK to do the modifications to the components. He explains that a POSITA would know that either the pin or the profile itself could rotate.

[399] I agree with Mr. Lehr that the patent does not set out the thickness of the sidewall and other specifications and cannot be read in, which was what Mr. Chambers advanced.

[400] Yet Mr. Lehr asks me to read in to the patents a number of things because it is not in the patent itself but a POSITA would know. As explained above, although a party can rely on the POSITA, CGK, and general propositions in the law that the Court is to read the claims with a “mind willing to understand,” the evidence must demonstrate that what is alleged is the truth. Here, there is insufficient evidence for the Court to conclude the modifications suggested by Mr. Lehr are within the CGK. I therefore prefer Mr. Chambers’ and Mr. David’s construction of “wherein the sliding member is an auto-J profile.”

[401] I cannot agree with Mr. Lehr’s construction given the language in Claim 4. The auto-J profile is, as in Claim 1, the sliding member and it says “slidable against a pin.” The reading of this cannot only mean the J-profile is the slidable member against a stationary pin or else it would have said the profile and/or pin are slidable to actuate the sealing member. The J-slot (zig zag) when assembled is straight up and down, and the sliding of the mandrel where the J-slot is machined into causes the pin to move to the J-slot profile.

[402] Claim 5 is dependent on Claim 4 and relates to debris relief discharge ports through the J-profile to permit discharge of debris upon slidable movement. Claim 6 (as in Claim 5) specifies

that the J-profile is sized at least 1/16th of an inch greater than the pin so that debris will discharge when sliding movement occurs. Claim 12 (as in Claim 11) comprises a compressible sealing element actuated by the sliding of the pin in the auto-J profile. In Claim 13 (as in Claim 12), the J-profile is a debris port adapted to discharge the debris upon the slidable movement of the pin within the J-profile. Claim 14 (as in Claim 13) has the J-slot being at least 1/16th of an inch greater than the pin to allow debris accumulation without impeding travel of the pin along the J-profile.

[403] I construe the auto J-profile (and synonymous terms) as a sliding member with three slots in a J or L-shaped orientation, slidable against a stationary pin design.

(9) **Equalization Valve or Plug**

[404] The terms “equalization valve” and “equalization plug” are points of disagreement across all the patents, but the construction is constant. The experts specifically disagree on what constitutes an equalization valve or plug. To justify equating this construction across patents, Mr. David annotated figures from the 676 and 704 Patents to show their equalization valves. Below are Mr. David’s annotated figures, beginning with the 676 (Figure 3] Patent’s equalization valve as outlined, followed by figures 1 and 2 of the 704 Patent with the equalization valve structure highlighted in yellow:

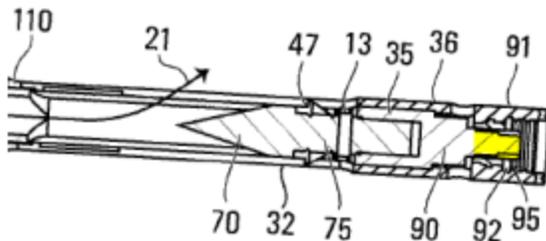
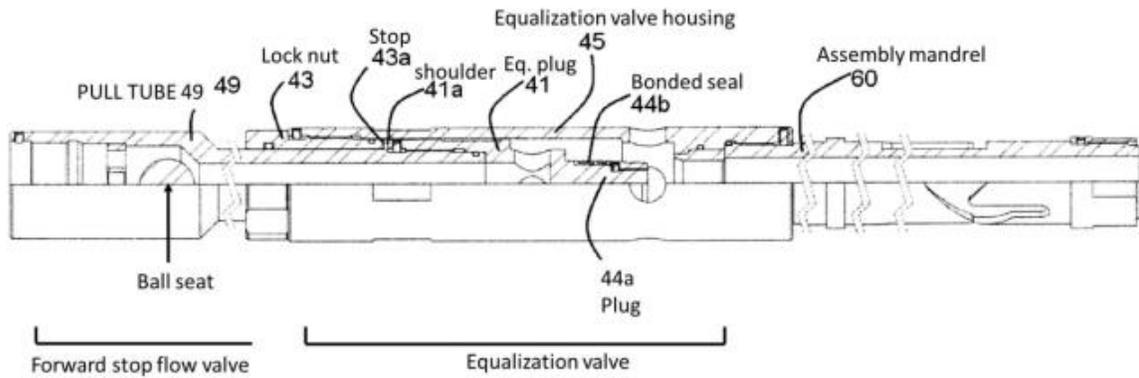


FIG. 1

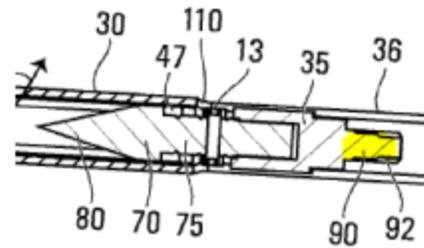


FIG. 2

[405] All the experts opined on the figure of the equalization plug, but as yet they disagree on its interpretation; I shall look at it myself. 676's Figure 4A shows the details of the equalization plug as shown on 676's Figure 3 at #41.

[406] Mr. David indicates when constructing Claims 8-10 that the sliding member is specified as an equalization valve or plug. This device or components of slides relate to the anchor/sealing assembly when stationary.

[407] 704's Claims 1-10 do not include an equalization plug, nor can an equalization plug be read into a fracturing valve. The expert evidence was insufficient for the Court to conclude that the skilled person would know to include an equalization plug in a fracturing valve.

[408] 704's Claim 11 adds an equalization plug that is actuatable between open and closed positions. The equalization plug acts to prevent fluid flow down the tubing string when the fracturing valve is in first position. When the fracturing valve is in first position the equalization plug is in closed position. I accept that the construction of an equalization plug is a plug that acts to prevent fluid flow down the tubing string, and may be a subcomponent of a fracturing valve or an equalization valve.

[409] Mr. Lehr in cross-examination agreed that 676's #42 are inner ports that you can pump flow fluid in and out. You can flow fluid through the ports in the outer housing once the packing element is relaxed and back to its prime position.

[410] I conclude that the skilled person would appreciate that the scope of the claims of the 676 Patent does not include one-directional equalization valves but they would also appreciate the equalization valve described in the 676 Patent is not limited to a single embodiment. Mr. David at para 167 of his report indicates that only 676's Claims 16 and 17 include most of the components of a BHA. Mr. David indicates that this BHA does not include a forward stop-flow valve, which is essential to a BHA of this patent. This goes to inutility, and I will not address it in construction.

[411] Kobold's experts limit the equalization valve to the specific embodiment described in the 676 Patent. Mr. Lehr disagrees, suggesting the claims are not so specific. He relies on the prior art and the CGK to clarify that the POSITA would appreciate that the equalization valves in the 676 Patent are not limited to a single embodiment.

[412] Kobold agrees that the claims are not limited to the "specific structure that is described as the preferred embodiment in the 676 Patent in Figure 3." However, Kobold explains that the suitable variants in the patent are limited to those that can achieve the required function of "constant fluid communication" through the equalization valve and plug.

[413] I agree. Even Mr. Lehr acknowledges in his Responding Validity Report that the "prior art equalization valves are described as only enabling equalization in one direction" [Emphasis added]. In cross-examination, Mr. Lehr also confirmed that the ports would always be in constant fluid communication and that you can always reverse circulate up through these ports.

[414] The simplistic construction of Mr. Chambers and confirmed by Mr. Lehr in cross examination is how a POSITA would understand an equalization valve as referenced in Figures 4A and 4B of the 676 Patent. The 676 Patent's disclosure says an equalization valve "permits constant fluid communication between the tubing string and the wellbore annulus whether the equalization valve is closed or open. When the equalization valve is open there is also a flowpath with the portion of the wellbore beneath the sealing device." I adopt this construction.

(10) **Clutch Ring**

[415] A “clutch ring” is claimed in 676’s Claims 7 and 15, both of which are dependent on Claims 4 and 14 respectively. Variations of it are claimed in the other patents.

[416] Mr. Lehr disagrees with Kobold’s experts’ construction of “clutch ring.” In his infringement report, Mr. Lehr constructed “clutch ring” as components that provide a mechanism to relieve torsional strain caused by a J-pin transitioning through the J-profile.

[417] In contrast, Kobolds’ experts describe the clutch ring according to the embodiment described in the 676 Patent. Mr. Chambers explained that the clutch ring is a “two-piece clutch ring” that holds the pin in place axially relative to the assembly while the auto-J profile slides in relation to the pin. Mr. David similarly described the clutch ring as a ring that surrounds the mandrel with the J-profile. In his opinion, the ring holds one or more pins facing inward on the interior of the ring that are held against the J-profile.

[418] Although Mr. Lehr agrees with this construction, he disagrees that the “clutch ring” in the 676 Patent is limited to the embodiment described by Kobold’s experts. Instead, in Mr. Lehr’s view, “the skilled person would appreciate that the claim does not require a two-piece clutch ring and rather is broader.”

[419] There is a Figure 6C (top view) and a Figure 6D (sideview) of the 676 Patent whereas the clutch ring is shown as a two piece clutch ring with debris relief openings at item #37:

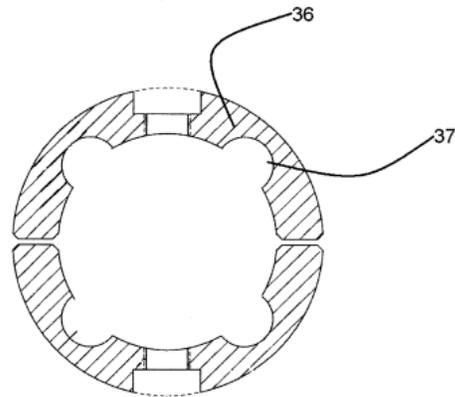


Figure 6c



Figure 6d

[420] Mr. David opined that Mr. Lehr's construction is significantly broader than what the 676 Patent describes as a clutch ring. He disagrees with Mr. Lehr's comparison to a car's clutch because a car clutch does not relieve torsional strain it "transmits or relieves torque by "clutching" a rotating shaft via friction plate that can be disengaged between the engine and transmission when the clutch pedal is pressed." He says a POSITA would read the patent as meaning a "simple ring that clutches the pins and can rotate freely, not an analog for an automobile clutch system."

[421] In cross-examination, Mr. Lehr confirmed, based on his review of Figures 6C and 6D, the clutch ring's holes are axial. In cross-examination he explained the following:

Q Okay, and these holes are, if I understand, are axial, which would mean sort of up and down in terms of the -- in practice, when you put this on a hole, these would be -- the tool is going this way, these holes are axial, they are going the same way as the tool as opposed to radial, which would be outward towards the wellbore.

A That's correct. The axis of these holes are in line with -- or prefer the axis of the mandrel that they ride on.

Q All right. And then if we look at 6D, this is sort of a side view of the clutch ring?

A M-hm, both of these are sections.

Q And it looks a lot to me like a wedding ring or something.

A Well, I -- what I see there is an accurate representation of the -- again, a section through the clutch ring. I mean I see the lines where the clutch ring is parted into two pieces during manufacturing. Yes.

Mr. Lehr Cross-Examination 19 January 2022, NCS Volume 6 at 154:26-155:17.

[422] Since there is disagreement over the term “clutch ring,” the description provides some clarity on this construction. Given this disagreement on the ambiguity of the term, I look to the description. The description explains that “[t]he pin may be held to the assembly by a clutch ring and the clutch ring may comprise debris relief passageways to permit discharge of debris from about the pin while the pin slides within the J-profile.”

[423] Given his construction aligns with the description without broadening its scope, the manner of its operation in the claims, and both Mr. David’s similar opinion and Mr. Lehr’s concession on cross-examination, I accept Mr. Chambers’ construction of a “clutch ring.” It is “the component that is attached to and holds the pin/lug that rides in the J-slot.” The clutch ring is able to rotate as the pin slides through the J-slot. The clutch ring would surround the portion of the mandrel having the J-slot. I reject Mr. Lehr’s approach and accept that the clutch ring is described and depicted as a two-piece clutch ring. I also accept that the clutch ring would have a debris relief opening/channel as depicted in Figure 6C.

(11) *Fracturing Valve*

[424] The 704 Patent's fracturing valve can be seen in Figures 1 and 2 (see: above para 404).

The 704 Patent's invention is the entirety of the fracturing valve, which consists of a tubular mandrel with a fracturing window through the mandrel. The tubular of the fracturing valve can be connected at both ends to a tubing string, which is a tubular arrangement for conveying fluid and/or tools from the surface into a wellbore. Mr. David explained, and I accept, that the skilled person would understand the valve itself is intended to have the fracturing fluids pumped through it, rather than down the annulus.

[425] NCS's position is that a skilled person would know that a fracturing valve requires an obstruction downhole of the fracturing ports. NCS disputes Mr. Chambers' position that the below figures would be included in the scope of the 704 Patent. NCS argues that Mr. Chambers believes devices that are inoperable as fracturing devices are within the scope of the 704 Patent and that claims should not be interpreted to include inoperable embodiments: *Burton Parsons* at paras 1-2, 9 and 12-13.

[426] 704's Claim 1 claims a "fracturing valve," which the skilled person would recognize includes an obstruction. Based on the experts' evidence, I cannot conclude that the skilled person would read in a seal or equalization plug to a "fracturing valve."

[427] Mr. Chambers' own background section includes an overview on "Fracturing Ports/Valves." He explains that there needs to be some type of port or valve in the tubing string that allows fluid to exit adjacent to the zone of interest. That is the whole purpose of a fracturing

valve. He also outlines that “[w]edge shaped deflection plugs at the base of fracturing ports/valves for fracturing down coiled tubing were also well known prior to 2013.”

[428] As already determined, the skilled person would understand that the fracturing valve includes an obstacle. To be clear, the POSITA would broadly know that *all* fracturing valves include some kind of obstruction and that knowledge would not be specific to the 704 Patent.

(12) ***“First Position” and “Second Position”***

[429] The 704 Patent Claims are directed toward a valve that can be mechanically actuated from a first position to a second position. This term comes up incidentally in the construction of other patents.

[430] First position refers to the open position in the 704 Patent’s disclosure. Figure 1 of the 704 Patent demonstrates the first position. When the valve is in first position, it allows fluid to exit the valve because the port on the outer sleeve and the window on the tubular are aligned in first position.

[431] Second position refers to the closed position in the 704 Patent’s disclosure. It denotes when fluid in the throughbore of the tubular above the port in the sleeve cannot exit the fracturing valve. Figure 2 in the 704 Patent demonstrates the valve in second position.

(13) *Seals*

[432] A seal acts to block flow between the inner tubular and outer sleeve when they are in tension. While there have been no critical disputes, seals come up in several other patents.

[433] As NCS explains, the following seals are used in the preferred embodiment described in the 704 Patent:

- A. A seal surrounding the upper end of the inside diameter of the outer sleeve to retain the outer sleeve against the tubular mandrel;
- B. A seal surrounding the lower end of the tubular mandrel to aid in preventing fluid flow out of the fracturing valve when the fracturing valve is in the second (i.e. closed) position; and,
- C. A bonded seal on the equalization plug to aid in preventing fluid flow below the fracturing valve when the fracturing valve is in the first position.

[434] There has been no controversy on this definition, so I accept NCS's explanation of a seal.

(14) *Wedge*

[435] All experts agree that the wedge is the obstruction found in a valve. The experts agree that the wedge does not necessarily have to be "wedge-shaped" to block fluid flow in the throughbore. I agree with NCS that a skilled person would understand that a wedge member is a component that comprises a wedge.

[436] A significant issue between the parties was whether the wedge and tubular are one piece (i.e. the wedge is a part of the sloped surface of the tubular mandrel). NCS's position is that the

skilled person would know that the wedge could be formed as part of the tubular or constructed as a separate piece.

[437] Reading the patent purposively, the tubular and the wedge are a single, unbroken piece. Although it may be possible to have a wedge constructed separately from the tubular, the 704 Patent does not include this specification. The 704 Patent's language limits the wedge to the same component as the tubular.

[438] 704's Claim 2 specifies that "the lower end of the window opens to a wedge continuous with the tubular" and Claim 15 also uses "a wedge continuous with the tubular." Claim 17 specifies that the wedge is formed "on the tubular," again indicating that the tubular and wedge are formed from the same component. In addition, as Mr. Chambers points out, Figure 5 of the 704 Patent shows the wedge and tubular as one. The 704 Patent description describes Figures 4, 5, and 6 as follows:

As shown in FIGS. 4, 5, and 6 fracturing window 60 opens onto a sloped surface of tubular mandrel referred to herein as wedge 70 disposed within tubular mandrel 15 at the downhole end of the fracturing window 60.

[Emphasis added]

[439] Mr. Lehr's original construction of the wedge and tubular in his first report also reflects that the wedge and tubular are machined as the same component. In his first report, Mr. Lehr stated that "[c]laim 2 requires that the lower end of the window opens to a wedge continuous with the tubular and in which the wedge is exposed through the window when the valve is in the first position." Although his second report disagrees and explains that Claims 2 and 15 are not

limited to a wedge that is built into the same part as the tubular, this is contrary to a purposive reading of the 704 Patent. There was no rationale for Mr. Lehr's disagreement with himself.

[440] I accept that the construction of a wedge is an obstruction found in a valve to toggle fluid flow in the throughbore. In these patents, a wedge and tubular are a single, unbroken component.

(15) *Dampening Fluid*

[441] NCS submits that "dampening fluid" can either be a compressible or incompressible fluid. Dr. Mennem explained the claims of the 571 Patent can be viewed with reference to the three types of dampening fluids for Claim 1, which are as follows:

- A. Substantially incompressible viscous fluids such as the specific grade 3 grease referred to in the 571 Patent;
- B. Less viscous or runny substantially incompressible fluids, such as water; or
- C. Compressible fluids such as nitrogen gas.

[442] Dr. Fleckenstein stated that "dampening fluid" means, "a fluid that can be pressurized and released in a controlled manner from the first annular chamber." This is an example of what he described as the "dampening shock absorption mechanism" in his report.

[443] As noted above, the CGK includes an understanding that dampening devices generate an opposite force to the downward force, as explained by Dr. Fleckenstein.

[444] In my view, Dr. Mennem is correct that “dampening fluid” includes both compressible and incompressible fluids.

[445] Dr. Fleckenstein explained that by describing the fluid as a “dampening fluid” the inventors limited the claim to fluids that achieve the function of dampening sleeve movement. The definition of dampen means “make less strong or intense” (Oxford English Dictionary, 7th edition). Dr. Fleckenstein’s definition in and of itself makes sense. However, it is in the context of the claims that dampening fluid requires further clarity with respect to whether it is a compressible or incompressible fluid.

[446] The specification provides clarity regarding whether the fluid should be a compressible or incompressible fluid.

[447] As highlighted by NCS, the written description of the 571 Patent discloses only one embodiment wherein the annular space of the downhole apparatus includes only one annular chamber:

In an alternative embodiment, the annulus 120 is a contiguous space, i.e., not divided. The downhole end 120B is sealably coupled to the housing 108 and the uphole end 120A is sealably coupled to the sleeve 144. The annulus space 120 is filled with a compressible fluid such as Nitrogen. When the sleeve 114 is moving axially from the first position downhole to the second position, the position of the downhole end 120B is unchanged while the position of the uphole end 120A is axially moving towards the downhole end 120B. The volume of the annulus 120 is then reduced, compressing the compressible fluid therein. As a result, the compressed fluid dampens the impact caused by the stopping of the sleeve 114.

571 Patent at 26: 13-22

[448] Where there is a second chamber, the specification provides that:

In some embodiments, the first dampening fluid is a substantially incompressible fluid such as grease.

In some embodiments, the first dampened fluid has a viscosity index in the range between 80 and 110. In some embodiments, the first dampened fluid has a viscosity index of 90.

571 Patent at 4:4-8

[449] A “dampening fluid” may either be a compressible or incompressible fluid. I accept that the inventors limited the claim to fluids that achieve the function of dampening sleeve movement, with respect to viscosity and compressibility. The skilled person would know that in a one chamber embodiment, the dampening fluid must be a compressible fluid and a two chamber embodiment must use incompressible fluid (for example, grease) as set out by the specification.

(16) *Annular Chamber*

[450] 571’s Claim 1 claims:

A downhole apparatus comprising:

a tubular housing along a tubing string;

a sleeve located within the housing and axially moveable therein from a first position to a second position; and

a first annular chamber radially intermediate the housing and the sleeve, said first annular chamber containing a first dampening fluid and being capable of controllably releasing the first dampening fluid under pressure; wherein

when the sleeve moves from the first position to the second position, the first dampening fluid is pressurized and controllably released for controlling the speed of the sleeve movement.

[Emphasis added]

[451] Claim 6 adds a second annular chamber that is in fluid communication with the first annular chamber.

[452] NCS argues that a purposive construction of Claim 1 in light of the disclosure and giving full effect to the intent of the inventors, requires that the annular chamber of Claim 1 must be sealed.

[453] Dr. Mennem's evidence was that Claim 1 has to be sealed because liquids or gases need to be trapped in the chamber. However, on cross-examination, Dr. Mennem acknowledged that the annular space within which the first annular chamber resides does not need to be fully sealed when grease is used as the dampening fluid. He acknowledged that "grease is the one ... semi fluid -- or pseudo fluid that would work with an open hole."

[454] Dr. Fleckenstein defined an annular chamber as "a volume with radial boundaries, with an inner radial boundary that is the outside surface(s) of the sleeve, and an outer radial boundary that is the inside surface(s) of the housing."

[455] Kobold disagrees that Claim 1 must be sealed. Instead, Kobold explains that the first annular chamber must be configured such that fluid is capable of being controllably released from it. Kobold submits that not only is there no language in Claim 1 that requires the first

annular chamber to be sealed but in order for Claim 1 to function, it requires the chamber *not* to be sealed.

[456] As Kobold points out, Claim 1 requires the fluid to be “controllably released.” I agree that NCS is attempting to impose a limitation into Claim 1 that is not present in the wording. Claim 1 does not include a seal when a dampening fluid is used – conversely, as NCS points out it is another question as to whether Claim 1 will work absent a seal, or information directing where the fluid is released to, or what pressurizes the first annular chamber. Whether Claim 1 functions without a seal is not a construction question and is therefore not addressed here.

[457] I adopt Dr. Fleckenstein’s construction, an annular chamber is a volume with radial boundaries, with an inner radial boundary that is the outside surface(s) of the sleeve, and an outer radial boundary that is the inside surface(s) of the housing which may or may not be sealed.

(17) ***Controllably Releasing***

[458] NCS submits that this term in 571’s Claim 1 is ambiguous. In Dr. Mennem’s view, “capable of controllably releasing the first dampening fluid under pressure” is ambiguous because there is no information regarding how the dampening fluid is pressurized nor how the first annular chamber controllably releases the first dampening fluid. He also explains that the skilled person would understand “controllably released” to mean the fluid is released in a controlled manner.

[459] Kobold explained that both experts were able to construe the meaning of “controllably releasing.” Similarly to Dr. Mennem, Dr. Fleckenstein opined that the term means that fluid can be pressurized and released in a controlled manner from the first annular chamber.

[460] The dampening fluid is pressurized from the movement of the sleeve from the first to the second position and is therefore not ambiguous.

[461] NCS asserts that Dr. Fleckenstein uses circular reasoning to construe “controllably releasing” because he says that the dampening fluid is released in a controlled manner. Although Dr. Fleckenstein uses the same words in the term to define its meaning, the plain meaning is clear. Control is defined as a “means of limiting or regulating something” and release is defined as “allow to move freely” (Oxford English Dictionary, 7th Ed).

[462] Dr. Fleckenstein also provided a useful analogy to explain “controllably releasing.” He equated the controlled release with the expulsion of air or water from a balloon. When the base of a balloon is un-pinched after it is filled, a passage is provided for fluid to exit the balloon in a controlled manner. This method can be contrasted to poking a hole in the balloon, which would allow the fluid to exit in an uncontrolled manner.

[463] Therefore, “controllably releasing” is where the dampening fluid is allowed to move in a controlled method.

(18) *Fluid Communication*

[464] NCS alleges that the term “fluid communication” in 571’s Claim 6 is ambiguous and its construction is therefore at issue. Although not included in NCS’s closing submissions, Dr. Mennem’s invalidity report explains that Claim 6 fails to disclose how the second chamber is in “fluid communication” with the first annular chamber.

[465] However, as Kobold notes, both Dr. Fleckenstein and Dr. Mennem were able to construe this term without contention.

[466] Dr. Mennem explained that “fluid communication” means that fluid is able to flow from the first chamber to the second chamber. Dr. Fleckenstein similarly constructed it to mean where the two chambers have a pathway between them, which allows for the passage of the fluid between the chambers.

[467] I agree that “fluid communication” means the two chambers have a pathway between them, which allows for the passage of fluid between the chambers. Again, however, whether “fluid communication” operates in the context of Claim 6 is another question, which I return to later in the ambiguity analysis.

(19) *Annular Barrier*

[468] The reference to an annular barrier is first found in 571’s Claim 11 and later claims add subsequent limitations. Claim 11 contains an “annular barrier” that divides the annular space into two chambers. Claims 12 and 15 contain further reference to the annular barrier. Claim 13 also

specifies that the annular barrier comprises of a seal arrangement for sealing between the sleeve and the housing.

[469] Dr. Fleckenstein opined that an annular barrier “is a barrier in the annular space that can allow fluid to flow through or around the barrier. The annular barrier may or may not seal against the housing or the sleeve.”

[470] Dr. Mennem reads later limitations regarding the annular barrier into Claim 11 to explain that the skilled person would construe the claim as “an annular barrier in the annular space, fixed to the sleeve and sealably moveable therewith for dividing the angular space into a first annular chamber and a second annular chamber.” NCS submits that the skilled person would understand Claim 11 to refer to a sealed annular barrier that is attached to and moves with the inner sleeve.

[471] An annular barrier is an obstacle that divides the chamber axially between a first and second annular chamber. I deal later with whether Claim 11 includes a sealed annular barrier when constructing Claim 11.

(20) *Metering Passage*

[472] 571’s Claim 16 comprises at least one metering passage fluidly connecting the first and second chambers across the barrier. Claims 17-21 add subsequent limitations to Claim 16 and Claims 22-23 provide for the formation of at least one axial metering passage.

[473] Dr. Mennem explained that “metering” is a known term in the industry, which means controlling the rate of flow by physically limiting how much fluid can pass through. Dr. Mennem

further opined that the metering passage would need to be a small orifice that permits passage of fluid but in a restricted manner due to its small size. However, Claim 16 does not actually provide parameters for the size or geometry of at least one metering passage.

[474] Dr. Fleckenstein construed “metering passage” as a passage that would allow a controlled movement of fluid, such as an orifice, through a solid structure or an intentional gap that fluid can travel through. Kobold explained that the controlled release of pressurized fluid in Claim 16 occurs via the metering passage.

[475] The only point of disagreement on the meaning of metering passage between the experts was whether Claim 16 included passageways of all sizes and geometries.

[476] Claim 16 does not specify the geometry nor the size of the metering passage, however the skilled person would understand that Claim 16 requires a controlled passage of fluid, for example through a small orifice.

VIII. Claims Construction

A. NCS's 676 Patent

[477] Claims 1, 18, and 34 are independent claims and the remaining claims are dependent. Claims 1 and 34 describe a tool assembly, and Claim 18 describes a method for perforating and treating a formation. I construe this to mean that all the elements listed are essential given that the CGK at the time of a POSITA would understand that these elements, if substituted, would take the device outside the monopoly and/or affect the ability of the invention to work.

[478] On the determination of essential elements versus non-essential elements, I address each claim's essential elements in detail below. However, I broadly note that NCS did not address, let alone contest, whether any term in a claim was essential or not.

(1) *Claim 1*

[479] Claim 1 is an independent claim that describes an assembly for deployment within a wellbore. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
1	N/A	<ul style="list-style-type: none"> a. A fluid jet perforation device; b. A resettable sealing device operatively assembled with the fluid jet perforation device for deployment on tubing string; c. A sliding member operatively associated with the sealing device, for use in actuation of the resettable sealing device; and, d. A debris relief passageway operatively associated with the sliding member, and adapted for use in discharge of settled debris about the sliding member.

[480] These essential elements are assembled on a tool string for deployment within a wellbore. It does not include in the claim the location on the assembly each device must be, however, the POSITA would understand how to assemble these components.

[481] A fluid jet perforation device has pressurized abrasive fluid that is forced through the jet nozzles to perforate the wellbore which fractures the geological formations that contain hydrocarbon-bearing formations.

[482] The Court uses the construction of “operatively assembled” as commonly construed at paragraph 354 above – where the resettable sealing device on the tubing string and must be in a position on the string and operated in order to use the fluid jet perforation device. The claim does not tell us where in relation to each other these two devices should be. But a POSITA would know where they should be on the string in relation to each other depending on which type of sealing device would permit the hydraulic isolation of the wellbore to be perforated. The POSITA would understand the resettable sealing device could be uphole or downhole in relation to the fluid jet perforation device. This is known, as Claim 10 states that the fluid jet perforation device can be uphole of the resettable sealing device. The logical conclusion is that in Claim 1 it could be uphole or downhole of the sealing device, but it must be assembled where it can be operated to use the fluid jet perforation device.

[483] The next device listed in Claim 1 is a sliding member operatively associated with the sealing device for use in actuation of the resettable sealing device. The Court uses the common construction of a sliding member at paragraph 343 above.

[484] In general, a sliding member consists of one of either an MCCL, a J-slot, or an equalization valve (all as commonly construed above at paragraphs 390, 403, and 415, respectively). A sliding member that is operatively associated means the sliding member has to be used to set or unset the resettable sealing device. A number of types of resettable sealing devices would be known to a POSITA. The sealing device can be located in any position as long as the sliding member can set or unset it. The sealing device allows for the isolation of areas so perforation can occur and can maintain the position of the assembly within the hole, after which they can be unset and moved to a new position and reset within the wellbore. Examples of

resettable sealing devices known to a POSITA and within the CGK: inflatable packers, compressible sealing elements, bridge plugs, friction cups, straddle packers.

[485] Claim 1 concludes the essential elements with a debris relief passageway. As commonly construed at paragraph 367 above, a debris relief passageway is “an opening (such as a hole or a channel) or other pathway through which solid debris and/or fluid can pass, and provides the ability to flush the tool to clear debris.” Operatively associated means the debris relief passageway has to be used with the sliding member and adapted for use in discharge of settled debris about the sliding member. Of importance is that the claim states it is a singular sliding member.

(2) *Claim 2*

[486] Claim 2 is dependent on Claim 1, specifying the wellbore is a cased wellbore and the sliding member is an MCCL. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
2	1	a. The wellbore is a cased wellbore; and, b. The sliding member is an MCCL having outwardly biased locating members slidable against the casing and engageable with a casing collar to verify the downhole location of the tool assembly prior to actuation of the sealing device.

[487] In Claim 2, it is specified that the sliding member is an MCCL that has fingers that slide along the cased wellbore and when the location members come to a joint they slide in to it given the spring (#62 and called resilient element) as shown in Figure 7. When the location members have engaged with a casing collar it can be determined where in the wellbore the assembly is.

When the location is known then the operator can perforate or perform the function the assembly is going to be used for. The assembly would have a jet perforator, a sealing device to operate the perforator, and an MCCL to locate and operate the sealing device, as well as being associated with the debris relief passageway to discharge debris so it doesn't settle on the MCCL.

(3) *Claim 3*

[488] Claim 3 is dependent on Claim 2. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
3	2	a. The debris relief passageway comprises one or more apertures through the locating members adapted to allow passage of fluid and debris through the MCCL, preventing accumulation of settled debris against the locating members.

[489] In Claim 3, there are one or more apertures in the locating members that allow the debris to pass through the MCCL to prevent the debris from settling against the locating members.

[490] Figure 7 shows a cavity #63, which could be a debris relief passageway but #63 is never described in the disclosure. A reading of the claim is clear that the apertures are to be through the locating members (fingers). There are no apertures for debris relief on the locating members shown in Figure 7. Confusingly, it says in the detailed description under the heading of "Further Debris Relief Features" when it discusses the MCCL:

A narrow slot extends longitudinally within each cavity over which the resilient element is placed, to allow fluid communication between the cavity and the tubing string. Further, another slot within the outer surface of the mandrel extends across each cavity such that fluid may enter each cavity from the wellbore annulus.

Once assembled, a fluid flowpath extends between the wellbore annulus, to the cavity beneath each finger, and through the cavity to the tubing string. Accordingly, this permits flushing of fluid past the fingers during operation. This open design minimizes the risk of debris accumulation adjacent the resilient element, which may force the fingers to remain extended against the casing or within a casing joint.

[491] This is only confirmation that there are additional debris relief features wherein the aperture is the open cavity where the resilient element is found through which fluid communicates with the tubing string. The description indicates there is a slot that communicates with the wellbore found in the outer mandrel but it is not shown in Figure 7 nor described in the claim. Claim 3 is clear that the aperture(s) are through the locating members and allow debris and fluid to pass through to prevent accumulation of debris on the locating members.

(4) *Claim 4*

[492] Claim 4 is dependent on Claim 1 and specifies that the sliding member is an auto-J profile. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
4	1	a. The sliding member is an auto-J profile slidable against a pin to actuate the sealing member upon application of mechanical force to the tubing string.

[493] Claim 4 introduces the auto-J profile. Claim 4 does not tell us where these devices are located on the tubing strings other than, as in Claim 1, to be operatively associated or assembled. A POSITA would know where to position the devices on the tubing string.

[494] Then, at page 11 line 20:

With reference to the J-profile shown in Figure 6b, three pin stop positions are shown, namely a compression set position 39a, a seal release position 39b, and a running-in position 39c. The sealing assembly mandrel 35 is coupled to the pull tube 49, which is slidable with respect to the bottom sub mandrel 50 that holds the pin 33. The bottom sub mandrel 50 also bears mechanical slips 51 for engaging the casing to provide resistance against sliding movement of the sealing assembly mandrel 35, such that the pin 33 slides within the J-profile 34 as the pull tube (and sealing assembly mandrel) is manipulated from surface.

[495] I construe Claim 4 as defining the sliding member as an auto-J profile slidable against a stationary pin, and a POSITA should know from prior art where on the tubing strings this sliding member is positioned.

(5) *Claim 5*

[496] Claim 5 is dependent on Claim 4 and specifies that the debris relief passageway comprises one or more debris discharge ports through the J-profile. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
5	4	a. The debris relief passageway comprises one or more debris discharge ports through the J-profile to permit discharge of debris upon slidable movement of the pin within the J-profile.

[497] The debris discharge ports are shown in Figure 6B and labeled as 38. In addition to the assembly in Claim 4, the auto-J profile would have one or more “apertures” in the J-profile which would be the debrief relief passageway. Apertures are holes drilled or machined into the J-

profile that would allow discharge of debris through the apertures (holes) when the pin is sliding through the J-profile.

(6) *Claim 6*

[498] Claim 6 is dependent on Claim 5 and describes the J-profile. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
6	5	a. The J-profile is sized at least 1/16 th of an inch greater than the diameter of the pin, to allow debris accumulation and movement within the J-profile without impeding travel of the pin along the J-profile.

[499] This embodiment has the J-profile machined at least 1/16th of an inch greater than the diameter of the pin. The claim says this is to allow debris accumulation and movement. The greater size of the profile would allegedly allow less debris to accumulate when the sliding is taking place, which would allow the pin to slide along the J-profile.

(7) *Claim 7*

[500] Claim 7 is dependent on Claim 4, which in turn is dependent on Claim 1, and specifies that the pin is held to the assembly by a clutch ring. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
7	4	a. The pin is held to the assembly by a clutch ring; and, b. The clutch ring comprises a debris relief passageway to permit discharge of debris from about the pin while the pin slides within the J-profile.

[501] The Claim 4 assembly relates back to Claim 1 when the sliding member is an auto-J profile and a clutch ring (as commonly construed at paragraph 423 above) holds it to the assembly. Figure 6C shows a two-piece clutch ring with debris relief openings (#37). Claim 7 does not specify if the clutch ring is the two-piece clutch ring. The clutch ring holds the pin to the assembly and would have openings on the clutch ring for all debris to move when the pin is moved within the J-slot. An example of the debris relief openings would be the axial channels shown in Figure 6C.

(8) **Claim 8**

[502] Claim 8 is dependent on Claim 1 and specifies that the sliding member is an equalization valve. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
8	1	a. The sliding member is an equalization valve actuatable to open or close a debris relief flowpath within the sealing device.

[503] In Claim 8, the assembly would have all of the devices in Claim 1 with the specific sliding member as the equalization valve. The equalization valve permits constant fluid communication (as commonly construed at paragraph 414above) between the tubing string and wellbore annulus. The type of sealing device is not specified and therefore could be any type of sealing device familiar to the skilled person.

[504] The debris relief flowpath has already been commonly constructed at paragraph 370 above. The equalization valve permits a constant fluid communication between the tubing string

and wellbore annulus. The equalization plug is what slides in the housing, but this is not mentioned in Claim 8 but is in Claim 9.

(9) ***Claim 9***

[505] Claim 9 is dependent on Claim 1 and explains that the equalization valve plug depends from the tubing string. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
9	1	a. The sliding member is an equalization valve plug depending from the tubing string and slidably disposed within an equalization valve housing continuous with the sealing device.

[506] The equalization plug depends on the tubing string whether pushed or pulled (at the surface) to make it slidable within an equalization valve housing that is continuous with the sealing device. Being continuous with the sealing device, it has a debris flow pathway continuous from the equalization valve housing and the resettable sealing device when in the open position. Claim 9 does not state that the equalization valve sets or unsets the sealing device unlike Claim 10 which does state it. The equalization plug just needs to be continuous with the sealing device.

(10) ***Claim 10***

[507] Claim 10 is dependent on Claim 9, which is dependent on Claim 1, and specifies the equalization plug is slidably actuatable by application of mechanical force to the tubing string. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
10	9	a. The equalization plug is slidably actuated by application of mechanical force to the tubing string to set or unset the sealing device within the wellbore.

[508] In Claim 10 the equalization plug is the sliding member which is the same as in Claim 9. The equalization plug is slidable when actuated by mechanical force (pushing or pulling) on the tubing string to set or unset the sealing device. Unlike Claim 9 where the equalization plug was continuous with the sealing device, in this claim the slidable plug sets and unsets the sealing device when the tubing string has mechanical force applied.

(11) *Claim 11*

[509] Claim 11 is dependent on any one of Claims 1 through 10. It explains that the fluid jet perforation device is assembled above the sealing device. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
11	Any one of 1-10	a. The fluid jet perforation device is assembled above the sealing device.

[510] Claim 11 does not say operably assembled or associated, rather, it specifies the location of the fluid jet perforation device is above the sealing device. This position allows the jet perforation device to perforate in the wellbore above the sealing device, after the sealing device is set (actuated).

(12) *Claim 12*

[511] Claim 12 is dependent only on Claim 11, but Claim 11 is dependent on any one of Claims 1-10. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
12	11	a. The resettable sealing device comprises a compressible sealing element actuated by the sliding of a pin within an auto-J profile.

[512] Claim 12 discusses the resettable sealing device, which was commonly construed at paragraph 375 above. The assembly would have all the devices in Claims 1 to 10 and would have the specific sealing device being a compressible sealing element that is actuated (set or unset) by the pin sliding in the auto-J profile. The compressible sealing element would be below the fluid jet perforation device, as in Claim 11.

(13) *Claim 13*

[513] Claim 13 is dependent on Claim 12, which is dependent on Claim 11, and specifies that the J-profile comprises debris ports. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
13	12	a. The J-profile comprises debris ports adapted to discharge debris upon slidable movement of the pin within the J-profile.

[514] Claim 13 explains that when the J-profile slides it is through the debris ports. There is no controversy on the construction of this Claim. It is agreed, and I accept, that the J-profile has multiple debris ports, which permit discharge when the pin slides within the profile.

[515] The ports are the same style of port as constructed in Claim 5, and so I construe them the same way.

(14) ***Claim 14***

[516] Claim 14 is dependent on Claim 13, which is dependent on Claim 12, and specifies that the J-slot is sized at least 1/16th of an inch greater than the pin. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
14	13	a. The J-slot is sized at least 1/16th of an inch greater than the pin, to allow debris accumulation and movement within the J-profile without impeding travel of the pin along the J-profile.

[517] This claim gives more clearance for the pin to allow for debris to accumulate without impeding the pin when traveling along the J-profile. This claim is similar to Claim 6 except we now know where the compressible sealing device is located in relation to the jet perforation device of which we did not in Claims 4-7 which are similar to Claims 13-15.

(15) ***Claim 15***

[518] Claim 15 is dependent on Claim 14, which is dependent on Claim 13. Claim 15 specifies that the pin is held to the assembly by a clutch ring. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
15	14	<ul style="list-style-type: none"> a. The pin is held to the assembly by a clutch ring; and, b. The clutch ring comprises debris relief passageways to permit discharge of debris from about the pin while the pin slides within the J-profile.

[519] Claim 15 describes a clutch ring that comprises debris relief passageways that will hold the pin to the assembly and the clutch passageway permits discharge of debris when the pin slides in the J-profile that is sized at least 1/16th of an inch greater than the pin.

[520] Claim 15's assembly has repeat elements but the claim specifies which sealing device and where it is located in relation to the jet perforation device.

(16) *Claim 16*

[521] Claim 16 is dependent on Claim 15's assembly and adds an MCCL. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
16	15	<ul style="list-style-type: none"> a. An MCCL having outwardly biased locating members slidable against the casing and engageable with a casing collar to verify the downhole location of the tool assembly prior to actuation of the sealing device.

[522] Claim 16 is similar to Claim 2, other than it does not specify that the wellbore is cased and does not explicitly define that the MCCL is the "sliding member" of the assembly. Aside from these differences, I interpret Claim 16 the same as Claim 2.

[523] Both Mr. Chambers and Mr. David raise a construction issue as Claim 16 relates to Claim 2 and, therefore, adds another MCCL, meaning there are two MCCLs. Claim 16 depends on Claim 15, with each prior claim recursively dependent on the prior claim until Claim 11. Claim 11 is dependent on “any one of Claims 1 through 10.” Mr. Lehr explains that Claim 16 includes every element of Claim 15, every element of Claim 14, every element of Claim 13, every element of Claim 12, every element of Claim 11, and every element of Claims 1-10 (where applicable). I agree. Mr. Lehr does not address whether Claim 16 includes two MCCLs where Claim 11 depends on Claim 2.

[524] I agree with Mr. Chambers and Mr. David that, where Claim 16 depends on Claim 2, an additional MCCL is added.

(17) *Claim 17*

[525] Claim 17 is dependent on Claim 16 and claims one or more apertures through the locating members. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
17	16	a. One or more apertures through the locating members to allow passage of fluid and debris through the mechanical casing collar, preventing accumulation of settled debris against the locating members.

[526] As Mr. Chambers points out, Claim 17 is similar to Claim 3 and does not explicitly define the one or more apertures as the “debris relief passageway” of the assembly. Aside from this difference, I interpret Claim 17 similarly to Claim 3.

[527] I accept Mr. Lehr's construction that Claim 17 includes every element of Claim 16, every element of Claim 15, every element of Claim 14, every element of Claim 13, every element of Claim 12, every element of Claim 11, and every element of Claims 1-10 (where applicable).

[528] However, as in Claim 16, where Claim 17 depends from Claim 16 and Claim 11 depends from Claim 2, there are two MCCLs. Again, where Claim 17 includes two MCCLs, it is unclear how these would operate with one another.

(18) *Claim 18*

[529] Claim 18 provides an independent method claim for abrasive perforation and treatment of a formation intersected by a cased wellbore. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
18	N/A	<ul style="list-style-type: none"> a. A method for abrasive perforation and treatment of a formation intersected by a cased wellbore: <ul style="list-style-type: none"> i. Providing a tool assembly comprising a fluid jet perforation device, a sealing device, and a debris relief passageway operatively associated with the sealing device; ii. Deploying the tool assembly on tubing string within the wellbore; iii. Setting the sealing device against the wellbore; iv. While the sealing device is set against the wellbore, jetting abrasive fluid from the perforation device to perforate the wellbore casing; v. While the sealing device remains set against the wellbore, circulating treatment fluid down the wellbore annulus to treat the perforations; vi. Circulating fluid from the wellbore annulus through the debris relief passageway within the tool assembly; and, vii. Unsetting the sealing device from the wellbore.

[530] The claim sets out the steps to perform this treatment in a logical order that a POSITA would expect to occur in that order. This procedure sets the sealing device, then the jet perforates and fractures the formation with treatment fluid. The tool assembly then has fluid circulated from the wellbore annulus through the debris relief passageway to flush and then the sealing device is unset.

[531] The tool assembly would be on a tool string that is used in a cased wellbore and would comprise of a fluid jet perforation device, a sealing device, a debris relief passageway that is operatively associated with the sealing device. The sealing device is set against the wellbore and then the perforation device would perforate the well casing by jetting abrasive fluid. With the sealing device still set, treatment fluid would be circulated down the annulus to treat the perforations. This fluid would circulate from the wellbore annulus (area between the tool assembly and the wellbore casing) through the debris relief passageway in the tool assembly (reverse circulate). The method is then to unset the sealing device which would allow the tool assembly to be moved to in the wellbore to the next perforation site.

[532] Of note, there is no mention of an equalization valve or other sliding member being used to determine where the tool assembly is in the hole. Nor does the sealing device need to be operatively assembled with a jet perf device. I do not accept Mr. Lehr's attempt to import an equalization valve by relying on the disclosure, this is a misuse of the disclosure to widen the scope of the essential elements of the claim.

[533] The disclosure further describes some steps as being mandatory and some optional, as well as noting "which may be performed in any logical order based on the particular

configuration of tool assembly used.” The claim does not indicate any of temporal or mandatory and optional steps in the method. The claim flows logically of when to do what step. A POSITA would know how to assemble the tool string and the order of the devices knowing the steps that were to be taken.

(19) *Claim 19*

[534] Claim 19 is dependent on Claim 18 and specifies the sealing device comprises a compressible sealing element. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
19	18	a. The sealing device comprises a compressible sealing element actuated by application of force to the tubing string.

[535] Claim 19 explains that the sealing device is a compressible sealing element that you set and unset by applying force at the surface to the tubing string. That means from the surface pushing down or pulling up on the tubing string. A compressible sealing element extends outwardly to seal or hydraulically isolate the casing wall from previous perforated and treated areas of the wellbore when force is applied. The 676 Patent disclosure explains that the sealing device would be the lower limit of the wellbore to be treated, which is below the assembly so that perforation, treatment, and debris removal can take place.

(20) *Claim 20*

[536] Claim 20 is dependent only on Claim 19 and claims the sealing device is actuated by sliding of a pin. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
20	19	a. The sealing device is actuated by sliding of a pin within an auto-J profile in response to the application of force to the tubing string.

[537] This Claim uses the method in Claim 19, which in turn depends on the method in Claim 18. Claim 20 requires the sealing device is actuated by sliding of a pin within an auto-J profile in response to the application of force to the tubing string.

[538] As Mr. Chambers points out, the function of a sliding pin is described in Claim 4.

(21) *Claim 21*

[539] Claim 21 is dependent on Claim 18 and therefore includes every element of Claim 18. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
21	18	a. The abrasive fluid comprises sand.

[540] The POSITA would know to use abrasive fluid with sand when perforating and treating a wellbore.

(22) *Claim 22*

[541] Claim 22 is also dependent on Claim 18 and incorporates every element of Claim 18. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
22	18	a. The treatment fluid comprises flowable solids.

[542] Claim 22 indicates the treatment fluid should be flowable solids, which are solids contained in a movable fluid. There was no contention between the experts that flowable solids can be moved from one location to another.

(23) *Claim 23*

[543] Claim 23 is dependent on Claim 18 and therefore includes every element of Claim 18. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
23	18	a. The step of delivering fluid to the tubing string while treatment is delivered down the wellbore annulus.

[544] Claim 23 further includes in Claim 18 the step of delivering fluid to the tubing string while treatment is delivered down the wellbore annulus. The claim specifies the treatment is delivered down the wellbore annulus, but does not specify which fluid (abrasive or treatment) is delivered to the tubing string.

[545] Mr. Lehr suggests it is “advantageous to circulate any type of fluid that maintains a slightly higher pressure in the coiled tubing, and which will not interfere with the chemistry or density of the fracturing fluids entering the perforations.” He goes on to suggest that the usual fluid would be clear “because fracturing fluids contain flowable solids.”

[546] I understand the POSITA would know to use clear fluids that would not interfere with the chemistry or density of the fracturing fluids entering the perforations. To do otherwise would hinder the fracturing process.

[547] I construe Claim 23 as a further step to Claim 18, requiring clear fluids that would not interfere with the chemistry or density of the fracturing fluids entering the perforations to be delivered to the tubing string while the treatment fluid is delivered down the wellbore annulus.

(24) *Claim 24*

[548] Claim 24 is dependent on Claims 18 or 23 and adds further step of monitoring fluid pressure, the rate and pressure of fluid delivery, and estimating the fracture extension. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
24	18 or 23	a. Monitoring fluid pressure within the tubing string; b. Monitoring the rate and pressure of fluid delivery down the wellbore annulus; and, c. Estimating the fracture extension pressure during treatment.

[549] The 676 Patent description explains that these steps monitor operations to detect adverse events.

[550] Mr. David explains in his report, and I accept, that “estimating the fracture extension pressure during treatment” is done by referring to specialized plots of net pressure versus time called a Nolte-Smith chart.

(25) *Claim 25*

[551] Claim 25 is dependent only on Claim 18 and adds the step of reverse circulating fluid from the wellbore annulus. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
25	18	a. The step of reverse circulating fluid from the wellbore annulus to surface through the tubing string.

[552] So all of the steps in Claim 18 are to be performed with the additional step of reverse circulation fluid from the wellbore annulus to the surface through the tubing string.

[553] Mr. David explains that this reverse circulation step is redundant because Claim 18 already adds a reverse circulation step. Mr. Lehr disagrees and explains that Claim 18 provides a step of “circulating fluid” whereas Claim 25 further comprises the step of reverse circulating, which is different than what Claim 18 describes.

[554] Mr. Chambers relies on the 676 Patent disclosure to explain that the reverse circulation flowpath allows constant fluid communication between the tubing string and the wellbore annulus.

[555] Based on my above construction of Claim 18, I agree with Mr. David.

(26) *Claim 26*

[556] Claim 26 is dependent only on Claim 25, which is dependent on Claim 18, and specifies that the sealing device remains set against the wellbore during reverse circulation. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
26	25	a. Sealing device remains set against the wellbore during reverse circulation.

[557] Mr. David points out, and I accept, that the requirement for the sealing device to be set is the only way the reverse circulation in Claim 25 could be possible. Claim 26 requires the sealing device to be set against the wellbore during the reverse circulation in this method.

(27) *Claim 27*

[558] Claim 27 is dependent on Claim 25 or 26 and specifies that the fluid comprises flowable solids. As Mr. Lehr explains, Claim 27 depends on Claim 25 or 26, so in one embodiment includes every element of Claims 25, 26 and 18 and in another embodiment includes every element of Claims 25 and 18. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
27	25 or 26	a. The fluid comprises flowable solids; and, b. The flowable solids are circulated to surface through the debris relief passageway.

[559] Mr. David opined that Claim 27 refers to the practice that typically “clean” fluid is circulated downward that “picks up” the solids or debris to return them to surface and out of the wellbore. There is no contention over this opinion and I therefore accept this.

(28) *Claim 28*

[560] Claim 28 is dependent only on Claim 18 and adds the step of equalizing pressure above and below the sealing device. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
28	18	a. The step of equalizing pressure above and below the sealing device by applying a force to the tubing string to actuate an equalization valve.

[561] Mr. Chambers explains that the equalization valve described in the 676 Patent permits constant fluid communication between the tubing string and the wellbore annulus whether the equalization valve is open or closed. However, he says that the equalization valve is described as part of the tool assembly but Claim 28 does not specify where the equalization valve is located, what it is connected to, or how the application of force to the tubing string would actuate the equalization valve.

[562] Mr. David similarly takes issue with Claim 28 and opines that the claim is missing the structure required to equalize.

[563] Mr. Chambers attempts to remedy these concerns by explaining that the skilled person would be familiar with suitable sealing equalization valves that can be used to equalize pressure

across the sealing device. He also relies on the 676 Patent description that sets out one embodiment of an equalization valve as follows:

The equalization valve therefore serves as a multi-function valve, and may be incorporated into various types of downhole assemblies, and manipulated to effect various functions, as required. That is, the equalization valve may be placed within any tubing-deployed assembly and positioned within the assembly to provide selective reverse circulation capability, and to aid in equalizing pressures between wellbore annulus segments, and with the tubing string flowpath to surface. When the equalization plug is in the sealed, or lowermost position, forward or reverse circulation may be effected by manipulation of fluids applied to the tubing string and/or wellbore annulus from surface. The equalization plug may be unset from the sealed position to allow fluid flow to/from the lower tool mandrel, continuous with the tubing string upon which the assembly is deployed. When the equalization plug is associated with a sealing device, this action will allow pressure equalization across the sealing device.

676 Patent Description at 13:26-14:7

[564] I accept that a POSITA would be familiar with suitable sealing equalization valves that can be used to equalize pressure across the sealing device, and would understand where to position the equalization valve. The additional step is added in Claim 28 to the method set out in Claim 18. This step is to equalize pressure above and below the sealing device by actuating an equalization valve by applying force on a tubing string.

(29) *Claim 29*

[565] Claim 29 is dependent only on Claim 18 and adds the step of equalizing pressure between the tubing string and wellbore annulus. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
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29	18	a. The step of equalizing pressure between the tubing string and wellbore annulus without unsetting the sealing device from the wellbore casing.
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[566] Mr. Chambers explains that Claim 29 is unclear whether it is directed to equalizing pressure with the wellbore annulus above or below the set sealing device. In his view, it is more likely that the annulus is below the set sealing device, since the tubing string and wellbore annulus above the sealing device are in constant fluid communication and therefore would not require pressure equalization. He also explains that Claim 29 does not explicitly claim how to equalize the pressure but would be done by actuating an equalization valve.

[567] Mr. David explained that, in practice, Claim 29 would be incredibly difficult to implement and the disclosure does not describe how this would be achieved. However, concerns regarding the functionality and operability of Claim 29 are not claim construction issues, rather, invalidity issues and I therefore do not address this here.

[568] Mr. David highlights that Mr. Lehr's construction does not include an equalization valve, nor does it explain how to accomplish Claim 29 without an equalization valve. Mr. Lehr does not appear to address these concerns.

[569] Despite its potential difficulty, I accept Mr. Chambers' more fulsome explanation and iterate that a POSITA should understand the same. Claim 29 adds the additional step of equalizing pressure with the wellbore annulus below the set sealing device, which would be done by actuating an equalization valve.

(30) *Claim 30*

[570] Claim 30 is dependent only on Claim 18 and adds the step of moving the tool assembly.

Its essential element is as follows:

Claim	Dependent on claim	Essential Element
30	18	a. The step of moving the tool assembly to another wellbore interval and repeating any or all of the above steps.

[571] Mr. Chambers opines that this would occur after the step of unsetting the sealing device from the wellbore in Claim 18. Mr. Lehr does not take issue with this statement.

[572] Mr. David explains that performing the same actions multiple times goes to the core of well-established multistage fracturing practices and would be familiar to the skilled person.

[573] I accept both Mr. Chambers' and Mr. David's constructions and note that to perform Claim 30, the sealing device would be unset and then reset once the new wellbore interval to fracture is located.

(31) *Claim 31*

[574] Claim 31 is dependent only on Claim 18 and adds the step of opening an equalization passage. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
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31	18	a. The step of opening an equalization passage from beneath the sealing device to the wellbore annulus above the sealing device.
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[575] Mr. Chambers relies on the patent disclosure to explain that this would logically take place after the sealing device has been set and the treatment occurs as this would lead to a pressure differential across the sealing device before it is unset.

[576] Mr. Lehr explains that if there is a pressure differential in a well across a set sealing device with higher pressures being encountered below the sealing device, opening an equalization passage below the set sealing device allows fluid to enter the assembly and be released above the sealing device to decrease the pressure differential.

[577] I accept both constructions, harmonizing them as a step of opening an equalization passage from beneath the sealing device to enter the assembly after the sealing device has been set and the treatment occurs to release pressure above the sealing device.

(32) **Claim 32**

[578] Claim 32 is dependent on any one of Claims 18 through 31 and adds the step of providing a valve assembly. Its essential element is as follows:

Claim	Dependent on claim	Essential Element
32	Any one of 18-31	a. The step of providing a valve assembly between the fluid jet perforation device and resettable sealing device.

[579] Mr. Chambers explains that even though Claim 32 references the “resettable sealing device” there is no such device included in any of Claims 18 through 31. He presumes that this must be referring to the sealing device of Claim 18.

[580] Mr. Lehr explains that construing the “resettable sealing device” as the same component as the “sealing device” referred to in Claim 18 is a logical construction and therefore the “sealing device” in Claim 18 may be a resettable sealing device.

[581] Mr. David also finds the term “valve assembly” vague and uncertain. However, he goes on to construct it as a valve that has the function of the “multifunction valve” or “valve assembly.”

[582] Mr. Lehr disagrees with Mr. David and opines that a skilled person would understand that the claimed valve assembly may include a forward flow-stop valve and/or an equalization valve.

[583] No where in the patent is there a valve assembly, nor is one identified on any of the figures. While this will resurface in the validity analysis, for now I construe Claim 32 as the step of providing a “valve assembly” between the fluid jet perforation device and the sealing device.

(33) *Claim 33*

[584] Claim 33 is dependent on Claim 32 and specifies the valve assembly. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
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33	32	<ul style="list-style-type: none"> a. A valve housing having an internal cavity continuous with the tubing string and with the lower assembly mandrel, the valve housing further comprising at least one cross flow port, to permit fluid cross flow between the internal cavity and the wellbore annulus; b. A forward flow-stop valve operatively assembled between the tubing string and the cross flow port to prevent fluid flow from the tubing string through the valve housing; c. A valve plug slidably disposed within the valve housing between a flow position and a sealed position; d. An internal fluid flowpath continuous with the tubing string and with the cross flow port of the valve housing when the valve plug is in either the sealed or flow position; and, e. A valve stem sealingly engageable within the lower assembly mandrel when the valve plug is in the sealed position to prevent fluid communication between the internal cavity of the valve housing and the lower assembly mandrel.
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[585] Claim 33 uses Claim 32, which in turn depends on Claims 18-31. Claim 33 describes the valve assembly mentioned in Claim 32. The valve assembly is described as a multifunction valve. Figure 3 has an internal cavity that is continuous with the tubing string and lower mandrel that has at least one cross flow port that allows fluid to cross flow from the internal cavity to the wellbore annulus. There is also a forward flow-stop valve that stops the forward flow from the tubing above the valve. The forward flow-stop valve also allows the fluid to flow in reverse.

[586] Mr. Lehr was not asked to construct or comment on Claim 33 or 34.

[587] The valve plug is described by Mr. David as “a tubular plug with a side port like the one depicted in Figure 4A of the 676 Patent... It permits constant fluid flow between the hollow interior of the plug and the wellbore annulus through inner ports in the plug and outer (or cross

flow) ports in the housing, and blocks flow above and below the solid plug end when in the sealed position.” Figures 4A and 4B are used by Mr. Chambers to construct this claim. He says that the valve plug positioning in the valve housing is such that the valve plug can slide within the valve housing. These two positions that the valve plug can slide between are a flow position and a sealed position. When sealed the fluid cannot flow between the internal cavity of the valve housing and the lower mandrel assembly. Thus, when open, it would imply that the fluid is allowed to communicate between the internal cavity of the valve housing and the lower assembly mandrel when in the flow position (open).

[588] The valve stem is the solid plug end of the equalizing plug that must be sealable within the lower assembly mandrel when the valve plug is in the sealed position to stop all fluid communication between the internal cavity of the valve housing and lower assembly mandrel. Mr. Chambers indicates that the valve plug also has a valve stem that seals the lower assembly mandrel when the valve plug is in position.

[589] I construe Claim 33 as describing a valve assembly consisting of:

- A. A valve housing with an internal cavity continuous with the tubing string and lower assembly mandrel, as well as at least one cross flow port;
- B. A forward flow-stop valve operatively assembled between the tubing string and the cross flow port;
- C. A valve stem, being a solid plug end that must be sealable within the lower assembly mandrel; and,
- D. A valve plug, being a tubular plug with a side port like the one depicted in Figure 4A, with a hollow interior, inner ports, and a valve stem.

(34) *Claim 34*

[590] Claim 34 is an independent claim that specifies a tool assembly for deployment within a wellbore on tubing string. Its essential elements are as follows:

Claim	Dependent on claim	Essential Elements
34	N/A	<ul style="list-style-type: none"> a. A fluid jet perforation device for deployment within the wellbore on tubing string; b. A resettable sealing device assembled below the fluid jet perforation device, the resettable sealing device comprising a sealing member disposed about a lower assembly mandrel; c. A multi-function valve operatively assembled between the fluid jet perforation device and resettable sealing device, the multi-function valve defining a debris relief passageway from the wellbore annulus through the lower assembly mandrel; d. The multi-function valve comprising: <ul style="list-style-type: none"> a. A valve housing having an internal cavity continuous with the tubing string and with the lower assembly mandrel, the valve housing further comprising at least one cross flow port, to permit fluid cross flow between the internal cavity and the wellbore annulus; b. A forward flow-stop valve operatively assembled between the tubing string and the cross flow port, for preventing fluid flow from the tubing string through the valve housing; c. A valve plug slidably disposed within the valve housing between a flow position and a sealed position, the valve plug comprising: <ul style="list-style-type: none"> i. An internal fluid flowpath continuous with the tubing string and with the cross flow port of the valve housing when the valve plug is in either the sealed or flow position; and, ii. A valve sealably engageable within the lower assembly mandrel when the valve plug is in the sealed position to prevent fluid communication between the internal cavity of the valve housing and the lower assembly mandrel.

[591] Of note, Claims 18-33 do not claim an MCCL or other locator as part of the BHA or method, nor does Claim 34. It does describe an assembly that includes a jet perf device, a resettable sealing device below the jet perf device, a multifunction valve that would be as is described in Claims 33 and 34 and is assembled between the jet perf device and the sealing device. The multifunction valve defines a debris relief passageway from the wellbore annulus through the lower assembly mandrel. It is understood that the debris relief passageway would be when the multifunction valve is in flow position. This assembly is to be used on a tubing string within a wellbore.

[592] Again, Mr. Lehr did not construct this claim. I therefore accept Mr. David's and Mr. Chambers' construction: a BHA that includes a jet perforation device, a resettable sealing device, and the valve assembly described in Claim 33 assembled between the jet perforation device and the sealing assembly.

B. NCS's 652 Patent

[593] The 652 Patent is identical to the 676 Patent in name, abstract, field of the invention, background of the invention, summary of the invention, brief description of the drawings, detailed description, and figures. The Claims themselves differ between the patents.

[594] At issue regarding this patent are Claims 1-26. Claims 1, 4, 14, 18, 19, and 24 are independent claims. There is no Claim 5 in the patent. The Plaintiff asserted Claims 4 and 6-26. At trial the terms in dispute according to the Plaintiff that need to be constructed are: tubular element, clutch ring, locator, sealing member, passageways that can conduct debris and debris relief feature.

(1) *Claim 1*

[595] Claim 1 is an independent claim for a sealing assembly. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
1	N/A	<ul style="list-style-type: none"> a. A mandrel having a longitudinal bore therein; b. A sealing member surrounding a portion of the mandrel; c. An anchor member surrounding a portion of the mandrel below the sealing member; d. A J-slot on said mandrel, the J-slot having one or more passageways defined in the slot portion, the passageways for providing communication between the outside of the mandrel and the longitudinal bore of the mandrel; and, e. A second mandrel surrounding a portion of the mandrel, the second mandrel having a pin for engaging with the J-slot.

[596] Mr. Lehr did not construct Claims 1-3 in his report. However, in his infringement report he construed a sealing member “to be an element of a ‘sealing assembly.’” This is consistent with Claim 1 of the 652 Patent. Claim 1 of the 652 Patent claims “sealing assembly” which comprises a “sealing member.” The “Sealing assembly” would be understood as the larger sealing device, while the “sealing member” would be understood as the sealing element within the sealing assembly. He goes on to say the POSITA would understand that a sealing member is “part of a sealing assembly that directly interacts with the wellbore to form the hydraulic seal” and that this would include a mechanical set packer, inflatable packer or bridge plug.

[597] Mr. Lehr in his responding report disagrees with Mr. David’s construction of a J-slot and disagrees with Mr. Chambers’ approach but only starts at Claim 4 in his disagreement. His

disagreement is concerning both Defendant experts' construction that the J-slot is formed via a groove in a tubular. In his disagreement with Mr. David he sets out at paragraph 104 of his reply that the J-slot is not limited to a "J-slot that is machined or carved out of the tubular creating a track for the pin to travel in."

[598] Mr. Chambers provided a claims chart for Claim 1 and indicated that Claim 1 was independent and directed to a sealing assembly. The mandrel has a longitudinal bore along its axial length with a sealing member surrounding a portion of the mandrel. Included as sealing members that permit hydraulic isolation of parts of the wellbore could include inflatable packers, compressible packers, bridge plugs, friction cups, straddle packers and others known in the prior art by the POSITA.

[599] His construction is that the second mandrel does not have to attach to the first mandrel to surround as indicated in the claim since the "sealing member may move relative to the mandrel." This would include an anchor member that surrounds a portion of the mandrel that is located below the sealing member meaning the downhole direction. The anchor engages the wellbore casing to hold the tool in a fixed location. This anchor may be used to set the sealing member with an example of an anchor being a mechanical slip. Again he states that to surround a portion of the mandrel does not require attachment as the anchor member may move in relation to the mandrel.

[600] Claim 1 also has a J-slot on the mandrel but does not specify where it is relative to the sealing or anchor member. Mr. Chambers goes on to say the J-slot has at least one passageway in the slot portion of the J-slot and that the slot is a machined groove forming a track on the

mandrel. The J-slot profile is machined in the surface or the component holding the pin must be capable of rotation to allow the pin to slide through which creates a track in which the pin can travel to set and unset the downhole tools such as a packer. The passageway is formed through the sidewall of the mandrel to allow fluid with or without solids to be communicated between the outside and inside of the longitudinal bore of the mandrel.

[601] Mr. Chambers indicates that the J-slot profile can only be a groove and cannot be through the mandrel or it would split in two and the patent does not say how it would be kept in alignment or why there would need to be a passageway if it was not just a groove. The second mandrel is on the outside and it has a pin for engaging with the J-slot. He indicates the only way for it to work is if this second mandrel surrounds the part of the mandrel with the pin.

[602] Mr. David's construction of Claim 1 is in essence similar to Mr. Chambers' construction. Mr. David uses the figures of the patent and colours to identify what the claim is discussing. He uses Figure 5 to illustrate where to find "a mandrel having a longitudinal bore therein" and "a sealing member surrounding a portion of the mandrel." He also notes there is an "anchor member" surrounding a portion of the mandrel below the sealing member.

[603] He construes the J-slot as the profile formed in the surface of the mandrel as illustrated in Figure 6A. He identifies the passageways set out in Claim 1 as being "holes that pass through the bottom of the profile and in to the bore of the mandrel." The second mandrel he construes as surrounding the first mandrel that has the J-slot and has an inward facing pin to engage the J-slot in the first mandrel. I will note he says the passageways are not depicted in Figure 5 and that he has added black arrows and circles to indicate where the passageways are.

[604] I will rely on Mr. Chambers' and Mr. David's construction of Claim 1.

(2) *Claim 2*

[605] Claim 2 is dependent on Claim 1. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
2	1	a. The second mandrel having a clutch for the supporting pin; and, b. The clutch ring having one or more passageways to assist in conducting debris away from the packer assembly.

[606] Mr. Lehr did not construct this claim.

[607] Mr. David constructed the clutch ring as being “a ring that surrounds the first mandrel and holds the pin in place against the first mandrel.” This clutch ring would have one or more passageways for debris as seen in Figure 6C.

[608] Mr. Chambers indicates that Claim 2 is dependent on Claim 1 and that in the sealing assembly of Claim 2 the second mandrel also has a clutch ring to support the pin (i.e. to hold the pin in place against the second mandrel). He goes on to construct the clutch ring using Figures 6C and 6D. The clutch ring attaches to, and supports, the pin and must surround the mandrel where the J-slot is. He indicates it must be able to rotate to allow the pin to slide through the J-slot. This clutch ring has axial debris passageways (#37) depicted in the figure that would allow debris to pass through especially when the pin is sliding within the J-slot.

[609] I will rely on the near-identical constructions of Mr. David and Mr. Chambers.

(3) *Claim 3*

[610] Claim 3 is dependent on Claim 1. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
3	1	a. The distance between the pin and the J-slot is at least 1/16th of an inch.

[611] Mr. Lehr did not construct this claim.

[612] Mr. Chambers indicated that Claim 3 has an “oversizing of the J-slot relative to the size of the pin is to allow the pin to slide in the J-slot even when a certain amount of debris is present.” He goes on to say the claim itself is a bit unclear as to where the distance is in width only or in both dimensions.

[613] Mr. David constructs this Claim as a distance between the pin and the J-slot of at least 1/16th of an inch. He too mentions that the claim does not make clear about where the clearance is but that a POSITA would know how to interpret the clearance as both width and depth.

[614] I will accept the construction of Mr. David and Mr. Chambers.

(4) *Claim 4*

[615] Claim 4 is an independent claim consisting of an apparatus. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
4	N/A	<ul style="list-style-type: none"> a. A tubular element configured to be connected in a downhole string, the tubular element having a J-slot formed therein; b. The tubular element being mateable with a second tubular element the second tubular element having a pin configured for relative slidable movement within the J-slot; and, c. Wherein the J-slot has one or more passageways that can conduct debris out of the J-slot.

[616] Mr. Lehr constructed this Claim and indicated it comprises several elements. He indicates one element is a tubular element connected in a downhole string having a J-slot formed therein. This tubular element is mateable with a second tubular element. The tubular element has a J-slot in it. He says the two tubular elements are arranged to interact with each other and “in particular the pin of the second tubular element will move or slide within the J-slot.” The J-slot has at least one passageway capable of conducting debris out of the J-slot. He notes that a POSITA would understand that “any debris may pass out of the J-slot whether by passing through the passageway or by being carried through the passageway by the movement of fluid through the passageways.”

[617] Mr. Chambers constructed the claim to be a tubular element with a J-slot formed in it that is connected to a downhole string. The tubular element is hollow and tubular. It does not specify whether it is jointed or coiled tubing for the string. The tubular element of Claim 4 is able to mechanically connect with a second tubular element which is also cylindrical and hollow, with a pin configured to slide within the J-slot which provides the mechanical link between the tubular elements. The J-slot has one or more passageways that can conduct debris out of the J-slot.

[618] Mr. David stated that the apparatus of Claim 4 is similar to the sealing assembly of Claim 1 but does not have an anchor or sealing member. A POSITA would understand the tubular element would include a mandrel with a J-slot that was machined or carved out of the tubular to create a track for the pin to travel in. The two tubulars would be mateable (connectable) with a pin in the second tubular configured to slide within the J-slot. He stated that a POSITA would know the two tubular elements would be joined together to permit both axial and rotational slidable movement as the pin circulates around the J-profile. The pin will move up and down in the profile depending on the function. He says that the J-slot would have at least one passageway through the bottom of the slot to allow debris to be conducted out of the slot. I disagree with this, the claim does not appear to specify that the debris is conducted out the bottom of the slot.

[619] The main disagreement between Mr. Lehr and both Mr. David and Mr. Chambers is that Mr. Lehr disagrees that the J-slot is limited to being formed via a groove in a tubular. The second disagreement is that Mr. Lehr disagrees when Mr. Chambers states mateable is not specified for how the pin is attached to the second tubular element. He disagrees that mateable requires attachment or connection between the tubular elements. He says his construction of mateable means the two tubulars are “arranged in a way that the two interact with each other and in particular the pin of the second tubular element will move or slide within the J-slot.” He said his and Mr. David’s construction are similar on that point.

[620] I find mateable means connectable or capable of being joined, which means in Claim 4 that the two tubulars are connectable. The claim does not specify how they may be connected (mateable) but it does say that the second tubular has the pin to slide in the J-slot. This construction would mean the pin is at least one element of how the two tubulars are connected.

[621] I find that the J-slot in the claim is limited to being formed via a groove in the tubular given Figure 5. The figure shows the J-profile (#34) is machined into the mandrel and without further options this is the J-profile that was the CGK of that time. The claim itself said “the tubular element having a J-slot formed therein.” The wording of the Claim itself is clear that the J-slot is cut into the tubular and is used as a track for the pin to travel in.

(5) ***Claim 5***

[622] There is no Claim 5.

(6) ***Claim 6***

[623] Claim 6 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
6	4	a. The movement of the pin within the J-slot assists in moving debris out of the slot.

[624] The apparatus of Claim 4 with the operation of the pin within the J-slot would move some debris from the slot. This construction is agreed on by the experts though Mr. David remarked it would be better to reverse circulate. I do not see Mr. David’s comments entering into the construction, as his opinion does not relate to the actual construction.

(7) ***Claim 7***

[625] Claim 7 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
7	4	a. The clearance between the J-slot and the pin is at least 1/16th of an inch.

[626] This embodiment has the clearance of the pin wider or looser. The experts again generally agree with the construction, though Mr. Chambers noted the claim did not set out if the clearance was width or depth.

(8) *Claim 8*

[627] Claim 8 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
8	4	a. The first and second tubular elements are capable of axial movement relative to each other in response to lifting or pushing on the downhole string.

[628] Mr. Lehr in his construction indicates there is an obvious typo in the claim in that the word “are” is misplaced. He says it should read “the tubular element and second tubular element are capable of axial movement.” The other experts agree there is a typographical error. Mr. Lehr says the POSITA would understand that the two tubular elements, J-slot and pin be moved axially in relation to each other when the string is lifted or pulled.

[629] Again, there is no real disagreement with this construction other than Mr. David finding it redundant.

(9) *Claim 9*

[630] Claim 9 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
9	4	a. A sealing member configured to seal the downhole string against a wellbore when the pin becomes positioned at least one predetermined location along the J-slot.

[631] This Claim adds a sealing member to the assembly which will seal the wellbore when the J-pin is set in one particular position. It does not specify the sealing member to be used, though a POSITA would know a number of them; nor does it mention where on the tool string it would be positioned. But again, a POSITA with CGK would know where and what type to use. Mr. Lehr points out that Figure 6B shows a J-profile with three pin stops (compression set (39A); seal release position (39b) and running in position (39c)).

[632] The experts all agree to the construction of this claim.

(10) *Claim 10*

[633] Claim 10 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
10	4	a. A locator for positioning the downhole string against a well bore.

[634] Mr. Lehr describes types of locators and function. He also says the locator is to identify the current location of the tool in the well. Generally, the experts agree to this construction, a locator is needed to position the apparatus in the wellbore. No particular location on the tool string is mentioned but depending on the function, this would be determined by the POSITA. As well, the function of the locator would be known by a POSITA but is not set out in the claim.

(11) *Claim 11*

[635] Claim 11 is dependent on Claim 10, which is subsequently dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
11	10	a. The locator is a mechanical collar locator having one or more passageways that can conduct debris into the downhole string.

[636] This Claim specifies that the locator is a mechanical collar locator with one or more passageways to conduct debris. The experts all refer to Figure 7. Mr. David goes further to specify the debris relief passageways shown in Figure 7. He notes that there is a long longitudinal passageway within each cavity with a second slot in the outer surface of the MCCL that extend across each cavity.

[637] The experts all agree on this construction.

(12) *Claim 12*

[638] Claim 12 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
12	4	a. A clutch ring configured to hold the pin, the clutch ring, having one or more passageways that can conduct debris into the downhole string.

[639] The experts all refer to Figure 6C when constructing this claim. They generally agree that the clutch ring holds the pin that rides in the J-slot, so it must surround the tubular element with the J-slot. Mr. Lehr adds that clutch rings “provide a mechanism to relieve torsional strain caused by a J-pin transitioning to a different position.” The passageways are seen in the figure as #37 and the claim indicates there can be one or more. Mr. David describes these passageways as half moon cutaways in the clutch ring. I accept this uncontentious construction.

(13) *Claim 13*

[640] Claim 13 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
13	4	a. The downhole string further comprises a perforation device.

[641] The experts generally agree that this Claim adds to the apparatus in Claim 4 with a perforation device. It does not specify where on the tool string it is positioned nor does it specify which type of perforation device is to be used.

(14) *Claim 14*

[642] Claim 14 is an independent claim. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
14	N/A	<ul style="list-style-type: none"> a. A tubular element configured to be connected in a downhole string, the tubular element having a pin configured for relative movement within the J-slot; b. The tubular element being mateable with a second tubular element, the second tubular element having a pin configured for relative movement within the J-slot; c. Wherein the clearance between the J-slot and the pin is at least 1/16th of an inch; and, d. Wherein the J-slot has one or more passageways that can conduct debris out of the J-slot.

[643] On inspection, Claim 14 is almost identical to Claim 4 except for the addition of the fourth essential element. This addition to Claim 14 is also found in Claim 7 which depends on Claim 4, making Claim 7 and subsequently Claim 4 identical to Claim 14. There is one other difference: the word “slidable” is missing from Claim 14 where it reads “relative movement” instead of Claim 4’s “relative slidable movement.”

[644] In Mr. Chambers’ and Mr. David’s opinion this Claim should be interpreted the same as Claims 4 and 7. Mr. Chambers notes the addition of sliding but does not feel it changes the construction of Claim 4 given the mechanics imply that it is slidable.

[645] Mr. Lehr also finds it similar to Claim 4 except he says with respect to the addition of slidable, which is not in Claim 14, a POSITA would know the pin is constrained by the J-slot profile and the two are similar. He does not equate the other addition as being the same as Claim 7 but constructs it the same.

[646] I find that the construction of Claim 14 is the same as Claim 4 and Claim 7 together.

(15) *Claim 15*

[647] Claim 15 is dependent on Claim 14. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
15	14	a. The tubular element and the second tubular element are capable of axial movement relative to each other in response to lifting or pushing on the downhole string.

[648] Mr. Lehr indicates that a POSITA would understand that the tubular elements, pin and J-slot would be moved axially when the tubing string is pulled or pushed.

[649] Both Mr. David and Mr. Chambers point out that this Claim is identical to Claim 8, other than it is dependent on Claim 14 and not Claim 4. I will construct it identical to Claim 8.

(16) *Claim 16*

[650] Claim 16 is dependent on Claim 14. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
16	14	a. A sealing member configured to seal the downhole string against a wellbore when the pin becomes positioned at least one predetermined location along the J-slot.

[651] Mr. Lehr notes it depends on Claim 14 and requires a sealing member that seals the tool string against the wellbore when the pin is in at least one position that has been predetermined.

[652] Mr. David and Mr. Chambers point out this Claim is identical (other than typos) to Claim 9 and should be constructed the same. I will construct it the same as Claim 9.

(17) *Claim 17*

[653] Claim 17 is dependent on Claim 14. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
17	14	a. A clutch ring configured to hold the pin, the clutch ring having one or more passageways that can conduct debris into the downhole string.

[654] Mr. Lehr suggests a POSITA would understand the clutch ring is “to be configured to hold the pin so that it can move through the J-slot. Further, the clutch ring has passageways or debris ports (#37) that can conduct debris into the downhole string.”

[655] Mr. David and Mr. Chambers both note that it is identical to Claim 12 (except dependent on Claim 14 not 4).

[656] I will construct this Claim identically to Claim 12.

(18) *Claim 18*

[657] Claim 18 is an independent claim. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
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18	N/A	<ul style="list-style-type: none"> a. A tubular element configured to be connected in a downhole string, the tubular element having a J-slot formed therein; b. The tubular element being mateable with a second tubular element, the second tubular element having a pin configured for relative movement within the J-slot and a clutch ring configured to hold the pin; and, c. The clutch ring has one or more passageways to conduct debris.
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[658] This is an independent claim. Mr. David said it is very similar to Claim 4 except that it has a limitation of having a clutch ring and that that is the debris relief rather than the J-slot. Mr. Chambers says it is the same as Claim 4 except it says relative movement rather than relative slidable movement, of which he says is a minor difference and should be interpreted the same as Claim 4. The other difference he notes is the clutch ring, which is the same as Claim 12 but the passageways of the clutch ring are to conduct debris. The difference from Claim 12 is that it “has one or more passageways that can conduct debris into the downhole string” whereas in Claim 18 the clutch ring can conduct the debris other than the downhole string.

[659] Mr. Lehr does not relate this Claim to any other previous claims. He does not distinguish the difference related to the clutch ring and where debris is conducted, as Mr. Chambers does. He otherwise constructs it as he did Claim 12.

[660] I will construct it the same as Claim 4 and Claim 12, with the addition noted by Mr. Chambers that it appears there is no limit to where the debris can be conducted from the passageways in the clutch ring. However, a POSITA would know that this is highly likely to be the downhole.

(19) *Claim 19*

[661] Claim 19 is an independent claim describing a method for activating a downhole tool function in a debris-laden environment. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
19	N/A	<ul style="list-style-type: none"> a. Deploying a downhole tool assembly comprising at least one J-slot assembly, the J-slot assembly having a J-slot and at least one debris relief feature, a resettable sealing member actuatable by the J-slot assembly, and a passageway for reverse circulation; b. Setting the downhole tool in a wellbore; c. Pushing on the tubing string to thereby set the sealing member against the well bore; d. Performing a first downhole function while the sealing member remains set against the wellbore; e. Pulling on the downhole string; f. Causing relative sliding movement of the pin within the J-slot to remove debris from the wellbore into the downhole tool; g. Reverse circulating fluid from the annulus into the passageway to cause debris to be removed to the surface of the wellbore; and, h. Releasing the sealing member from the wellbore.

[662] This is the fifth independent claim and is a method claim to activate functions in a downhole tool in a debris-laden environment.

[663] Mr. Chambers notes that this method is a systematic instruction, and should be followed in this order. The first step is to deploy an assembly down the wellbore that has at least one J-slot assembly and the J-slot has at least one debris relief feature. As well, the assembly has a resettable sealing member. This can be set and unset by the J-slot. This Claim also has a passageway for reverse circulation.

[664] The claim has the step of pushing on the tubing string to set the sealing member. Mr. Chambers says the claim does not include a tubing string, but presumes it is what the assembly is deployed on. The sealing member is set by having the pin slide in the J-slot when the string is pushed on. He notes that there must be a dragblock or anchor to have the pin slide. The next step is to perform a first downhole function while the sealing member is set against the wellbore, but the claim does not tell us the first downhole function. The next step is to pull on the downhole string, which would create an upward force. Mr. Chambers said this upward force would not cause the pin to slide in the J-slot or to perform the last step which is to unset the sealing device.

[665] In his construction chart, Mr. Chambers points out that in this assembly no equalization valve is claimed as part of the downhole assembly, which would block flow through the tool assembly below the sealing element to hydraulically isolate a part of the wellbore. He agrees that the next step of the pin sliding in the J-slot would remove some debris into the downhole tube with the step of reverse circulation causing debris to be removed to the surface of the well. Then the step of releasing the sealing member can be done by applying upward force to the tool assembly and sliding the pin in the J-slot, which he notes has already been done in an earlier step after pulling the downhole string.

[666] Mr. David finds the method confusing, as some steps are repeated such as setting the tool in the second element and then setting the sealing member in the third step both doing the same. He notes many components of this method are not described in the claim, but a POSITA would understand a J-slot, resettable sealing member, passageway, and MCCL. Mr. David raises concerns about utility of this method, but these shall not be canvassed here.

[667] Both the Defendants' experts agree the claim does not say which the first downhole function is. This Claim only has on the assembly a J-slot assembly, a sealing member, and a reverse circulation passageway without an equalization valve, ball check valve, MCCL, or jet perforator.

[668] Mr. Lehr does not address any concerns such as there being no anchor so that the tubing string could not be pushed on. His construction is similar to the Defendants' experts just with no critique of the claim.

[669] I will construct the claim as per Mr. David's construction, which is similar to Mr. Lehr's and Mr. Chambers', on what the method is of Claim 19. The issues raised concerning the utility of the claim are not considered at this construction stage.

(20) *Claim 20*

[670] Claim 20 is dependent on Claim 19. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
20	19	a. Performing a second downhole function prior to releasing the sealing device from the wellbore.

[671] This Claim depends on Claim 19 and includes all the elements of Claim 19 plus the performing of a second downhole function before releasing the sealing device.

[672] Mr. David indicates that the second downhole method would be limited by what he said regarding Claim 19. Mr. Chambers indicates the second function would logically take place after

the first function. His concern regarding Claim 19 not knowing what the first function is makes it hard to know what the second function is.

[673] Mr. Lehr does not have this concern and says a POSITA would understand that a second function would be performed downhole before unsetting the sealing device and he gave the example of treating the formulation.

[674] I will construct it as having all the elements of Claim 19 and then performing a second function before releasing the sealing device. I note that in Claim 19 it is only a sealing member but I will construct the two as meaning the same.

(21) *Claim 21*

[675] Claim 21 is dependent on Claim 20, and subsequently Claim 19. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
21	20	a. The first downhole function is abrasive jet perforation.

[676] This method claim has the first downhole function being perforation using an abrasive jet device. I note that this Claim is dependent on Claims 20 and 19 and there is no jet perforation device, but a POSITA would know in order to do the function of this Claim you would need this device as well as other devices on the tool string in order to do the function.

(22) *Claim 22*

[677] Claim 22 is dependent on Claim 19. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
22	19	a. The second downhole function is fracturing.

[678] This Claim depends on Claim 19, which does not have a second downhole function in the method. This Claim would need to have several devices that are not listed in Claim 19 in order to perform the fracturing, which is to be the second downhole function.

(23) *Claim 23*

[679] Claim 23 is dependent on Claim 19. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
23	19	a. At least one debris relief feature is a passageway in the J-slot or a 1/16th of an inch clearance between the pin and the J-slot.

[680] In this Claim there is either the debris relief passageway in the J-slot or having 1/16th of an inch clearance between the pin and J-slot for debris relief. This fits the same description as Claims 3 and 7, and so I will apply the same construction. At least one debris relief feature is the passageway of the J-slot or the 1/16th of an inch clearance as previously constructed.

(24) *Claim 24*

[681] Claim 24 is an independent claim. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
24	N/A	a. An actuation device for use with a resettable downhole tool in the presence of flowable solids, the actuation device comprising a pin slidable within an auto J-profile, wherein the auto J-profile comprises debris ports for discharging debris upon slidable movement of the pin with the J-profile.

[682] This is 652's sixth independent claim, describing a mandrel with a J-profile and pin with debris ports. When the actuation device slides in the J-profile it discharges flowable solids in a resettable downhole tool.

[683] I accept Mr. Lehr's suggestion that a POSITA would understand "debris ports" to mean ports through the J-profile to permit the discharge of debris. Mr. David similarly describes these as "holes through" the J-profile.

[684] I construe Claim 24 as a mandrel with a J-profile and slidable pin with holes in the J-profile through which debris can be discharged.

(25) *Claim 25*

[685] Claim 25 is dependent on Claim 24. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
25	24	a. The J-slot is sized at least 1/16th of an inch greater than the pin to allow debris accumulation and movement within the J-profile without impeding travel of the pin along the J-profile.

[686] In this Claim the J-slot is 1/16th of an inch greater than the pin which allows debris to be moved so it doesn't impede the pin along the J-profile. This is repetitive of Claims 3, 7, and 23, and so I construct it the same way.

(26) *Claim 26*

[687] Claim 26 is dependent on Claim 24. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
26	24	a. The pin is held to the assembly by a clutch ring and wherein the clutch ring comprises debris relief passageways to permit discharge of debris from about the pin while the pin slides within the J-profile.

[688] In this dependent claim the pin is held on with a clutch ring that has debris relief passageways that permit the discharge of debris when the J-profile is functioning with the pin moving through the profile. This is repetitive of the clutch ring claims in Claims 12 and 18, and so I construct it the same way.

C. *NCS's 907 Patent*

[689] At issue regarding this patent are Claims 1-28.

[690] There are two independent claims: Claims 1 and 16 (both method claims), with the rest being dependent.

[691] Mr. Lehr indicates he was told that Claims 1-3, 8-10, 12-18, and 20-28 are at issue. Mr. Lehr indicates that Figure 3 is a “design similar to a device similar to a device called the ‘OptiPort’ sleeve that was put on the market by my former employer, BJ Services in about 2010. BJ Services did not have a downhole tool that could reliably shift open the OptiPort and as a result BJ Services had NCS shift OptiPort Sleeves using NCS’s Mongoose Tool.” He then goes on to describe what he sees as the differences.

[692] The Plaintiff, in closing, constructs the terms “tubing,” “downward force,” “inner profile,” “resettable anchor member,” “resettable sealing member,” and “locating device.” Mr. Lehr constructed similar terms within his claim-by-claim construction. Kobold’s experts do a claim-by-claim construction with the closing argument touching on somewhat similar terms to the Plaintiff’s.

[693] There are copious disagreements found in the written closing arguments that I will not be addressing. Nor will I rely on the responding records and replies of the experts as much as I will rely on their original constructions and evidence given at trial. An example of why I am taking this approach is illustrated in the Plaintiff’s closing regarding this Patent: “Curiously, the term ‘passive’ is not used in association with the term ‘locator’ in either of the Defendant’s experts’ first reports. The similar language and arguments between Mr. Chambers’ and Mr. David’s reports suggest they are conduits for counsels’ arguments.” Though I do not agree with their statement and see no undue influence by either party, it does shine light on why I give more weight to the original reports. None of this was made easier with all the “he said/she said” and voluminous arguments on each point.

(1) *Claim 1*

[694] Claim 1 is an independent method claim that describes a method for shifting a sliding sleeve in a wellbore. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
1	N/A	<ul style="list-style-type: none"> a. Providing a wellbore lined with tubing, the tubing comprising a sleeve slidably disposed within a tubular, the tubular having an inner profile for use in locating said sleeve; b. Providing a tool assembly comprising: <ul style="list-style-type: none"> i. A locator engageable with said locatable inner profile of the tubular; and, ii. A resettable anchor member; c. Deploying the tool assembly within the wellbore on coiled tubing; d. Engaging the inner profile with the locator; e. Setting the anchor within the wellbore to engage the sliding sleeve; and, f. Applying a downward force to the tool assembly to slide the sleeve with respect to the tubular.

[695] Kobold's experts agreed that "providing a wellbore lined with tubing" is known by the POSITA to be casing that is often cemented into place. Mr. Lehr was broader, saying it was in reference to "casing, casing string, jointed pipe or production tubing that is set against the formation." I accept the method's first step of providing a wellbore lined with tubing is understood to be using a wellbore with a casing cemented to it, which is normally permanent.

[696] The next part is "a sleeve slidably disposed within a tubular" of which Mr. Lehr says a POSITA would understand to mean a "tubular" is part of one or more tubulars that are assembled together to form the tubing string. He as well said a POSITA would understand tubular can also refer to housings that can be stationary or sliding sleeves, collars and assemblies. Mr. Lehr says

the tubular has ports that are opened or closed by the sleeve that slides within the tubular. The inner profile is said to be required to locate the sleeve and from the description, a POSITA would know that inner sleeve is a form of engagement profile given it says the locator is engageable with the inner profile. In his report, he stated that the inner profile allows an MCCL to locate the sleeve so that “the operator is able to identify when components on the tool assembly are lined up with the sleeve and then to shift the sleeve.”

[697] Mr. David’s construction is simpler and has a schematic drawing to illustrate it. Mr. Chambers’ construction conforms to Mr. David’s schematic drawing. Mr. David’s construction of this part is a “sliding sleeve assembly itself, with the sleeve housing called the ‘tubular’, and the inner profile being the recess into which the sleeve shifts.” I will use Mr. David’s construction.

[698] The next part of the Claim specifies there is a locator that is engageable with the locatable inner profile of the tubular and a resettable anchor member.

[699] Mr. Lehr says that the anchor must locate and engage the tool to be set against the sliding sleeve so the two are operatively connected. He goes into great detail concerning where the anchor would be located on a tubular or a sleeve and that locating the engagement profile on the sleeve is not important on how the tool and sleeve will function together and the sleeve to be shifted.

[700] Mr. Lehr set out what the patent says are suitable anchors. He indicated that the anchors “must be capable of anchoring to the sliding sleeve due to frictional means or mechanical features such as slips, teeth and dogs, among other common anchor members.”

[701] Mr. Chambers constructs that, on this tool assembly, there will be at least two separate tools: a locator and a resettable anchor member. He says the locator will engage with the inner profile of the tubular and that is shown in Figure 1A as #13. In that figure it is a collar locator. His construction of a resettable anchor as set out later in Claim 1 is that the anchor is to engage the sliding sleeve with the ability to set or unset the anchor and then reset and unset as necessary. He lists what the patent says are anchors: inflatable packers, compressible packers, drag locks or mechanical slips as shown in Figure 2A (#28). Anchors may provide the means to actuate a sealing member when set to stabilize the tool but a sealing member is not claimed in Claim 1.

[702] Mr. David constructs this portion of the claim as the locator being a device that can find the profile in the tubular and that a POSITA would know that a locator would need outwardly biased members to engage the profile using an outward force. He constructs the anchor as being a device to fix the position by engaging an external surface. This prevents the tool from sliding during treatment.

[703] Mr. Lehr disagrees that a POSITA would categorize a dragblock as an anchor, they only provide resistance and assist J-slots but do not render a BHA immovable. To anchor within a pipe as set out in the claim there would need to be an “application of radial force from the anchor to the interior surface of the pipe, where the friction between the anchor and the surface holds it in place.” This is usually accomplished by coiled tubing being pushed or pulled, which translates

from a linear force to a radial one, or by hydraulic pressure from the surface. In this context, he says a POSITA would know that an anchor is not interchangeable with the terms “packer” or “sealing member.”

[704] There is little disagreement between the experts, only additional warnings of what the claim does not say by Kobold’s experts. The experts agree on this construction and I therefore accept their construction.

[705] Mr. Lehr opines that if the hydraulic force is to be utilized, the skilled person would understand that the anchor must have a sealing device associated with it. Mr. Chambers similarly recognizes that the anchor member of Claim 1 may incorporate a sealing member. Mr. David emphasizes that an “anchor” is not interchangeable with the term “packer” or “sealing member.”

[706] However, both Mr. David and Mr. Chambers point out that no sealing member is claimed as part of the tool assembly of Claim 1. Mr. David also indicates that a POSITA would know that the pressure differential could not be used to shift a sleeve with only an anchor in place – as the lack of a seal would permit the frac sand to wash over the tool and erode it.

[707] Read as a whole, the anchor member in Claim 1 may have a sealing device associated with it. However, claim differentiation suggests otherwise here.

[708] Claim 10, which includes a sealing device, is dependent on any one of Claims 1 through 9 and therefore can incorporate all of the elements of Claim 1. The limitations included in Claim 10 cannot be read into the earlier claim as it renders Claim 10 redundant: *Camso* at para 103. The

presumption of claim differentiation is “especially strong” where there is only one meaningful difference between the independent and dependent claim: *Halford* at para 94. Here, the only difference between Claim 1 and 10, where Claim 10 depends on Claim 1, is the anchor comprising a sealing member.

[709] In further support of this view, Claim 13 depends only on Claim 1 and specifies the tool assembly comprises a sealing member. Again, the only difference between Claims 1 and 13 is the addition of this sealing member. The presumption is strong here.

[710] NCS cannot rely on the CGK to override the principle of claim differentiation.

Accordingly, the principle of claim differentiation means that Claim 1 does not include a sealing device, sealing member, or any form of seal.

(2) ***Claim 2***

[711] Claim 2 is dependent on Claim 1 and specifies that the tubular comprises a lateral port through the tubular. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
2	1	a. The tubular comprises a lateral port through the tubular, the port covered by the sliding sleeve; and, b. The downward force slides the sleeve from the ports to open the port.

[712] Mr. Lehr says the addition of a lateral port through the tubular would mean a connection through the wellbore to the formation and the ports could be covered and uncovered by the slidable sleeve. He indicates that Figure 4A shows the ports (#42) closed and in Figure 4B the

ports are open. Mr. Lehr explains that a POSITA would know which engagement device to use to lock the sleeve open or closed and that engagement devices are CGK. With a downward force the pin would shear (#43) and the port would open.

[713] Mr. David constructs this Claim as describing what was done in the industry and that is “sliding a sleeve to provide access from the interior of a tubular to its exterior.” Mr. Chambers explained that the lateral port would enable fluid communication between the wellbore and the exterior with the lateral port being covered by the sliding sleeve (closed) as well as sliding the sleeve to the open position when the port is uncovered allowing the fluid communication.

[714] Again, given that there is little disagreement in principle of how to construct this Claim between all the experts, I will accept their mutual construction.

(3) *Claim 3*

[715] Claim 3 is dependent only on Claim 2 and adds the step of releasing the anchor from engagement with the sliding sleeve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
3	2	a. The step of releasing the anchor from engagement with the sliding sleeve.

[716] The experts agree that this additional step is to disengage the anchor from the sliding sleeve. As Mr. Chambers says, “this accords with the definition of a ‘resettable’ anchor member” described in Claim 1. He also explains that there are various ways to release the anchor, depending on which anchor is used, but the claim does not specify this. All of the experts agree

that resetting anchors is common practice in the industry and the POSITA would therefore be familiar with this.

(4) ***Claim 4***

[717] Claim 4 is dependent only on Claim 1 and specifies a step where downward force is applied to disengage the locator from the inner profile of the tubular. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
4	1	a. The step of applying a downward force disengages the locator from the inner profile of the tubular.

[718] Mr. Lehr did not construct this Claim and I therefore accept Kobold's experts' construction.

[719] Mr. Chambers opined, and I accept, that the downward force that slides the sleeve relative to the tubular has the simultaneous effect of disengaging the locator of the tool assembly from the inner profile of the tubular. He explained that this is because the sleeve shifts into the gap that was the inner profile and pushes the locator out.

(5) ***Claim 5***

[720] Claim 5 is dependent on Claim 4 and adds the step of releasing the anchor from engagement with the sliding sleeve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
5	4	a. The step of releasing the anchor from engagement with the sliding sleeve.

[721] Mr. Lehr did not construct this Claim and I therefore accept Kobold's experts' construction.

[722] Kobold's experts agreed on their construction of Claim 5. Except for the claim dependency, Claim 5 is identical to Claim 3 and would logically occur at some point after all of the other steps in Claim 1 have been completed.

(6) *Claim 6*

[723] Claim 6 is dependent on Claim 5 and adds a step of engaging the inner profile of a second sleeve within the wellbore in the tool assembly. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
6	5	a. The step of engaging the inner profile of a second sleeve within the wellbore within the tool assembly.

[724] Mr. Lehr did not construct this Claim and I therefore accept Kobold's experts' construction.

[725] Mr. Chambers explained that although Claim 6 does not specify the timing, this step would occur at some point after all the other steps in Claims 1 to 5 have been completed. He also

opined that the “second sleeve” is substantially identical to the sleeve of the previous claims but in a different location in the same wellbore.

[726] Mr. David constructed Claims 6 and 7 together. Similarly to Mr. Chambers, he opined that the claims require performing the same actions in Claims 1-5 multiple times, namely locating and sliding a sleeve.

(7) *Claim 7*

[727] Claim 7 is dependent on Claim 6 and specifies the setting of the anchor. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
7	6	a. Setting the anchor within the second sleeve and applying a downward force to the tool assembly.

[728] Mr. Lehr did not construct this Claim and I therefore accept Kobold’s experts’ construction.

[729] Mr. Chambers explained that Claim 7 is a repetition of the last two steps of Claim 1 and should be interpreted in the same way.

[730] Mr. David similarly construed Claim 7 as requiring the locating and sliding of a sleeve.

(8) *Claim 8*

[731] Claim 8 is dependent on any one of Claims 1 through 7 and specifies the application of treatment fluid. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
8	Any one of 1-7	a. The step of applying treatment fluid through the lateral port of a tubular.

[732] Mr. Lehr constructed this as including every element from Claims 1-7 with the addition of applying treatment fluid through the ports in the tubular. He says this would mean “any type of fluid used for stimulation, isolation or control of a formation.” In his view, that is inclusive of fracturing fluid.

[733] Mr. Chambers points out that only Claims 2 and 3 mention a lateral port of which treatment of fluid could come through.

[734] The experts agree on the construction and I will construct using Mr. Lehr’s wording: “Claim 8 additionally requires the application of treatment fluid through the lateral port of a tubular. The fluid passes through the ports on the tubular and into the formation.”

(9) *Claim 9*

[735] Claim 9 is dependent on Claim 1 and adds a step of setting the anchor. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
9	1	a. The step of setting the anchor comprises application of a radially outward force with the anchor against the sleeve to frictionally engage the sleeve with the anchor.

[736] Mr. Lehr constructs this as an additional step to apply outward force with the anchor against the sleeve. He says a POSITA would know that the force would result in the anchor and sleeve coming in direct contact. He also indicates that a cone would include a resettable packer with dogs or slips being forced radically outward.

[737] Both Mr. David and Mr. Chambers indicate this Claim is “superfluous.” Mr. Chambers sums it up as “given it is a functional step inherent in the step of setting the anchor in Claim 1.”

[738] While I do not disagree with Mr. Chambers or Mr. David that this Claim is superfluous, that determination goes to validity. My construction is not in disagreement with any of the experts and I find it is just a step where with outward force the anchor would engage the sleeve.

(10) *Claim 10*

[739] Claim 10 is dependent on any one of Claims 1 through 9. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
10	Any one of 1-9	a. The anchor comprises a sealing member.

[740] Mr. Lehr opines that the sealing member can be a mechanical set packer, inflatable packer, bridge plug, straddle isolation device, inflatable sealing elements, compressible sealing elements, cup seals or other types of seals that a POSITA would know about. Mr. Lehr relies on the 907 Patent disclosure to explain that the sealing member “allows some degree of isolation during application of treatment fluid.”

[741] Mr. Chambers also lists what the Patent says are suitable sealing members and notes that they can be set against any surface and do not need a profile. He says the sealing member can be used to hydraulically seal off a portion of the wellbore or to hydraulically seal against a sleeve to provide physical shifting.

[742] Mr. David ‘s construction revisits the note that a sealing member is not an anchor and vice versa, so it would be confusing to a POSITA how this method would work given the anchor in Claim 1 is not a sealing member. A sealing member is described in the disclosure as a sealing device, sealing assembly, sealing member, seal, or packer and yet all use #11 in the figures. In Figure 5B, the #11 line points directly at what a POSITA would identify as a sealing element of a packer while #14 points at what a POSITA would see as an anchor. #11 does not include slips. In Mr. David’s opinion, the inventors do “not limit the patent to a sealing member and anchor (aka packer with compressible seal) as depicted in the drawings. However, no teaching is provided as to how to adapt the other sealing members and anchors to the method taught in the 907 Patent.”

[743] I find that Claim 10 has to have a sealing member that is also an anchor. This means it must be able to perform the function of anchoring the sleeve and that the sealing member must set a hydraulic seal to shift the sleeve by being set in the inner sliding sleeve.

(11) *Claim 11*

[744] Claim 11 is dependent on any one of Claims 1 through 10. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
11	Any one of 1-10	a. The sleeve comprises an inner surface of uniform diameter along its length, free of any engagement profile.

[745] Mr. Lehr does not construct Claim 11.

[746] Mr. Chambers says Claim 11 means that the inner surface of the sleeve (smooth and consistent in diameter) does not have a profile. This means that the sleeve can be shifted by the engagement of a sealing member via Claim 10.

[747] Mr. David says it would not be practical with a smooth-sided sleeve to engage with an anchor unless “radically outward force” was applied to the sealing member attached to the anchor (see Claim 10). He says this Claim supports that Claim 9 is superfluous.

[748] I will construct it as meaning that using the device as set out in Claim 10, an anchor with a sealing member and a smooth sleeve that can be shifted with radical outward force.

(12) *Claim 12*

[749] Claim 12 is dependent on any one of Claims 1 through 11. Claim 12 specifies that the sleeve has an inner diameter consistent with the inner diameter of the tubing. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
12	Any one of 1-11	a. The sleeve has an inner diameter consistent with the inner diameter of the tubing.

[750] Mr. Lehr, Mr. Chambers and Mr. David all say in their construction that the purpose of having the inner surface consistent with the inner surface of the tubing is so there is no barrier or impediment of the work string/tool down the tubing of the wellbore. I adopt this construction.

(13) *Claim 13*

[751] Claim 13 is dependent only on Claim 1. Claim 13 reads: The method as in Claim 1, wherein the tool assembly further comprises a sealing member, and wherein the method further comprises the step of setting the sealing member across the sleeve to provide a hydraulic seal across the sleeve. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
13	1	a. The tool assembly further comprises a sealing member; and, b. The method further comprises the step of setting the sealing member across the sleeve to provide a hydraulic seal across the sleeve.

[752] The experts agree with this claim's construction that the tool from Claim 1 must use a sealing member at Claim 13 that, when set in the sleeve, provides a hydraulic seal in the sleeve which would isolate the area. I adopt this construction.

(14) ***Claim 14***

[753] Claim 14 is dependent on any one of Claims 1 to 13 and adds the step of applying the downward force. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
14	Any one of 1-13	a. The step of applying the downward force comprises applying hydraulic pressure to the wellbore annulus.

[754] The experts do not necessarily disagree on the construction, but Mr. Lehr and Mr. Chambers do go into more detail of how this claim would work, and Mr. David remarked this is a common operation in fracturing operations.

[755] This Claim means that hydraulic pressure is applied which is the downward force down the wellbore. The claim does not specify whether it is by pumping gas or liquid. I do not agree with Mr. Lehr that it could be "hydraulic alone or in conjunction with mechanical." This Claim specifies, unlike the earlier claims, that the downward forces comprises hydraulic pressure only.

(15) ***Claim 15***

[756] Claim 15 is dependent only on Claim 14 and adds the step of applying hydraulic pressure. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
15	14	a. The step of applying hydraulic pressure to the wellbore annulus comprises delivering pressurized fluid to the wellbore.

[757] This Claim does specify that the hydraulic pressure will be from pressurized fluid to the wellbore, unlike Claim 14. The experts do not substantially disagree but I will use Mr. Lehr's simple construction that states "[c]laim 15 additionally requires that the step of applying hydraulic pressure is completed by delivering pressurized fluid into the wellbore."

(16) *Claim 16*

[758] Claim 16 provides an independent method claim for shifting a sliding sleeve in a wellbore. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
16	N/A	<ul style="list-style-type: none"> a. Providing a wellbore lined with tubing, the tubing comprising a locatable sleeve slidably disposed within a tubular; b. Providing a tool assembly comprising: <ul style="list-style-type: none"> i. A locating device; and, ii. A resettable sealing member; c. Deploying the tool assembly within the wellbore on coiled tubing; d. Locating the tool assembly within the locatable sleeve; e. Setting the sealing member across the sleeve; and, f. Applying a downward force to the tool assembly to slide the sleeve with respect to the tubular.

[759] The experts agree this Claim is similar to Claim 1. Mr. Lehr indicates the differences are that there is no resettable anchor member, a resettable sealing member is required, and there is no inner profile. Instead, Claim 16 substitutes a locatable sleeve for an inner profile.

[760] Mr. Chambers indicates some differences being Claim 1 has a locator engageable with an inner profile and a resettable anchor member with Claim 15. He says it appears that a locating device on the tool string locates the locatable sleeve in Claim 16. He says this assembly would have two separate tools, being a locating device and a resettable sealing member. The tool assembly would be on coiled tubing and the next step in the method would be to locate the tool within the locatable sleeve. In this method the sealing member will be set across the sleeve by downward force on the tool to slide the sleeve relative to the tubular. There is both mechanical and hydraulic pressure, though the patent does not say either or both should apply the downward force. The claim does say this is to slide the sleeve with respect to the tubular.

[761] Mr. David says the tool has a locating device and a resettable sealing member. In his construction, a locating device is broader than the locator in Claim 1 though he says the claim does not say “what allows the locating device to locate the sleeve.” The purpose is to locate the tool so that the sealing member can be set across the sleeve, though no profile is indicated in the claim. He concludes his construction by saying a downward force is used to slide the sleeve and this force is transferred from the sealing member to the sliding sleeve.

[762] There is no resettable anchor in Claim 16. However, there is a locator which will locate the sleeve on the coiled tubing string so that the sealing member can be activated. Therefore, the sealing member will shift the sleeve by gripping it with the downward force. This sealing member will also seal and isolate the downhole. Inherent in the sealing member being engaged is some “anchoring” but there is no separate anchor device mentioned in the claim. Some resettable sealing devices have more capacity to anchor and some have little if any. An anchor as in Claim 1 can only function as an anchor and has little sealing function.

(17) *Claim 17*

[763] Claim 17 is dependent on Claim 16. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
17	16	a. The tubular comprises a lateral port through the tubular; b. The port covered by the sliding sleeve; and, c. The downward force slides the sleeve from the ports to open the port.

[764] Mr. Lehr indicated there were no terms in Claim 17 that he had not already constructed. Similarly, Mr. Chambers and Mr. David both found this superfluous Claim to be identical to Claim 2, excepting Claim 2 depends on Claim 1.

[765] I accept the construction of Mr. David and Mr. Chambers.

(18) *Claim 18*

[766] Claim 18 is dependent on Claim 16 or 17 and adds the step of setting the sealing members. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
18	16 or 17	a. The step of setting the sealing member comprises application of a radially outward force with the sealing member to the sleeve to frictionally engage the sleeve with the sealing member.

[767] Mr. Lehr said that the addition to this Claim requires the setting of the sealing device by the “application of a radically outward force with the sealing member to the sleeve so as to frictionally engage the sleeve with the sealing member.”

[768] Mr. Chambers found this superfluous given that it is a “functional result that is inherent in the step of the sealing member in Claim 16.” He indicated “frictional engagement between the sleeve with the sealing member is necessary in Claim 16 to be able to slide the sleeve with respect to the tubular upon the application of a downward force to the tool assembly.”

[769] Mr. David said that this claim, other than missing the term “anchor,” is identical to Claim 9. He does not find anything added to Claim 9.

[770] I will construct it as Claim 9 using a sealing member, not an anchor.

(19) ***Claim 19***

[771] Claim 19 is dependent on any one of Claims 16 “or through 25.” Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
19	16 or “through 25”	a. The sleeve comprises an inner surface of uniform diameter along its length, free of any profile.

[772] Mr. Lehr did not construct Claim 19.

[773] Mr. Chambers indicated it was almost identical to Claim 11 except the sleeve's inner surface in Claim 19 has no profile at all, while Claim 11 has no engagement profile.

[774] Mr. David indicated that Claims 19 and 20 are identical to Claims 11 and 12 except Claims 11 and 12 depend on Claim 1 like Claims 19 and 20 depend on Claim 16 and Claims 11 and 12 require a smooth profile sliding sleeve.

[775] I construe Claim 19 identically to Claim 11. The sleeve's inner surface is of uniform diameter and has no profile.

(20) *Claim 20*

[776] Claim 20 reads: The method as in any one of Claims 16 through 19, wherein the sleeve has an inner diameter consistent with the inner diameter of the tubing. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
20	Any one of 16-19	a. The sleeve has an inner diameter consistent with the inner diameter of the tubing.

[777] Mr. Lehr constructs this as including all the elements of Claims 16-19, as well "as having an inner diameter consistent with the inner diameter of the tubing." This means that the sleeve will not impede the downhole tube from moving past the sleeve.

[778] Mr. Chambers says it is identical to Claim 12 other than it depends on Claims 16 to 19 while Claim 12 depends on Claims 1-11, and he suggests it should be constructed the same way. Mr. David's response is the same as Mr. Chambers.

[779] I construct Claim 20 the same as Claim 12.

(21) *Claim 21*

[780] Claim 21 reads: The method as in any one of Claims 16 through 20, further comprising the step of releasing the sealing member from engagement with the sliding sleeve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
21	Any one of 16-20	a. The step of releasing the sealing member from engagement with the sliding sleeve.

[781] Mr. Lehr indicates all the elements in this claim have already been constructed.

[782] Mr. Chambers constructs this Claim as having an extra step of releasing the sealing member from the sliding sleeve and, in his opinion, means this connection is "between the sealing member and the sleeve with the sealing member set across the sleeve." He says this coincides with a resettable seal.

[783] Mr. David finds this claim identical to Claim 3 other than the difference being that the anchor member in Claim 3 is replaced here with a sealing member.

[784] This construction has the step of releasing the sealing member from the sleeve.

(22) *Claim 22*

[785] Claim 22 reads: The method as in Claim 21, further comprising the step of engaging the inner profile of a second sleeve within the wellbore within the tool assembly. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
22	21	a. The step of engaging the inner profile of a second sleeve within the wellbore within the tool assembly.

[786] Mr. Lehr indicates he has constructed all the elements previously.

[787] Mr. Chambers says this is the same wording as Claim 6 and that he constructed it to mean the inner profile of a second tubular. He says a second sleeve is the same as in previous claims but it is in a different location. He says that the locating device would be what engages the inner profile.

[788] In Mr. David's opinion an inner profile was not in Claim 16 or the dependents and Claims 19 and 20 require the profile of the sleeve to be smooth. He mentions this Claim is a copy of Claim 6 without the modification necessary to fit into the method of Claims 16 to 21.

[789] I agree that it is identical to Claim 6 other than the named dependent claims, and I will construct it the same way as Claim 6 with the sliding sleeve being smooth. Since it is dependent on Claim 21, it would seem the resettable seal is what engages the inner profile.

(23) *Claim 23*

[790] Claim 23 reads: The method as in Claim 22, further comprising setting the anchor within the second sleeve and applying a downward force to the tool assembly. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
23	22	a. Setting the anchor within the second sleeve; and, b. Applying a downward force to the tool assembly.

[791] Mr. Lehr indicated he has constructed all the elements of this Claim previously.

[792] Mr. Chambers finds it identical other than the claim dependencies to Claim 7. He says that Claim 23 refers to the anchor but there is no anchor claimed in Claims 16-22 so it is unclear what is referred to in this claim.

[793] Mr. David also indicated that it says to set an anchor even though no anchor is claimed in Claims 16 to 22. This Claim is a copy of Claim 7 without the modifications to reflect Claim 16 of which it depends.

[794] This method does have the step of setting an anchor in the second sleeve and then applying downward force to the tool assembly. In reviewing the Claims and the experts' opinions there is no anchor device claimed in Claims 16 to 22.

(24) *Claim 24*

[795] Claim 24 reads: The method as in any one of Claims 16 through 21, further comprising the step of applying treatment fluid through a lateral port of the tubular. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
24	Any one of 16-21	a. The step of applying treatment fluid through a lateral port of the tubular.

[796] Mr. Lehr says he has constructed all these elements already.

[797] Mr. Chambers has the added steps of applying treatment fluid through the ports which were in Claims 17, 18, 20, and 21 but not in Claim 16. He has some concerns about when this step would take place.

[798] Mr. David stated this Claim is the same as Claim 8 and should be constructed the same.

[799] This construction is the step of applying the treatment fluid through the port when the port is open. It is identical to the method in Claim 8 other than the dependencies.

(25) *Claim 25*

[800] Claim 25 reads: The method as in Claim 24, further comprising the step of actuating the sleeve to close a lateral port through the tubular. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
25	24	a. The step of actuating the sleeve to close a lateral port through the tubular.

[801] Mr. Lehr says he has constructed all these elements already.

[802] Mr. Chambers construes it as the step of closing the lateral port and that Claim 17 is the only Claim that discusses opening the port so he says he is not sure if Claim 25 is referring to a different port or not. He feels that an additional tool would be needed given the Patent does not say “how the assembly is moved in the opposite direction while maintaining the engagement necessary between the tool assembly and the sleeve to transmit a force from the tool assembly to the sleeve.”

[803] Mr. David constructed this as to close the sleeve after applying the treatment fluid, but he has trouble with the fact that Claim 21 has the sealing member released so he does not know how you would close the sleeve once it was no longer engaged as there would be no way to transfer force to the sleeve. He notes that Claims 16 to 21 do not have a method to close the sleeve.

[804] This Claim does indicate that the port should be closed by actuating the sleeve. I agree with Mr. David and Mr. Chambers that the method to close the port when the sealing member is released is not claimed in Claims 16-25. It could be done with the anchor engaged as claimed in Claim 23, but for the issue of no anchor device being claimed in Claims 16-22.

[805] Despite the question of validity at this stage, my construction of this claim is to actuate the sleeve after the sealing member is released to close the lateral port discussed in Claim 17 using an (unclaimed) anchor.

(26) *Claim 26*

[806] Claim 26 reads: The method as in any one of Claims 16 through 25, wherein the step of applying the downward force comprises applying hydraulic pressure to the wellbore annulus. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
26	Any one of 16-25	a. The step of applying the downward force comprises applying hydraulic pressure to the wellbore annulus.

[807] Mr. Lehr says he has constructed all these elements already.

[808] Mr. Chambers finds it identical to Claim 14 other than the dependencies and suggests it should be constructed the same. He notes that, as no anchor has been claimed, it is the sealing member that provides the hydraulic pressure.

[809] Mr. David finds this Claim is identical to Claim 14 (save the dependencies) and should be construed the same.

[810] I will construe this Claim identically to Claim 14, save the dependencies.

(27) *Claim 27*

[811] Claim 27 reads: The method as in Claim 26, wherein the step of applying hydraulic pressure to the wellbore annulus comprises delivering pressurized fluid to the wellbore. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
27	26	a. the step of applying hydraulic pressure to the wellbore annulus comprises delivering pressurized fluid to the wellbore

[812] Mr. Lehr says he has constructed all these elements already.

[813] Mr. Chambers says it is identical save the dependencies to Claim 15 and should be constructed the same. Similarly, Mr. David found it identical to Claim 15.

[814] I will construct this Claim identically to Claim 15, save the dependencies.

(28) *Claim 28*

[815] Claim 28 reads: The method as in Claim 27, wherein the pressurized fluid is fracturing fluid. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
28	27	a. The pressurized fluid is fracturing fluid.

[816] Mr. Lehr says he has constructed all these elements already.

[817] Mr. Chambers constructed this as having the pressurized fluid being fracturing fluid that is typically delivered under high pressure.

[818] Mr. David indicated that the claim “does not define any intrinsic properties of the fluid itself, but rather implies the pressure is high enough to create fractures.” He says this means all fluids.

[819] I will construct this Claim as indicating the pressurized fluid is fracturing fluid without further details, as none specified in the claim.

D. NCS's 026 Patent

[820] At issue regarding this Patent are Claims 1-14. Claim 1 is the only independent claim in the Patent and the remaining claims are dependent.

[821] There is significant overlap in the disclosure of the 907 Patent and the 026 Patent. The Patents are identical with respect to the following headings in the disclosure: a) the field of the invention; b) background of the invention; c) brief description of the drawings; and d) the drawings themselves.

[822] However, and rather interestingly, the claims differ. Although they differ, Mr. Lehr and Mr. David incorporate their comments by reference to the 907 Patent when construing the 026 Patent. Since NCS's expert is on the same page as Kobold's with respect to the similarity between the two, I am inclined to take the same position.

[823] Mr. Lehr remarked in his report that while the 907 Patent is a method to shift a sleeve to fracture a formation in a wellbore, the 026 Patent is concerned “with a method for delivering treatment fluid to a formation using sliding sleeves.” In his report, he indicated the 907 Patent “relates to sliding sleeves which may open and close over ports or apertures in the tubing string to either permit or block, respectively, the movement of fluid out of the tubing string and into the formation.” I do not see a practical difference between the two explanations given by Mr. Lehr.

[824] Again, it appears that the parties dispute which claims are at issue with respect to the 026 Patent.

[825] The Joint Statement of Issues puts the construction of all of the 026 Patent Claims at issue. However, NCS only alleges infringement of Claims 6-14 of the 026 Patent.

[826] Kobold alleges Claims 1, 2, 6, 7, 11, and 12 of the 026 Patent are invalid for anticipation. It also alleges all of the claims of the 026 Patent are invalid for obviousness, overbreadth, inutility, and insufficiency.

[827] The question, therefore, is whether Kobold can allege invalidity of claims that NCS does not allege infringed.

[828] As noted previously, Kobold counterclaimed its invalidity allegations against all the NCS Patents at issue in these actions pursuant to subsection 60(1) of the *Patent Act*. As held in *Johnson & Johnson* at paragraph 49, an impeachment action under section 60 of the *Patent Act*

determines the validity of the patent throughout Canada. Pursuant to subsection 60(1), it is open to Kobold to allege invalidity against all claims of the 026 Patent.

[829] Therefore, it remains open to Kobold to allege invalidity of Claims 1-14 of the 026 Patent, even though NCS only maintains its infringement allegations with respect to Claims 6-14.

[830] Similar to previous construction issues, NCS argues that Kobold's experts do not understand claim construction principles and therefore do not construct correctly. They allege Kobold's experts fail to construe the Patent purposively and in light of the CGK and prior art. Having resolved this issue at the outset of this decision, I echo Justice Manson's comments in *Excalibre* at paragraph 259, that an inventor or patentee cannot ask the Court to read in "functional language into an overly broad claim, or a claim lacking utility, to try to correct poor drafting."

[831] Finally, before turning to the claim-by-claim construction, I note that a central disagreement between the parties is the term "ported tubular segment." This term is found in Claim 1.

(1) ***Claim 1***

[832] Claim 1 is the 026 Patent's only independent claim. It is a method for delivering treatment fluid to a formation intersected by a wellbore. This method claim's essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
1	N/A	<ul style="list-style-type: none"> a. Lining the wellbore with liner tubing, the liner tubing comprising one or more ported tubular segments, each ported tubular segment having one or more lateral openings for communication of fluid through the liner tubing to a formation adjacent the wellbore; <ul style="list-style-type: none"> i. Said lateral openings being provided in each ported tubular segment prior to lining the wellbore; b. Deploying a tool assembly downhole on tubing string and a sealing member; <ul style="list-style-type: none"> i. The tool assembly comprising an abrasive fluid perforation device for perforating the liner tubing; c. Locating the tool assembly at a depth generally corresponding to one of the ported tubular segments; d. Setting the sealing member against the liner tubing below the ported tubular segment; e. Delivering treatment fluid to the ported tubular segment via either: <ul style="list-style-type: none"> i. The tubing string; or, ii. An annulus between the tubing string and the liner tubing; f. The one or more ported tubular segments comprises a closure over one or more of the lateral openings; <ul style="list-style-type: none"> i. The closure comprising a sleeve sliding disposed within the tubular segment; and, ii. The method further comprises the step of sliding the sleeve to open one or more of the lateral openings.

[833] Although the claim does not specify the order that the steps should be done in, Mr. Chambers explained that the steps should be performed in the order that they are presented in Claim 1. Neither Mr. David nor Mr. Lehr disagreed with this and I therefore accept Mr. Chambers' opinion.

[834] Mr. Lehr and Mr. David agree, and I accept, that the POSITA would be familiar with the term "liner tubing" and that the POSITA would know that it is a reference to casing, casing

string, jointed pipe, or production tubing. They also agree that a “liner tubing” is a tubing that lines the wellbore.

[835] A central point of disagreement between the experts is the construction of Claim 1 and the term “ported tubular segment.”

[836] Mr. Lehr’s construction of “ported tubular segment” relied on the 026 Patent’s disclosure that states:

The ported tubulars referred to herein are tubular components or assemblies of the type typically used downhole, having one or more fluid ports through a wall to permit fluid delivery from the inside of the tubular to the outside. For example, ported tubular include stationary and sliding sleeves, collars and assemblies for use in connection of adjacent lengths of tubing, or subs and assemblies for placement downhole. In some embodiments, the ports may be covered and selectively opened. The ported tubulars may be assembled with lengths of non-ported tubing such as casing or production liner, for use in casing or lining a wellbore, or otherwise for placement within the wellbore.

026 Patent Disclosure at 8 Lines 13-19

[837] Although Mr. Lehr cites the disclosure, he does not actually construe “ported tubular segment” in relation to Claim 1.

[838] NCS is critical of Kobold’s experts’ construction. NCS explained that Kobold’s experts construe a “ported tubular segment” as a “segment of tubular that comprises the lateral ports.” However, unlike Mr. Lehr, Kobold’s experts further opined that the ported tubular segment must be the entire sleeve assembly.

[839] In NCS's view, this is not a construction supported by Figures 3, 4A, and 4B, given the entire sleeve assemblies are referred to as "ported subs" not "ported tubular segments."

[840] Unfortunately for NCS, Mr. Lehr acknowledged in cross-examination that the tubular segment includes the "entirety of the sleeve," where he answered:

Q So the tubular segment includes the entirety of the sleeve, do you agree with that?

A Yes.

Mr. Lehr Cross-Examination, 24 January 2022 NCS Volume 8 at 14:24-26

[841] Given that Mr. Lehr did not construe "ported tubular segment" with specific reference to the language in Claim 1, I also give less weight to his construction.

[842] Mr. Chambers construes the term as "tubular components that may be connected to adjacent lengths of ported or non-ported tubing to line or case the wellbore," citing the 026 Patent's disclosure. He further explains that each ported tubular has one or more lateral openings that permit fluid flow through the liner tubing/casing between the wellbore and the formation.

[843] Mr. David construes "ported tubular segment" as having a lateral opening that is a passageway through the ported tubular segment to the formation. He explained that the openings are provided in the ported tubular before lining the wellbore with the casing. Mr. David further explained that the POSITA would know that having an opening in the casing before it is run into the hole would allow fracturing to take place without having to perforate the casing at the location.

[844] I conclude that the ported tubular segment would have one or more lateral openings to allow the fluid to flow through to the formation.

[845] In light of my criticisms of Mr. Lehr and his concession on cross-examination, I prefer Kobold's experts' construction.

[846] The reason why the term "ported tubular segments" is important is that if the term consists of the entirety of the sleeve then it means the sealing member is set "below the ported tubular segment."

[847] A purposive reading of the claim does find there can be one or more ported tubular segments, which have one or more lateral ports to communicate fluid through the liner to the formation.

[848] The next step involves the tool assembly having an abrasive fluid perforation device (jet sub) to perforate the liner tubing as well as a sealing member on the downhole assembly. There is no disagreement between the experts on this construction.

[849] In the method, the next step is to locate the tool assembly generally corresponding with a ported tubular segment. Locating devices are known to the POSITA, and how to locate a ported tubular segment would be known. Again, this is not in dispute by the experts.

[850] Claim 1 then indicates that the treatment fluid can be delivered either through the ported tubular segment, tubing string, or annulus. This would mean the fracturing fluid can be delivered

to the ported tubular segment three ways to fracture the formation. Again, this is not in dispute between the experts.

[851] The next step's construction is in disagreement by the experts. Mr. Lehr's construction is that the ported tubular segment can be moved to open one or more of the lateral openings, and suggests the POSITA would be familiar with what is meant by a "sleeve slidingly disposed within the tubular segment." He also says he has discussed this phrase in his construction of the 907 Patent. If this is a typo, it is an unfortunate one, because his only interpretation of the capacity for a sleeve to slide was in constructing the term "downward force" which would "shift" the sleeve. His discussion of what constitutes a "downward force" to slide a sleeve does not constitute a discussion of what can make the 026 Patent's sleeve slide when no such force has been specified.

[852] Mr. David's construction is that a sliding sleeve is necessary in order to access the formation and that the sliding sleeve must be shifted to open one or more of the lateral openings in order to treat the formation. He notes that the claim does not say how the sleeve would be shifted and that Figures 3 and 4 require sealing members to be set within the ported tubular segment. Mr. David says a POSITA would not understand how the sleeve would be shifted where the sealing member is set on the casing below the ported tubular segment, and this information is neither provided in the claims nor the disclosure.

[853] Mr. Chambers opines that "one or more ported tubular segments has a closure over at least one of the lateral openings. A closure is a component of the ported tubular segment that can be opened to allow fluid flow through a lateral opening of the ported tubular segment. This step

also specifies that the closure comprises a sleeve positioned in the tubular segment such that the sleeve can slide within the tubular segment.” He too mentions that the claim does not say how to slide the sleeve. This construction has the ported tubular segment including the sleeve as it also must have a closure which would comprise the entire segment with a sleeve that can slide within the tubular segment.

[854] In cross-examination, Mr. Lehr did acknowledge that the ported tubular segment includes the entirety of the sleeve given the second part of the claim having ported tubular segments closing over one or more of the lateral openings. This acknowledgment came given that ported tubular segment must be broad enough to include more than just the part with the lateral openings especially if the sealing member is set below the ported tubular segment.

[855] I will therefore construe the “sleeve slidingly disposed within the tubular segment” as a component of the ported tubular segments which may slide to control fluid flow. The method for shifting said sleeve is unknown.

(2) *Claim 2*

[856] Claim 2 depends on Claim 1 and specifies that the sealing member is a “straddle isolation device comprising first and second sealing members.” Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
2	1	a. The sealing member is a straddle isolation device comprising first and second sealing members; and, b. The tool assembly further comprises a treatment aperture between the first and second sealing members, the treatment aperture continuous with the tubing string for

		delivery of treatment fluid from the tubing string to the formation through the ports.
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[857] Mr. Lehr did not construct Claim 2, however, as concluded above its validity remains at issue insofar as Kobold disputes its validity. In light of the absence of Mr. Lehr's construction, I accept Kobold's experts' constructions.

[858] Mr. Chambers opined that the sealing member is a straddle isolation device and that the treatment hole is in the tool assembly between the two sealing members of the straddle device. For example, one embodiment is demonstrated in Figure 2A where items #22 and #23 show upper and lower cup seals. He also explained how the treatment hole allows movement of fluid between the inside of the tool assembly and the annulus between the tool assembly and the liner tubing.

[859] Mr. Chambers construes Claim 2 where the treatment fluid is pumped from the surface via the tubing string and out through the aperture to the formation through the ports. He indicates that ports is more than likely the lateral openings in the ported tubular segments.

[860] Mr. David shares the same view that Claim 2 specifies that a sealing member is a straddle assembly. He outlined that the POSITA would understand a straddle assembly which typically involves an upper and lower seal that creates the straddle formation. Mr. David explained that a straddle configuration allows the treatment of a particular portion of the formation without fluid communication between locations.

(3) *Claim 3*

[861] Claim 3 is dependent on Claim 2. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
3	2	a. The first and second sealing members are inflatable sealing elements.

[862] Again, Mr. Lehr did not construct Claim 3 and I therefore rely on Mr. Chambers' and Mr. David's construction of Claim 3.

[863] Mr. Chambers and Mr. David both constructed Claim 3 and noted that it only depends on Claim 2. This Claim indicates that the two sealing members are inflatable sealing members. Inflatable sealing members were known to POSITA.

(4) *Claim 4*

[864] Claim 4 is dependent on Claim 2. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
4	2	a. The first and second sealing members are compressible sealing elements.

[865] Again, both the Defendants' experts agree that Claim 4 depends on Claim 2 and that in this method the two sealing members of the straddle isolation device (first and second sealing members) are compressible sealing elements which are known to a POSITA. Both experts note that it is unclear how these were to be set without the claim having an anchoring device. I adopt this construction.

(5) *Claim 5*

[866] Claim 5 is dependent on Claim 2. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
5	2	a. The first and second sealing members are cup seals.

[867] I accept that Claim 5 specifies the sealing members are cup seals. As outlined by all experts, cup seals have been used in the industry for years.

(6) *Claim 6*

[868] Claim 6 is dependent on Claim 1. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
6	1	a. The sealing member is a mechanical set packer, inflatable packer, or bridge plug.

[869] Mr. Lehr did construct Claim 6. He explained that Claim 6 includes everything in Claim 1, as well as specifying what the sealing member is. In Claim 6, the sealing member can either be a mechanical set packer, inflatable packer, or bridge plug. Mr. Lehr outlined that different types of sealing members are known in the industry and familiarity with sealing members forms a part of the CGK.

[870] Mr. Chambers and Mr. David agree that sealing members are a part of the CGK for this Patent.

[871] Neither Mr. Chambers nor Mr. David disagree with Mr. Lehr's construction but Mr. Chambers emphasizes that since Claim 6 does not depend on Claim 2 it is not a straddle isolation device. He also notes that each of the sealing members mentioned are set and released differently and are used for different purposes.

[872] I accept that Claim 6 specifies the sealing member in Claim 1 is not a straddle isolation device, but it is either a mechanical set packer, inflatable packer, or bridge plug.

(7) *Claim 7*

[873] Claim 7 is dependent on Claim 1. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
7	1	a. The step of sliding the sleeve comprises application of hydraulic pressure to the sleeve.

[874] Mr. Lehr constructs this as having every element in Claim 1 and including the step of sliding the sleeve by applying hydraulic pressure to the sleeve. He says a POSITA would understand the hydraulic pressure would be applied to the sleeve through another component.

[875] Both the Defendants' experts agree as to what the claim says. However, they do not understand how the sleeve would be able to slide by hydraulic force when the sealing member is set on the casing below the ported tubular segment as per Claim 1.

[876] This Claim relies on Claim 1 and I do not agree with Mr. Lehr that I should read in that another component could be added. The construction is just that the method of Claim 1 includes a step of sliding the sleeve by the application of hydraulic pressure to the sleeve.

(8) *Claim 8*

[877] Claim 8 is dependent on Claim 1 that specifies the sliding step comprises the application of mechanical force to the sleeve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
8	1	a. The step of sliding the sleeve comprises application of mechanical force to the sleeve.

[878] Everything said by the experts regarding Claim 7 is applicable to Claims 8 and 9. The construction is just that the method of Claim 1 includes a step of sliding the sleeve by the application of mechanical force to the sleeve.

(9) *Claim 9*

[879] Claim 9 is dependent on Claim 1 and also specifies that the step of sliding the sleeve comprises application of mechanical force and hydraulic pressure to the sleeve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
9	1	a. The step of sliding the sleeve comprises application of mechanical force and hydraulic pressure to the sleeve.

[880] The construction is the same as Claims 7 and 8, the method of Claim 1 includes a step of sliding the sleeve by the application of mechanical force and hydraulic pressure to the sleeve.

(10) *Claim 10*

[881] Claim 10 is dependent on Claim 8 and specifies the tubing string is coiled. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
10	8	a. The tubing string is coiled tubing.

[882] All experts agree this construction of the claim includes every element in Claim 8 and specifies that the tubing is coiled tubing. I agree.

(11) *Claim 11*

[883] Claim 11 depends on any one of Claims 1 to 10. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
11	1-10	a. The step of jetting one or more new perforations in the liner.

[884] Mr. Lehr correctly identifies that this Claim includes all the elements from Claims 1-10 and adds the step of jetting one or more perforations in the liner. He constructs this as the ported tubular having pre-existing ports as part of the liner tubing and does not require perforation downhole, but this Claim adds the possibility of perforating the liner if you want to fracture where there is no sliding sleeve or as a backup.

[885] Mr. David constructs the claim as adding the use of a jet perforation device to perforate new perforation in the casing, though he does indicate the POSITA will have to reconfigure the tool to make it work.

[886] I will construct it as Mr. Lehr has opined, given neither Mr. David nor Mr. Chambers have disagreed.

(12) *Claim 12*

[887] Claim 12 is dependent on Claim 11. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
12	11	a. The step of jetting one or more new perforations in the liner comprises delivering abrasive fluid through the tubing string to jet nozzles within the tool assembly.

[888] Mr. Lehr constructs this as depending only on Claim 11 and having the step of jetting one or more new perforations in the liner by delivering through the tubing abrasive fluid.

[889] Mr. David notes that it depends from Claim 11 which includes any one of Claims 1-10, Claim 1 of which already includes a jet perforation device on the tool string. Mr. Chambers states it does not say the abrasive fluid is delivered through the jet nozzles and notes that jet nozzles are not mentioned in any other claims.

[890] I construct this as a step of using the jet perforator to jet one or more perforations in the liner through the tubing string.

(13) *Claim 13*

[891] Claim 13 is dependent on any one of Claims 1 to 12. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
13	1-12	a. The step of closing an equalization valve in the tool assembly to provide a dead leg for monitoring of bottom hole pressure during treatment.

[892] Mr. Lehr constructs this Claim as having in the method the step of closing an equalization valve to give a dead leg for monitoring the pressure during treatment. He explains in depth how this is done using a fracturing plan and differences in pressure of the fluid in the tubing string and annulus. The tubing string being used as a dead leg allows a balancing pressure to be applied to directly read the bottom hole treating pressure.

[893] Mr. David constructs it as the equalization valve not being required or benefiting a dead leg given a POSITA knows an equalization valve being closed on a dead leg would not allow it to monitor bottom hole pressure. Mr. Chambers likewise does not see the dead leg working with a straddle packer unless a separate monitor were used to monitor the annulus pressure.

[894] The construction of this Claim is that there is a step to add the closing of an equalization valve to provide a dead leg for monitoring the bottom hole pressure during treatment. There is no timing or placement information in this claim.

(14) *Claim 14*

[895] Claim 14 is dependent on any one of Claims 1 to 10. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
14	1-10	a. Detecting a failure of treatment fluid flow into the formation; and, b. Perforating the liner tubing using the fluid perforation device.

[896] Mr. Lehr constructs Claim 14 as adding the additional step to any of Claims 1 to 10 where the method is to detect a failure of treatment fluid flow into the formation and perforating the liner using the perforation device.

[897] Mr. Chambers again notes the lack of timing of this step but assumes there are two steps to Claim 14 and would logically be done after the delivery fluid is delivered or at the same time. He points out there is nothing in the claim to say how it is detected if the fluid does not flow to the formation.

[898] Mr. David indicates this Claim is similar to Claim 11 except the jet device is used to perforate after the failure of treatment fluid to flow into the formation. He says this Claim may be for when a sleeve does not shift using Claim 1.

[899] I construct this to be a step in the method where it detects the failure of treatment fluid to flow into the formation and then perforate a liner using the fluid (jet) perforation device.

E. NCS's 704 Patent

[900] The claims can be grouped as follows:

Claims	Invention
1-10	Tool claims for a fracturing valve
11-15	Tool claims for a BHA
16-23	Tool claims for a BHA with a fracturing valve
24-27	Method claims for fracturing a cased wellbore
28-30	Method claims for perforating and fracturing a formation

[901] Claims 24-27 are no longer at issue and I have therefore not construed them.

(1) *Claim 1*

[902] Claim 1 describes a first position (i.e. where the window and port are aligned) and a second position (i.e. the closed valve position). Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
1	N/A	<ul style="list-style-type: none"> a. A tubular having a throughbore, the tubular being adapted to be connected in a tubing string, the tubular having a window formed through the tubular; b. An outer sleeve disposed around the tubular, the outer sleeve having a port formed in a sidewall of the sleeve; and, c. The valve being arranged such that the tubular and the sleeve are axially moveable relative to one another from a first position in which the window and port are aligned such that fluid can exit the valve through the aligned window and port and a second position in which fluid in the throughbore of the tubular above the port cannot exit the valve and the valve being further arranged such that movement from the first position to the second position can be effectuated by applying a mechanical force to the tubular.

[903] Claim 1 is an independent claim that is directed at a fracturing valve, which is intended to be included as a component of a downhole tool. The fracturing valve allows the selective enabling of fluid communication between the downhole tool and the formation to carry out fracturing operations down the tubing string.

[904] The experts largely agree on the construction of Claim 1. Disagreement pertained to whether additional components can be read into the claim and whether an alignment mechanism is required to make Claim 1 work. Mr. David and Mr. Chambers bring validity issues, such as utility, into construction of this claim, so I shall construct it from the evidence.

[905] As previously discussed, the term “comprising” can include other components that are not listed explicitly in the claim. However, any components that are essential cannot be read into the patent and expand the fences beyond what was claimed. Otherwise, the patent’s monopoly could expand over time, depending on how “comprising” is interpreted: *Wyeth* at para 61.

[906] Claim 1 includes a “tubular having a throughbore ... the tubular having a window formed through the tubular.” All experts agree that the tubing string can include coiled tubing and jointed pipe. I accept Mr. David’s explanation that fluid can be reverse circulated up the tubing string to the surface. The window means that a hole is machined or manufactured through the tubular, which allows fluid to exit the valve when the window is aligned with a port on an outer sleeve.

[907] The experts agree that a valve with a throughbore allows fluids sent downhole via the tubing string to enter the valve via the throughbore of the tubular of the fracturing valve.

[908] Mr. Lehr explained, and I accept, that the outer sleeve allows the fluid to exit the valve when the port on the outer sleeve and the window on the tubular are aligned in the first position. Claim 1 also specifies that the outer sleeve is disposed around the tubular whereby the outer sleeve forms a port in the sidewall of the sleeve. I accept Mr. Lehr's explanation that this allows fluid to exit the valve when the port on the outer sleeve and the window on the tubular are aligned in the first position.

[909] The final element of Claim 1 requires the tubular to be adapted to a tubing string. Mr. Lehr and Mr. Chambers agree, and I accept, that mechanical force is applied to the tubular by either pushing down or pulling up on the tubing string which will in turn transmit those forces to the tubular of the valve. Mr. Chambers specifies that a pulling force is applied to the tubular to move the fracturing valve from the first position to the second position.

[910] Issues regarding whether components of this Claim will function, as raised by Kobold's experts, will be discussed at the validity stage.

(2) *Claim 2*

[911] Claim 2 depends on Claim 1 and specifies that the obstruction is a wedge, unlike Claim 1 which does not specify what the obstruction is. Wedge is commonly construed at paragraph 440 above. As already discussed, the language of Claim 2 only allows for one interpretation of continuous: that the wedge and the tubular are a single, unbroken piece. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
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2	1	a. The lower end of the window opens to a wedge continuous with the tubular, the wedge being exposed through the window when the valve is in the first position.
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[912] As discussed, an obstruction is a necessary component in a fracturing valve. The skilled person would be familiar with the components of a fracturing valve and the obstruction. When Claim 2's fracturing valve is in the first position, the wedge is exposed through the window to the exterior valve. Mr. Chambers and Mr. Lehr agree that the wedge is described "such that the window (in the tubular) opens to the wedge."

[913] The 704 Patent's disclosure describes how the sloped surface of the wedge assists in decreasing the velocity of the fracturing fluid exiting the tubing string. The specification explains how decreasing the velocity of the fluid may prolong the life of the valve and the tool in which the valve is deployed.

[914] As *Free World* at paragraph 15 explains, "the inventor may contemplate, and the reader skilled in the art appreciate, that variants could easily be used or substituted without making any material difference to the working of the invention."

[915] The shape of the wedge is therefore essential to Claim 2. If the shape were substituted for another shape, it would reduce the efficacy of the wedge and the life span of the valve.

(3) *Claim 3*

[916] Claim 3 is dependent on Claim 1. It claims that the port and the window are substantially the same size but not necessarily identical in terms of shape and size. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
3	1	a. The size and shape of the sleeve port is substantially congruent with the size and shape of the window.

[917] All experts agree that Claim 3 stipulates that the window in the tubular is substantially the same size and shape (but not necessarily identical) as the port in the sleeve.

(4) *Claim 4*

[918] Claim 4 is dependent on Claim 1 and explains that the fracturing valve comprises of two seals. Claim 4 specifies one embodiment with seal placement of the fracturing valve. The upper seal is positioned between the sleeve and the tubular, whereas the lower seal is positioned at the lower end of the sleeve to seal between the sleeve and the tubular. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
4	1	a. An upper seal position between the sleeve and tubular; and, b. A lower seal positioned at a lower end of the sleeve to seal between the sleeve and the tubular.

[919] The 704 Patent defines “upper” as “away from the bottom of the wellbore along the longitudinal axis of the workstring.” Lower is defined as “toward the bottom of the wellbore along the longitudinal axis of the workstring.”

[920] Claim 4 does not specify whether the upper or lower seal are fixed and this is a point of contention between NCS and Kobold.

[921] Mr. Lehr disagrees with Mr. David and Mr. Chambers regarding whether the seals are fixed or not – he says the claims are not so limited. Mr. David explains that the upper seal in Claim 4 will have to be fixed to either the outer sleeve or the tubular. Mr. Chambers also explains that the upper seal does not slide when the tubular moves axially relative to the sleeve. Mr. Chambers appears to suggest that Claim 4 is unclear as to whether it specifies the lower seal as fixed or not fixed. Mr. David concludes that the lower seal is “placed on the sleeve itself at the lower end.”

[922] Based on the 704 Patent’s specification, the upper seal is fixed. The specification explains that:

[t]he upper end 31 of outer sleeve 30 is retained against tubular mandrel 15 by at least one upper seal, which in the embodiment shown is an o-ring 46. Seals other than an o-ring may be employed. O-ring 46 is disposed within a groove encircling the outer circumference of outer sleeve 30.

[923] Unlike the upper seal, the lower seal is not fixed at the lower end of the sleeve. Although Mr. Chambers indicates that because the claim does not specify “that this seal position is dependent on a particular position of the valve (i.e. the first/open valve position or the

second/closed valve position),” the lower seal is likely fixed. However, a review of the patent’s detailed description indicates the lower seal is not fixed in one position (it would, however, be attached to the sleeve itself).

[924] I agree with Mr. David that the lower seal is placed on the sleeve itself at the lower end, allowing the tubular to move relative to the sleeve. This interpretation is consistent with the patent’s detailed disclosure, which explains that “[b]ecause o-ring 47 is disposed in a groove on outer sleeve 30, it does not slide when tubular mandrel 15 slides, since sleeve can be held stationary while tubular mandrel 15 slides axially relative to sleeve 30.” The detailed description states that the lower seal surrounds and moves with the tubular, and is not fixed to the sleeve.

(5) *Claim 5*

[925] Claim 5 is dependent on Claim 4. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
5	4	a. The lower seal slides axially with the tubular so that in the second position, the lower seal is sealing between the sleeve and the tubular thereby preventing fluid flow to the tubing string below the lower seal.

[926] Kobold’s experts allege that Claim 5 does not make sense in light of Claim 4, as if the lower seal is fixed then it cannot slide axially with the tubular. However, I construed Claim 4 wherein the lower seal was placed on the sleeve and is therefore axially moveable.

[927] Given how I construed ‘fracturing valve’ above, Claim 5 would fully block flow from exiting the port when the valve is in the second position, as the fracturing valve would have both

the lower seal and an obstruction. When the tubular of the fracturing valve is uphole, the lower seal abuts the outer sleeve, which prevents fluid from exiting the valve through the port in the outer sleeve.

(6) *Claim 6*

[928] Claim 6 depends on Claim 2 and specifies the characteristics of a particular wedge embodiment. It claims that the angle of the wedge's sloped surface is between 10 and 40 degrees relative to the longitudinal axis of the tubular. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
6	2	a. The wedge has a surface that slopes radially outward toward the lower end of the tubular at an angle of between 10-40 degrees from the longitudinal axis of the tubular.

[929] Claim 6 is non-contentious between the experts. I agree that Claim 6 specifies the characteristics of a particular wedge embodiment, "where the angle of the wedge's sloped surface is between 10 and 40 degrees relative to the longitudinal axis of the tubular."

(7) *Claim 7*

[930] All experts largely agree on Claim 7's construction. Claim 7 is dependent on Claim 1 and therefore carries all the limitations of Claim 1. Claim 7 describes a mechanism to prevent the tubular and the outer sleeve from rotating relative to each other when in use. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
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7	1	a. Comprising an alignment mechanism consisting of a groove formed in the outer sleeve and a pin disposed on the tubular.
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[931] I accept the construction that the fracturing valve of Claim 7 has an alignment mechanism consisting of a pin positioned on the tubular and a groove formed in the outer sleeve.

(8) *Claim 8*

[932] Again, there is no major dispute over the construction of Claim 8. Claim 8 is dependent on Claim 1. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
8	1	a. The length of the window is about 60-90 percent of the valve stroke.

[933] Claim 8 specifies that the length of the window is approximately 60-90% of the valve stroke. Even though the claim does not explain what the “valve stroke” is, the disclosure indicates that it is the length of the axial movement of the tubular when the fracturing valve is moved from the first position to the second position.

[934] Therefore, the skilled person would understand that the length of the window is 60-90% of the length that the tubular travelled between the first and second positions.

(9) *Claim 9*

[935] Claim 9 depends on Claim 2 and requires the length of the wedge to be about 40-60% of the length of the window. Mr. Lehr explained, and I agree, that the 704 Patent disclosure

indicates that the length of the wedge is the distance from the base to the apex (i.e. point of the wedge). Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
9	2	a. The length of the wedge is about 40 to 60 percent of the length of the window.

[936] Although Mr. Chambers expresses some confusion about the clarity of the claim, he explains that the “lengths referred to are axial lengths along the longitudinal axis of the tubular. In this claim, the (presumably axial) length of the wedge is about 40 to 60 percent of the (presumably axial) length of the window in the tubular.”

[937] Therefore, the experts agree that the POSITA would understand that the height of the wedge from the base of the tip of the wedge is about 40-60% of the length of the window.

(10) *Claim 10*

[938] Claim 10 depends from Claim 1 and specifies that the fracturing valve has a circulation port below the window for the circulation of debris to the annulus of the tool. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
10	1	a. Comprising at least one circulation port below the window size and configured for circulating debris from the annulus to the tubing string.

[939] There is disagreement about the placement of the circulation ports in the valve. Claim 10 does not specify whether the circulation ports are found in the tubular or the sleeve, or whether they can be a part of the equalization plug.

[940] As Mr. Chambers points out Figure 4 shows the circulation ports as holes in the outer sleeve only and below the window. Figure 10A shows an example of a circulation port below the window on the outer sleeve. However, the 704 Patent description explains that the circulation ports should extend through the equalization plug.

[941] Mr. Lehr opines that a skilled person would understand that the circulation ports may be incorporated into any logical position below the window.

[942] The figures are examples of embodiments and the circulation ports could be placed below the window. The patent description is clear that one embodiment means that the circulation ports extend through the equalization plug. This is one possible embodiment, whereby the circulation ports are placed below the window. Both of these embodiments are within the scope of Claim 10.

(11) *Claim 11*

[943] Claim 11 is an independent claim that prescribes a wellbore treatment assembly. The wellbore treatment of Claim 11 has a fracturing valve similar to independent Claim 1, which allows for the selective enabling of fluid communication between the downhole tool and the formation to carry out fracturing operations. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
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11	N/A	<p>a. A fracturing valve for a downhole tool, the valve comprising: a tubular having a throughbore, the tubular being adapted to be connected in a tubing string, and the tubular having a window formed through the tubular, an outer sleeve disposed around the tubular, the outer sleeve having a port formed in a sidewall of the sleeve, the valve being arranged such that the tubular and the sleeve are axially moveable relative to one another from a first position in which the window and the port are aligned such that fluid in the throughbore above the port can exit the valve through the aligned window and port and a second position in which fluid in the throughbore above the port cannot exit the valve and the valve being further arranged such that movement from the first position to the second position can be effectuated by applying a mechanical force to the tubular;</p> <p>b. A tubing string that can be manipulated from the surface into which the valve can be connected such that the throughbore of the tubular is fluidically continuous with a flow path of the tubing string; and,</p> <p>c. An equalization plug disposed on the tubing string below the window, the equalization plug being actuatable between an open position in which fluid flow to the tubing string below the fracturing valve is enabled to a closed position in which fluid flow to the tubing string below the fracturing valve is prevented, wherein the actuation of the equalization plug from the open to the closed position can be effectuated by applying a mechanical force to the plug and actuation of the equalization plug from the open to the closed position effectuates movement of the fracturing valve from the second position to the first position.</p>
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[944] Claim 11 does not specify an obstruction but the skilled person would understand that some type of obstruction would be required in the fracturing valve, similar to Claim 1's construction.

[945] Mr. David and Mr. Chambers explain that Claim 11 has three components: (1) a valve; (2) a tubing string; and (3) an equalization plug. Both elaborate that the valve is very similar to Claim 1. An equalization plug is as commonly construed at paragraph 408 above.

[946] Kobold's experts submit that unlike Claim 1, Claim 11 explicitly limits the fluid that can exit the valve in the first position to fluid that is in the throughbore above the port. Mr. Chambers and Mr. David assert that this is because the equalization plug in this Claim specifically blocks fluid from flowing up or down through the tubing string when the valve is in the first position.

[947] The second element of Claim 11 specifies that the valve can be connected to the tubing string, thereby allowing fluid from the tubing string to be continuous with the throughbore of the tubular.

[948] I construe the tubular having a throughbore and the outer sleeve elements the same as above in Claim 1.

[949] Nobody disagrees with Mr. David's explanation that the tubing string is manipulated from the surface. I accept his explanation that a POSITA would "consider any tubing string (jointed or coiled) that is run into a well during fracturing operations necessarily manipulatable from the surface, as there would be no other way to operate it."

[950] Mr. Lehr attempted to explain that where no equalization plug or seal is included in a fracturing valve, the skilled person would know to machine the tubular, outer sleeve, and mandrel to the downhole end of the valve in such a way to eliminate these components.

[951] NCS and Mr. Lehr's construction misapprehends the question of essential elements. Although an equalization plug may not be a *necessary* component it is certainly an essential

element of Claim 11. When determining what an essential element is, the Court asks whether the element is replaceable without altering the functionality of the inventive concept.

[952] *Free World* explains that for an element to be considered essential “the skilled addressees would have appreciated that a particular element could be substituted without affecting the working of the invention” (at para 55). The arrangement of the fracturing valve in the invention is more reliable and to substitute this component would reduce the reliability of the invention; therefore, failing to meeting the *Free World* substitutability standard. The equalization plug, introduced in Claim 11, is an essential element of the 704 Patent but is not *necessary* to make the tool functional.

[953] Mr. Lehr specifically notes that an arrangement that does not have an equalization plug, whereby the tubular, outer sleeve, and mandrel are machined in such a way to avoid the need for an equalization plug, would not be the most “reliable design.” Substituting these elements reduces the reliability of the invention, therefore failing to meet the *Free World* substitutability standard and I do not accept it.

[954] The experts agree that Claim 11 specifies how to activate the equalization plug from the open to the closed position. This occurs by applying mechanical force to the equalization plug, which also moves the fracturing valve from the first to the second position. Figure 1 shows the fracturing valve in the first position and Figure 2 in closed position (whereby the equalization plug is in the open position).

(12) *Claim 12*

[955] Claim 12 depends only on Claim 11. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
12	11	a. The mechanical force is effectuated by manipulation of the tubing string.

[956] Claim 11 prescribes how the mechanical force is applied by manipulating the tubing string, which can be done at the surface. Reading the patent as a whole, the mechanical force referred to in Claim 12 means the mechanical force required to move the fracturing valve *and* to actuate the equalization plug.

(13) *Claim 13*

[957] Claim 13 is dependent only on Claim 12. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
13	12	a. Pushing down on the tubing string actuates the valve from the first to the second position.

[958] Claim 13 describes the opposite direction of what is claimed in Claims 11 and 12. Instead of a pulling force, this is a pushing down force. I agree with both Mr. David and Mr. Chambers that there is no structure or description of how this force could be applied in the disclosure.

[959] Mr. Lehr initially opined that Claim 13 requires pushing down on the tubing string, thereby moving the fracturing valve from the first (aligned) position to the second position.

[960] In response to Kobold’s experts, Mr. Lehr attempts to explain that in the case where the window in the tubular is located above the opening in the sleeve the equalization valve would be suspended below the fracturing valve on a shaft, and extended down into the packer mandrel. Thus, the equalization valve would close when pulling up. He notes that this may not be an efficient design but it is within the scope of Claim 11. Since the claim explicitly prescribes a pushing down action, I do not accept Mr. Lehr’s construction.

[961] Nowhere does the 704 Patent describe or include the configuration that Mr. Lehr describes, nor is it readily apparent that the POSITA would know that this configuration is possible. To go from first to second position, the 704 Patent describes that a pulling mechanism is required. The 704 Patent summary explains that “[t]he valve can be actuated from an open to a closed position by pulling up on the coiled tubing string and from a closed to an open position by pushing down on the coiled tubing string to which the valve is attached.”

[962] As Mr. David points out, “[t]his is the opposite direction described in the disclosure.” This construction is incompatible with the remainder of the 704 Patent.

[963] I construe Claim 13, as problematic as it may be, as a purported ability to actuate the valve from first to second position exclusively by pushing down on the tubing string.

(14) *Claim 14*

[964] Claim 14 is dependent on Claim 11. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
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14	11	a. The equalization plug comprises a stem sealingly engageable with the tubing string below the fracturing valve when set down weight is applied to the tubing string.
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[965] There was no major dispute between the experts as to Claim 14's construction. Claim 14 is illustrated in Figure 1, where the stem can be seen as 90. It can also be seen in Figure 7 as 90.

[966] I accept Mr. Chambers' explanation that a pushing down force is applied to the tubing string to move the equalization plug from the open to the closed plug position.

(15) *Claim 15*

[967] Claim 15 is dependent on Claim 12 and requires the wedge to be continuous with the tubular. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
15	12	a. Comprising a wedge continuous with the tubular; b. The wedge being exposed through the window when the valve is in first position; and, c. The wedge is coupled to the plug such that the plug and the wedge move together in response to mechanical force.

[968] I construe Claim 15 similarly to Claim 2, although the wedge in Claim 15 is coupled to the plug. The experts agree, and I accept, that the plug and wedge can be made as one part or as separate parts, so long as they are able to slide together, as the 704 Patent's disclosure explains.

(16) *Claim 16*

[969] Claim 16 is an independent claim that is directed to a downhole tool. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
16	N/A	<ul style="list-style-type: none"> i. A jet perforation device disposed on a tubing string; ii. A fracturing valve on the tubing string below the jet perforation device, the fracturing valve comprising: <ul style="list-style-type: none"> 1. A tubular having a throughbore, the tubular being adapted to be connected in a tubing string, the tubular having a window formed through the tubular, an outer sleeve disposed around the tubular, the outer sleeve having a port formed in a sidewall of the sleeve, the valve being arranged such that the tubular and the sleeve are axially moveable relative to one another from a first position in which the window and port are aligned such that fluid can exit the valve through the aligned window and port and a second position in which fluid cannot exit the valve and the valve being further arranged such that movement from the first position to the second position can be effectuated by applying a mechanical force to the tubular; and, 2. Wherein fluid pumped down the tubing string when the fracturing valve is in the second position is forced to exit the tool via the perforation device.

[970] The downhole tool claimed in Claim 16 specifies two components: i) a jet perforation device on a tubing string; and ii) a fracturing valve on the tubing string below the jet perforation device.

[971] The experts agree that the jet perforation device is positioned on a tubing string. Fluid can be reverse circulated up the tubing string to the surface. I accept Mr. David's explanation that the tubing string would also include other parts of the downhole tools above and below the jet perforation device.

[972] The experts construe the fracturing valve in Claim 16 similarly to Claim 1. The fracturing valve is located on the tubing string below the jet perforation device. All experts agree that the jet perforation device allows for selective enabling of fluid communication between the downhole tool and the formation that allows perforating and fracturing operations down the tubing string. There is also no dispute over Mr. Lehr's construction of a jet perforation device. He explains that it is a component that has nozzles "whereby abrasive perforating fluid sent downhole in the tubing string can be ejected out of nozzles on the jet perforation device at high velocity to perforate casing walls." Mr. David also specifies that the velocity allows the fluid to "abrasively perforate the casing."

[973] Mr. Chambers is correct that there is a typographical error in "the tubular having window [sic] formed through the tubular." It should be read as "the tubular having [a] window formed through the tubular." This typo would not affect the skilled person's interpretation of the claim element.

[974] Mr. Chambers and Mr. David raise an issue similar to Claim 1 regarding the fluid's ability to exit the fracturing valve. Both opine that any fluid can exit the valve through the aligned window and port when the fracturing valve of Claim 16 is in the first position. However, given my above construction of the fracturing valve, an obstruction would be present in the fracturing valve. Both Mr. Chambers and Mr. David opine that there is no equalization plug claimed and there is therefore no structure blocking fluid from flowing down through the tubing string when the valve is in the first position. This is a validity issue, not a construction issue.

[975] Mr. Lehr’s initial construction is relatively straightforward. He opines that Claim 16 adds an additional limitation, whereby the fracturing valve is located on the tubing string below the jet perforation device. He explains that when perforation is done, the fracturing valve can be moved to the second position, which prevents fluid from entering the fracturing valve. This results in the perforation fluid being forced out the nozzles in the jet perforation device.

[976] Mr. David and Mr. Chambers raise an issue in relation to the term “and a second position in which fluid cannot exit the valve.” They construe the claim term restrictively, opining that fluid cannot exit the valve at all, while in Claims 1 and 11 only fluid above the port in the outer sleeve cannot exit the valve (see table below showing comparison). Therefore, in his view, the valve of Claim 16 does not allow the valve “to be open to the annulus or the tubing string below the port in the second position.”

Comparison of Claims 1, 11, and 16 – Fluid Exiting the Valve		
Claim 1	Claim 11	Claim 16
“...are aligned such that fluid can exit the valve through the aligned window and port and a second position in which fluid in the throughbore of the tubular above the port cannot exit the valve...”	“...are axially moveable relative to one another from a first position in which the window and the port are aligned such that fluid in the throughbore above the port can exit the valve through the aligned window and port and a second position in which fluid in the throughbore above the port cannot exit the valve...”	“...are axially moveable relative to one another from a first position in which the window and port are aligned such that fluid can exit the valve through the aligned window and port and a second position in which fluid cannot exit the valve...”
[Emphasis added]	[Emphasis added]	[Emphasis added]

[977] Mr. Chambers explained that the POSITA would understand the phrase “a second position in which fluid cannot exit the valve” to mean fluid cannot exit out of the valve through the window and port into the formation.

[978] A patent should “be construed making due allowance for any faults of expression or misuse of words that do not mislead the addressee of the patents in issue”: Fox on the Canadian Law of Patents § 8:25. A patent is to be read fairly with a mind willing to understand: *Ernest Scragg & Sons Ltd v Leeson Corp*, [1964] Ex CR 648, 26 Fox Pat C 1 at 55-58.

[979] I accept Mr. Lehr’s construction — Claim 16 should not be read restrictively. In light of a purposive interpretation, Claim 16 indicates that fluid does not exit out of the valve through the window and port into the formation, which therefore forces the fluid out of the nozzles in the jet perforation device.

(17) *Claim 17*

[980] Claim 17 is dependent on Claim 16 and claims a wedge formed on the tubular, which is downhole of the window. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
17	16	a. Tubular further comprises a wedge formed on the tubular, downhole of the window, the wedge configured for diverting fracturing treatment fluid pumped through the tubing string to the exterior of the tool when the valve is in an open position.

[981] Mr. Lehr does not address Claim 17 in either of his expert reports. This is likely due to the fact that NCS does not allege infringement of Claim 17. However, as noted above, Kobold

raised its counterclaim pursuant to section 60(1) of the *Patent Act* and is therefore entitled to impugn the validity of the 704 Patent Claims *in rem*. I therefore construct Claim 17.

[982] Accordingly, I adopt Mr. Chambers and Mr. David's construction.

[983] Both of Kobold's experts again construe the wedge as part of the tubular below the wedge, similarly to Claim 2. Mr. Chambers explained several functional advantages to having the tubular and wedge as one piece: it limits the number of seals required and it minimizes the wear due to erosion.

[984] I agree with Mr. Chambers and Mr. David that the wedge would serve to partially prevent fluid in the throughbore of the tubular above the port from exiting the valve when it is in the second/closed valve position.

(18) ***Claim 18***

[985] Claim 18 depends on Claim 16. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
18	16	a. The wedge is exposed to the exterior of the tool when the valve is in the first position.

[986] As previously noted, first position means the window and port are aligned, thereby allowing fluid to exit the valve. Mr. Lehr opines that when the wedge is exposed to the exterior, it means the wedge is visible through the window and port when they are aligned.

[987] Kobold's experts point out that Claim 18 depends on Claim 16 but there is no wedge in Claim 16 and it is unclear what the inventor is referring to.

[988] Mr. Lehr explains that the skilled person would understand that Claim 18 is a dependent claim that specifically requires a wedge because Claim 16 does not preclude the presence of a wedge. He opines that Claim 16 does not preclude the presence of a wedge and he therefore appears to imply that a wedge can be read into Claim 16. However, this differs from the approach in Claim 1, where I agreed that an obstruction would be required in a fracturing valve. The wedge is clearly intended to be an essential element in Claim 18 and Claim 16 fails to establish this essential element.

[989] I do not accept Mr. Lehr's construction. There is no wedge in Claim 16; the problem here is the use of "the wedge," not a wedge. Mr. Lehr cannot say that Claim 18 specifies "a wedge" as a workaround of the absence of a wedge in Claim 16. I agree with Mr. David and Mr. Chambers that, aside from the fact that the wedge is visible through the window and port when they are aligned, the structure and position of the wedge in Claim 18 is unknown.

(19) *Claim 19*

[990] Claim 19 is dependent on Claim 16 and is similar to Claim 5. It specifies that the downhole tool has a lower seal positioned between the tubular and the sleeve of the fracturing valve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
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19	16	a. Comprising a lower seal disposed between the tubular and the sleeve to prevent fluid flow out of the tool through the port when the valve is in the closed position.
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[991] Mr. Lehr reminds the Court that the sleeve is disposed around the tubular on the fracturing valve. In addition, he highlights that where a lower seal is included between the tubular and sleeve, the sleeve prevents fluid flow out of the tool when the fracturing valve is in the closed position.

[992] Mr. Chambers adopts the same definition of “lower” as in Claim 4, which I also adopt.

(20) *Claim 20*

[993] Claim 20 is dependent on Claim 16 and specifies that there is an equalization plug disposed on the tubing string below the fracturing valve. Claim 20 is similar to Claim 11’s specification and I therefore construe it the same. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
20	16	<ul style="list-style-type: none"> a. An equalization plug adapted to be disposed on the tubing string below the fracturing valve; and, b. The equalization plug being actuatable from an open position in which fluid flow below the plug is permitted to a closed position in which fluid flow below the equalization plug is prevented, the actuation between the open and closed positions being effectuated by applying a mechanical force to the plug.

[994] Mr. Chambers relies on his construction of Claim 11 regarding the equalization plug. He explains that the downhole tool of Claim 20 has an equalization plug positioned at some point on

the tubing string below the fracturing valve. This allows fluid down the tubing string below the fracturing valve until it reaches the equalization plug.

[995] Mr. David and Mr. Chambers explain that the equalization plug can be actuated such that it moves from an “open” plug position to a “closed” plug position. I agree with their construction of Claim 20. They also clarify that when the plug is in the open position, fluid can flow down below it, whereas, in the closed position, fluid cannot flow below the plug.

[996] I accept Mr. Chambers’ explanation that the 704 Patent’s disclosure describes embodiments where a pushing force is applied to the tubing string to move the equalization plug from the open to the closed plug position.

(21) *Claim 21*

[997] Claim 21 is dependent on Claim 16 and specifies that the equalization plug is adjoined to the wedge. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
21	16	a. An equalization plug adjoined to the wedge member, the plug slidable between an open position and a closed position by applying a mechanical force to the tubular.

[998] As already noted, the skilled person would understand that the “wedge member” refers to the wedge. Claim 21 requires the equalization plug be adjoined to the wedge. The plug can slide between the open and closed position via mechanical force.

[999] Claim 21 has the same issue as Claim 18, where it refers to “the wedge” but there is no wedge claimed in Claim 16.

[1000] I agree with Kobold’s experts that since the structure and position of the “wedge member” is unknown, it is unclear how applying a force to the tubular will cause the equalization plug to slide, or what the “open position” or “closed position” means for the positioning or functioning of the equalization plug.

(22) *Claim 22*

[1001] Claim 22 is dependent on Claim 16 and specifies that a sealing assembly is disposed on the tubing string below the valve. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
22	16	a. Comprising a sealing assembly disposed on the tubing string below the valve.

[1002] The experts agree that Claim 22 specifies a sealing assembly position on the tubing string below the fracturing valve. They also agree that Claim 22 includes a sealing or packer element and an anchor.

(23) *Claim 23*

[1003] Claim 23 is dependent on Claim 16 and specifies a mandrel on the tubing string below the fracturing valve. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
23	16	<ul style="list-style-type: none"> a. A mandrel on the tubing string below the fracturing valve; and, b. The outer sleeve connected to the mandrel in such a way that the mandrel is held stationary while the tubular moves relative to the sleeve by pushing or pulling on the tubing string.

[1004] The experts agree that Claim 23 requires a mandrel on the tubing string below the fracturing valve.

[1005] I accept Mr. Chambers' construction that the outer sleeve of the fracturing valve is connected to the mandrel, which is held stationary while the tubular of the fracturing valve moves relative to the sleeve by pushing or pulling on the tubing string.

(24) *Claim 28*

[1006] Claim 28 is an independent claim that is directed to a method of perforating in intervals and fracturing a formation intersected by a wellbore. Its essential elements are as follows:

Claim	Dependent on Claim	Essential Elements
28	N/A	<ul style="list-style-type: none"> a. Deploying a tool on a tubing string into the wellbore; <ul style="list-style-type: none"> i. The tool having a perforation device and having the capability of carrying out fracturing following perforation by pushing down on the tubing string to open a fluid passageway in the tool continuous with the tubing string and with the exterior of the tool when the tubing string is pushed down, such that fracturing fluid can exit the tubing string through the fluid passageway to the formation; b. Perforating an interval of the formation; c. Pushing down on the tubing string; d. Pumping fracturing treatment fluid through the tubing string into the perforations created by the perforation device without removing the tool from the formation between perforation and fracturing;

		<p>i. Further comprising pumping fracturing treatment fluid down the tubing string and through a fracturing window on the tool below the perforation device, the fracturing window being exposable to the formation when the tubing string is pushed down.</p>
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[1007] Claim 28 broadly claims a perforation device on a tool but does not specify the tool structure, nor the components of the tool.

[1008] Mr. Lehr's and Mr. Chambers' construction is similar. The experts broadly agree, and I accept that:

- A. Element (a) describes a tool on a tubing string. Claim 28 specifies that the tool has a perforating device and a fluid passageway that allows fracturing fluid to exit the tool when it is pushed down. Fluid can also be reverse circulated up the tubing string;
- B. Element (a)(i) claims a tool that can fracture after perforation, which is enabled by a fluid passageway in the tool;
- C. Element (b) sets out the method for perforating at intervals of the formation with the perforation device;
- D. Element (c) claims a downward pushing force, which is applied to the tubing string. The pushing force opens the fluid passageway, which allows fracturing fluids to exit the tubing string and enter the formation; and,
- E. Element (d) describes how the fracturing treatment fluid is pumped through the tubing string into the perforations. The fracturing treatment fluid is pumped down the tubing string and through a fracturing window on the tool, which may be exposed to the formation when the tubing string is pushed down.

[1009] Finally, I also agree with Mr. Chambers that Claim 28 does not specify whether the wellbore is cased.

(25) *Claim 29*

[1010] Claim 29 is dependent on Claim 28 and specifies steps to seal the wellbore following fracturing but before applying fracturing treatment. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
29	28	a. Sealing the wellbore following perforation and before applying fracturing treatment.

[1011] The experts agree on Claim 29's meaning. Mr. Chambers returns to Claim 28 and explains that Claim 29 adds a limitation that sealing occurs after the perforation described in essential term (b) of Claim 28 and before applying the fracturing treatment, described as essential term (d) of Claim 28. I accept the experts' construction.

(26) *Claim 30*

[1012] Claim 30 depends on Claim 28 and repeats steps (b)-(d) from Claim 28 for at least an additional interval of the formation. Its essential element is as follows:

Claim	Dependent on Claim	Essential Element
30	28	a. Repeating steps (b), (c) and (d) for at least one additional interval of the formation.

[1013] The experts all agree that Claim 30 simply requires repeating steps (b)-(d) from Claim 28 for at least an additional interval of the formation.

F. Kobold's 571 Patent

[1014] The relevant date for the purposes of claim construction is the publication date, which for the 571 Patent is October 27, 2020: *Whirlpool* at paras 53-54.

[1015] The 571 Patent is directed to three main sleeve operations: (i) a dampening shock absorption mechanism; (ii) an angled shoulder damage prevention mechanism; and (iii) a gripper restraining mechanism. Other than Claim 24, which incorporates the angled shoulder prevention, the 571 Patent Claims are directed at the dampening shock absorption mechanism.

[1016] In addition to the previously noted legal principles, the 571 Patent raises important considerations regarding claim differentiation. The principle of claim differentiation explains that there is a rebuttable presumption that claims in a patent are not redundant. See for example *Camso* at paragraph 103. *Camso* explained claim differentiation as follows:

It follows from this that a dependent claim, which incorporates all of the elements of the independent claim on which it depends, will generally be construed more narrowly than the independent claim: *Halford v Seed Hawk Inc*, 2004 FC 88 at para 90 [*Halford*], aff'd 2006 FCA 275. The limitations of the dependent claim are generally not read into the independent claim: *Halford* at para 93. Moreover, the independent claim should not be construed in a manner that is inconsistent with the dependent claim: *Halford* at paras 91, 95.

[Emphasis added]

[1017] The Federal Court of Appeal has also held that, according to claim differentiation, it is impermissible to import limitations from dependent claims into the prior claims on which they depend: *CanMar Foods Ltd v TA Foods Ltd*, 2021 FCA 7 at paras 44-45.

[1018] The below table identifies the limitations defined in each of the dependent claims that are at issue:

Claim	Dependent on Claim	Limitation
6	1-5	A second annular chamber radially intermediate the housing and the sleeve, and axially immediately adjacent the first annular chamber; wherein the second annular chamber is in fluid communication with the first chamber for receiving the first dampening fluid released from the first chamber.
11	6-10	The first and second chambers are formed from an annular space radially intermediate the housing and the sleeve, and wherein an annular barrier divides the annular space into the first and second chambers.
12	11	The annular space is located at a fixed location with respect to the housing, and the annular barrier is fixed to the sleeve and moveable therewith, the movement of the annular barrier simultaneously reducing the volume of the first chamber and enlarging the volume of the second chamber.
16	11-15	The apparatus further comprises at least one metering passage fluidly connecting the first and second chambers across the barrier.

[1019] Kobold is only asserting that the embodiments without a seal are infringed. Kobold explained that the 571 Patent Claims cover two separate and distinct embodiments – one where the annular space between the sleeve and the housing is sealed, and one where it is not.

[1020] The 571 Patent has 27 claims, three of which are independent claims (1, 25, and 27).

[1021] There is much agreement on the construction of most of the terms used in the claims in issue. The experts disputed a few claim terms, which I have already addressed.

[1022] I understand and construe the claims' essential features, as summarized in

Dr. Fleckenstein's Construction and Infringement Report and Dr. Mennem's Invalidity Report as follows:

Claim	Dependent on Claim	Essential Elements
1	N/A	a. A downhole apparatus comprising: <ol style="list-style-type: none"> i. A tubular housing along a tubing string; ii. A sleeve located within the housing and axially moveable therein from a first position to a second position; iii. A first annular chamber radially intermediate the housing and the sleeve; iv. Said first annular chamber containing a first dampening fluid and being of controllably releasing the first dampening fluid under pressure; <ol style="list-style-type: none"> 1. When the sleeve moves from the first position to the second position, the first dampening fluid is pressurized and controllably released for controlling the speed of the sleeve movement.
2	1	a. The first dampening fluid is a substantially incompressible fluid.
3	1 or 2	a. The first dampened fluid is grease.
4	1-3	a. The first dampened fluid has a viscosity index in the range between 80 and 110.
5	1-3	a. The first dampened fluid has a viscosity index of 90.
6	1-5	a. A second annular chamber radially intermediate the housing and the sleeve, and axially immediately adjacent the first annular chamber; and, b. The second annular chamber is in fluid communication with the first chamber for receiving the first dampening fluid released from the first chamber.
7	6	a. The first chamber has a first volume; b. The second chamber has a second volume; and,

		c. The first volume being smaller than the second volume.
8	6 or 7	a. The second chamber contains a second dampening fluid.
9	8	a. The first and second dampening fluids are like fluids.
10	8	a. The first and second dampening fluids are different fluids.
11	6-10	a. The first and second chambers are formed from an annular space radially intermediate the housing and the sleeve; and, b. An annular barrier divides the annular space into the first and second chambers.
12	11	a. The annular space is located at a fixed location with respect to the housing; b. The annular barrier is fixed to the sleeve and moveable therewith; and, c. The movement of the annular barrier simultaneously reducing the volume of the first chamber and enlarging the volume of the second chamber.
13	12	a. Said barrier comprises a seal arrangement for sealing between the sleeve and the housing.
14	12 or 13	a. The barrier is threadably engaged along the sleeve.
15	11	a. The annular space is located at a fixed location with respect to the sleeve and moveable therewith; b. The annular barrier is located at a fixed location with respect to the housing; and, c. The movement of the annular barrier simultaneously reducing the volume of the first chamber and enlarging the volume of the second chamber.
16	11 to 15	a. The apparatus further comprises at least one metering passage fluidly connecting the first and second chambers across the barrier.
17	16	a. The apparatus further comprises at least one metering passage extends axially through the interface of the sleeve and the barrier.

18	17	a. At least one metering passage is on both sides of the interface of the sleeve and the barrier.
19	17	a. At least one metering passage is on the sleeve side of the interface of the sleeve and the barrier.
20	17	a. At least one metering passage is on the barrier side of the interface of the sleeve and the barrier.
21	16	a. At least one metering passage extends axially through the barrier.
22	14	<p>a. The sleeve comprises exterior threads and the barrier comprises internal threads; and,</p> <p>b. The sleeve's exterior threads being circumferentially discontinuous forming at least one axial metering passage fluidly connecting the first and second chambers across the barrier.</p>
23	14 or 22	<p>a. The sleeve comprises exterior threads and the barrier comprises internal threads; and,</p> <p>b. The barrier's internal threads being circumferentially discontinuous forming at least one axial metering passage fluidly connecting the first and second chambers across the barrier.</p>
24	1-23	<p>a. The housing comprises a shoulder for receiving an annular end surface of the sleeve when the sleeve is at the second position;</p> <p>b. The annular end surface of the sleeve extends axially outward with a predefined angle from an inner edge thereof to an outer edge thereof; and,</p> <p>c. The shoulder of the housing extends axially inward with the predefined angle from an inner edge thereof to an outer edge thereof.</p>
25	N/A	<p>a. A method of moving a sleeve in a housing axially from a first position to a second position:</p> <p style="padding-left: 40px;">a. Said housing being used in a tubing string;</p> <p>b. Said method comprising:</p> <p style="padding-left: 40px;">i. Providing a first annular chamber radially intermediate the housing and the sleeve;</p>

		<ul style="list-style-type: none"> ii. Enclosing a first dampening fluid in the first chamber; iii. Moving the sleeve from the first position to the second position; iv. During the movement of the sleeve: <ul style="list-style-type: none"> 1. Pressurizing the first dampening fluid in the first chamber; 2. Controllably releasing the pressurized first dampening fluid out of the first chamber for controlling the speed of the sleeve.
26	25	<ul style="list-style-type: none"> a. Providing a second annular chamber radially intermediate the housing and the sleeve; b. Axially immediately adjacent the first annular chamber: <ul style="list-style-type: none"> i. The second annular chamber is in fluid communication with the first chamber; ii. Receiving, in the second chamber, controlled release of fluid out of the first chamber during the movement of the sleeve.
27	N/A	<ul style="list-style-type: none"> a. A method of moving a sleeve in a housing axially from a first position to a second position; b. Said housing being used in a tubing string; c. Said method comprising: <ul style="list-style-type: none"> i. Providing a closed annular space radially intermediate the housing and the sleeve; ii. Dividing the annular space into a first and a second chambers in fluid communication; iii. Enclosing the incompressible fluid in the first and second chambers; iv. Moving the sleeve from the first position to the second position; v. During the movement of the sleeve, simultaneously reducing the volume of the first chamber and increasing the volume of the second chamber to pressurize the fluid in the first chamber and force the fluid in the first chamber to controllably flow into the second chamber for dampening the sleeve's movement.

(1) *Claim 6*

[1023] Claim 6 depends on any one of Claims 1 to 5 and therefore requires the Court to construe Claims 1 to 5.

[1024] Claim 1 is an independent claim that is directed to the downhole apparatus used in a wellbore. The downhole apparatus includes a tubular housing incorporated into a tubing string. The skilled person would understand that the housing surrounds the shifting sleeve and the inner sleeve can be shifted or moved. The skilled person would know that the sleeve can be moved or shift through a variety of methods, such as a pressure generated force of a ball drop mechanism.

[1025] Claim 1 consists of a first annular chamber (a volume with radial boundaries) that is located between the outer surface of the inner sleeve and the inner surface of the housing. This first annular chamber is not sealed and contains a fluid that can be controllably released under pressure. The claim does not specify where the dampening fluid is released into. Dampening fluid is commonly construed at paragraph 449 above.

[1026] In Claim 1, when the “first dampening fluid” is released from the annular chamber, it helps to control the speed of the sleeve movement, as the flow of the fluid is restricted in some controlled way. The fluid is pressurized upon movement of the sleeve from first position (i.e. closed) to second position (i.e. open).

[1027] Claim 2 specifies that the first dampening fluid is a substantially incompressible fluid. The skilled person would know that incompressible dampening fluid encompasses liquids whose density does not change due to pressure.

[1028] Claim 3 “additionally required that the first dampened fluid is grease.” The skilled person would know that grease is an incompressible fluid.

[1029] Claim 4 depends from any of Claims 1 to 3. It adds that the first dampened fluid has a viscosity index in the range between 80 and 110. The Society of Automotive Engineers created the viscosity index scale. As Dr. Mennem explained, this viscosity index indicates that the first dampened fluid’s viscosity is relatively insensitive to temperature changes. Dr. Fleckenstein also explained that the higher the viscosity index, the more a fluid’s viscosity remains stable with changing temperatures.

[1030] Claim 5 depends from any of Claims 1 to 3. It specifies that the first dampened fluid has a viscosity index of 90.

[1031] Claim 6 depends from any of Claims 1 to 5 and includes at least every element of Claim 1. Claim 6 includes a second annular chamber and therefore describes a two chamber embodiment. There is no mention of a barrier ring or metered passage and these apparatus cannot be read into the claim. The second chamber radially intermediates the housing and the sleeve, meaning the radial boundaries of the second chamber are the same as the first.

[1032] Claim 6 describes the spatial relationship between the two chambers, which abut each other axially across a boundary that separates the two chambers. The two annular chambers are in fluid communication.

(2) *Claim 11*

[1033] Claim 11 depends on any one of Claims 6 to 10 and therefore requires the Court to construct those claims.

[1034] Claim 7 depends only on Claim 6. In Claim 7, the volume of the first annular chamber is smaller than the volume of the second annular chamber. I accept Dr. Mennem's submission that the skilled person would understand that the dampening mechanism would still work if the first volume was larger than the second volume or if the first and second volumes were equal.

[1035] Claim 8 depends on the apparatus of Claims 6 or 7 and adds that the second chamber contains a second dampening fluid. The skilled person would know that the "second dampening fluid" is a compressible fluid or an incompressible fluid.

[1036] Claim 9 depends on Claim 8 and requires that "the first and second dampening fluids are like fluids." "[L]ike fluids" means that the first and second dampening fluids are similar fluids.

[1037] Claim 10 relies only on Claim 8 and requires the first and second dampening fluids to be different fluids.

[1038] Claim 11 adds the requirement that an annular barrier divide the annular space into the first and second annular chambers. In this embodiment, the first and second annular chambers are located in the annular space between the housing and the sleeve.

(3) *Claim 12*

[1039] Claim 12 depends on any one of Claims 6 to 10 and specifies that the annular space is located at a fixed location with respect to the housing, and the annular barrier is fixed to the sleeve. The annular barrier is moveable, thereby reducing the volume of the first chamber and enlarging the volume of the second chamber.

[1040] However, as Dr. Mennem points out, there are several possible embodiments for Claim 12. The annular barrier can be sealably moveable or include at least one metering passage.

[1041] NCS argues that because Claim 13 is dependent on Claim 12, the annular barrier of Claim 12 includes the annular barrier seal, as well as a barrier ring with a gap.

[1042] Claim 12 does not include the annular barrier seal and NCS's interpretation is a violation of claim differentiation. If Claim 12 contained an annular barrier seal, Claim 13 would be redundant. Given the presumption against redundancy has not been rebutted here, the limitation in Claim 13 cannot be read into Claim 12.

[1043] Therefore, the skilled person would understand that the annular gap acts as a metered passage in Claim 12.

(4) ***Claim 16***

[1044] Since Kobold only alleges that those embodiments without a seal are infringed, the Court only needs to construct Claim 16 as it depends from Claims 1, 3, 4, 6, 11, and 12. Claim 13 adds the seal apparatus and that embodiment is not at issue.

[1045] Claim 16 explains that the apparatus consists of at least one metering passage that fluidly connects the first and second chambers across the barrier. As previously concluded, Claim 16 does not specify the geometry nor the size of the metering passage, however the skilled person would understand that Claim 16 requires a controlled passage of fluid, for example through a small orifice.

[1046] Only for the purposes of this action, I construe Claim 16 as a metering passage which fluidly connects the first and second chambers across the barrier, with no specificity of the geometry nor size of the passage, and excluding previous claims regarding a seal.

IX. **Validity**

A. **NCS's 676 Patent**

[1047] Before turning to the specific invalidity allegations, I first address which claims are at issue. I note that part of this issue does come to a head in the 571 Patent, where Kobold alleges invalidity issues for claims that are no longer asserted are moot because NCS brought the invalidity allegations under section 59 of the *Patent Act* as opposed to through an impeachment action under section 60. Although the mootness issue is linked to the question of whether a

defendant can counterclaim against a non-asserted claim, I address the mootness issue later in the 571 Patent analysis.

[1048] As noted in the claim construction of the 676 Patent, Mr. Lehr did not construct some of the claims, as NCS did not allege infringement of those claims (Claims 33 and 34).

[1049] The underlying issue, is whether a defendant can counterclaim against a non-asserted patent claim. Neither party provided case law on this issue, nor was it directly addressed.

[1050] Based on the language of section 60(1) of the *Patent Act*, in my view, a defendant who counterclaims under this provision may assert invalidity of non-asserted claims of a patent at issue. In addition, section 60 can be asserted independently and does not have to arise from a counterclaim. This lends further support to the conclusion that the language of “any claim” allows an “interested person” to broadly assert invalidity against a patent’s claim.

[1051] I note that a similar issue arose in *Angelcare*. Canadian Patent 2,686,128 [128 Patent] consists of 28 claims and the Plaintiff, Angelcare, alleged Claims 11-3, 16, 18, 19, 22, and 23 were infringed. The Defendant, Munchkin, alleged invalidity of Claims 1, 2, 20, and 21, despite the fact that the Plaintiff did not allege those claims were infringed. Justice Roy still considered the validity of these claims. Although not explicitly commented on, Munchkin’s Statement of Defence and Counterclaim relied on section 60(1) of the *Patent Act*. In my view, it was open to Munchkin to raise invalidity allegations against non-asserted claims of the 128 Patent and it certainly appears that Justice Roy was of the same view.

[1052] In *Hercules Inc v Diamond Shamrock Corp* (1969), [1970] Ex CR 574 (Can Ex Ct), 1969 CarswellNat 346F [*Hercules*] [*Hercules* cited to CarswellNat] the Exchequer Court of Canada dealt with what constitutes an “interested person” for the purposes of section 60(1) (then section 62). The Court’s commentary on this is relevant insofar as the Defendants argued they were an interested person who could seek a declaration such that the patent in its entirety was invalid, even though the Plaintiff restricted their claim to infringement of some claims: *Hercules* at para 7. In answering this argument, the Court concluded:

... It may be that, if it were possible to frame Claims so that they could be readily understood, a court could say, in some cases, at a preliminary stage, that the Defendant who has been sued for infringement of certain Claims can have no possible interest in having the other claims declared invalid. If such a case exists, this is not such a case.

Hercules at para 29

[1053] *Hercules* demonstrates that it is open to an “interested person” to impeach non-asserted claims pursuant to section 60 of the *Patent Act*. This Court has relied on *Hercules* for the proposition that Defendants are “not restricted to impeaching only those claims allegedly infringed”: *Purcell Systems, Inc v Argus Technologies Ltd*, 2008 FC 1210 at para 22. Much like *Hercules*, this is not a case where Kobold has no possible interest in having the other claims declared invalid, nor did NCS advance any contention over the fact that Kobold is an “interested person.” Therefore, it remains quite properly open to Kobold to allege invalidity of non-asserted claims in its counterclaim.

(1) *Anticipation*

[1054] Kobold attacks the validity of this patent. They do so by advancing that Claims 1, 4, 8-12, and 18-31 are invalid for Anticipation based on the Pioneer Application.

(a) *Prior Art for 676*

[1055] There are many pieces of prior art that Kobold has relied on with respect to NCS's patents. Given the overlap between the prior art raised with respect to NCS's patents, please see the Summary of Prior Art at paragraphs 250-257 above.

(b) *Disclosure*

[1056] Kobold alleges that the 676 Patent was disclosed in Claims 1, 4, 8-12, and 18-31. The Defendants rely on the Pioneer Application as anticipating those claims of the 676 Patent given the subject matter was disclosed before the claim date in a manner that the subject matter was available to the public. The Defendants argue that this single embodiment falls in the claims set out above. The 676 filing date was 2010/02/18; date of issue: 2011/11/01.

[1057] The inventors of US 745 are Marty Stromquist, Phillip Mandrell and Howard Dustin. During the course of the trial the 745 was also referred to as the Pioneer Application (international publication date March 29, 2007) titled: "Well Treatment Device, Method, and System" given Pioneer Natural Resources USA INC. was the company the inventors then worked for in Denver, Colorado. I will refer to it as the Mandrell Patent or the 745. The 745 claims priority to the US Provisional application 60/71/8 481 [Pioneer Provisional] (filing date September 19, 2005, Application date September 19, 2005) titled "Well Fracturing Apparatus,

System and Method.” There is also a provisional application dated October 19, 2005: US60/728, 182 (filing date October 19, 2005); titled: “Well Treatment Device, Method and System.” Both the 481 and 182 are listed on the Pioneer Application for priority dates.

[1058] The 745 Patent is for a “Well treatment device, method and system” and was published on March 29th, 2007, which is before the filing date of the 676 Patent. This application describes it as a BHA with the purpose of “reduc[ing] the chance of having a tool stuck in a well and/or for more efficient well treatment procedures.” The patent describes what is called the commercial name of “Mongoose.”

[1059] Mr. David set out in a detailed chart on a claim-by-claim basis his comparison of the Pioneer Application and the 676 Patent.

[1060] The Defendants argued, with respect to Claims 1, 4, 11, and 12, that those claims are anticipated. Concerning Claims 8, 9, 10 and 28, the Defendants claim that, though the Mandrell patent does not claim an equalization valve with constant communication, if a broader construction of the equalization valve is taken then those claims would also be anticipated by the Pioneer Application.

[1061] The Defendants say Claim 18 has the debris relief passageway as an opening or port in the tool string that can have both an equalization path as well as reverse circulation flow path, which allows fluids to go up and down. While the Mandrell debris relief passageway is below the sealing device, the Defendants argue if a broader construction is used for a debris relief passageway then the method in Claim 18 is also anticipated by the Pioneer Application.

Consequently, if in Claim 18 the independent claim is anticipated then it follows that Claims 19-31 (except 28) also are anticipated.

[1062] Kobold argues that, given reverse circulation was CGK at the time and the POSITA would understand it was used for debris relief, it not being specifically mentioned in the Pioneer Application still has it being anticipated given it could be done by the Mandrell. Further support that reverse circulation was known (CGK) and used (POSITA) is found in the testimony of both Stromquist and Nipper, who both did reverse circulation with the Mongoose tool at that time for debris relief.

[1063] Of note is that the 676 inventors are listed as Don Getzlaf, Robert Nipper and Marty Stromquist. Marty Stromquist is listed as an inventor on the Mandrell patent and both he and Robert Nipper testified at this trial.

[1064] Step one is to determine if the Pioneer Application anticipates any of the claims of the 676 Patent.

[1065] Mr. Lehr is strong in his opposition to whether the Pioneer Application anticipated the 676 in his responding report. In summary his opinion is that none of the claims are anticipated. He begins his response noting that Marty Stromquist is an inventor on both patents. He indicates that debris relief functions are not claimed by the Pioneer Application. He says in the 20 examples that only one talks about a debris barrier which he says is to keep the debris out of the tool. He notes the patent “discusses methods for relieving debris around the area of the upper cup in the annular space (i.e. on the outside of the tool)” as well as that the patent includes functional

qualities that “can aid in clearing debris.” In giving examples of what the patent teaches as ways to keep debris from stopping function included in the Pioneer Application, Mr. Lehr notes that if debris above the thimble prevents the cup packer element from being able to be pulled that “circulating fluid can be pumped down the annulus to clear debris that may gather around the tool.”

[1066] He states that the Pioneer Application commission packer has “no obvious provision for debris relief within its J-slot 420,” while at the same time the J-slot is exposed which could cause “debris ingress or egress through slots 421 and [sic] 421” as the “valve below the packer opens and closes, and the slips are activated and deactivated, there is ample opportunity for debris to accumulate on the J-slot 420.”

[1067] Mr. Lehr suggests the Pioneer Application does not have the jet perforation device on the same tool string so it does not have to deal with the perforation fluid debris, whereas the 676 Patent’s resettable sealing device is set before perforation and fracturing can be done without moving the tool.

[1068] His third and most important distinction is summarized as a complete divergence from the Pioneer Application, which tries to keep debris out and the 676 does not try and keep the debris out of the tool but provides for “a multitude of apertures, passageways and channels for debris to flow throughout the whole tool such that resistance is minimized and the tool does not get stuck.” Mr. Lehr’s summary is that a POSITA would understand that the Pioneer Application is focused to keep debris out of the tool. He does admit that the patent does include “tool-recovery features such as the cup packer element and allows for prior art methods of debris relief

such as circulation fluid down the annulus to clear debris from around the tool.” He concludes that the Pioneer Application does not disclose the 676 subject matter and instead is a structurally different device that is focused on keeping debris out of the tool.

[1069] After his summary, Mr. Lehr compares Claim 1 to the Pioneer Application and finds that the Pioneer Application mentions a jetting tool in place of a slotted member (used when no perforation is done), and thus there is no debris relief passageway operatively associated with the sliding member as in the 676 Patent. He suggests the Pioneer Application only discloses valve ports which are standard on an equalization valve, which allow debris relief in the annular space. His opinion is that valve ports or equalization valves are not debris relief passageways. The 676 describes additional passageways that provide “active debris relief” and do not have an open/close function as debris relief passageways are always open and can be on the equalization valve, J-slot, MCCL, or elsewhere on the BHA. Thus he finds Claims 1-17 are not disclosed by the Pioneer Application. I am assuming because Claim 1 is independent, in his opinion the dependent claims are also not disclosed.

[1070] He then goes to Claim 18 and, for the same reasons as Claim 1, finds the Pioneer Application does not disclose “a debris relief passageway operatively associated with the sealing device” so it does not disclose the method of Claim 18 “and does not disclose the specific steps of the method claims of the 676 Patent.” He concludes that the Pioneer Application teaches towards a “hermetically sealed device.”

[1071] In specific response to Mr. David’s report, while Mr. Lehr agreed that the Pioneer Application did have a purpose of not having a tool stuck in the hole he disagreed that the

Pioneer Application teaches how to not have the BHA stuck. He says Mr. David ignored the reference in the Pioneer Application to a “debris barrier,” as well as the Pioneer Application not specifying how you would include additional components such as the jetting tool. Mr. Lehr suggests the Pioneer Application does not disclose how the two-piece slip would be debris relief as disclosed in the 676 Patent. He disagrees with Mr. David’s claims chart about there being ports in the equalization valve equating to a debris relief passageway, and finds this misleading given it is not a “new debris relief feature as it is a standard and essential component of any valve.”

[1072] Mr. Lehr did not do a claim-by-claim analysis or produce a claims chart. Mr. David and Mr. Chambers did.

[1073] Mr. Chambers did not directly address the anticipation argument, but did provide a thorough overview of the prior art. Mr. David, as mentioned above, drafted a chart comparing the concerned claims with those in the Pioneer Application, and found that Claims 1, 4, 7-12, 18-24, and 28-31 were disclosed in the Pioneer Application.

[1074] The Supreme Court of Canada has indicated that I should do a claim-by-claim analysis. I will do so for Claims 1, 4, 6-12, and 18-31, as those were the ones claimed to be anticipated.

[1075] Claim 1: I find, given my construction of Claim 1, that Mandrell disclosed all of those essential elements.

[1076] The 745 at [0089] discusses how “a jetting tool (as is commonly known in the art) is used with a liquid and sand to perforate casing.” The provisional is incorporated as a jet tool manufactured by NCS. Later in the provisional there is a list of products and a jetting sub is included, one being a 4-shot and one a 6-shot. The 182 provisional, which is a priority for the 745, has numerous references to jet subs. The method in Mandrell’s Claim 39 includes perforating the cased wellbore above the expansion packer. Claim 42 means to perforate the cased wellbore.

[1077] The next element of Claim 1 indicates that the resettable sealing device is operatively assembled with the jet device on the tubing string. The Mandrell also discloses a resettable sealing device that is operatively assembled with the jet sub. Claim 39 of 182 has an “expansion packer on a work string and then perforating the cased wellbore above the expansion packer. And then after equalizing the pressure moving the expansion packer up to the next zone to perforate it above the expansion packer.” This is a resettable sealing device that is operatively assembled with a jet device on a tubing string. Claim 42 also discloses this in the Pioneer Application at [0023].

[1078] The next element in Claim 1 is the sliding member operatively associated with the sealing device to actuate the resettable sealing device. I agree with Mr. David that this is disclosed in the Pioneer Application 402 as it has a “sliding member that slides relative to the BHA. It has a J-slot that is operatively associated with the sealing device for use in actuation of the resettable sealing device.”

[1079] Finally, Claim 1 of the 676 says it has a debris relief passageway operatively associated with the sliding member and adapted for use in discharge of settled debris on the sliding member. Again, I agree with Mr. David given my construction of debris relief passageway and reading the Mandrell Patent. The ports can be operatively associated with the sliding member to discharge debris from the sliding member. As Mr. David sets out “At 0060, Mandrell describes that the ports create a large flow path that allows the tool to be run in the wellbore faster and causes the tool to have less problems with debris.” Mandrell at [0067] describes that after treatment operations, the sliding member (J-pin) shifts into position causing the ports to be in fluid communication again with equalized pressure. Page [0081] further discusses how to remove collected debris using the mandrel slide and valve ports to communicate with the opening and how the fluid flows. Pages [0082] and [0083] discuss different fluid pathways to displace debris.

[1080] The 182 is more specific and says that “[a] significant advantage is ... that a larger flow path is available than with valves located within the mandrel. This allows the tool to be run in the wellbore faster and causes the tool to have less problems with debris” [0060]. At [0076] when discussing the “run in” position, wherein communication between the valve port and opening “allows fluid communication between the inner bores of mandrel 402.” This certainly discloses that the 676 Patent was not the first to have sand-laden fluid with a flow path inside the BHA, and it had been disclosed that debris relief pathways were disclosed on the interior.

[1081] Mr. Lehr argued that the port through an equalization valve as a debris relief passageway misleads in that a POSITA would “understand that this is not a new debris relief feature as it is a standard and essential component of any valve.” I am not convinced that this means it is not

disclosed in the Mandrell Patent. My construction of debris relief passageway does not indicate it must be novel or new; it must be a pathway for debris to be flushed. I find that the fact Mr. Lehr sees the debris relief feature in an equalization valve as being standard only supports Mr. David's opinion that this was disclosed in the Mandrell. Nor does the Plaintiff's closing argument convince me that the Mandrell did not disclose the 676. The argument that the flow paths are not the same is irrelevant given that 676's Claim 1 only asks that there be a debris relief passageway to operate with the sliding member. There is no specification in Claim 1 beyond that. The Plaintiff's addition that it has to be an active debris relief is not in the claim's language. As discussed above, the "spirit of the invention" is not part of the bargain for the monopoly.

[1082] The Plaintiff's argument regarding the evidence of Mr. Stromquist of the tool usage at Nexen Donalda using the non-straddle version of the Mandrell was that, when the J-slots jammed with sand, Mr. Stromquist took the tool to his shop and used an angle grinder to increase the clearance around the J-slot. When the configuration was changed, holes were drilled in the J-slot and debris relief apertures were added to the clutch ring and the locator. To me this is proof that a POSITA could take the Mandrell and would have the CGK to make adjustments such as described above and it would infringe the 676 tool. Mr. Stromquist was a named inventor on both tools, so it would seem that the disclosure in the Mandrell would be enabled. I need little further analysis on the enablement given the Plaintiff's own witness said he took a Mandrell and used CGK to make a tool that would infringe the 676. While Stromquist did some trial and error, this is permitted at the enablement stage. The POSITA could and did enable the invention of the 676 to be used.

[1083] While the Plaintiff argued that the Mandrell did not teach a person how to configure the BHA as contemplated by the 676 Patent or have debris relief feature in the BHA to “enable active debris relief,” I disagree, as did Mr. David. Assembling a BHA is unique to the particular well and conditions and a POSITA would have that knowledge. Over the course of both the Plaintiff’s and Defendants’ fact and expert witnesses’ evidence it was clear it was part of the CGK of a POSITA to configure the BHA depending on the wellbore and what was necessary for that particular well. In fairness, Claim 1 of the 676 does not say how to configure other than to say when some devices should be operatively assembled or operatively associated. The POSITA would know how to assemble the BHA in the 676 without being told exactly how to configure it. As well, the Mandrell does discuss debris relief and Mr. Stromquist, as a POSITA, did in fact use CGK to adjust the Mandrell by widening passages and putting holes in.

[1084] Claim 4 is dependent on Claim 1 and has the sliding member, a J-slot slidable against a pin that actuates a sealing member when mechanical force is applied. I rely on Mr. David’s chart and agree that the Pioneer Application does disclose a J-profile that slides against a pin that can actuate the sealing member when force is put on the tool string from above. In the 481 there are drawings and mentions on a parts list of a J-slot and J-pins. In the 182 Provisional Application a J-slot is referred to at [0061], [0065] [0067], [0077], and [0082].

[1085] I find that Claim 4 was disclosed. I also find that it was enabled given that a POSITA would know how to assemble a tool string including a J-slot that would actuate a sealing member when force was placed on the tool string.

[1086] As set out in the Defendants' closing submissions, the construction of the equalization valve is that the equalization valve must have constant fluid communication between the wellbore annulus. The Pioneer Application does not disclose such a valve, and so it does not anticipate Claims 8, 9, 10, and 28.

[1087] Claim 11 says that the fluid jet perforation device is assembled above the sealing device. As discussed in Claim 1's analysis, the Mandrell says that the jet fluid perforation device can replace the slotted member. In Figure 2, the slotted sub is above the sealing device. This is consistent with the claims chart in Mr. David's report. Setting aside the semantics, these two claims do appear to disclose essentially the same elements that a POSITA would understand, and would certainly be enabled to replicate with little additional effort. Claim 11 is therefore anticipated by Mandrell.

[1088] Concerning Claim 18, which is an independent method claim, it includes fluids that go up or down (reverse circulation). Mandrell does not disclose that the debris relief passageway is above the sealing device, and after careful review of the construction, neither does Claim 18. My construction of debris relief passageway was an opening (such as a hole or a channel) or other pathway through which solid debris and/or fluid can pass, and provides the ability to flush the tool to clear debris. Mr. David notes that the Pioneer Application does not specifically disclose a step for pumping, circulating, or reverse circulating down the annulus or through a debris relief passageway. I do not accept Mr. David's construction of the passageway specifically being above the sealing device. I have constructed for "debris relief passageway" and specifically for Claims 1 and 18 that a POSITA would know how to arrange the devices on the tubing string depending on their intended use. In his Anticipation chart, Mr. David concedes that if I do not

accept his specific construction, the Pioneer Application would anticipate Claim 18. Based on my construction of the debris relief passageway and both Claims 1 and 18, I would say Claim 18 is anticipated by Mandrell. This notwithstanding, I do not make this determination because it is not alleged in the Joint Statement of Issues that Claim 18 is invalid for anticipation. Kobold did argue Claim 18 and its dependents were invalid for anticipation in their Closing Submissions, but NCS did not address this or frame it as an issue in their submissions and it is not included in the Joint Statement of Issues, so it would be inappropriate to make such a finding.

[1089] I find that Mandrell does plant the flag at the destination of the 676 and that a POSITA with a few trial and errors could perform the invention to use with the Mandrell in hand for Claims 1, 4, and 11.

[1090] For the reasons above, I find the Mandrell anticipates 676's Claims 1, 4, and 11, and they are therefore invalid.

(2) ***Obviousness***

[1091] As mentioned above in Issues, I will assess Claims 1-34 for obviousness. The Defendants' experts state that Claims 1-34 are obvious. I agree given the state of art at the time.

[1092] The next step as directed in *Sanofi* is the inventive concept. Much was made by the Plaintiff that the inventive concept was "active debris relief." The term "active debris relief" is mentioned only once in the disclosure and never in the claims. The jurisprudence tells me that I am to look at the entire patent to determine the inventive concept and not go to the disclosure unless it is necessary. When I read the patent as a whole, the inventive concept would be for

debris relief to be part of this downhole tool assembly for completing a well. The patent refers to debris relief apertures, holes and passageways. With a purposive reading of this patent I do not find “active debris relief” is an inventive concept, given this phrase is only used once in the background of the invention at page 1 line 18. When setting out what the problem is with tools malfunctioning or immobility of the BHA to continue to perform if there is no debris relief in these debris laden environments, no direct or indirect reference of “active debris relief” is made.

[1093] Construction using the “spirit of the invention” has been rejected by the Supreme Court of Canada for reasons including the claims would not perform their public function as well and cause uncertainty:

50 I do not suggest that the two-stage approach necessarily ends at a different destination than the one-stage approach, or that the two-stage approach has resulted in abuse. I think we should now recognize, however, that the greater the level of discretion left to courts to peer below the language of the Claims in a search for “the spirit of the invention,” the less the Claims can perform their public notice function, and the greater the resulting level of unwelcome uncertainty and unpredictability. “Purposive construction” does away with the first step of purely literal interpretation but disciplines the scope of “substantive” claim construction in the interest of fairness to both the patentee and the public. In my view its endorsement by the Federal Court of Appeal in O'Hara was correct.

Free World Trust v Electro Sante Inc, 2000 SCC 66 [Emphasis added]

[1094] Using the “spirit of the invention” does not give the public or other users the ability to know where the “fence” is, it is too wide for interpretation. I therefore reject Mr. Lehr’s reliance on the spirit of the invention. As well, he was not asked to construe Claims 33 and 34, which the Defendants and their experts argue, and I agree, are essential for using claim differentiation to

construe the term and other claims. Of course the inventors' intentions are relevant to determining if an element is essential or not, but not to the construction: *Free World Trust* at para 66.

[1095] But the patent as a whole does not claim any "active debris relief" apart from what was in the CGK and disclosed in the prior art.

[1096] In *Tearlab* at paragraph 78 the inventive concept was downplayed as an analytical tool for obviousness and focused on the claims themselves. Similarly, Justice Locke in *Hospira* held at paragraph 94 that, when ascertaining the inventive concept, "the claimed invention for any given claim in issue is defined by the essential elements thereof, which do not contemplate any particular experiments or results." Though there is controversy in this subject, I will decide as Justice Rennie did in *Astra Zeneca v Apotex*, 2014 FC 638 it is not necessary to go to the disclosure because the Court was able to determine the inventive concept by the claims alone.

[1097] Mr. Lehr's testimony and evidence is influenced by his reliance on the inventive concept being "active debris relief" which, at best, could be seen in hindsight as the "spirit of the invention." For this reason, I will rely more heavily on Mr. David's and Mr. Chambers' reports and charts.

[1098] The Plaintiff said in their closing submissions that all the experts agree that the inventive concept is active debris relief. They say Mr. Lehr referenced "active debris relief" with regard to a "multitude of debris relief features incorporated into the tool." Mr. Lehr said a key feature is that this patent does not have components or elements that seek to keep debris out of the tool and

had opted to allow debris into the tool with “sufficient debris relief passageways and flow paths such that the deleterious effects from the presence of debris were mitigated.” The Plaintiff’s position is this was not what was taught in the prior art; in fact, they claim the prior art taught away from this approach and that this inventive concept is throughout all the claims.

[1099] Mr. Lehr did not determine the inventive concept on a claim-by-claim basis, but the Plaintiff said he was clear that active debris relief was present in all the claims and he felt he did not need to go claim-by-claim. Similarly, the same justification the Plaintiff offered could be made of Mr. Chambers’ and Mr. David’s approach.

[1100] The Defendants do not agree that “all the parties agreed” the inventive concept was “active debris relief.” Nor do they understand the criticism that their experts did not do as *Sanofi* dictated and ask that Mr. David’s construction of inventive concept be adopted by the Court.

[1101] I do prefer and adopt Mr. David’s inventive concept as set out in his report at paragraphs 244-246 as well as his claims charts at pages 88-102:

In my opinion, the POSITA would recognize the inventive concept presented by the 676 Patent is a BHA modified to incorporate debris relief features on a tool with a jet perforation device, a ball check valve, an equalizing valve, a packer, and an MCCL that can be used for multistage perforating and fracking in sand laden environments. The debris relief features being holes or slots in the J-profile, the MCCL, or the clutch ring, and increased clearance between the J-pin and the J-profile.

The suggested inventive concept would also include a valve that incorporates both a forward flow stop valve and an equalization plug with constant fluid communication from the interior of the equalization plug to the wellbore annulus, via a port in the housing, and with the wellbore below the seal when the valve is in the “open” position.

[1102] I will also note that in their opening statement starting on their second slide, NCS also characterizes the 676 and 652 Patents as “Debris Relief Patents.” If the Defendants’ experts suggest debris relief is the inventive concept, and NCS appears to align with this characterization, I am satisfied this is the inventive concept.

[1103] The prior art as related to this analysis are the Tolman, Howell, and Pioneer Application.

[1104] Mr. Chambers also does a claim-by-claim analysis to determine the inventive concept and can only propose there is nothing inventive here. Debris in the environment they are working has been a problem since before 2010 and inventors have been coming up with a variety of solutions to stop the negative impact to tools of debris for “centuries.” Though that may be an overstatement, a number of prior art patents do state exactly that. Mr. Chambers indicates that the patent does not teach any new components on a BHA, all of which were already well known. He concludes that the inventive concept would be the “addition of debris relief features associated with these components,” which he adds is “not new.”

[1105] All of the essential elements of Claim 1 were known components in the prior art related to BHA, as well as being in the CGK. As well, the CGK included reverse circulation, which would meet the element in the essential elements table’s item 1(d) of a debris relief passageway. In the Gazda and Howell prior art there were debris relief passageways. For example, in Gazda’s Figure 5 there are holes in the J-slot. Of course there are differences, but that is not the test to be used. Much is made by the Plaintiff of the differences between the prior art and the 676 Patent, but given the mosaic nature of the exercise and the fact this would have entered into the CGK of

the POSITA, the fact a component in the 676 Patent was known in the prior art to also have holes in them is relevant and part of the exercise to determine if it was obvious.

[1106] Gazda is a good example; in the background of the invention, it discusses other US patents that used a zig-zag slot and a pin with a rotational movement. One object of Gazda is listed as “to provide such a connector device having a porous material in said lateral passage for filtering solids out of well fluids entering the housing there through.” It would seem that keeping solids out of the device was not inventive, passageways were in place for well fluids entering the housing as early as 1988.

[1107] I found that Claims 1, 4, and 11 were anticipated by the Pioneer Application but if I am wrong then I do find those Claims also obvious for the reasons below as well as all the other claims.

[1108] Claim 1: All of the essential components were known by a POSITA, and they were already being used in the field. The fluid jet perforation device, sliding member, resettable sealing device, sliding member with a debris relief passageway. Those devices as deployed on the string are discussed in the anticipation section. In addition, in Tolman the description of Figure 2A indicates on the tool string “the bottom hole device consists of a perforating device, an inflatable, re-settable packer, a re-settable packer, a re-settable axial slip device and ancillary components.” The CGK was that these devices are components that can be assembled on a tool string depending on the well and the general foreman determined what the configuration should be.

[1109] Depending on the operation, not all devices are used at the same time and can be added or removed from the string. This nature of the configurations was discussed in the Pioneer Provisional. In Gazda there were holes in the Auto-J profile for debris relief. In practice and in the CGK, reverse circulation could dislodge or flush debris. It is indicated that “fluid can be circulated through the circulation port 114 to wash-over and clean-out the proppant to free the coiled tubing / BHA and allow movement.” Again, starting at line 62 it says “it could be desirable to perform a circulation/washing operation to ensure any proppant that may be present in the wellbore is circulated out of the wellbore prior to conducting the test. The circulation/washing operation could be performed by opening the circulation port 114 and then pumping of circulation fluid down the coiled tubing 106 to circulate the proppant out of the wellbore.” There is also discussion regarding how a POSITA would deal with proppant-laden fluids.

[1110] The inventive concept and the cumulative effect of the prior art as of the claim date were obvious.

[1111] Claim 2: The Pioneer Application has a locator assembly (612) that is attached to the equalizing sleeve (416). This includes a mechanical casing collar, which is a locator device. The need for a locator assembly was within the CGK and a POSITA would understand how to use it. In the prior art, locators on BHA were known. Specific mention is made in Szarka where it discusses that the positioning tool (locator) #44 is on the tool string.

[1112] Locators are called keys, dogs, or fingers that are outwardly biased and locate the space between the joints. They slide along and then pop in to the space where the joints are. A tally sheet can then be used to determine where in the wellbore the BHA is.

[1113] In the Pioneer Application at page 12 the concept of debris relief is seen in several places. For example: “Being slidable around mandrel 303 allows cup element 308 to spin, allowing it to clear debris more easily than if it were not able to move in that dimension.” Another example being: “A significant advantage of the example valve ports being, outside the mandrel (and, in at least some cases, below the mandrel) is that a larger flow path is available than with the valves located within the mandrel. This allows the tool to be run in the wellbore faster and causes the tool to have less problems with debris.”

[1114] Howell at Figure 6 has a collar locator that tells the operator the position of the BHA.

[1115] Claim 3: The debris passageway is apertures or holes through the locating members to allow debris to pass through the MCCL. By the time of publication, the CGK was that, where debris may settle, you could put holes or passageways in the tool to allow the debris to be flushed. This was confirmed by testimony of fact witnesses. The construction of the patent shows a cavity #63. This type of cavity or passageway was found in Figure 10 of the Szarka Patent.

[1116] Claim 4 has the sliding member as the J-profile slidable against a pin that actuates the sealing member. J-profiles were used for years to actuate a sealing member. For example, in Gazda Figure 3, a J-slot (called a control pin in the Patent) is shown as well as a pin. Gazda at 8 line 65 says “The control slot means 94 is a zig-zag type continuous slot which can be followed

by the control pins as the prong on which the control slot is formed is moved up and down relative to the pins.” Figure 4B of the Pioneer Application shows a J-slot and, at [0019], “In at least one such example, the means for setting the compressible expansion packer comprises at least one J-slot on the expansion packer mandrel interacting with at least one J-pin on a slip ring disposed about the expansion packer mandrel.” Pioneer 182’s Figure 4B illustrates how the J-slot and pins are used to actuate the sealing member, which is a packer in this case.

[1117] Claim 5 adds that there be debris relief passageways of one or more debris ports in the J-profile to permit discharge of debris from J-profile. I note that, though the claim says this, 676’s Figure 6B does not show holes in the J-slot but shows the stationary pin’s position.

[1118] There was much evidence regarding when the holes were actually put into a J-slot. But first a brief discussion regarding the name of Mongoose in order to understand the evidence. Mongoose was used as a commercial name for a tool by Pioneer which could perforate and fracture in a single trip. Mr. Nipper’s evidence was that Stromquist (then with NCS) took tools (devices) already in the industry and modified them. The Mongoose was used at the Nexen well and Stromquist needed to fix it, as there were issues with the sand clogging the tool. The exact modification is not known but it is in the evidence that, if the Mongoose at the Nexen site had holes in the J-slot, it would not have worked as it would have destroyed the pressure integrity and not been able to frac but could have been used for other things. The evidence of Mr. Stromquist is that the new equalization valve above the packer was done after the Nexen job and that he did those modifications in Texas. I will deal with the equalization valve development in relation to subsequent claims. Mr. Stromquist does not remember when holes were first drilled in

the J-slot or if there was any impact on the performance of the tool given he does not remember any testing, nor does Mr. Nipper.

[1119] It was CGK and acknowledged in the testimony that having greater room to ground out for the pin to move, and thus having more room for debris to be dislodged, was commonplace. This relates to Claims 5 and 6. This was confirmed by the evidence of both Mr. Baudistel and Mr. Angman, what they called “sloppy clearances” was a design concept that allowed for debris to be dislodged. In Gazda the patent said using loose fits would assist in debris relief.

[1120] It was obvious that Claims 3-6 were CGK and that a POSITA would have, with little or no testing and little effort, bridged the gap with the prior art. As was the evidence of Mr. Nipper and Mr. Stromquist, little effort was needed to modify existing tools and little to no testing was done of the 676 Patent.

[1121] Claim 7 has the addition to Claim 4 of a clutch ring with a debris relief passageway to permit debris relief around the pin in the J-slot. A clutch ring was CGK and used in the Pioneer Application, though referred to as a slip ring. Please see Pioneer Application’s Figure 4J and 676 Patent’s Figure 6C below for comparison:

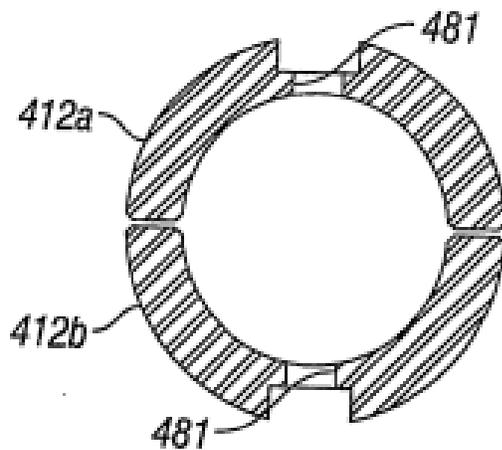


FIG. 4J

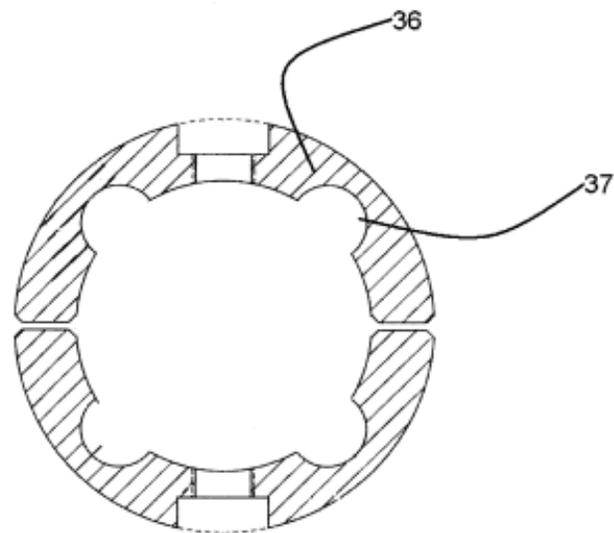


Figure 6c

[1122] You will note that the Pioneer Application's ring does not have the debris relief openings but that gap could be bridged given the CGK and modifications done in the field. It seems obvious to try this type of modification given industry development in BHA for horizontal tools and the refinements being done in the field or shop for each specific job and tool string application. In the Pioneer Application at [0065] it discusses methods of reducing "wear and other problems caused by debris interfering between J-pin 413 and slip ring 412." Both figures have two-piece clutch rings.

[1123] Both Gazda and Howell have a clutch ring holding the pin to the J-slot but do not have the four semi-circles cut in. As stated above, it seems the normal progression was to have more flowpaths to dislodge debris and it would not have been a large gap to add semi-circles. This cannot be seen as inventive as it would have taken little if any testing and would have been a development to an existing clutch ring, possibly even performed in the field or shop with little

effort. There was no evidence regarding increased performance with the semi-circles, or if there was any testing.

[1124] In the detailed description of the 676 it acknowledges that examples given may have “[a]lterations, modifications and variations may be effected by those of skill in the art without departing from the scope of the inventions which is defined solely by the claim appended hereto.” This acknowledgment confirms that modifications were expected and it was logical that debris relief semi-circles could be added to the clutch ring. The motivation was seen throughout the prior art to increase the dislodgment or create a flowpath for the debris so the tools would not become stuck.

[1125] Claim 8 indicates that the sliding member is an equalization valve that can open or close a debris flowpath in the sealing device. Claim 9 has the equalization valve plug depending on the tubing string and slidably disposed in an equalization valve housing continuous with the sealing device. Claim 10 is the same as Claim 9 but has the equalization plug actuated by mechanical force to the tubing string to set or unset the sealing device.

[1126] An equalization valve is essential to have a sealing device that functions, you need to be able to differentiate pressure across a packer. Equalization valves were in the prior art with constant fluid communication between the wellbore and the annulus. In Patel, it is called an isolation valve and valve operator. A Haliburton-owned patent called Maier claims an equalizing valve and method of use. Marty Stromquist is a named inventor. “The packer has an equalizing valve which allows differential pressure across the packer element to be equalized after the packer has been set so that the packer can easily unset and move within the wellbore even in high

solids environments.” The equalization valves in the prior art could be used to set and unset the sealing devices when mechanical force was applied to the tubing string. There would have been little if any bridge to even close the gap for Claims 8-10 with little if any experimentation to do so.

[1127] Claim 11 is where the jet perforation device is assembled above the sealing device. This is where, as seen in the construction section, claims differentiation should be considered and applied. This is the first time it is said the device must be above the sealing device. If the equalization valve is below the sealing device then the jet perforation device would have difficulties functioning. One problem is that when the valve is below the packer, to preserve the pressure integrity, you would not be able to have debris relief holes in the J-slot. As well, you could not open the valve when the packer was below and pressurized. Inutility arguments notwithstanding, it stands to reason that assembling the jet perf device above the sealing device must be obvious from the prior art, CGK, POSITA, and common sense.

[1128] Another issue of differentiation is with respect to the type of equalization valve claimed in Claims 8-17. In the disclosure, the valve is described as a multi-function valve with a forward flow-stop valve with continuous internal fluid flowpath with sealed or flow position. The forward flow-stop valve is only described in Claims 33 and 34, which were not asserted by NCS or constructed by their expert. Claim 33, which claims a forward flow-stop valve depends on Claims 18-32 making those claims broader without a forward flow-stop valve.

[1129] Mr. Lehr does say that a forward flow-stop valve is necessary to make the fluid jet perforation device operable. If you do not have debris relief passageways below a jet sub you do

not need a forward flow-stop valve or, if like in Pioneer their equalization valve is closed, then the pressure forces the fluid out of the nozzles. However, in the 676 the debris relief passageways would need to have a forward flow-stop valve, which is not introduced until Claims 33 and 34. I find the forward flow-stop valve to be essential and is not found in the Claims until 33 and 34, which are not asserted.

[1130] Even if I am incorrect and Claims 8-10 do use the forward flow-stop valve I find it was obvious. In the evidence of Mr. Stromquist, it was not used at the Nexen job (near Donald, Alberta) and the old valve was used in horizontal jobs before. That was modified after Nexen in Texas but he cannot recall exactly when or who came up with the idea. The drawings of the “new valve” were done by a Mr. Trahan who was an NCS employee after being given the legacy valve drawings of the Mongoose valve. When asked, Mr. Nipper was very certain that Mr. Trahan did not contribute to the invention of the valve. Neither Mr. Nipper nor Mr. Stromquist remember any testing of the new valve above the packer nor were any field testing records located. Mr. Nipper does not know what Mr. Stromquist did for modifications in the field.

[1131] All of the elements constructed in Claims 8-10 were in the prior art and could be built by a POSITA. There is a question of whether they would work as set out in the claims, but this is an inutility issue. The evidence shows it was memorable that the Plaintiff used the legacy valve in their horizontal jobs, but when the new valve was developed it was not memorable and did not necessitate any field testing as no records exist. If any modifications were needed they were done in the field, again being such a small bridge to gap that it is not recorded or memorable. Therefore, it must have been self-evident with little effort to come to the new valve with the

POSITA's skill and the CGK. This includes Claim 11, where it is needed to put the jet perf device above the sealing device if there were going to be debris relief holes.

[1132] Claims 12-17 have the same issue, all their elements were in prior art and have been discussed above as being obvious.

[1133] Claim 18 is the independent method claim. The dependent Claims 19-32 all are embodiments of how to perforate and treat a formation. The Pioneer Application does disclose the embodiments of this method as the method for fracking and treating multiple sites at intervals with reverse circulating to clear debris as well as other debris relief features using various devices on a tool. Since the embodiments of this method are disclosed in the Pioneer Application, Claims 19-32 must also be obvious. As well, reverse circulation was CGK and a POSITA would know how to do so depending on what tools were on the tool string in which configuration. Circulating through a port was already being used. Thus, this method of treating a formation is not inventive and indeed was obvious.

[1134] Claim 23 is also disclosed by Tolman, adding a commonly known circulation or flushing step to the method.

[1135] In Claim 24, methods are claimed for monitoring and measuring different pressures and rates. This was done in virtually all fracking jobs and were not inventive processes of the methods described in previous claims.

[1136] Some of the methods described were used in everyday operations and would be obvious to a POSITA (for example Claim 24 or Claim 28) as demonstrated in Howell and the discussion in Claims 33 and 34. The specific multi-function valve claimed in Claims 33 and 34 could be made with CGK by a POSITA from components already being used in the industry. To bridge the gap between the valve described in Claims 33 and 34, and to reach the functionality in Claims 33 and 34, several valve components already used in the prior art and some testing to ensure it would function with constant fluid communication above the packer would be required. Howell and Tolman use valves above the packer and these could be modified by a POSITA with the CGK to become the multi-function valve. Mr. David describes how this could be done at page 113 of his Report. I accept Mr. David's description; a POSITA with the CGK could modify existing valves into the claimed valve. It would mean taking a variety of valves used in the prior art and using jetting assemblies to achieve the functionality needed in the BHA.

[1137] In conclusion, all the claims of the 676 Patent are obvious.

(3) *Ambiguity*

[1138] Finally, I note that although Kobold did not raise ambiguity as an independent ground of invalidity, it is raised by both of Kobold's experts in relation to Claim 16, where Claim 16 depends from Claim 2. When Claim 16 depends from Claim 2, it adds an additional MCCL. As noted above, it is entirely unclear how two MCCLs, as defined in the 676 Patent, would operate in concert. Therefore, when Claim 16 depends on Claim 2, it is ambiguous and the Court is unable to give meaning to the claim.

(4) *Other Issues with the 676 Patent*

[1139] In *MediaTube*, Justice Locke decided it was not necessary to “consider or reach any conclusions on overbreadth or insufficiency” which were made in the alternative if he accepted the Plaintiffs’ claim construction because he had not accepted the Plaintiffs’ construction.

[1140] While Kobold’s submissions with respect to inutility and overbreadth were not made in the alternative, I have largely agreed with their construction of the 676 Patent Claims. They and their experts (improperly) raised several inutility, overbreadth, and insufficiency points in their claims construction. The Claims have been constructed, warts and all, and have failed to survive to this stage in my analysis. I have found the 676 Patent’s entire set of Claims invalid variously for anticipation and obviousness. Like Justice Locke, and in the long-forementioned interest of keeping this decision as focused as possible, I too find it unnecessary to consider or reach any conclusions on inutility, overbreadth, or insufficiency.

B. *NCS’s 652 Patent*

[1141] The 652 Patent is named, disclosed, and is constructed the same as the 676 Patent and is a divisional patent of the 636 Patent. I find the 652 is a voluntary divisional patent, the distinction and consequences of which will be discussed at length below.

(1) *Anticipation*

(a) *Disclosure*

[1142] Please see the Summary of Prior Art at paragraphs 250-257 above. The claim date from which to assess anticipation is February 18, 2010.

[1143] Mr. David concludes that the Howell prior art discloses and enables all the elements of Claims 1, 4, 6, 8-10, 13, and 24. He also concludes that the Gazda prior art discloses and enables all the elements of Claims 4, 6, 8, and 24.

[1144] Mr. Chambers indicates that, in his opinion, Claims 1, 4, 6, 8-10, 13, and 24 are anticipated by the Howell Patent. He also suggests Claim 24 is anticipated by the Gazda Patent.

[1145] Mr. Lehr's analysis was that neither Gazda nor Howell have "active debris relief" so there is no anticipation. He relies on his anticipation comments and refers to his opinion in the 676 Patent. He believes the Howell Patent's focus is on electronic communication with a downhole tool and on avoiding debris by having the jet perforation gun below the sealing element, thereby disallowing debris to enter or exit the tool. Between Howell and Gazda, Mr. Lehr believes none of the claims are anticipated.

[1146] His report says all the independent claims have debris relief that a POSITA would understand as "active debris relief." Claim 18 has a clutch ring with one or more passageways to conduct debris. Claim 19 is a method to activate a tool where the tool is a J-slot assembly with at least one debris relief feature. Claim 24 has an actuation device with a J-profile with debris ports

when the pin slides in the J-profile. In contrast to these claims, Mr. Lehr says that Howell and Gazda do not “disclose[s] a J-slot having the ‘active debris relief’ contemplated by the 652 Patent. In fact, these references would have taught the skilled person away from this solution.”

[1147] He then suggests Howell does not address any ports, apertures, or gags in the lug ring or carrier body, and even if they were in the J-slot (inconsistencies in Figure 5 and description) there is no real fluid communication from the wellbore to the annulus, or vice versa, as Howell does not show ports below the sealing element so there is no “active debris relief.” The debris was to exit the ports at the end of the tool and the ports do not allow debris from the annulus to flow into the tool string.

[1148] According to Mr. Lehr, Gazda also does not disclose the debris relief features in the 652 Patent. Gazda only has porous material that does not allow sand to enter the device. He disagrees that the lateral passages and communications ports in Gazda are debris relief passageways. The porous filter in Gazda, he says, would have to come to the surface to be cleaned which is not what the 652 Patent does given it permits multiple functions in a single trip.

[1149] In summary, his opinion is that neither Howell nor Gazda disclose “active debris relief” taught by the 652 Patent, and even though some debris may be moved in the J-slot it cannot exit the tool as taught in the 652 Patent.

[1150] He concludes that neither of the prior arts enable a POSITA to practice the 652 Patent because they do not teach debris relief passageways about the J-slot that allow “active debris

relief.” Mr. Lehr says there are no debris passageways in the clutch rings or MCCLs, nor is there a method as claimed in the 652 Patent.

[1151] Like the 676 Patent validity analysis, Mr. Lehr’s “spirit of the invention” and focus on what he sees as the magic phrase of “active debris relief” influences his validity analysis. As discussed in the 676 Patent’s validity analysis, the claims do not say “active debris relief” so this cannot be the inventive concept. It is merely “debris relief” with “debateable improvements or changes to” the prior art.

[1152] I accept the reasoning of Mr. David and Mr. Chambers, and where they conflict I will make a finding.

[1153] Claim 1: The essential elements are an inner and outer mandrel, a sealing member, an anchor member, a J-slot on the inner mandrel with passageways, and a pin on the outer mandrel to engage with the J-slot.

[1154] Howell has an inner and outer mandrel in Figure 3A. The sealing member surrounds the main body in Howell (#54). The anchor member (#64) surrounds some of the mandrel (#24) below the sealing member. Another essential element present in Howell is a J-slot (#78). The passageways are shown in the drawings as a slot in the mandrel that communicates between the outside and the bore. These passageways were not specifically in the claim but are shown in the figure and were known in the prior art and CGK. The POSITA would know how to machine holes in a J-slot for communication between the exterior and interior of the mandrel. Pin #74 is disclosed to engage the J-slot.

[1155] Claims 2 and 3 are not disclosed.

[1156] Claim 4: The essential elements in this independent claim are a tubular element with a J-slot that is mateable with a second tubular, one or more passageways in the J-slot to conduct debris out of the J-slot, a second tubular mateable with the first tubular, and the second tubular has a pin that slides within the J-slot.

[1157] These essential elements are all disclosed in Howell, as well as in Gazda, which has an apparatus with a tubular element including a J-slot which is mateable with a second tubular. Gazda's J-profile has passageways in Figure 1A through which debris can be conducted out of the J-slot.

[1158] Claim 5 does not exist.

[1159] Claim 6: This Claim adds that the moving pin assists in removing debris from the J-slot. Mr. Chambers suggests this is not structural and instead describes a logical function of the passageways. He supports this with the drawings in Howell, which show holes in the J-slot which a POSITA would understand debris could be communicated through. Mr. David indicates that Gazda teaches debris can be conducted out of the J-slot passageways. I agree with both.

[1160] Claim 7: This is not disclosed in Gazda nor Howell. The addition of a 1/16th of an inch clearance is enough to escape an anticipation claim.

[1161] Claim 8: This is dependent on Claim 4 with the addition of tubular elements capable of axial movement relative to each other when the downhole string is pushed or pulled. Both Defendant experts agree that Howell disclosed a carrier body (#68) and main body that are axially movable relative to each other and moveable by pulling or pushing on the tool string. These are elements in the Howell Patent that a POSITA would be able to practice given that tubulars are pushed and pulled and the mandrels are telescoping in response. Howell discloses that the “carrier body 68 is configured to slide axially on the main body 24.” Gazda also discloses that the J-slot moves upward and downward in relation to the pin when the tool string is pushed or pulled. This Claim is disclosed.

[1162] Claim 9: This is dependent on Claim 4 and adds a sealing member to seal the downhole string against the wellbore when the pin is in one position. This is disclosed in Howell when it discloses that the actuation of the packer seal (#54) seals against the wellbore when the lug (pin) (#76) is in the J-slot (#78). The engaged position is J-slot #80. This Claim is disclosed by Howell.

[1163] Claim 10: This Claim is dependent on Claim 4 and adds a locator. Howell discloses a locator (16B) that can locate the tool string within the wellbore and determine its location. The issue of a locator has already been discussed at length, and so I find that Claim 10 is disclosed by Howell.

[1164] Claims 11 and 12 are not disclosed nor anticipated.

[1165] Claim 13: This Claim is dependent on Claim 4 and adds a perforating device to the tool string. Howell discloses a perforating gun on the tool string. Howell discloses as well that a POSITA would know how to use a perforation gun. I find that Claim 13 was disclosed by Howell.

[1166] With respect to Claims 14, 15, and 16, all elements are disclosed except the clearance of 1/16th of an inch. These claims are not disclosed by Howell or Gazda for the same reason I found Claim 7 was not disclosed.

[1167] Claim 17 is not alleged to be, nor is it, anticipated.

[1168] Claim 18: Howell does not disclose passageways in the clutch ring but does disclose the other elements. This Claim is not disclosed.

[1169] Claim 19: This method claim has all the elements disclosed by Howell. Howell does not have to set out the step of reverse circulation; it was available, it was simply not called reverse circulation. Howell provides for communicating fluids down the annulus between the tool string and wellbore. Mr. Lehr and Mr. David agreed that reverse circulation was CGK and could be used in Howell.

[1170] Claim 20: Howell does have more than one downhole function that can be performed which is the same as Claim 20, which relies on Claim 19. This Claim was disclosed by Howell.

[1171] Claim 21: This Claim was not disclosed.

[1172] Claim 22: The second step of fracturing when the BHA is set by a seal against the wellbore is disclosed in Howell. This Claim was disclosed by Howell.

[1173] Claim 23: This Claim is not disclosed.

[1174] Claim 24: Howell discloses the elements of this independent claim identically to its disclosure of Claim 1. Gazda also discloses this in the same way as Claim 4. This Claim is disclosed.

[1175] Claims 25 and 26: These claims were not disclosed.

(b) *Enablement*

[1176] By reading Howell, you could make the tools and use the methods of the 652 Patent. A POSITA would be able to make the tool using the figures in Howell. In Gazda, there is enough detail to make and use the apparatus with debris relief passageways in the J-profile.

[1177] In summary, I find Claims 1, 4, 6, 8-10, 13, 19, 20, 22, and 24 are anticipated by Howell, and Claims 4, 6, 8, and 24 are also anticipated by Gazda.

(2) *Obviousness*

[1178] The experts agreed who the POSITA was and what the CGK was. There is little if any difference between the POSITA and CGK of the 676 Patent.

[1179] The claim date and the filing date are the same here, as the 652 Patent does not claim priority from any other patent. Accordingly, the claim date is February 18, 2010.

(a) *Inventive Concept*

[1180] In Mr. Lehr's opinion the inventive concept is "a BHA comprising a J-profile bearing passageways allowing for the clearance of solid particles from the J-slot. This provides 'active debris relief' around the J-profile and J-slot."

[1181] In the 676 Patent's validity analysis, I discussed the problem with Mr. Lehr's reliance on "active debris relief" as a phrase. As before, I prefer Mr. David's opinion of what the inventive concept is for the same reasons I did for the 676 Patent. I note that the 652 Patent Claims do not mention active debris relief, and what little sense Mr. Lehr's opinion made in the 676 Patent's discussion makes even less sense here.

[1182] Mr. David indicated that the 652 Patent's inventive concept would be the inclusion on a BHA of debris relief features including on the J-slot passageways, greater clearance for the pin to move, as well as passageways on both the clutch ring and MCCL, which all provide debris relief. He notes that all components of the 652 Patent are known in the prior art (prior to February 2010) and within the CGK. Likewise, remarking individually on each claim, Mr. Chambers gives some variation of "the only possible inventive concept ... relates to the one or more passageways ... for debris relief purposes."

(b) *Difference between “State of the Art” and the Inventive Concept*

[1183] The parties agreed that the prior art is the same as what was put forth in the 676 Patent. The Plaintiff argued that “the state of the art all taught away from the solution of ‘active debris relief’ as taught by the 676 and 652 Patents.” As in the 676 Patent arguments, the Plaintiff said the “State of the Art” taught J-profiles, pins, and J-slots. However, Gazda used a porous membrane as a filter, and other prior art taught debris exclusion features.

[1184] The Plaintiff presented the differences noted in the 676 Patent analysis, and some additional differences in the 652 Patent. They say one difference was that the prior art did not teach “active debris relief” around the J-profile, and I feel we have already beaten that dead horse enough.

[1185] NCS suggests the clutch ring with passageways was not taught by the prior art. They say the prior art did not teach the configuration in the 652 Patent “in combination with the debris relief features as disclosed and claimed by the 652 Patent.”

[1186] In summary, the Plaintiff directly and indirectly acknowledged that the prior art did teach a number of methods to deal with debris issues, but none had passageways and apertures in the J-profile to allow the debris to flow into and through the device. No passageways are found in clutch rings (Claim 12) or in the mechanical collar locator (Claim 12) in the prior art where the passageways send the debris down the tool string. NCS believes that even if a POSITA inserted additional apertures or holes in a J-profile, it is not simple and could make the tool inoperable. I mention that one factor of the “obvious to try” analysis does not mean the invention has to work.

[1187] Mr. David set out his differences, which the Plaintiff does not dispute. He sets out the differences as:

- A. Howell describes the lug that slides within the J-profile as part of a lug ring which rotates independently from the carrier body. Howell does not disclose the idea of including passageways in the lug ring as claimed in Claims 2, 12, 17, 18, and 26;
- B. With respect to Claims 3, 7, 14, 23, and 25, Howell does not describe including a clearance of 1/16th of an inch between the pin and the slot;
- C. With respect to Claim 12, Howell does not describe including debris relief passageways in an MCCL;
- D. With respect to Claim 19 and Claims dependent on it, a reverse circulation step; and,
- E. With respect to Claim 21, Howell describes using a perforation gun to perforate the casing and not an abrasive jet perforator.

(c) *Do the Differences Constitute Steps that would have been Obvious to the POSITA?*

[1188] Again, this must be assessed on a claim-by-claim basis. The elements as determined in the anticipation section also make those same claims obvious. For the reasons set out in the Anticipation analysis above, Claims 1, 4, 6, 8-10, 13, and 24 are already invalid for anticipation, but even so, the same reasons would invalidate those claims for obviousness.

[1189] Claim 1: see Anticipation.

[1190] Claim 2: The difference is that in Howell, there are not axial holes in the clutch ring (called lug ring in Howell) through which debris flows when the mandrel slides relative to the

ring. It is self-evident that a POSITA would drill holes in the lug (clutch) ring if debris was settling on it. This is a predictable solution that would not take much effort, as it could be machined in the field. The Gazda prior art was already putting holes in the J-slot for the same reason, so it would seem the natural course to do so on the clutch ring. It is predictable and would take little effort. It would seem that the history of the art was to try and have the debris flushed so the tool would not get stuck.

[1191] Claim 3: Though the prior art of Howell and Gazda did not have specifics regarding the clearance being $1/16^{\text{th}}$ of an inch between the pin and J-slot, as surveyed in the 676 Patent's discussion it was in the CGK to machine out a greater clearance so the pin could move freely and free debris. A clearance of more than $1/16^{\text{th}}$ of an inch had been disclosed in detailed drawings in the Pioneer Provisional's prior art. Loose fits in J-slots would be obvious to try. Again, it would take little effort to have the slots widened and no inventive spark to do so. Enlarging the clearance would be an obvious progression that would be motivated by efficiency and cost-savings from not having to remove the tool.

[1192] Claim 4: see Anticipation.

[1193] Claim 5 does not exist.

[1194] Claim 6: see Anticipation.

[1195] Claim 7: see Claim 3.

[1196] Claims 8, 9, and 10: see Anticipation.

[1197] Claim 11: A mechanical collar locator having passageways for debris is similar to the clutch ring analysis in that it would not be a big gap to bridge and would be self-evident to put passageways in the locator if debris settled on it, in that it could help in its removal if there was a passageway. In addition, MCCLs were off the shelf items that could be modified to fit the function and tool string operation needed. Similar holes were added in Gazda, so to add holes to the MCCL here which allow passage of debris and avoid pile up is not inventive. Even aside from Claim 2, not only is this not inventive, it is entirely obvious.

[1198] Claim 12: see Claim 2.

[1199] Claim 13: see Anticipation.

[1200] Claim 14: see Claim 3.

[1201] Claim 15: see Anticipation, Claims 4 and 8.

[1202] Claim 16: see Anticipation, Claim 9.

[1203] Claims 17 and 18: see Claim 2.

[1204] Claim 19: The method claimed in Claim 19 appears to be intended to provide at least one debris relief feature. Regardless of whether it accomplishes that goal, there is nothing new nor inventive about this. A POSITA would be aware of how to design a tool to function in a wellbore

environment filled with solids, and the method bares remarkable similarity to the method disclosed in Howell. This similarity becomes striking in comparing the J-profiles between the 652 Patent and Howell: they are identical. The basic method is the same, the design is the same, and both methods are activated by the up-and-down movement of the tubing string. Howell may not expressly teach that the J-pin sliding would remove debris, but that is the natural consequence of the sliding movement. Howell also includes the structure for reverse circulation, even though reverse circulation is not expressly stated. As already discussed, reverse circulation was a known process for debris removal, and the method described in Claim 19 must therefore be obvious.

[1205] Claim 20: see Anticipation. Reverse circulation was in the CGK to displace debris. A POSITA would know how to work this and the steps that must be taken.

[1206] Claim 21: abrasive jet perforators were known to POSITA and CGK. These too, like MCCLs, were off-the-shelf items that would have been known and used according to the particular function and well. How to assemble a tool string with a jet perforator would not have been inventive and would have been known to a POSITA; this was disclosed in the Pioneer Provisional.

[1207] Claim 22: see Anticipation.

[1208] Claim 23: see Claim 3.

[1209] Claim 24: see Anticipation.

[1210] Claim 25: see Claim 3.

[1211] Claim 26: see Claims 1 and 4, Anticipation, and Claims 2 and 17.

[1212] The mosaic of the prior art, as well as the industry knowledge at the time, would make these claims obvious given it was self-evident to try NCS's predictable solutions. It would have taken little effort to come to the "invention" of the 652 Patent, especially given the motive of the industry to keep refining the BHA to have debris relief so that the tools did not become stuck, thus costing time and money.

[1213] The Plaintiff argued that, if it was obvious then why would Haliburton (who owned most of the prior art) not have done it? The Plaintiff further asked why Exxon Mobil, BJ Services, Packers Plus or Baker Hughes did not reach the invention if it was obvious. Finally, the Plaintiff asked why Mr. Chambers or Mr. Lehr, who were experts at the time, did not reach the invention if it was obvious. These are not questions that I had evidence on, but given the prior art and CGK, I think it was a small gap to bridge. Many of the same people are listed at various times on various patents with various employees.

[1214] I find all 26 claims of the 652 Patent are invalid as obvious.

(3) ***Double Patenting***

[1215] The Defendants argue that the 652 Patent is not a forced divisional but is a voluntary division. NCS argues that the Defendants have not plead invalidity of the 652 Patent based on double patenting and, therefore, these portions of Mr. David's report should be struck.

Regardless, all the divisional applications originating from the 676 Patent were forced divisional applications and are therefore immune to double patenting attacks.

[1216] I must determine if any of Claims 1-18 and 24-26 of the 652 Patent are invalid for double patenting based on Claim 17 (as it depends from Claims 1, 4-6, and 11-16) of the 676 Patent.

(a) *Kobold Cannot Raise the Double Patent Arguments*

[1217] To address this issue, it is helpful to review the litigation history of this matter.

[1218] In the original pleadings, Kobold alleged the 636 Patent was invalid because it claimed the same invention as the 676 Patent. The Defendants filed the Fresh as Amended Statement of Defence and Counterclaim on November 30, 2021. Sometime between November 29, 2021 and the filing of the Joint Statement of Issues on December 21, 2021, the parties resolved the issues related to the 636 Patent. Therefore, the 636 Patent is no longer at issue in this matter.

[1219] In their Closing Submissions, the Defendants separately assert double patenting against Claims 1-18 and Claims 24-26 of the 652 Patent based on Claim 17 of the 676 Patent. These allegations were not included in the Fresh as Amended Statement of Defence and Counterclaim.

[1220] In its closing, NCS asked for the portions of Mr. David's report pertaining to whether the 652 Patent is patentably distinct over the claims of the 676 Patent be struck.

[1221] Neither party provided submissions on whether this Court could consider the double patenting issue because it was present in the Joint Statement of Issues and closing submissions,

but not in the pleadings. This likely arose due to the strict time confinements the parties faced in trying to argue 128 issues simultaneously.

[1222] A Statement of Defence sets out a Defendant's case and defines the scope of actions, including document production and oral examinations for discovery: see for example *AbbVie Corporation v Janssen Inc*, 2019 FC 1148 at para 3. The Federal Court of Appeal explained the role of the Notice of Appeal in *Pfizer Canada Inc v Teva Canada Limited*, 2016 FCA 218.

Although the Federal Court of Appeal's commentary pertains to a Notice of Appeal, a Statement of Defence serves a similar purpose but in the context of a Defendant's pleadings. There, the Federal Court of Appeal explained:

[22] The notice of appeal defines the scope of the appeal, sets the parameters of the debate, and triggers the Court's jurisdiction to act. Without a formal, explicit request for specific relief in the notice of appeal, the request is not before the Court. It was open to Pfizer to seek leave to amend the notice of appeal to include that sort of request right up until the time of judgment and offer fresh evidence as to the payments made in accordance with the Federal Court's judgment. Pfizer did not do so. Now that judgment has been rendered, it is not possible to retroactively expand the scope of the appeal and then vary the judgment.

[Emphasis added]

Pfizer Canada Inc v Teva Canada Limited, 2016 FCA 218 at para 22

[1223] Similarly, a Statement of Defence defines the scope of the defence and sets the parameters of the debate. Without a formal request for specific relief in its Statement of Defence, Kobold's request is not properly before this Court. It was entirely open to Kobold to amend its pleadings but it did not do so.

[1224] Pleadings essentially identify, for both the Court and the opposing party, the position that a party is advancing: *Johnson & Johnson Inc v Boston Scientific Ltd (FC)*, 2004 FC 1672 at para 54 [*Johnson & Johnson*]. Pleadings allow the opposing party to know the case they are required to meet at trial, thereby preventing either party from being taken by surprise: *Johnson & Johnson* at para 54.

[1225] In essence, a Statement of Issues acts as a funnel for narrowing the issues between the parties. The pleadings lay the groundwork for every possible issue that parties can raise.

[1226] Therefore, I find that Kobold cannot raise double patenting invalidity of the 652 Patent. However, given the issue is contained in the Joint Statement of Issues, I decline to exercise my discretion to strike the applicable portions of Mr. David's affidavit.

[1227] If I am wrong on any of these conclusions, I will address the double patenting arguments as they relate to the 652 Patent in the alternative.

(b) *Are the 636 and 652 Patents Voluntary or Forced Divisionals*

[1228] Before turning to the obvious-type double patenting arguments, it is necessary to resolve whether the 652 Patent is a voluntary or forced divisional patent. This conclusion rests on whether a Patent Office objection made under section 36(2) of the *Patent Act* is sufficient to amount to a forced division.

[1229] In my view, it is also necessary to address whether the 636 Patent, the divisional of the 676 Patent, was a voluntary or forced division. This is because it would be unfair for Kobold to

argue invalidity of the 652 Patent without also addressing the division of the 636 Patent. The 676 Patent is the parent patent of both.

[1230] NCS asserts that both the 636 Patent and the 652 Patent are forced divisions resulting from plurality of invention objections from the Patent Office pursuant to section 36(1) of the *Patent Act*.

[1231] Kobold does not appear to directly address whether the 636 Patent is a forced or voluntary divisional. However, Kobold's reasoning regarding the 652 Patent applies the same to the 636 Patent. The logical inherent in Kobold's position is that the 636 and 652 Patents are both voluntary divisions.

[1232] Therefore, I address whether both the 636 Patent and the 652 Patent are voluntary or forced divisional patents, as opposed to whether the 652 *alone* is a voluntary or forced divisional.

[1233] NCS divided the 636 Patent, forming the 652 Patent, following a multiplicity of invention objections from the Patent Office under section 36(2) of the *Patent Act* on June 29, 2012. On July 11, 2013, NCS filed a "voluntary amendment," which replaced the 636 Patent Claims with the Claims 1 through 27 (which later became the 652 Patent Claims 1-26) as follows:

RE: New Canadian Patent Application, a division of Canadian Application 2,749,636
Title: DOWNHOLE TOOL ASSEMBLY WITH DEBRIS RELIEF, AND METHOD FOR
USIG SAME
Our file number: 67192-89

VOLUNTARY AMENDMENT

Applicant makes the following voluntary amendments. Entry of the amendments is requested.

IN THE CLAIMS

Please also cancel the claims currently of record and replace them with new claims 1 through 27 submitted herewith as replacement pages 20 through 23.

REMARKS

Applicant has replaced the claims. Accordingly, 27 claims are now pending.

[1234] NCS divided the 676 Patent, forming the 636 Patent. NCS asserts “all the divisional applications of [*sic*] originating from the 676 Patent were forced divisional applications.” NCS relies on the 676 File History to demonstrate the division was made as a result of the Patent Office’s objections. Specifically, NCS relies on two Examiner Requisitions dated October 19, 2010 and June 16, 2011.

[1235] A review of the file history leaves it unclear whether NCS divided the 676 Patent due to these objections from the Patent Office. I acknowledge that there are two Examiner Requisitions on October 19, 2010 and June 16, 2011. However, there is no indication as there was above, in the case of the 652 Patent that NCS created a new patent application based on these objections or even in response to these objections.

[1236] Therefore, there is nothing in the record to indicate the 636 Patent is a forced divisional. Accordingly, I conclude that the 636 Patent is a voluntary divisional. I turn next to whether the 652 Patent division is voluntary or forced.

[1237] In its closing submissions, the Plaintiff argued that it would be “completely unfair” to the patentee to only benefit from forced divisional status in the event a final action is received. The Plaintiff says that *Biogen FC*’s approach forces the patentee to argue with the examiner as to why a unity of invention objection should be retracted, which could jeopardize the patentee’s ability to address other substantive objections and ultimately secure patent rights.

[1238] I do not accept the Plaintiff’s assertion in these circumstances for several reasons.

[1239] First, following the approach in *Abbott FC*, this assertion potentially opens a door to misuse the patent prosecution process. Every inventor could file as many patents as they desire in a single application, and then when the Patent Office suggests division, the inventor has protection from double patenting attacks because the divisionals were “forced.”

[1240] The underlying policy rationale of double patenting must be kept in mind. Allowing inventors to expand their domain via decisions that are made by the patentees themselves is counterintuitive to the rationale underpinning double patenting. Accepting NCS’s approach means inventors can benefit from accidental misuse of the system, or worse, knowingly expand their domain in the knowledge that forced divisional applications are immune from double patenting attacks.

[1241] Second, I agree with Kobold that the *Patent Act* distinguishes between voluntary and forced divisional patents.

[1242] Kobold argues that, at the time *Consolboard* was decided, the 1970 *Patent Act* applied, which had a different section for divisional applications. The *Patent Act* has since been amended so that there are two subsections: 36(2) where an applicant limits the claim themselves (i.e. voluntarily); and 36(2.1) where an applicant limits the claim due to direction of the Commissioner (i.e. forced). Subsection 38(2) of the 1970 *Patent Act* instead provided:

Divisional applications

(2) Where an application describes and Claims more than one invention the applicant may, and on the direction of the Commissioner to that effect shall, limit his Claims to one invention only, and the invention or inventions defined in the other claims may be made the subject of one or more divisional applications, if such divisional applications are filed before the issue of a patent on the original application ; but if the original application becomes abandoned or forfeited, the time for filing divisional applications terminates with the expiration of the time for reinstating or restoring and reviving the original application under this Act or the rules made thereunder.

Demandes divisionnaires

(2) Si une demande décrit et revendique plus d'une invention, le demandeur peut et, selon les instructions du commissaire à cet égard, doit restreindre ses revendications à une invention seulement, et l'invention ou les inventions définies dans les autres revendications peuvent faire le sujet d'une ou de plusieurs demandes divisionnaires, si ces demandes divisionnaires sont déposées avant la délivrance d'un brevet sur la demande originale ; mais si la demande originale a été abandonnée ou si elle est déchue, le délai pour le dépôt des demandes divisionnaires se termine à l'expiration du délai fixé pour le rétablissement ou la restauration et remise en vigueur de la demande originale aux termes de la présente loi ou des règles établies sous son autorité.

[1243] Currently, section 36 of the *Patent Act* provides:

Limitation of Claims by applicant

(2) Where an application [original application] describes more than one invention, the applicant may limit the Claims to one invention only, and any other invention disclosed may be made the subject of a divisional application, if the divisional application is filed before the issue of a patent on the original application.

Demandes divisionnaires

(2) Si une demande décrit plus d'une invention, le demandeur peut restreindre ses revendications à une seule invention, toute autre invention divulguée pouvant faire l'objet d'une demande divisionnaire, si celle-ci est déposée avant la délivrance d'un brevet sur la demande originale.

Limitation of Claims on direction of Commissioner

(2.1) Where an application [original application] describes and Claims more than one invention, the applicant shall, on the direction of the Commissioner, limit the Claims to one invention only, and any other invention disclosed may be made the subject of a divisional application, if the divisional application is filed before the issue of a patent on the original application.

[Emphasis added]

Idem

(2.1) Si une demande décrit et revendique plus d'une invention, le demandeur doit, selon les instructions du commissaire, restreindre ses revendications à une seule invention, toute autre invention divulguée pouvant faire l'objet d'une demande divisionnaire, si celle-ci est déposée avant la délivrance d'un brevet sur la demande originale.

[Je souligne]

[1244] As can be seen, Parliament created two avenues for the Patent Office when objecting to a multiplicity of invention. Subsection 36(2) allows the inventor to voluntarily divide, whereas subsection 36(2.1) enforces a division.

[1245] NCS adopts the position that both voluntary and forced divisional applications are possible under subsections 36(2) and 36(2.1) of the *Patent Act*.

[1246] However, I am of the view that subsection 36(2.1) is comparable to the Supreme Court's wording of "enforced divisional application" in *Consolboard* at paras 536-537. This further supports adopting the approach in *Biogen FC*.

[1247] As such, I agree with Kobold that the 652 Patent is a voluntary divisional.

[1248] Accordingly, NCS's 652 Patent is not shielded by *Consolboard* from double patenting arguments.

[1249] While the 652 Patent is almost identical to the 676 Patent, what is not identical are the individual claims. The FCA in *Proctor & Gamble Co v Calgon Interamerican Corp* (1982), 61 CPR (2d) 1, held that the test is that claims themselves must be identical or conterminous. This was followed in the leading double patenting case of *Whirlpool*, which says that for double patenting the judge is to compare the claims rather than the disclosure. In this case the disclosure is almost identical but the claims themselves are not. Since the claims define the monopoly, in this case it is not double patenting.

(4) *Other Issues with the 652 Patent*

[1250] I will take the same approach here as I did with the 676 Patent. Due to the sheer volume of issues in this lengthy decision, and given that I have found some of the claims anticipated and all of the claims obvious, I find it unnecessary to address the inutility, overbreadth, insufficiency, ambiguity or prior disclosure issues on the 652 Patent.

C. *NCS's 907 Patent*

[1251] Kobold points to the evidence of Mr. Nipper that this patent is referred to as the “Getzlaf Sleeve” which is two-layered given he was a named inventor on the 907 Patent. Getzlaf is also a named inventor on the 676, 652, 026, and 704 Patents. Mr. Getzlaf was not called as a witness at trial but it is alleged that he started the idea and did the napkin sketch. The evidence that NCS’s first sleeve was similar to the OptiPort was given by Mr. Nipper in examination-in-chief. There was evidence that Mr. Ravensbergen developed in two weeks a two-layer design called the OptiPort MV, having the goal of making the invention simpler.

[1252] In argument, Kobold said this is not quite accurate given that the starting point for the 907 Patent and the 026 Patent (which is a divisional patent of the 907) was the OptiPort Sleeve (three-layered sleeve) owned by BJ Services.

[1253] Kobold alleges that the 907 Patent is not sufficient in its disclosure to enable all of the embodiments of the invention. They also argue that the patent is invalid for anticipation, obviousness, and material misrepresentation pursuant to section 53 of the *Patent Act*. The Plaintiff's position is that the Patent is valid and that the Defendants infringed this patent with Kobold's G5 tool and/or sleeves.

(1) ***Anticipation***

[1254] The Defendants allege that Claim 16 (as well the dependent claims) was anticipated by Patel.

[1255] This is an inflatable shifting tool to shift a sleeve or valve. In this case it is to shift a valve. The tool assembly in this Patent is to be run on coiled tubing down a cemented wellbore (either vertical or horizontal).

[1256] The purpose of Patel is to locate and shift a valve. Below is Figure 4:

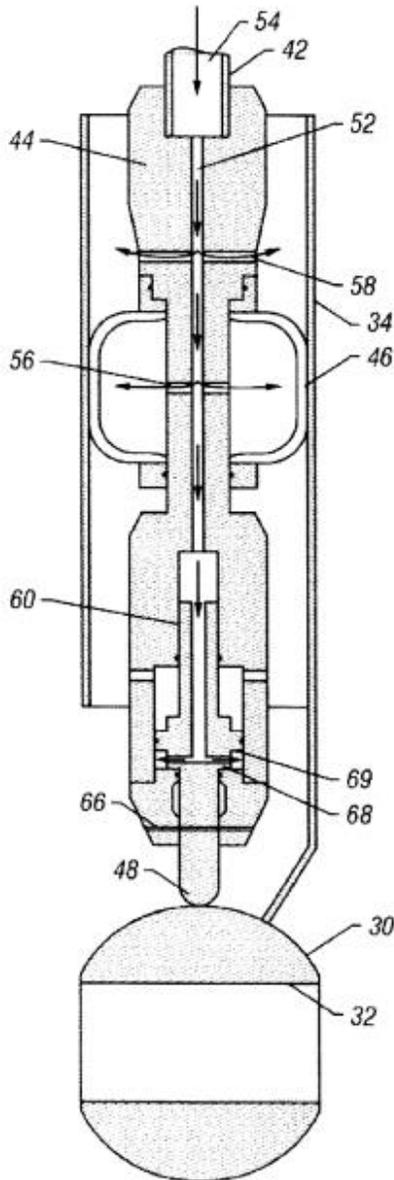
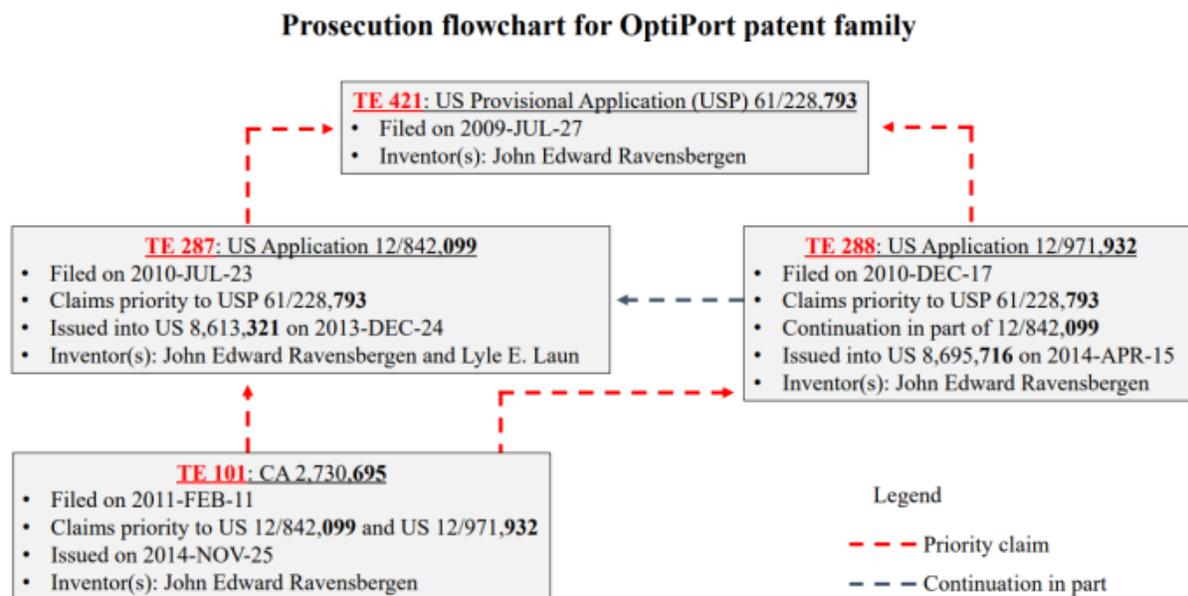


FIG. 4

(a) *Prior Art*

[1257] Kobold primarily relies on the Otis B, the Patel Patent, and the OptiPort that is referred to in the “What Up?” Presentation. Please see the Summary of Prior Art at paragraphs 258-262 above.

[1258] However, an issue arises between the parties due to Kobold’s reliance on the OptiPort. NCS alleges that the “What Up?” Presentation contains knowledge obtained from NCS. NCS therefore maintains that Kobold cannot rely on the “What Up?” Presentation as prior art due to section 28.3 of the *Patent Act*. Section 28.3 gives a one-year grace period for information disclosed by the patent applicant, or a person who obtained knowledge directly or indirectly, from the patent applicant. NCS contends that since the presentation is dated August 2010 and contains information obtained from NCS, it is not citable as prior art to invalidate the 907 Patent. The Plaintiff helpfully provided the prosecution flowchart for the OptiPort:



[1259] I therefore address whether Kobold can rely on the BJ OptiPort Sleeve that is disclosed in the “What Up?” Presentation.

(i) Mongoose / OptiPort Sleeve

[1260] The 907 Patent filing date is May 4, 2011 and its priority date is October 18, 2010. The applicable claim date under subsection 28.3(a) is the priority date of October 18, 2010. The Plaintiff argues that the claim date of October 18, 2010 is to be used given the information in the prior art (“What Up?” Presentation) was disclosed by the Plaintiff within the grace period.

[1261] I must first determine whether NCS disclosed the subject matter of the 907 Patent publicly. This debate focuses on the inclusion of drawings and references to NCS’s Mongoose BHA in an OptiPort Sleeve. NCS says given the Mongoose tool is owned by them, the only way it could be in the “What Up?” Presentation is if that information came from them. Second, I must determine if the “What Up?” Presentation is public in the context of subsection 28.3(a) of the *Patent Act*.

[1262] NCS says the presentation is not citable because it contains drawings and references to a Mongoose BHA in an OptiPort Sleeve and BJ only learned that the Mongoose tool could shift the OptiPort Sleeve because it obtained knowledge from NCS.

[1263] Kobold says the significant amount of oral evidence indicates that BJ came up with a method for shifting the OptiPort Sleeve, put that method into practice as early as December 2009, and then disclosed the method to NCS. Kobold also maintains that the evidence shows that this development occurred while BJ obtained assistance from NCS and its Mongoose tool to shift subsequent OptiPort Sleeves.

[1264] Kobold relies on the “What Up?” Presentation in relation to the 907 Patent. The 907 Patent’s subject matter does not relate to the Mongoose tool, rather, its subject matter pertains to the two-layer sleeve.

[1265] NCS now seeks to exclude the “What Up?” Presentation in relation to the 907 Patent – which is about a two-layer sleeve – on the basis that the Mongoose disclosure was provided by NCS.

(ii) Public Disclosure

[1266] Whether or not information constitutes a disclosure to the public is a question of fact.

[1267] Put simply, information will constitute subject matter available to the public where there has been an unconditional disclosure to a member of the public.

[1268] The same language is used in section 28.2(1) and section 28.3 of the *Patent Act*: “in such a manner that the subject matter became available to the public in Canada or elsewhere.”

Therefore, the jurisprudence commenting on the principles of public disclosure applies both to anticipation and obviousness.

[1269] In *Baker Petrolite Corp v Canwell Enviro-Industries Ltd*, 2002 FCA 158, the Federal Court of Appeal provided guidance on disclosure and when it becomes available to the public. Justice Rothstein explained that, with respect to public disclosure, we are free in law and equity to examine information “communicated to a single member of the public without inhibiting fetter...”: *Baker Petrolite Corp v Canwell Enviro-Industries Ltd*, 2002 FCA 158 at para 42.

[1270] In *Betser-Zilevitch v Petrochina Canada Ltd*, 2021 FC 85 [*Petrochina*], Justice Manson dealt with what constituted public disclosure. In *Petrochina*, the Plaintiff attempted to argue that since the well pads were only viewed, that was insufficient to establish public disclosure that would allow a POSITA to produce the well pads “without undue burden” (at para 164, relying on *Bombardier FC 2017* at para 490, rev’d in part on other grounds 2018 FCA 172). In *Bombardier FC 2017* at paragraph 490, this Court explained:

[490] The degree of scrutiny and examination required will, of course, vary from product to product for the disclosure to be enabling. However, merely viewing, without more, may not satisfy the “enabling” condition. The disclosure itself must convey enough information for the skilled person to make the invention or, as in the case of a skate boot, to discover the internal structure and then reproduce the invention without undue burden.

[1271] In *Petrochina* at paragraph 165, Justice Manson concluded, based on the record, that the relevant elements of the modules “were consistently identifiable by expert and fact witnesses in reference to photographs.” Justice Manson accordingly concluded that the POSITA could reproduce the well pads without undue burden.

[1272] Kobold cross-examined Mr. Ravensbergen on the BJ presentation where he confirmed that the presentation was a sales presentation:

Q Take a look at what seems to be our favourite document the first four days of trial, which is Exhibit 58.

This is a sales presentation.

A Yes.

Q And it is dated August 2010?

A Yes.

Q And it would have been released right when the BJ OptiPort was being commercialized?

A Around that time, yeah.

Q The idea of this is to sort of sell your sleeves to customers?

A Yes.

Mr. Ravensbergen Cross-Examination January 17, 2022 Volume 4
at 71:27-72:11

[1273] In my view, BJ’s “What Up?” Presentation constitutes a public disclosure. Although fact witnesses such as Mr. Ravensbergen could not say exactly who created the presentation, it was clear that the presentation was created as marketing material that was publicly distributed.

[1274] Similarly to *Petrochina*, the experts in this action were consistently able to identify and explain diagrams, figures, and cross-sectionals of the various patents and prior art. Page 10 of the “What Up?” Presentation shows a cross-section of the OptiPort Sleeve. Mr. Ravensbergen acknowledged that in some way the cross-sectional diagram is not fit to scale but it “communicate[s] the important part of the collar to a customer.”

[1275] In addition, and most importantly, Mr. Watkins testified that the OptiPort Sleeve became commercial in about April or May of 2010. In light of the evidence presented at trial, I find this sufficient to allow the POSITA to reproduce the OptiPort Sleeve “without undue burden”: *Bombardier FC 2017* at para 490.

[1276] Accordingly, I conclude that the OptiPort Sleeve was publicly disclosed.

(iii) Disclosed Subject Matter

[1277] NCS seeks to exclude the “What Up?” Presentation (and therefore the OptiPort) in relation to the 907 and 026 Patents – which involves two-layer sleeves – “What Up?” on the basis that the Presentation includes the Mongoose, which NCS disclosed.

[1278] NCS argues that the “What Up?” Presentation as a whole cannot be used as it contains knowledge obtained from NCS. Specifically, they argue that the presentation includes the Mongoose BHA in an OptiPort Sleeve, and BJ only learned the Mongoose tool can shift an OptiPort Sleeve because it obtained that knowledge from NCS.

[1279] However, NCS misapprehends the relevant legal question here. The question is whether the information was obtained in such a manner that the subject matter became available. The applicable subject matter is the 907 Patent – which provides a method of treating a single zone through a fracturing sleeve.

[1280] NCS’s Mongoose BHA is a tool that BJ used to shift the OptiPort Sleeve following the failure of the Sureset tool. Although NCS is correct that the Mongoose is referenced in the BJ “What Up?” Presentation, NCS did not disclose the “subject matter” of the 907 Patent. The reference to the Mongoose and the slide separately referring to the OptiPort Sleeve are two independent pieces of information.

[1281] I am of the view that NCS cannot use the depiction of the Mongoose to shield the entire “What Up?” Presentation, inclusive of other pieces of information, from being used as prior art.

The Mongoose disclosure is irrelevant. When Mr. Ravensbergen was employed at BJ, he came up with the OptiPort Sleeve idea and was working on a project of the OptiPort Sleeve.

[1282] As such, I reject NCS's argument that the "What Up?" Presentation cannot be used as a citable piece of prior art to invalidate the 907 or 026 Patents.

(b) *Disclosure*

[1283] In Mr. Lehr's opinion, the Patel Patent does not anticipate any of the claims from 16-23. His main contention is that formulation isolation valves [FIV] are not frac sleeves and that FIVs are not used in horizontal multi-zone wells. He stated that lower performance versions are for simple land completions and more complex versions are for offshore. These applications are not targeted by the 907 Patent so the intended use is completely different than the Patel, as would be the person that would practice the Patel. For support, he says the words "treatment, fracturing or stimulation" are not used in the Patel Patent. He indicated that the only way to locate and open an FIV sleeve would be having shear pins, which would need to be replaced on each trip downhole. This would not be like the 907 Patent which can function by either mechanical or hydraulic pressure whereas Patel can only work with mechanical force. His opinion is that the sleeve valves are not frac sleeves and therefore frac valves cannot be shifted using the Patel tool.

[1284] In Mr. Chambers' opinion, Patel anticipated Claims 16 and 18-21. His opinion was that all the components of Claim 16 are disclosed in Patel, being a sleeve slidable within a tubular part of a tubing lining a wellbore (sleeve valve), locating device (retractable bull nose and other depth correlation tools), resettable sealing member (inflatable packer), and coiled tubing. He says

Patel's claims to set the sealing member across the sleeve and then apply downward force to slide the sleeve is exactly what the method Claim 16's steps are. He also says Claim 18 is anticipated by Patel given it adds to Claim 16 the step of setting the sealing member by applying radial force to engage the sleeve with the sealing member. Claim 19's addition is that the sleeve's inner surface is uniform in diameter and has no profile, which is exactly what Patel discloses. When looking at Claim 20, he says this adds a sleeve with an inner diameter consistent with the inner diameter, which Patel shows as a single diameter in the sleeve. This is the same as a sleeve valve in wellbore casing. Finally, in Claim 21, he says Patel discloses the step of releasing the sealing member at column 4, lines 27-32.

[1285] I disagree with Mr. Lehr that Patel was for use in simple operations, which he alluded would be single fracture verticals. Patel at column 2 line 12 says, "while the wellbore shown is as a vertical wellbore, it should be clear that the invention is equally applicable to horizontal and inclined wells."

[1286] At column 2 line 54, Patel discloses that "the shifting tool may be hydraulically actuated to engage the valve operator. When the shifting tool engages the valve operator force may be applied to the shifting tool to move the valve operator." This is contrary to Mr. Lehr indicating Patel could only be operated mechanically as a marked difference between Patel and the 907 Patent. What I do agree with Mr. Lehr about is that, given the shear pins are sheared at a high force, it would seem likely the tool would have to be removed after each use to replace shear pins.

[1287] I agree with Mr. Chambers' and Mr. David's analyses that Patel anticipates Claim 16 and 18-21. I agree with all the experts that Claims 1-15 are not anticipated by Patel given that the sleeve is to be located by a profile.

[1288] Mr. Lehr disagrees with the Defendants' experts for Claims 16-21 for the construction of the sleeve. I do not accept his construction, and since he does not do a claim-by-claim, I will not refer to his opinion in each individual Claim given. Below is a claim-by-claim analysis.

[1289] Claim 16: In my construction of Claim 16, I did not construct the sleeve to be only a "frac sleeve." In fact, Mr. Lehr's explanation that frac sleeves were a particular type of sleeve does not line up with his construction of the sleeve in the 676 and 652 Patents.

[1290] I adopt Mr. David's claim chart and Mr. Chambers' analysis for Claim 16.

[1291] Claim 17: Mr. David says that Patel does not specifically disclose the sleeves as having lateral ports, but a POSITA would understand the sleeve valves as having ports. Neither Mr. Chambers nor Mr. Lehr opined specifically on Claim 17, but I accept Mr. David's point. Patel does not anticipate Claim 17, but this will be revisited under obviousness.

[1292] Claim 18: I find that Patel discloses that when the inflatable packer (46) is inflated (set), it applies force to the sleeve (valve operator (34)) which frictionally engages the sleeve (valve operator) with the sealing member. The Defendants' experts agree with this and, as noted though not done on a claim-by-claim basis, Mr. Lehr disagrees given his position that the 907 Patent is a frac sleeve and Patel is not.

[1293] Claim 19: Patel discloses that the valve operator has along its length a uniform diameter with no inner profile. Both Defendants' experts agree and Mr. Chambers refers to Figure 5 of Patel as support for this. I agree with these experts.

[1294] Claim 20: Mr. David sees Patel as disclosing this step and having an advantage as Patel can pass through a smaller diameter before engaging the larger diameter sleeve. Mr. Chambers also notes that Patel has a single diameter. Both say a POSITA would understand what the diameter of the sleeve should be. This Claim is disclosed in Patel.

[1295] Claim 21: Mr. Chambers and Mr. David both say this is disclosed by Patel. Mr. Chambers notes it is at column 4 lines 27-32 of Patel. Mr. David indicates this is done in Patel by the inflatable packer being replaced by stopping the fluid flow to the coiled tubing. I accept these positions that Patel disclosed Claim 21.

(c) *Enablement*

[1296] The Plaintiff says that Mr. David admitting modifications to Patel would not be straightforward contrasts his "bald" assertion of enablement.

[1297] Mr. Lehr said that a POSITA taking the Patel and creating a downhole tool as in the 907 Patent would not enable them to practice this invention given the debris on top of the tool, and would need an equalization valve. Answering my question at trial, Mr. Lehr said you could do some lab testing but you would get "definitive feedback through field testing." Given no testing is permissible at the enablement step, the Plaintiff says for this reason, as well as others, Patel

cannot enable the 907 Patent. Mr. Lehr lists a host of reasons why you would have problems converting the Patel Patent tool to a frac sleeve tool like the 907 Patent. Most of Mr. Lehr's issues related to the fact the Patel tool could not locate and open frac sleeves in multi-zone horizontal wells, followed by treating the formation through ports in the frac sleeve.

[1298] Mr. Chambers indicates that "Patel provides more than enough information to enable the POSITA to practice this method without the exercise of inventive ingenuity or undue experimentation."

[1299] Mr. David also indicates in his opinion that a POSITA would have little difficulty to make the device and then practice the method of Claims 16 and 18-21 using Patel. I do not agree that Claims 16 and 18-21 are not enabled. With the teachings of Patel, the apparatus could be made and the methods of Claim 16 and 18-21 could be practiced with no inventiveness given none of those Claims claim to do what Mr. Lehr indicates could not be enabled. His general position does not apply to the specific Claims I find are anticipated: Claims 16 and 18-21.

(2) *Obviousness*

[1300] The Defendants allege that this patent is obvious given the Otis B shifting tool had been used since the 1970's as a shifting tool. Other prior art relied on by the Defendants is Patel, OptiPort, Ravensbergen (one of the OptiPort family of Patents), as well as witnesses evidence. The Defendants rely on evidence that BJ had a method to shift the OptiPort Sleeve and disclosed the method to NCS when it engaged NCS to use the NCS Mongoose tool to shift OptiPort Sleeves. The Defendants say the evidence shows NCS was developing its model, which was a

copy of the OptiPort, until they went with the Getzlaf model (napkin version) on or around October 1, 2010. Seventeen days later, a provisional patent was filed that included the OptiPort and Getzlaf sleeve.

[1301] In contrast, the Plaintiff provided the prosecution flow chart of the OptiPort family to demonstrate that “the NCS type sleeve as claimed in the 907 Patent, and therefore the NCS type sleeve subject matter in the OptiPort family patents are not citable for anticipation or obviousness against the Claims of the 907 Patents.” NCS also argues the “What Up?” Presentation is not citable, but this has been dealt with. This knowledge only was obtained by BJ from NCS; NCS owned the Mongoose and had been hired to use this tool to shift the BJ sleeves. The Plaintiff argued that the presentation does not disclose the method in Figure 4 of the 907 Patent as the 907 Patent does not claim a method for shifting that type of sleeve, which was a far sleeve with an internal sleeve in the annular space. Other prior art papers that do not mention frac sleeves are irrelevant in Mr. Lehr’s opinion.

[1302] Before I can do the obviousness evaluation the issue regarding what can be used as prior art must be determined. The issue arises because, from a review of the 907 Patent and the Ravensbergen histories and protests, it is clear the two patents were for almost identical inventions. The analysis of whether the 907 Patent is obvious rests on which priority date can be relied on in this action. The priority dates assigned by the Patent Office were after protests, and yet the priority dates remain after the prosecution on the issued patent.

[1303] The Ravensbergen was invented by Mr. Ravensbergen, owned by Baker Hughes Inc, and published on April 19, 2011. While Baker Hughes bought out BJ Services, for consistency, I will

use BJ. BJ had purchased Newsco previously. Mr. Ravensbergen, also the inventor of many other patents, was working with BJ Services (Newsco-Baker) from approximately 1993 until April 2011, when he began working with NCS. He left the employ of NCS in April 2020. Another inventor and salesman for BJ, Lyle Laun also left BJ to work for NCS in April 2011, a few weeks before Mr. Ravensbergen. You will see Mr. Ravensbergen listed as an inventor on the 704 Patent owned by NCS later in this decision. Mr. Ravensbergen testified at trial for the Plaintiff. He was a straightforward, reliable witness given his uncomfortable position of having invented patents for both parties in this trial.

[1304] The 907 Patent file history contains a protest and submission of prior art.

[1305] On March 6, 2012, a protester filed prior art pursuant to a protest under subsection 34.1(1) of the *Patent Act*. The protester raised the following pieces of prior art:

- A. Claim 1:
 - Canadian Patent 2,639,341;
 - 2002 Baker Oil Tools Catalog;
- B. Claim 16: Patel's US Patent 6,024,173; and,
- C. Claims 1 to 28: Ravensbergen's Canadian Patent 2,730,695.

[1306] In the event that the October 2010 claim date was invalid, the protester provided additional prior art. In such circumstance, the protester provided that the Ravensbergen was citable as anticipatory under subsection 28.2(1)(d) of the *Patent Act*. In the 907 Patent protest,

the protester also provided the related protest of the Ravensbergen. On February 23, 2012, Mr. Owens filed a protest against the Ravensbergen. The complaint notes that the Ravensbergen is “completely anticipatory” of the 907 Patent application, depending on the appropriate claim date.

[1307] Although third parties have the right to file a protest pursuant to section 34.1 of the *Patent Act*, the Commissioner can only acknowledge a protest. The Commissioner must not give information as to the action taken unless the application for the patent is open to public inspection at the Patent Office: Patent Rules, SOR/2019-251, Rule 12. As *Canadian National Railway Company v BNSF Railway Company*, 2019 FC 142 explains, “[t]hird parties have no standing and are not ‘directly affected’ by the matter in a legal sense, apart from their own competitive commercial interests” citing *Monsanto Co v Canada (Commissioner of Patents)*, 1999 CanLII 8504 (FC) at paragraph 37.

[1308] Accordingly, the Commissioner did not issue a response to the 907 Patent protest and the patent issued on March 24, 2012, a few weeks after the protest.

[1309] The Plaintiff filed as exhibits the file history of the Ravensbergen and the OptiPort.

[1310] An individual [Mr. O] made the Ravensbergen protest to alert the examiner to prior patent documents that allegedly disclosed the subject matter claimed in the Ravensbergen. Mr. O explained that the 907 Patent discloses the subject matter in the Ravensbergen.

[1311] Mr. O deals with the Ravensbergen priority claims. In the protest, he contends that the claim for priority from the 099 Patent reveals a “significant distinction in subject matter from the

allowed claims of the [Ravensbergen].” He suggests the applicable priority date is December 17, 2010, not the earlier July 23, 2010 date.

[1312] Regarding the subject matter claimed in the Ravensbergen, US 12/842,099 does not disclose any embodiment in which a movable sleeve may be connected to a tool string disposed within the well. Therefore, given that the subject matter of the present claims of the Ravensbergen is not disclosed in US 12/842,099, it is believed that a claim date of July 23, 2010 cannot be applicable to the present claims of the Ravensbergen.

[1313] A close review of the Ravensbergen is confusing. The protest related to the priority date was accepted but then there were several changes to the patent as requested by the different examiners in their reviews while the priority dates were never discussed in subsequent correspondence. The patent was then issued with the priority dates as they currently are.

[1314] The initial protest was filed with the statement: “Regarding this reference, it is submitted that the ‘907 application discloses the subject matter claimed and allowed in the [Ravensbergen], and further, that the ‘907 application has a filing date that is earlier than the [Ravensbergen] claim date.” The protest goes on to make the exact same arguments as the Plaintiff does now regarding the “claimed subject matter of the original [Ravensbergen] claims is not the subject matter present in any of the earlier applications to which priority is claimed.”

[1315] On April 5, 2012, the examiner Alexis Cote said:

Claims 1, 2, 5, 6, 8-11, 14, and 23 encompass subject matter that was disclosed in co-pending application D2, (added: D2 is CA 2738907) which Claims an earlier priority date than the present

application, and do not comply with paragraph 28.2(1)(d) of the *Patent Act*. D2 has an earlier priority date (2010/10/18) due to the fact that the earliest priority date for the claimed subject matter is not valid. Indeed, the claimed subject matter is not present in priority document US 12/842,099 (associated with the earliest priority date 2010/07/23) but is only present in priority document US 12//971,931 (associated with the later priority date 2010/12/17)

[1316] On June 12, 2012, the applicant asked that Claims 1-18 be replaced with new ones as well as answered other issues previously noted by the examiner, but there is no mention of priority dates.

[1317] In response, the protester on August 14, 2012 wrote saying that on April 5, 2012, the examiner acknowledged that the claim date for the Ravensbergen was December 12, 2010.

Alongside were other arguments as to why it should not be issued.

[1318] On January 30, 2013, Daniel Westlake, a patent examiner said that as a consequence of the applicant's correspondence dated June 12, 2012, and the protest dated August 16, 2012, the prior art of the 907 Patent would be re-applied against this application for anticipation. He found a number of other deficiencies.

[1319] A "follow up" protest dated February 11, 2011 was received on March 5, 2013, by Westlake. I believe the date of this protest is a typo, and that the actual date was February 11, 2013. It was not signed, but after stating it protested after the Office Action dated January 13, 2012, the conclusion states: "It would be contrary to the workings of the Patent system to allow a patent on both the '907 Patent and the [Ravensbergen]. Since the 907 Patent is already issued, the [Ravensbergen] cannot issue."

[1320] The applicant responded on April 29th, 2013, and again amended the claims and replaced Claims 1-15. They dispute the prior art, including the 907 Patent, and ask that the application is in a condition for allowance. There is no discussion regarding the priority dates.

[1321] On August 27, 2013, the examiner applied 907 for anticipation as prior art given the priority date of December 17th, 2010. The examiner found that the amended Claims were anticipated by 907.

[1322] On January 13, 2014, the applicant amended Claims 1-14, and addressed concerns the examiner had on August 27th, 2013. The applicant remarked that they had an interview with the examiner on December 5, 2013.

[1323] There was a voluntary amendment on January 30, 2014, which in addition to other changes replaced old claims with new Claims 1-14. Examiner analyst Jean Charette then responded with concerns. On February 14, 2014, the applicant sent in further amendments to address these concerns and again had new Claims 1-14. In a letter, the applicant paid the fees and the Patent application was allowed on March 10, 2014. There was never a mention of priority dates.

[1324] Subsection 53.1(1) of the *Patent Act* opened the door to using file histories, however, this provision only applies to claim construction. In *Free World Trust*, the Supreme Court discussed the use of file histories in non-claim construction circumstances:

67 This is not to suggest that prosecution history can never be relevant for a purpose other than defining the scope of the grant of the monopoly: *Foseco Trading A.G. v. Canadian Ferro Hot Metal*

Specialties, Ltd (1991), 36 C.P.R. (3d) 35 (F.C.T.D.), at p. 47. That point does not arise in this case for decision and lies outside the scope of these reasons.

[1325] Thus, while the door remains firmly ajar to relying on file histories in other circumstances, in my view, it is not appropriate to submit a file history essentially to re-argue the same protest in relation to the Ravensbergen when the Patent Office issued the patent with those priority dates. This was an issue brought to the attention of the Patent Office and, even though the Patent Office made findings initially, who knows what the findings would have been on the final iteration of the patent given the many new claims that replaced the original ones.

[1326] *Samsonite Corp v Holiday Luggage Inc*, [1988] FCJ No 409, 1988 CarswellNat 624 [Samsonite] [Samsonite cited to CarswellNat] also dealt with file histories in the context of an interlocutory injunction motion to show what prior art had been before the patent examiner. The Federal Court held that the prior art was relevant to the rebuttable presumption of validity. However, the Federal Court commented that the file histories carried very little weight: *Samsonite* at para 52.

[1327] Similarly, the file histories here must carry little weight unless they are related to claims construction. In this case, no experts were given this task and there is no claim-by-claim argument to assist me.

[1328] NCS presents the argument as a binary assessment: the subject matter relating to the sleeve that is contained in the Ravensbergen can only be traced back to the 932 Application – either the subject matter came from the 099 or the 932 Patent. However, this assessment requires

a determination of which claims correspond to which priority date as well as a claim-by-claim analysis in relation to the subject matter of the prior patents.

[1329] Subsection 28.4(1) of the *Patent Act* states:

Request for priority

28.4 (1) For the purposes of sections 28.1, 28.2 and 78.3, an applicant for a patent in Canada may request priority in respect of the application on the basis of one or more previously regularly filed applications.

Demande de priorité

28.4 (1) Pour l'application des articles 28.1, 28.2 et 78.3, le demandeur de brevet peut présenter une demande de priorité fondée sur une ou plusieurs demandes de brevet antérieurement déposées de façon régulière.

[1330] The parties did not provide any jurisprudence to explain their interpretation of the Court's role in re-assessing priority dates.

[1331] Although Canadian jurisprudence does not appear to have directly addressed this question, priority can be asserted on a claim-by-claim basis. The *Annotated Patent Act* § 9:57 explains that it is “possible for different claims to be subject to different priority requests relating to different previously filed applications.”

[1332] In *Paid Search Engine Tools, LLC v Google Canada Corporation*, 2021 FC 1435 at paragraphs 208-222 [*Paid Search Engine*], this Court addressed priority dates. However, in *Paid Search Engine* the parties did not dispute the priority date and agreed that the priority date considerations only applied to certain claims of the patent at issue. Although the ability of the Court to review priority dates is not explicitly addressed, this further indicates that priority dates may be evaluated in the way NCS requests.

[1333] The *Manual of Patent Office Practice* (October 2022) [MOPOP] sets out the CIPO's interpretation of the *Patent Act*, *Patent Rules*, and jurisprudence. The MOPOP is not binding but sets out how CIPO approaches priority issues under subsection 28.1(1) of the *Patent Act*. Section 18.03 of the MOPOP discusses claim dates and priority dates and explains:

In principle, each Claim in an application may have a different claim date from all other claims, although in practice it is typical for an application to Claim priority from one or two priority documents.

Where a public disclosure would be relevant prior art for the assessment of anticipation or obviousness if a claim's claim date is the application's filing date, but not relevant if the claim's claim date is a specific priority date, it will be necessary for the examiner to obtain the relevant priority document and determine whether the application is entitled to the earlier claim date.

[Emphasis added]

[1334] Canada is also a signatory to the *Paris Convention for the Protection of Industrial Property*, 1883 (as amended on September 28, 1979) [*Paris Convention*]. In further support of a claim-by-claim assessment of priority, Article 4 the *Paris Convention* stipulates:

F. — No country of the Union may refuse a priority or a patent application on the ground that the applicant claims multiple priorities, even if they originate in different countries, or on the ground that an application claiming one or more priorities contains one or more elements that were not included in the application or applications whose priority is claimed, provided that, in both cases, there is unity of invention within the meaning of the law of the country. With respect to the elements not included in the application or applications whose priority is claimed, the filing of the subsequent application shall give rise to a right of priority under ordinary conditions.

...

H. — Priority may not be refused on the ground that certain elements of the invention for which priority is claimed do not

appear among the Claims formulated in the application in the country of origin, provided that the application documents as a whole specifically disclose such elements.

[1335] As such, it is possible for different claims to be subject to different priority dates relating to different, previously filed applications. However, I interpret this as taking place during the application process and not at the stage in an action where validity is being determined. This would amount to an *ex post facto* prosecution of the patent, and contrary to the role of this Court.

[1336] At this point, the jurisprudence from the FCA has opened the door to using the prosecution history for construction. However, on this record with very limited argument and no expert assistance, I am not prepared to do a claim-by-claim review of priority dates. Based on the record for the 907 Patent, I am unwilling to rely on the file histories to re-evaluate the priority date.

[1337] The Defendants argued that it was a material misrepresentation not naming Mr. Ravensbergen as an inventor of the 907 Patent or at least as a co-inventor given the evidence at trial of who was responsible for the inventive concept. At the time, Mr. Ravensbergen was working at a different company with ownership rights and NCS knew this given the fact they had information concerning the OptiPort and had shifted it. It will be unnecessary to address that issue given my findings below.

(a) *Inventive Concept*

[1338] Mr. Lehr's opinion is that 907's inventive concept is "setting a resettable packer in a frac sleeve and actuating the frac sleeve by applying mechanical and / or hydraulic force to the tool assembly."

[1339] In Mr. David's opinion, the "claims of the 907 Patent all describe a tool assembly with a locator and either a seal and / or anchor member. The locator is used to locate a sleeve in a casing string, while the sealing member, anchor, or both may be used to engage/grip the sleeve. Once engaged a downward force is then applied to the tool assembly to shift the sleeve."

[1340] Mr. Chambers states that the 907 Patent was trying to solve the problem of "improved reliability of mechanisms used on coiled tubing to shift a sleeve." He goes on to say that there is no new shifting tool proposed in the claim as they are all methods that were identical to what was being practiced in the field.

[1341] Kobold presented Mr. Lehr's inventive concept as being the same in the 907 and 026 Patents (with the 026 being broader). Mr. Lehr's opinion was that:

[655]...The claims, as construed, are consistent with the inventive concept of the 907 Patent, which is a novel method to shift open a frac sleeve via the application of mechanical force and/or hydraulic pressure to a downhole tool deployed on coiled tubing. Claim 8.13.15.24 and 28 also Claim processes by which the wellbore is sealed such that fracturing can occur through the shifted sleeve.

[1342] In contrast, in their closing, Kobold attributes the inventive concept to Mr. Ravensbergen, which was then taught to NCS, and that he should be a co-inventor. This argument was advanced

in their material misrepresentation/section 53 arguments, as well as in their motivation in the industry arguments. While relevant to those arguments, I turn to Mr. David for his opinion on the inventive concept in order to do the analysis. He indicates that at the most basic level that a “tool assembly with a locator and either a seal and/or anchor member. The locator is used to locate a sleeve in a casing string, while the sealing member, anchor, or both may be used to engage/grip the sleeve. Once engaged a downward force is then applied to the tool assembly to shift the sleeve.” Mr. Chambers does note that though the 907 says it is solving the reliability of tools on coiled tubing to shift a sleeve, it does not propose anything new as the methods are nearly if not identical to what was being practiced in the field.

[1343] The most obvious difference between the experts is that Mr. Lehr stated his characterization of the inventive concept was novel, and the Defendants’ experts do not believe it was. Based on my construction, I do not see the inventive concept limited to a frac sleeve. For simplicity, I will use Mr. Lehr’s inventive concept but modified to read as a “method to shift open a sleeve via the application of mechanical force and/or hydraulic pressure to a downhole tool deployed on coiled tubing as the inventive concept.”

(b) *Differences between the “State of the Art” and the Inventive Concept*

[1344] In regards to the differences between “State of the Art” and Inventive Concept, Mr. Lehr says that the differences between the prior art including the Otis B and the 907 are:

- A. Option to use hydraulic and / or mechanical force to open a frac sleeve;
- B. Positive indication on surface that a sleeve has been opened;

- C. An efficient strategy to selectively open/close sleeves; and,
- D. When a settable sealing element is used to perform a method claimed in the 907 Patent, in addition to shifting open a sleeve, that sealing member will also seal off lower portions of the wellbore prior to fracturing.

[1345] Mr. Lehr indicated all of the differences between the Patel and the 907 as noted in the Anticipation section.

[1346] The Defendants' closing says there are three known steps to shifting a sleeve: locate the sleeve in the wellbore, engage the slidable portion of the sleeve with a tool, and apply a force to shift the sleeve.

[1347] These were all being done in the prior art (Otis B, Patel, OptiPort) so the Defendants say there were no differences in having to bridge the gap, as the way the 907 worked is how those tools worked. The Defendants note the Patel engages a sleeve with an outward force from a packer. The industry was using a compressible packer for when the fracture is pumped, and the Mongoose is a good example and would have been obvious that a compressible packer could withstand the pressure to shift a sleeve.

[1348] The Defendants used the Otis B shifting tool as prior art and indicated it has been used since the 1970's to pass through a sliding sleeve, to shift the sliding port, and when the sleeve reaches the end, to disengage. The Patel Patent is also considered as prior art by the Defendants, as is the OptiPort Sleeve that was being used from at least January 2010 ("What Up?" Presentation).

[1349] In the joint issues, Claims 1-28 are what the Defendants indicate are obvious. I will go claim-by-claim, except for the claims already dealt with in the Anticipation analysis. They would be, by virtue of the same analysis, as done in anticipation, obvious and invalid.

(c) *Do the Differences Constitute Steps that would have been Obvious to the POSITA?*

[1350] The difference can be bridged, as all was in the CGK and it was obvious to try given the motivation not to have BHA stuck in a hole thus wasting time and money. The basics were in the prior art and were refined occasionally in the field itself by a bit of grinding or a configuration of devices on a tool string. There was motive to do so for if the inventors had their own patent, they would not have had to buy a licence from ExxonMobil (3% royalty). The motive, to save money by not having to purchase the licence and also to create a tool that had better performance and greater efficiency, was strong.

[1351] The evidence at trial was that NCS had, by October 1, 2010 (the date when Mr. Getzlaf did his napkin drawing), shifted the commercially available OptiPort Sleeves 50 to 100 times. The napkin drawing showed the Getzlaf sleeve (two-layer) side-by-side to the OptiPort Sleeve (three-layer) with the same shifting tool to shift both types of sleeves. The Mongoose tool had been used to shift the OptiPort and “it was the tool that was conceived of to shift the new two-layer Getzlaf sleeve.” The next step, OptiPort MV, was also a two-sleeve and was developed by Mr. Ravensbergen by his philosophy of simplifying his design using the same tool to shift the OptiPort. This took him only 17 days to do.

[1352] The “What Up?” Presentation cover page does say August 2010, and on another slide, does say that they fracked wellsites from January to August 2010 using ported collars and packers. The evidence is that the Mongoose was used to shift sleeves. Testimony at trial was that BJ had obtained an ExxonMobil licence (2007/08) to do annular coil tubing fracturing and they paid a royalty to Exxon for this. BJ was developing the Sureset tool and in the mean time used the Mongoose to do the Exxon method. Many companies had the motivation to develop their own method to avoid paying royalties. At trial, there was evidence that the “What Up?” Presentation was heard by the industry and it was publicly available. In Mr. Lehr’s opinion, this presentation does not show the type of frac sleeve in the 907 Patent as it only “shows a frac sleeve with an internal sleeve in the annular space.” So even if it is prior art, it does not disclose the subject matter of the 907 Patent.

[1353] Claim 1 is an independent claim. Mr. Lehr says Patel does not bridge the gap between the Otis B method and the 907 Patent method of shifting sleeves, as it would take “years of learning, conceptualizing and design to develop the methods of the 907 Patent. The experimental burden for achieving proof of concept in light of Patel and the Otis B prior art method would be extremely high.” He does not do a claim-by-claim analysis.

[1354] His general response to Mr. David and Mr. Chambers is that they “underplay the ingenuity underlying the claims of the 907 Patent, especially given that the POSITA does not possess inventiveness.” He indicates they were using hindsight and NCS was “the first to invent the novel method of shifting sleeves as claimed in the 907 Patent.” He says as an example that, for a long time, compressible packers were used in fracking but no one thought of setting it across a frac sleeve to enable shifting of the sleeve. This is illustrated by there being a 10-year

gap between Patel and the 907 Patent. He then goes into further detail of why he disagrees with Mr. David and Mr. Chambers. He does say he was told that the “What Up?” Presentation was not to be considered prior art and so he did not consider it.

[1355] Regarding Claim 1, I rely on Kobold’s experts and my findings with respect to the prior art. Mr. David indicates that the method of Claim 1 would be arrived at without much difficulty. Depending of the sleeve in the well, the three well-known steps are physically locating the sleeve, engaging with a tool the slidable portion, and apply a force to shift the sleeve.

[1356] NCS used essentially those same steps in their method. The 907 Patent located the place using a profile that was in the prior art (Otis B and OptiPort), including the 676 Patent and incorporated into the 907 Patent by reference. The second step was done by an anchor and by applying a force to set the tool, which was also in the 676 Patent and others. The final step was to apply a downward force to shift the sleeve, this was done using the Otis B tool. He indicates that NCS was using the Mongoose tool using a locator, sealing member and anchor, to shift the OptiPort with the compressible packer being relied on to keep the tool in place while fracturing. This method was done before 2010 (Otis B and Sureset) as evidenced by testimony and documentary evidence of the Midway Energy LTD well completion data submission dated December 27, 2009, when the Mongoose tool was brought in to shift the sleeve.

[1357] In contrast, NCS questions that if the methods were so obvious then why did Mr. Ravensbergen, “one of the most brilliant minds in the hydraulic fracturing industry,” not come up with it until he had a hint and rethought. Contrary to the Plaintiff’s position, I think that this proves exactly that it was obvious.

[1358] Mr. David points out the difference as the location of the profile used to locate the sleeve, the profile being below the sliding sleeve. However, he indicates that a POSITA when choosing options of where to locate the locator would know an internal sleeve needs room to slide. It would not have been a leap to bridge the gap by a POSITA with the CGK to locate the profile below the sliding sleeve so it can slide.

[1359] I agree that the method in Claim 1 was obvious, and Claims 2 to 15 depend on Claim 1.

[1360] I rely on Mr. Chambers' claim-by-claim opinion starting at paragraph 598 of his report.

[1361] Claim 2's ports in the tubular are covered by the sleeve but uncovered by the sliding of the sleeve in Claim 1. A sliding sleeve was obvious given that a common casing sleeve valve would have been known and used by a POSITA before 2010. Sleeves that cover ports were included in the background of the invention.

[1362] Claims 3 and 5's process, having the anchor released after the sleeve is shifted, was not inventive given Patel taught this method.

[1363] Claim 4 describes that when downward force is applied to the tool, the locator is released from contact with the inner profile of the sleeve. This was CGK at the time and is not inventive as it is the natural outcome.

[1364] Claims 6 and 7 repeat some of the steps in Claim 1 on a second sleeve. This was CGK to do multiple stimulations in a single downhole trip. Evidence of this was given in the SPE 50655 to the industry.

[1365] Claim 8 regards the treatment fluid being applied through a lateral port. This was CGK and had been done before 2010.

[1366] Claim 9, having the anchor set by application of force to engage the sleeve, was described by Patel as well as in SPE 50655.

[1367] Claim 10 is also described in Patel as the sealing member comprises an anchor. Again, SPE 50655 and Patel teach this, where wells used inflatable packers to form seals.

[1368] The sleeves with smooth profile inner surfaces in Claim 11 are again in Patel and, with the inflatable packer, you do not need a profile to engage and shift a sleeve.

[1369] Claim 12 was known in the industry to be a monobore designed before 2010 and continuing in use to date.

[1370] The method in Claim 13 of including a sealing member and setting the seal to create a hydraulic seal was used in Patel. It was known in the industry that you could use more than one inflatable packer, using one as an anchor and one to seal.

[1371] Claim 14's method was a common method used on coiled tubing to manipulate a tool from the surface. Mechanical force on the coiled tubing or hydraulic pressure on the annulus and/or the coiled tubing was known.

[1372] To conclude this set of dependent claims, Claim 15's embodiment of applying hydraulic pressure to the annulus and pumping pressurized fluid in the coiled tubing was also common practice as evidenced in the CGK and prior art.

[1373] Claim 16 is an independent method claim. Claims 16 and 18-21 all are anticipated by Patel with the difference being Patel used a ball valve or the type of locator used. These differences are easily bridged by the CGK of the time being able to swap out different components without this being an inventive step. This method describes how to shift a sleeve in the wellbore just as Claim 1 does. The difference being the method in Claim 1 uses a resettable anchor and the tubular inner profile locates the sleeve with an inner profile. Claim 16 uses a resettable seal and has a locating device within the locatable sleeve. Patel does address this by describing that an inflatable packer can be a resettable sealing member and describes a number of locating devices that can locate the packer in the sleeve. Patel does say the ball valve can be substituted for a sleeve valve which is a slidable sleeve over a port (as seen in the 907 Patent). MCCLs were known before the 907 Patent, as evidenced by BJ using their own locators when they had the Mongoose tool slide the OptiPort. MCCLs were CGK in the prior art.

[1374] Dependent Claims 17-24, 26, and 27 are almost mirrors of Claims 2-15 and are obvious for the same reasons. Claim 17 in particular suffers from a deficiency already touched upon: a

POSITA would understand the sleeve valves as having ports. While Claim 17 was barely not anticipated, it cannot escape this gap in obviousness.

[1375] Dependent Claim 25's step in the method of how to close a sleeve does not mirror any claim in 2-15 as Claims 1-16 do not say how to close a sleeve. Nevertheless, this is obvious given it was known how to open and thus close the sleeve the same way. As was taught in Patel, you could use the tool to close a sleeve.

[1376] Claim 28 also has no equivalent in Claims 1-16. Claim 28 has the pressurized fluid being fracturing fluid. Fracturing fluid as the pressurized fluid certainly was known to the industry and was not inventive.

[1377] The claimed method of completion of wells described in the 907 Patent Claims would have been obvious to skilled persons at the relevant time. Thus the patentee does not merit a monopoly as the invention was not new, useful and unobvious: see *Sanofi*.

[1378] I find Claims 1-28 of the 907 Patent are invalid for obviousness.

(3) ***Other Issues with the 907 Patent***

[1379] The Defendants advanced several other attacks on the validity of the 907 Patent. The inutility, overbreadth, and material misrepresentation allegations were front and centre in the invalidity arguments. While I do not need to make determinations on each of these issues given my findings as well as the breadth and multitude of issues already in this decision, I will comment that the Defendants' arguments are strong.

[1380] I echo my approach from the 676 and 652 Patents and decline to make any further validity determinations given my invalidity findings in anticipation and obviousness.

D. NCS's 026 Patent

[1381] The 026 Patent is titled, “Tools and Methods for Use in Completion of a Wellbore” and consists of 14 claims. The 026 Patent was filed on May 4, 2011, was published on July 12, 2011, and was issued on December 29, 2015.

[1382] The 026 Patent claims priority from US61/394,077 and is a divisional of the 907 Patent. I note that the 026 Patent's disclosure shares a considerable overlap with the 907 Patent's disclosure – although, the claims do differ slightly.

[1383] Finally, the inventors are Donald Getzlaf, Marty Stromquist, Robert Nipper and Timothy Willems.

[1384] The relevant date for construction is the publication date of July 12, 2011.

[1385] The Defendants have attacked the validity of this Patent as having Claims 1, 2, 6, 7, 11 and 12 as being anticipated by the methods used to shift the OptiPort Sleeve. As well, the advance and the invalidity of the 026 Patent as being obvious, overbreadth, inutility and as being insufficient. The Defendants also raised section 53 of the *Patent Act* regarding a material misrepresentation that NCS did not invent the OptiPort Sleeve yet included it in their figures and did not add Mr. Ravensbergen on as an inventor, which evidence was also applicable to the 907

Patent. The Plaintiff addressed in closing the arguments related to obviousness-type double patenting.

(1) *Anticipation*

[1386] Considering the total symmetry between the 026 Patent and the 907 Patent, the same prior art and anticipation analysis must apply. All of 026's claims that are mirrored in the 907 Patent which were found to have been anticipated for the 907 Patent must also be anticipated for the 026 Patent.

(2) *Obviousness*

(a) *Inventive Concept*

[1387] The Plaintiff's position was that the inventive concept was "a novel method to shift open a frac sleeve via the application of mechanical force and/or hydraulic pressure to frac sleeve." Mr. Lehr's opinion is that the 026 Patent does not use mechanical and or hydraulic force to open a frac sleeve. This invention covers sleeves shown in Figures 3, 4A, and 4B. The methods of the 907 Patent do not cover the sleeves in Figure 3.

[1388] The Defendants' position, as articulated by Mr. Chambers, is that there is not a clear inventive concept but the summary does describe "a variety of embodiments, including hydraulically shifted sleeves, mechanically shifted sleeves, and abrasive jet cut ports. The method claims a wide variety of BHA's with combinations of sealing members in dual straddle or single element setups, many of which already appear in the prior art (such as BJ OptiPort collars, the Haliburton CobraFrac tool, etc.)." Mr. David echoes Mr. Chambers' opinion by

saying there is nothing inventive about a method when there is no explanation of how to make the method work.

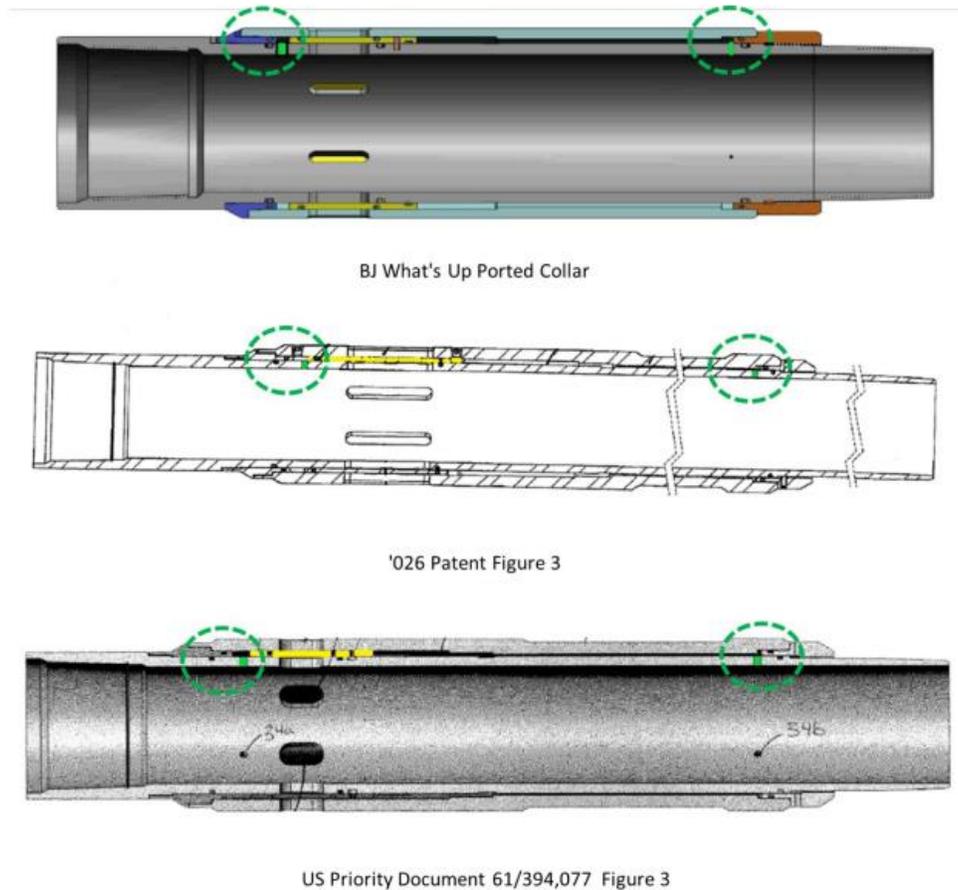
[1389] I find that there is not an inventive concept as the abstract is the same as the 907 Patent as is the field of the invention, etc. If I am wrong in that there is no inventive concept, or that there cannot be no inventive concept, I find that the inventive concept is the exact same as the 907 Patent.

[1390] For this analysis I wholly accept Mr. Chambers' opinion where he states that the patent does not propose any new shifting tool designed and relies on method claims that if they "claimed to cover any workable embodiments, are identical to those that were already being practiced previously by others in the field. However, as set out in greater detail in my analysis below under the 'Claims broader and inoperable embodiments' section, there are no workable embodiments in any claim of the 026 Patent based on my construction of the claims... In the event that there is a workable method disclosed in the claims of the 026, it is no different than the method of operating BJ's OptiPort Sleeve, which was carried out using NCS's Mongoose BHA prior to the claim date for the 026 Patent."

[1391] Mr. Lehr summarized the differences in the "State of the Art" here as being the same as he set out in the 907 Patent. He summarized the prior art, reviewing the OptiPort, Cobra, Patel, papers OTC 6755, SPE 143250, and SPE 50655. He says the OptiPort Sleeve had no reliable tool to shift it, so in the summer of 2010, NCS was hired to use their tool, the Mongoose, to do it. In his opinion there is no citable prior art that makes the claims of the 026 Patent obvious.

[1392] Mr. David indicated that the methods to slide sleeves, straddle packers and jet perforation devices were well known to the POSITA. He does indicate that the difference between the prior art and the claims of the 026 Patent are that there is a requirement that the sealing device must be set below the ported tubular segment and that the jet perforation device be on the same tool string to shift the sleeve. Mr. David states that having a jet perforation device on the string is a matter of choice and NCS did disclose the use of a jet sub on a tool assembly in the 676 Patent, which is incorporated by reference. This option was commonly used as early as Mandrell and the Cobra Jet as well. Using different types of sealing members is not new as this was disclosed in both Mandrell and the 676 Patent, but it is unclear how two compressible sealing elements could be used. He sees nothing inventive in applying force to shift a sleeve or in measuring a dead leg.

[1393] Mr. David opines that Figure 3 of the 026 Patent is identical to the BJ OptiPort. He provided the figures below:



(b) *Difference between the “State of the Art” and the Inventive Concept*

[1394] I agree with Mr. Chambers’ opinion on the obviousness of the 026 Patent and have summarized his opinion on a claim-by-claim basis below using the construction. I prefer his opinion (Mr. David’s is similar) to Mr. Lehr’s given my construction of the patent follows those experts’ construction, and not Mr. Lehr’s, when construction terms were disputed, and that construction is to be used in my obviousness analysis.

[1395] Claim 1’s method, if it works (which is argued it does not because of the placement of the sealing element), is the method used to shift the OptiPort Sleeve which was then fracked through.

[1396] Claim 2's straddle isolation device with two sealing members is disclosed in the "What Up?" Presentation.

[1397] Claim 3's two inflatable sealing elements are not specifically disclosed in the "What Up?" Presentation but they were used in straddle packers prior to 2010 as set out in SPE 50655. To use inflatable packers would have been obvious to a POSITA for the purpose of the method in Claim 3.

[1398] Claim 4 uses compressible sealing elements. This is disclosed in the "What Up?" Presentation as the lower member, and it would have been obvious for a POSITA to use a compressible sealing element for both the top and bottom arrangement.

[1399] Claim 5 uses cup seals which was disclosed in the "What Up?" Presentation and also would have been obvious to use cup seals as it was CGK to use a variety of seals.

[1400] Claim 6 setting out that the sealing member could be several different ones was not inventive, given the common use of these packers, and a POSITA would be familiar with them all. The "What Up?" Presentation shows a mechanical set packer as a sealing member and a POSITA would adapt and use any one of the ones listed in Claim 6.

[1401] Claim 7 uses hydraulic pressure to shift the sleeve which is exactly how an OptiPort Sleeve is shifted.

[1402] Claim 8, if it is workable, has mechanical force used to shift a sleeve. Shifting a sleeve using mechanical force has been used in the Patel Patent as well as in the Otis B.

[1403] Claim 9 uses both hydraulic and mechanical force to shift the sleeve and, as set out in Claim 7 and 8, if it is workable it has been done before and would be obvious.

[1404] Claim 10 has the tubing string as being coiled tubing which is used in the “What Up?” Presentation as well as in SPE 143250.

[1405] Claim 11 has the option of jetting a perforation in the liner. I find this obvious given that the “What Up?” Presentation has a jet perforation on the Mongoose to be used as a contingency.

[1406] Claim 12 is obvious as it is just the normal use of a jet perforator, of which had been in the industry’s prior art for a significant time before.

[1407] Claim 13 is the claim that uses an equalization valve to create a dead string to use for monitoring. Mr. Chambers’ evidence was that he had used this on wells since the late 1980’s and a POSITA would know how to use an equalization valve to make a dead string to monitor.

[1408] Claim 14 detects failure of treatment fluid into the formation and to perforate the liner tubing. This again is not inventive and has been used for some time and would be in the CGK.

[1409] I find Claims 1 to 14 of the 026 Patent to be obvious and thus invalid.

(3) *Other Issues with the 026 Patent*

[1410] The Defendants raised several other issues concerning this patent. As well, even though it was not identified as an issue, there was argument in Closing Submissions regarding obviousness in relation to double patenting.

[1411] I will again echo my approach from the 676, 652, and 907 Patents and decline to make any further validity determinations given my invalidity findings in anticipation and obviousness.

E. NCS's 704 Patent

[1412] NCS contends that Kobold's products infringe the following claims of the 704 Patent:

Category	Claim #s	Claims
Category A	1-8 and 10	Fracturing valve for a downhole tool
Category B	11-12, 14, and 15	Wellbore treatment assembly comprising a fracturing valve for a downhole tool
Category C	16, and 18-23	Downhole tool
Category D	28-30	Method of perforating and fracturing a formation intersected by a wellbore

[1413] NCS specifically alleges that Kobold's selector valve and BHAs incorporating the selector valve infringe the 704 Patent.

[1414] Kobold alleges that Claims 1-16, 18-23, and 28-30 of the 704 Patent are invalid. I note that, initially, the validity of *all* of the 704 Patent's 30 claims were at issue in the Joint Statement

of Issues. Kobold has narrowed the invalidity allegations slightly, although it still maintains invalidity of some claims that NCS does not allege infringement of (i.e. 9 and 13).

(1) *Anticipation*

(a) *Prior Art*

[1415] Please see the Summary of Prior Art at paragraphs 263-272 above. In the industry, the approach to switch between perforating and fracture stimulation was done via pumping a ball from the surface. This is known as a ball-seat arrangement. That ball would land on a seat and isolate the fracture ports below, thereby allowing the sand jet perforating or all of the fluid to be diverted out of the sand jet perforating port. Once that operation was complete, the operator would reverse circulate, which pumps through the wellbore coil tubing annulus and returns the ball back to the surface. Following this, the stimulating or fracture treatment could begin.

(i) Whether Experts Must Rely on the Same Pieces of Prior Art

[1416] Mr. David and Mr. Lehr rely on nine references as prior art, which form the basis of their obviousness opinion. In its closing submissions, the Defendants only relied on the 676 Patent family for its obviousness arguments.

Reference	Cited by		
	Mr. Chambers	Mr. David	Defendants' Closing Submissions
676 Patent Family	✓	✓	✓
Sherman	✓	✗	✗

SPE 130689	✓	✓	✗
Eslinger	✓	✗	✓
Howell	✓	✓	✗
Maier	✗	✓	✗
Pioneer	✗	✓	✗
SurgiFrac	✗	✓	✗
Costley	✓	✗	✗

[1417] NCS raises a preliminary issue, alleging that Kobold can only rely on references that were discussed by *both* of its experts. I take it that NCS implies where a piece of prior art is obvious, it should be obvious to both experts. NCS does not rely on any authority in support of this proposition, nor is it rational.

[1418] The “challenger may rely on a combination of pieces of prior art under the ‘mosaic’ theory of obviousness”: *Ciba* at para 60 citing *Wenzel* at para 87. In my view, all experts are able to contribute to this mosaic through different pieces of prior art. I reject the proposition that references must be discussed by both (or all) experts where there is more than one expert giving their opinion for a single party. Once a piece of prior art forms part of the record, the Court is able to consider it under the obviousness analysis. If all experts rely on the same piece of prior art, it is beneficial to the Court’s analysis but it is not determinative evidence of obviousness.

(b) *Disclosure*

[1419] Kobold alleges Claim 1 is anticipated. Between its two experts, Kobold relies on nine pieces of prior art. However, specifically for the anticipation analysis, only Mr. Chambers opines on the issue for Kobold and he relies only on Eslinger.

[1420] Claim 1 is a fracturing valve for a downhole tool, the essential elements of which have already been constructed. The tubular and sleeve have two positions: a first position where the window and port are aligned so that fluid can exit the valve, and a second position where fluid cannot. Movement of the valve from first to second position is effectuated only by applying a mechanical force to the tubular.

[1421] In Mr. Chambers' opinion, Eslinger sufficiently describes Claim 1.

[1422] Mr. Lehr attempts to counter Mr. Chambers' findings by claiming Eslinger "does not disclose a valve" at all. His greatest objection is that he claims the Eslinger valve is supposedly not capable of being "mechanically actuated and operatively coupled" to a perforating device.

[1423] The term "operatively coupled" has not been constructed, but given the context I give it the same meaning as "operatively assembled." I will also note that I have already constructed the fracturing valve in Common Issues.

[1424] With these constructions in mind, the fundamental flaw Mr. Lehr's objection suffers from is his frequent reading in of essential elements that are not only not part of the construction of Claim 1, but are also not contained in Claim 1 at all. There is no requirement in the claim that the

valve be “operatively coupled” or “operatively assembled” with any perforating device. Mr. Lehr’s importation of information from subsequent claims and the disclosure has his analysis colouring outside the lines of construction, making his anticipation analysis unhelpful.

[1425] To be clear, in analyzing anticipation for Claim 1 the focus is only on the essential elements of the claim. The character of the patent, including the capacity to perforate and fracture in one trip, is not the subject of the analysis. If anticipation were claimed against the entire patent this would be different, but the Defendants only alleged anticipation against Claim 1.

[1426] I agree with Mr. Chambers. Logically, the function of the valves must be the same: to prevent or enable fluid to exit the valve when a port and window are aligned. Based on the construction of the valve, I see no difference between Claim 1’s valve being effectuated by applying a mechanical force to the tubular and Eslinger’s valve being moved by the application of force to the inner tubular member and actuated by a spring assisted medium. I find Eslinger’s ability to move by the application of force to the inner tubular member and actuated by a spring assisted medium is a rephrasing of “effectuated by applying a mechanical force to the tubular.” Claim 1 is therefore disclosed by Eslinger.

(c) *Enablement*

[1427] If a POSITA were to read Eslinger and assemble the Eslinger valve, they would have a valve with all the same essential elements as the valve in 704’s Claim 1. As Mr. Chambers notes, this can be practiced entirely “without inventive ingenuity or undue experimentation.”

[1428] For these reasons, Claim 1 is anticipated by Eslinger and is therefore invalid.

(2) *Obviousness*

(a) *Inventive Concept*

[1429] The 704 Patent's inventive concept is directed toward a valve that allows a well to be perforated and fractured by pumping fluid down the coil without having to remove the BHA from the well. Mr. Lehr agrees that the 704 Patent discloses a fracturing valve that can be opened and closed via mechanized force transmitted to the valve via pushing down or pulling up on the tubing string.

[1430] Mr. Lehr attempts to go one step further than Kobold's experts and expand the inventive concept such that it includes well cleaning capabilities of the 704 Patent. However, when determining the inventive concept the Court must look at the "invention as claimed": see *Janssen-Ortho Inc v Novopharm Ltd*, 2006 FC 1234 at para 114 aff'd 2007 FCA 217. As construed, the 704 Patent invention pertains to a valve that allows a well to be fractured and perforated. Whilst cleaning functions of a fracturing valve may be advantageous, the inventive concept as claimed relates to a downhole valve that allows fracturing and perforating in one trip.

[1431] As previously discussed, an important aspect of the 704 Patent's inventive concept is that the fracturing valve can be actuated between two different modes by the application of mechanical force. The 704 Patent also strives to reduce inefficiencies that were associated with the traditional ball-seat assembly.

(b) *Differences between the “State of the Art” and the Inventive Concept*

[1432] I will analyze two pieces of prior art used by Kobold’s experts in particular: the 676 Patent Family and the Howell Patent. This is because only the 676 Patent Family and the Howell Patent disclose teachings related to perforating and fracturing in the same trip. I accept that other prior art unrelated to perforating and fracturing in the same trip may not be as helpful in analyzing obviousness of 704 as a whole, but could make specific essential elements obvious. I also note that by the conclusion of Kobold’s closing submissions, its obviousness analysis was focused on the 676 Patent Family.

[1433] Kobold explains that the difference between the 676 Patent Family’s and the 704 Patent’s inventive concept is the inclusion of a lower seal. NCS argues that while components of the 704 Patent share similarities with the 676 Patent Family, the specific niche fracturing valve disclosed and claimed by the 704 Patent is not consequently obvious.

[1434] As pointed out by Mr. Lehr, only the Howell Patent and the 676 Patent Family enable perforating and fracturing “in the same trip.” However, Mr. Lehr explained that the main difference between those pieces of prior art and the 704 Patent is that the teachings of Howell and the 676 Patent Family do not disclose a fracturing valve that can switch between the fracturing and perforating modes via mechanical force to the tool assembly. Therefore, Mr. Lehr is of the view that there is a significant inventive gap between the Howell and 676 Patent Family teachings and the teaching of the 704 Patent.

[1435] Kobold relies on Sherman and SPE for the proposition that fracturing wedges or flow diverters were known in the art. However, NCS points out that a wedge in the 704 Patent is an optional component that is only included in some dependent claims. As I understand NCS's position, since the wedge is only optional for the 704 Patent, it does not form a part of the inventive concept. Therefore, there is no gap to bridge with respect to wedges in fracturing valves.

[1436] I accept NCS's position for those claims that do not contain reference to a wedge. However, obviousness analysis is a claim-by-claim analysis: *Zero Spill* at para 83. Based on the claims construction, the wedge is essential to the dependent claims mentioning it and Kobold must establish that the wedge is obvious in those claims.

[1437] The 676 Patent Family describes a multi-function valve. Mr. David maintains that there is no inventive difference between the 676 Patent Family and the 704 Patent. However, Mr. Lehr explained that the 676 Patent Family is not intended for coil tubing fractures, cannot toggle between modes via the pushing and pulling mechanism, and the jet perforation device is not actuated by mechanical force. I accept that although the 704 Patent falls within the scope of the 676 Patent Family, Mr. Lehr's explanation outlines the differences.

[1438] In sum, the overarching gap between the "State of the Art" and the 704 Patent is the ability to perforate and fracture without the need for a ball to seal or divert the perforating fluid through the abrasive jet port.

(c) *Do the Differences Constitute Steps that would have been Obvious to the POSITA*

[1439] It is insufficient for a party alleging obviousness of a patent to provide numerous pieces of prior art and say all the pieces of prior art provide specific components from the invention and as such the impugned invention can be made. Such an approach suffers from hindsight bias: *Sanofi* at para 67. This does not explain *why* the POSITA would choose to put all the components together. The question is: viewed without hindsight, do the differences between the prior art and the inventive concept constitute steps which would have been obvious to the POSITA, or do they require any degree of invention: *Apotex* at para 67.

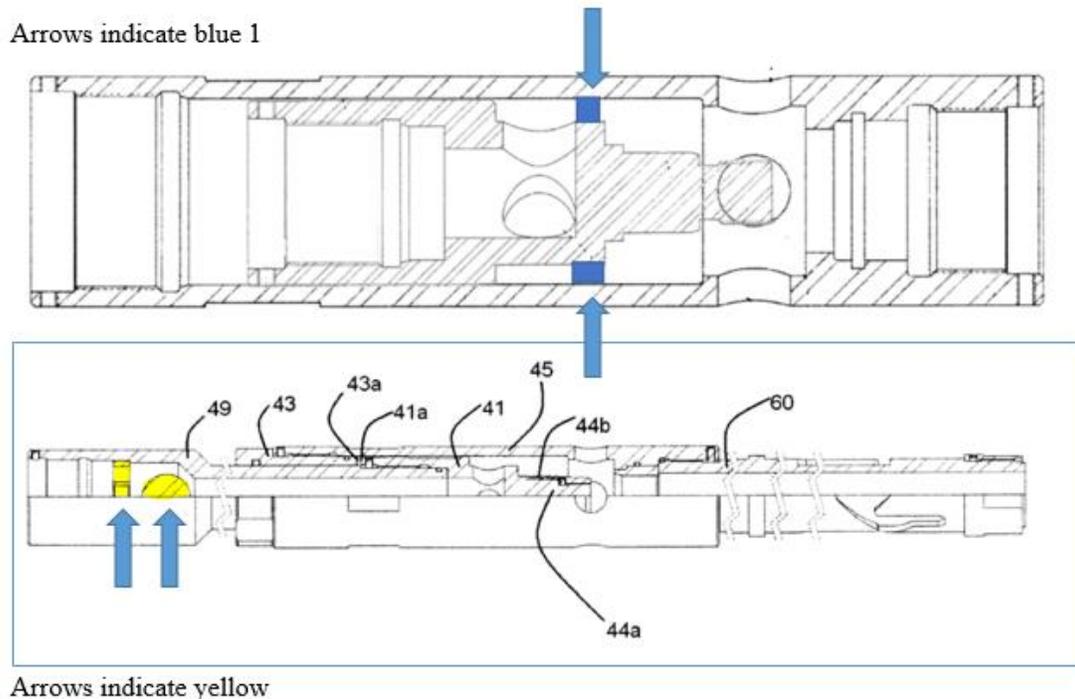
[1440] Although the POSITA can mosaic several (or potentially as many) pieces of prior art with the CGK, the Court should ask why such a combination would be obvious.

[1441] Obviousness analysis is conducted on a claim-by-claim basis but Kobold directs its submissions to the 704 Patent's inventive concept generally. I note that neither Mr. David's nor Mr. Chambers' 704 obviousness analysis correctly addresses the legal test for obviousness as set out in *Sanofi*. Mr. David's analysis here is succinct and unhelpful, he reviews individual claims and then simply states that the essential part of the claim can be found in the prior art. Mr. Chambers takes a broader approach but similarly outlines how each component of the 704 Patent can be found in the 676 Patent Family. Neither expert explains *why* the claims are obvious nor am I able to ascertain why the skilled person would choose to assemble the components together.

[1442] The dispute between NCS and Kobold largely revolved around whether the skilled person would configure the seal in the same placement as the 704 Patent and remove the ball and ball

retainer. This is demonstrated in the images below from Mr. Lehr's responding report, where it is blue (arrow points to where it is blue) signifies where a seal would need to be positioned and the ball and seat retainer (in yellow; arrow points to where it is) would need to be removed:

[Emphasis added].



[1443] Mr. Lehr explained that a “significant amount of trial and error experimentation in combination with ingenuity would be required to construct the 704 valve.” Mr. Lehr also opined that if the skilled person wanted to design a tool assembly that could perform a fracture and also perforate in a single trip, the skilled person would follow Howell’s teachings and install a perforation gun below the fracturing valve.

[1444] NCS acknowledges that the 704 Patent falls within the scope of the asserted claims of the 676 Patent Family, although it disputes that this renders the *specific* fracturing valve disclosed and claimed by the 704 Patent to be obvious. NCS explains that the fracturing valve disclosed by

the 704 Patent relates to a “specific niche application.” NCS relies on Mr. David’s statement that the 704 Patent’s teaching was “not a common practice in Canada prior to the filing of the 704 Patent and is still not common practice today” to suggest that the skilled person would not be motivated to create new fracturing valve designs.

[1445] *Novopharm* provides a useful summary of factors to consider when assessing obviousness. Of particular relevance to NCS’s point that a skilled person would “never have thought of modifying any of the state-of-the-art references” disclosed in the 704 Patent are factors four and five as follows:

4. The climate in the relevant field at the time the alleged invention was made

The general “State of the Art” includes not only knowledge and information but also attitudes, trends, prejudices and expectations.

5. The motivation in existence at the time the alleged invention to solve a recognized problem

“Motivation” in this context may mean the reason why the claimed inventor made the claimed invention, or it may mean the reason why one might reasonably expect the hypothetical person of ordinary skill in the art to combine elements of the prior art to come up with the claimed invention. If within the relevant field there is a specific problem that everyone in the field is trying to solve (a general motivation), it may be more likely that the solution, once found, required inventive ingenuity. On the other hand, if there is a problem that only the claimed inventor is trying to solve (a unique or personal motivation), and no one else has a reason to address that problem, it may be more likely that the solution required inventive ingenuity. However, if commonplace thought and techniques can come up with a solution, there may be a reduced possibility that the solution required inventive ingenuity.

[Emphasis added]

Novopharm at para 25

[1446] As I understand Mr. David's comment, the reason why the 704 Patent was not and is still not common practice is because in coiled tubing the fluid must be pumped through the entire coil string to reach the BHA regardless of how much has actually been deployed in the well. This method creates limitations on the rates that fluid can be pumped, whereas, the typical approach which pumps fluid down the annulus of the well does not have this limitation.

[1447] NCS's argument on motivation is puzzling because it raises two points that are counterintuitive to one another. First, NCS alleges that the POSITA would not be motivated to combine the prior art because the result is "apparently undesirable." This falls into the specific motivation category and therefore suggests inventiveness: see for example *AstraZeneca Canada Inc v Mylan Pharmaceuticals ULC*, 2017 FC 142 at para 151. However, this argument points away from inventiveness because the invention appears not to have been commercially successful. Commercial success is a secondary factor listed in *Novopharm* at paragraph 25 for consideration of obviousness.

[1448] As stated by the Federal Court of Appeal at paragraph 27 of *Novopharm*, the "task of the trial judge in each case is to determine, on the basis of the evidence, sound judgment and reason, the weight (of any) to be given to the listed factors." I do not find NCS's position regarding the motivation to create new, allegedly less effective fracturing valves particularly persuasive.

[1449] In Kobold's view, neither the addition of a seal nor the removal of a ball and seat retainer require any degree of inventiveness. In their opinion, the differences identified by Mr. Lehr can be bridged either by the 676 Patent or the CGK.

[1450] Kobold’s overarching submissions on the inventiveness of the patent do not aid the claim-by-claim analysis. Kobold’s experts also provide conclusory statements on obviousness that do not show why the POSITA would draw these conclusions.

[1451] Even if I accept that the skilled person would have removed the ball and seat and replaced it with a lower seal, it is unclear how this applies to each claim.

[1452] Kobold had the onus of showing why each claim was obvious and why the POSITA would combine the pieces of prior art together in such a way. Aside from any motivation to create the specific fracturing valve in the 704 Patent, I find that Kobold has not met its burden to show invalidity due to obviousness of the 704 Patent. Kobold did not provide sufficiently clear evidence or submissions to meet the burden of proving the claims were obvious.

[1453] In light of this deficiency, the 704 Patent’s Claims are not obvious on this record.

(3) *Overbreadth*

[1454] The applicable date for the overbreadth analysis is the publication date of January 10, 2015.

(a) *Essential Elements of a Fracturing Valve – Seal, Wedge, and Equalization Plug*

[1455] Kobold argues that the wedge, plug, and seal interact together “at the core of the invention to make the valve described in the 704 Patent work.” In support of its position, Kobold

points to the disclosure of the 704 Patent, which does not teach how to make the invention work without these three core components.

[1456] NCS deals with Kobold's overbreadth attack by pointing out that overbreadth is concerned with whether essential components core to the invention are not disclosed or claimed. Therefore, in NCS's view, allegations with respect to "structural components" are not salient. NCS contends that both Mr. Chambers' and Mr. David's issues can be resolved by "a proper construction of Claim 1 of the 704 Patent." I have done this construction, and the issues have not resolved.

[1457] I am mindful of the fact that an overbreadth analysis must not revive the "promise of the patent" doctrine: "the search for the missing essential element must not morph into an inquiry into the achievement of the invention's objectives": *Seedlings FC 1* at para 173.

[1458] I turn to each of the components, the wedge, plug, and seal, below and address whether:

- A. They are at the core of the invention actually invented or disclosed; and,
- B. The components formed part of the CGK of the skilled person.

(i) Wedge

[1459] Kobold explains that the integral wedge and lower seal act together to block flow through the valve in the second position, which is a "claimed functional requirement" of each of independent Claims 1, 11, and 16 (and therefore each of Claims 1-23). In Kobold's view, if the wedge is not present, the function of blocking flow through the valve in the second position

cannot be performed. Therefore, in its submission, the claims that do not claim a wedge are invalid for being overly broad.

[1460] NCS disputes this, submitting that the wedge does not give rise to overbreadth as contemplated in *Seedlings FCA*, as the “wedge is not an essential feature of the invention.”

[1461] I agree with NCS that the wedge does not go to the very core of the 704 Patent. Kobold alleges that “[a]lthough the shape of the wedge is not crucial, the presence of a solid component to block the throughbore of the tubular is.”

[1462] Consequently, the actual issue with respect to the wedge is whether the skilled person would understand that a solid component is required to block the throughbore of the tubular. Based on my above construction, the skilled person would know that an obstruction is inherently included in the skilled person’s understanding of a fracturing valve. Such an obstruction suffices to fulfill the requirement of a solid component to block the throughbore of the tubular, which is at the core of the invention of the 704 Patent.

[1463] Therefore, claims that do not specify the wedge do not fail for overbreadth – the wedge does not go to the very core of the invention described in the 704 Patent. The obstruction is the core of the invention. Reading the patent through the “goggles supplied by the experts” the skilled person would understand that claims which do not specify an obstruction would still be read as including an obstruction based on the skilled person’s understanding of the term “frac valve”: *Cobalt Pharmaceuticals Company v Bayer Inc*, 2015 FCA 116 at para 17.

(ii) Seal(s)

[1464] The 704 Patent describes numerous embodiments that have various seal placements. As noted in the “seal” construction section above, there are three seals described in the preferred embodiment. However, the parties do not dispute that the lower seal is essential to allow the fracturing valve to operate. The lower seal blocks fluid flow through the valve, which is necessary to develop sufficient pressure to perform a fracturing operation.

[1465] Kobold argues that the claims that do not include a lower seal are invalid for overbreadth, as the lower seal goes to the very core of the invention. NCS, again, explains that Kobold’s allegations are based on a non-purposive construction that fails to consider whether seals may be included in claims that use the word “comprising.”

[1466] In cross-examination, Mr. Lehr explained his view of the seal issue as follows:

Q And so you agree with me that there is no seal in Claim 1?

A What I would say is Claim 1, the scope of Claim 1 includes a seal.

Q All rights. So you would read it in to Claim 1?

A No, no, what I’m saying is the scope -- the scope of Claim 1 includes a seal because we have a dependent claim here identifying it as a -- as a possible -- was a limitation.

So again, if I look at Claim 1, again and look at the teachings of the patent, look at the figures, I see seal 47, I see another seal in there maybe, 46 or something like that.

It’s my opinion that the teaching is sufficient to help the skilled person work the invention and inclusion of the seal would give you maximum longevity on the components.

Mr. Lehr Cross-Examination Volume 8 at 142:13-143:2

[1467] The placement of the seals and the number of seals goes to the very core of the 704 Patent invention. The 704 Patent discloses a fracturing valve and both parties agree that the lower seal is essential to allow the fracturing valve to operate as disclosed. The 704 Patent does not disclose any method by which the invention could operate without the described lower seal placement. The lower seal is an essential element that goes to the very core of the invention.

[1468] The evidence does not establish that the skilled person, in construing claims without a seal, would understand based on the CGK that the claim was only describing a fracturing valve including the described specific lower seal position.

[1469] A purposive construction does not save the 704 Patent Claims. I repeat the warning from *Minerals Separation North American Corporation v Noranda Mines Limited* (1947), 1949 CanLII 55 (SCC), Ex CR 306:

By his Claims the inventor puts fences around the fields of his monopoly and warns the public against trespassing on his property. His fences must be clearly placed in order to give the necessary warning and he must not fence in any property that is not his own. The terms of a Claim must be free from avoidable ambiguity or obscurity and must not be flexible; they must be clear and precise so that the public will be able to know not only where it must not trespass but also where it may safely go.

[Emphasis added]

[1470] Accordingly, I conclude that Claims 1-3, 6-18, and 20-23 are invalid for overbreadth.

(iii) Equalization Valve or Plug

[1471] Again, Kobold argues that claims which fail to claim an equalization valve are invalid for overbreadth because it is another component at the very core of the valve disclosed in the 704 Patent. NCS maintains that this is another instance where Kobold's non-purposive construction leads to the overbreadth findings.

[1472] NCS argues that the 704 Patent teaches how an equalization plug can prevent fluid from flowing further down the tool string below a set sealing device. Further, NCS submits that familiarity with an equalization plug on a tool string forms part of the CGK. Alternatively, NCS contends that if the fracturing valve is used for applications other than fracturing (for example well cleaning) it is not necessary for the fracturing valve to include an equalization plug.

[1473] Mr. Chambers' primer explains the following regarding equalization valves:

“An equalizing, or equalization, valve is a common component in downhole tools, and has been since long before 2010. The valve can be closed or opened to block or permit flow past a certain point in the BHA. An equalization valve is often associated with a packer, which can be set to seal the wellbore annulus, and this was the case before 2010 as well...”

Mr. Chambers Invalidity Report at para 202

[1474] Based on Mr. Chambers' background information, I accept that the skilled person would understand an equalization plug is frequently found within fracturing valves. However, I do not accept that all fracturing valves include an equalization plug and therefore the skilled person would not know that this specific fracturing valve must be read as including an equalization plug.

[1475] The equalization plug in the 704 Patent goes to the very core of the invention, such that the fracturing valve cannot operate without an equalization plug. However, the evidence does not demonstrate that the skilled person would inherently read a “fracturing valve” as including an equalization plug. Although they were commonly known, I am unable to conclude that the skilled person would know that a fracturing valve always includes an equalization plug. Claims that do not specifically claim an equalization valve are therefore invalid for overbreadth because the inventors claimed a fracturing valve without an equalization plug, which is beyond the scope of the invention.

[1476] I reject NCS’s alternative submission that, if the fracturing valve is only used for applications other than fracturing (such as well cleaning), it is not necessary for the fracturing valve to include an equalization plug.

[1477] The claimed invention is directed toward a fracturing valve and the core of the invention includes components required for fracturing, not cleaning. This is not a resurrection nor reliance on the “promise of the patent” doctrine but a determination of what goes to the core of the invention, as required by *Seedlings FCA*. The 704 Patent is directed to a fracturing valve, wherein the disclosure states that the invention “relates to a method for fracturing a wellbore, and to a valve for fracturing of a wellbore, and to a method and tool for fracturing and perforation of a wellbore.” Insofar as Claim 10 relates to well cleaning, it is in relation to fracturing and perforating; the invention is directed to a fracturing valve.

[1478] Accordingly, those claims that do not explicitly claim an equalization plug are invalid for overbreadth. Claims 1-10, 16, 18-19, 22, 23, and 28-30 are invalid for overbreadth.

(b) *Alignment Mechanism*

[1479] Kobold alleges that Claims 1-6 and 8-30 are overly broad because they fail to include an alignment mechanism. The alignment mechanism is important because, without it, the tubular and sleeve could rotate relative to one another as they move axially between the first and second positions. Kobold also submits that Mr. Lehr admitted that an alignment mechanism is necessary for the fracturing valve of Claim 1 to work.

[1480] In his responding report, Mr. Lehr disagrees that all of the 704 Patent Claims require an alignment mechanism. In his view, “constant alignment is not required for all applications to which the frac valve of the 704 Patent can be used.” Again, Mr. Lehr suggests that alignment is not necessary for functions such as well cleaning.

[1481] As above, I reject the notion that cleaning capabilities can save the 704 Patent from overbreadth. As set out in *Seedlings FCA* at paragraph 54, the focus of the overbreadth analysis is whether the “feature is so key to the invention described in the disclosure that a Claim that omits it encompasses embodiments that were not contemplated in the disclosure.” Considered as a whole, the invention described in the 704 Patent is a fracturing valve for perforating and fracturing; the cleaning capabilities in the 704 Patent relate to its perforating and fracturing uses and not an altogether separate cleaning function.

[1482] There is insufficient evidence with respect to alignment mechanisms for the Court to conclude that the skilled person would understand how to implement the alignment mechanism to make those claims work that do not specify an alignment mechanism.

[1483] The evidence establishes that all of the claims of the 704 Patent require an alignment mechanism to allow for perforating and fracturing. An alignment mechanism goes to the very core of the 704 Patent invention, as it is essential for fracturing and perforating to occur. Mr. Lehr acknowledged this in cross-examination when he was examined on Claim 1 as follows:

Q So you, to make this work, you would need to add in another component?

A Yes. I believe the dependent claims help you with that, including a sleeve and alignment mechanism and that kind of thing.

But again, when we look at -- when I look at -- sorry, when I look at the patent in its totality, read it, look at the claims, it is pretty clear to me, but please go ahead.

Mr. Lehr Cross-Examination, Volume 8 Transcript at 117 Lines 13-23 [Emphasis added]

[1484] However, the evidence did not establish that the skilled person would know that the claim would inherently include an alignment mechanism. There is nothing in the record to suggest that the skilled person would read the 704 claims that do not specify an alignment mechanism as including one. Therefore, the inventors have claimed a fracturing valve without an alignment mechanism, which is beyond the scope of the invention.

[1485] I echo Justice Manson's comments in *Frac Shack Inc v AFD Petroleum Ltd*, 2017 FC 104

[*Frac Shack*], regarding claims that are overly broad:

[231] In some cases, patentees and their agents come to the Court seeking validation of Claims that are purposefully drafted broader than any invention conceived of, developed, or made by the inventors. They hope to secure the broadest protection possible for new, unobvious, and useful inventions, knowing that if some Claims are overly broad, the cascading, narrower dependent claims, or other narrower independent claims, can survive the

scrutiny of the Court. Claim construction is done by the Court “in the interest of fairness to both the patentee and the public” (emphasis added; *Free World Trust* at para 50). Therefore, these overly broad Claims cannot, and should not, be upheld by “reading in” language or limitations not included within the fence posts of the Claims being construed, based on a fair and purposive reading of the supporting patent specification—nothing in the ‘567 Patent supports the Plaintiffs’ proposed narrow construction of work site.

[1486] Therefore, because Claims 1-6 and 8-30 do not specify an alignment mechanism, they are invalid for overbreadth.

(c) *Nothing to Hold the Mandrel Stationary in Claims 16 and 18-23*

[1487] In constructing Claim 23 of the 704 Patent, Kobold raised concern with respect to how the mandrel is stationary. Both of Kobold’s experts explained that the inclusion of a mandrel in dependent Claim 23 suggests that there is no feature holding the outer sleeve stationary in any of the earlier claims. Kobold alleges that independent Claim 16 and dependent Claims 18-22 are invalid for failing to specify that the mandrel is held stationary as that is an essential element of the invention.

[1488] *Ratiopharm Inc v Canada (Health)*, 2007 FCA 83 [*Ratiopharm*] explains that there is a starting presumption that claims are not redundant:

[33] There is no doubt that claims can be repeated and that this will occur from time to time. However, the starting assumption must be that claims are not redundant, and only if a purposive analysis shows that claims are in effect duplicated can this construction be adopted. In this case, Claim 1 is an independent claim which, absent a contrary indication, must be read in a manner consistent with Claim 3 which is dependent on it (see *Halford et al v. Seed Hawk Inc et al*, 2004 FC 88 (CanLII), 31 C.P.R. (4th) 434, per

Pelletier J. (as he then was) at paras. 92 to 98). This is how Campbell J. read Claim 1. I can see no error in this regard.

[Emphasis added]

[1489] Claim 23 is a dependent claim, which incorporates all of the elements of the independent Claim 16. In my view, the limitations included in Claim 23 (i.e. that the mandrel is held stationary) cannot be read into the earlier claims as it renders Claim 23 redundant. A purposive analysis does not show intention to duplicate claims here. In addition, claim differentiation provides that the limitations of dependent claims are not generally read into independent claims: see for example *Camsco* at para 103; *Halford* at para 90. In my view, it would be a violation of claim differentiation to read Claim 23 into the earlier independent claims. Claims 16 and 18-22 therefore do not include the limitation that the mandrel is held stationary.

[1490] Puzzlingly, the evidence suggests the skilled person would understand that Claims 16 and 18-22 do need to include the limitation that the mandrel is held stationary. Mr. Lehr's evidence was that any connection, such as a threaded connection, between the mandrel and outer sleeve would enable the mandrel to be held stationary. In addition, the 676 Patent Family provides a similar understanding on the CGK. Although NCS did not directly address the stationary issue in Claim 23 in either its overbreadth or utility section in closing, I infer that its position is that holding the mandrel stationary forms a rudimentary part of the CGK.

[1491] Unfortunately, I cannot accept that Claims 16 and 18-22 can be saved via the CGK, as this is contrary to the principle against redundancy and claim differentiation.

[1492] It appears that, generally, the mandrel would be held stationary in such a tool and this would form a basic part of the CGK. However, the POSITA would not know that these claims inherently include a mechanism to hold the mandrel stationary due to the principles of claim differentiation and the principle against redundancy. The limitations of a dependent claim should not be read into the independent claim, unless rebutted: *Ratiopharm FCA* at para 33. Claim differentiation is “especially strong” where there is only one meaningful difference between an independent and dependent claim: *Halford* at para 94. Here, the only meaningful difference between Claim 23 and Claim 16 is the fact that the mandrel is held stationary. Consequently, in my view, the presumption is strong in this instance.

[1493] Despite the CGK, the POSITA would not construe Claim 16 as including a limitation that the mandrel must be stationary as they would presume the inventor intended not to create redundant claims. NCS has not adduced sufficient evidence or arguments to rebut this presumption.

[1494] Holding the mandrel stationary is core to the 704 Patent invention: there must be some kind of component that provides frictional resistance against the wellbore that allows the mandrel to remain stationary for the invention to operate.

[1495] The inventors have only disclosed and invented a fracturing valve whereby the mandrel is stationary, however, the 704 Patent invention claims more whereby there is no limitation on whether the mandrel is stationary or sliding, which is beyond the scope of the 704 invention. Therefore, Claims 16 and 18-22 fail for overbreadth.

(4) *Utility*

[1496] NCS points out that, despite Kobold's experts receiving proper instructions on the law of inutility, they did not apply the test as set out by the Supreme Court in *AstraZeneca*. NCS further highlights how even though Kobold's experts did not apply the law of inutility, Kobold still maintains issues of invalidity based on inutility.

[1497] I agree that Kobold's approach to utility is not overtly clear. However, to re-emphasize, as I understand Kobold's arguments, the inutility allegations flow from the overbreadth findings. In essence, it is because the 704 Patent Claims are missing essential elements that are necessary for it to operate as a fracturing valve that it does not claim anything useful. Therefore, in Kobold's view, it did not need to address sound prediction because the 704 Patent Claims have never been useful nor will they ever be useful because it cannot function. In addition, utility by demonstration could not be shown because the claimed invention has never been useful. As counsel for Kobold explained in closing, "it has to be able to work ... it is not met in this case with embodiments without a seal and embodiments without a wedge and embodiments without an equalization valve."

[1498] NCS raises two issues with Kobold's utility allegations. First, NCS explains that the alleged missing elements can be read in to the claims via the CGK. Second, NCS maintains that where elements of the fracturing valve are not claimed, the fracturing valve can serve other purposes.

[1499] *AstraZeneca* explains that the utility must be related to the invention's subject matter:

[53] Utility will differ based on the subject matter of the invention as identified by claim construction. Thus, the scope of potentially acceptable uses to meet the s. 2 requirement is limited — not any use will do. By requiring the usefulness of the proposed invention to be related to the nature of the subject matter, a proposed invention cannot be saved by an entirely unrelated use. It is not sufficient for an inventor seeking a patent for a machine to assert it is useful as a paperweight.

[1500] Although a “scintilla of utility” will suffice, that scintilla must relate to the nature of the subject matter: *AstraZeneca* at para 55.

[1501] The 704 Patent “relates to a valve and method for fracturing” and to a tool for carrying out perforating and fracturing. Therefore, any other alleged purpose of the 704 Patent must relate to the perforating and fracturing function.

(a) *Wedge, Seal, and Equalization Plug*

(i) Wedge

[1502] Kobold alleges the 704 Patent Claims that do not claim a wedge are invalid for utility. This is because, in Kobold’s view, if the wedge is not present, the function of blocking flow through the valve in the second position cannot be performed.

[1503] I agree with NCS that the purpose of the wedge is to redirect flow through the aligned window and port to slow the speed of proppant laden fluid and prolong the life of the tool. However, as noted in the overbreadth section, the wedge does not go to the very core of the 704 Patent’s invention. Rather, the core of the invention is an obstruction required to block the throughbore of the tubular.

[1504] Both parties and their respective experts agree “the shape of the wedge is not crucial,” but the “presence of a solid component to block the throughbore of the tubular is.”

[1505] Based on my construction above, even without a wedge, the POSITA would understand that the 704 Patent Claims contain an obstruction. Therefore, the functionality required of a fracturing valve is met. It is clear that, on the wedge issue, the POSITA could make the invention work through the application of “some basic knowledge or routine testing”: *AstraZeneca* 2015 at para 281.

[1506] Therefore, there is a demonstration of utility with respect to the wedge since the fracturing valve can operate with or without a wedge.

(ii) Seal(s)

[1507] NCS advances two positions with respect to the seals in the 704 Patent. First, NCS is of the view that the skilled person would read the claims in light of the CGK and therefore know where the seals should be placed. Second, NCS maintains the 704 Patent is still useful without seals. For example, Mr. Lehr explained that a lower seal between the mandrel and outer sleeve may not be required when the valve is used for a simple wellbore circulation and cleanup task.

[1508] On NCS’s first position, the source of disagreement is whether a skilled person would understand that claims which do not explicitly specify a seal would still include a seal. On overbreadth, I rejected the notion that the skilled person would know where to position the seals in the 704 Patent.

[1509] I repeat Justice Manson’s warning in *Excalibre* at paragraph 259 that an inventor “cannot properly ask the Court to impart functional language into ... a Claim lacking utility, to try and correct poor drafting and in order to give the Claim the necessary scope to be useful.”

[1510] In addition, Kobold rightly points out Mr. Baudistel’s evidence that, where a seal is not included between an inner sliding component and an outer sliding component, it can result in the tool experiencing catastrophic failure.

[1511] Similar to the overbreadth conclusion, the POSITA could not read in the seal placement. The 704 Patent Claims that do not prescribe the seal placement lack utility as they are missing a fundamental component that is required for them to function. There are no operable embodiments of the 704 Patent Claims that do not include a seal. Therefore, utility could not have been demonstrated at, or soundly predicted prior to, the relevant date.

[1512] NCS’s second position, that the 704 Patent is still useful without seals, also fails. As outlined above, “a proposed invention cannot be saved by an entirely unrelated use”: *AstraZeneca* at para 53. The 704 Patent’s use is related to perforating and fracturing; the cleaning capabilities in the 704 Patent relate to its perforating and fracturing uses, not to altogether provide a separate cleaning function.

[1513] The experts agree that in order for the 704 Patent to perforate and fracture, it must be sealed. Where the 704 Patent does not have seals, the cleaning function is an unrelated use and cannot save the utility of the claims.

[1514] Therefore, the 704 Patent Claims that do not specify a seal are invalid for inutility. Claims 1-3, 6-16, 18, 20-23, and 28-30 are invalid for inutility.

(iii) Equalization plug

[1515] Similarly to the wedge and seal, Kobold alleges that claims that do not specify an equalization plug lack utility because without an equalization plug, the fracturing valve will be unable to perform a fracturing operation.

[1516] Similar to its overbreadth arguments, NCS argued that Kobold's allegations arise out of its experts' non-purposive construction. In NCS's view, the equalization plug forms a part of the CGK and therefore the skilled person understands that those claims that do not specifically claim the equalization plug include it. Alternatively, NCS details that the fracturing valve is useful when used for applications other than fracturing.

[1517] As I concluded in the overbreadth section, based on the CGK the skilled person would not inherently know that the 704 Patent Claims that do not specify an equalization plug include one. The evidence was clear that in order to perform fracturing and perforating operations, the 704 Patent must have an equalization plug. As such, the 704 Patent Claims that do not claim an equalization plug cannot perform the claimed fracturing function; they will not operate. Therefore, neither sound prediction nor demonstration can be shown here as the claims never operated and could never operate.

[1518] NCS's alternative argument also fails. As noted, the experts agree that in order for the 704 Patent to perforate and fracture, it must have an equalization plug. Where the 704 Patent

does not have an equalization plug, the cleaning function is an unrelated use and cannot save the utility of the claims.

[1519] Accordingly, Claims 1-10, 16, 18-19, 22-23, and 28-30 are invalid for inutility.

(b) *Alignment Mechanism*

[1520] As I concluded in the overbreadth section, the evidence clearly shows that an alignment mechanism is necessary for the fracturing valve to operate in the 704 Patent. Those claims that do not specify an alignment mechanism are not capable of performing the fracturing and perforating functions in the 704 Patent.

[1521] Therefore, neither sound prediction nor demonstration are fulfilled here. The 704 Patent Claims that do not claim an alignment mechanism are invalid for inutility. Claims 1-6, 8-16, 18-23, and 28-30 are invalid for inutility.

(c) *Placement of Circulation Ports through the Equalization Plug in Claim 10*

[1522] As referenced above in Claim 10's construction, Kobold raises an issue with respect to the placement of circulation ports. In Kobold's view, the patent description specifies one embodiment where the circulation ports extend through the equalization plug. Mr. Chambers explains that having the circulation ports through the equalization plug prevents fluid or debris from passing from the annulus to the tubing string. As this issue was raised by Kobold, it is a utility issue and not a construction issue.

[1523] Claim 10 still has utility. There are several embodiments as described by Claim 10 and the patent description specifies one possible embodiment.

[1524] Even accepting Mr. Chambers' position that the embodiment with circulation ports through the equalization plug lacks utility, there are still other possible embodiments. Based on the Court's construction, the circulation ports can also be placed below the window. This embodiment is capable of a practical purpose and Claim 10 is therefore useful with respect to this issue.

(d) *Nothing to Hold the Mandrel Stationary in Claims 16, 18-23*

[1525] There was insufficient evidence on this issue to demonstrate that the 704 Patent will not work where the mandrel is not held stationary. This is likely due to the fact that Kobold raised this issue in construction and it was not argued substantively by either party in closing.

[1526] Therefore, without more evidence on this specific issue, I find that Kobold has not met its burden to demonstrate inutility on this issue.

(5) ***Ambiguity***

[1527] Kobold asserts that Claims 18 and 21 are invalid for ambiguity, both of which depend only from independent Claim 16. This is because the term "the wedge" (in Claim 18) and "the wedge member" (in Claim 21) have no antecedent basis in Claim 16 and it is therefore unclear what structure or physical arrangement these components have within the apparatus of the claims.

[1528] In addition, when construing Claim 13, I noted that it is incompatible with the remainder of the 704 Patent. The objections raised by Mr. Chambers and Mr. David in construction are ambiguity issues and I therefore address them here.

[1529] NCS disputes Kobold's ambiguity allegations, relying on the difficult bar established in the jurisprudence: see for example *Pollard* at paras 141-144; *Pfizer 2005* at paras 49-53. Mr. Lehr explains that Claim 16 does not preclude the presence of a wedge and therefore it can be read in. Similarly, NCS attempts to explain that Mr. Chambers has a faulty understanding of the term "comprising."

[1530] Even in light of the difficult bar to establishing ambiguity, Claims 18 and 21 are invalid. The claims are incapable of being meaningfully interpreted; the POSITA would not know what "the wedge" in these claims refers to.

[1531] Based on my above construction of Claims 18 and 21, "the wedge" is an essential element. It is not specified anywhere and, as previously analyzed, essential claim terms cannot be read in via the term "comprising": *Johnson & Johnson* at para 213. Neither Mr. Lehr's explanation nor NCS's submissions can salvage the ambiguity of Claims 18 and 21.

[1532] Claim 13 describes a pushing down mechanism on the tubing string to actuate the fracturing valve from the first to the second position. As noted in my construction, the pushing down mechanism is entirely inconsistent with the 704 Patent: Claim 13 describes the opposite direction. It is unclear how this mechanism works (or if it works at all). Even Mr. Lehr's own

construction describes a structural position where the equalization valve closes when pulling up, not pushing down. Accordingly, I find Claim 13 invalid for ambiguity.

(6) ***Conclusion***

[1533] The parties did raise issues regarding ownership of the NCS Patents. However, there was insufficient evidence and inadequate arguments for the Court to make any determination on this issue. I decline to make any finding on this issue.

[1534] In summary I have found Claim 1 invalid for anticipation. Claims 1-23, 28-30 are invalid for overbreadth. Claim 13 invalid for ambiguity and Claims 1-16, 18-23, 28-30 invalid for inutility. I will again echo my approach from the 676, 652, 907, and 026 Patents and decline to make any further validity determinations given my invalidity findings in anticipation, overbreadth, inutility, and ambiguity.

F. ***Kobold's 571 Patent***

(1) ***571 Patent Invention Story***

[1535] Mr. Angman – the founder and former Chief Engineer of Kobold – is the primary inventor of the 571 Patent. He was the primary fact witness that explained the creation of the 571 Patent.

[1536] Mr. Angman explained that the purpose behind the 571 Patent was to create a mechanism that would make the shifting event (i.e. when a sleeve is opened) less violent, thereby reducing damage to the tools and sleeves. Downhole shifting tools cycle between several states as they

move to the various sleeve positions in the well. The shifting tool can become damaged, as well as the sleeve, costing the ground crew time and decreasing efficiency.

[1537] The shifting process is violent, as it involves the application of a tremendous force to the shifting tool in a matter of milliseconds. Shifting is violent because the sleeves are locked in a closed position with shear pins and that is why a great force is required to open the sleeve for the first time.

[1538] Mr. Angman described how Kobold's overall goal was to try and make the process overall less violent, to avoid damage to the tools and sleeves, which in turn improves efficiency.

[1539] To achieve this goal, Mr. Angman described how the key aspect of the invention would require it to try and slow down the sleeve when the shifting event happens. The design his team came up with was to divide the annular space into two chambers, with a viscous fluid in the lower chamber being squeezed into the upper chamber in order to create a dampening effect.

[1540] At the first stages of creating the dampening invention, Mr. Angman and the other inventors drew up a concept. Then, the concept went through several phases of testing and the team put together a "white paper" report that states and discusses the results. The testing began in February, 2012.

[1541] NCS points to the fact that there is no testing data in the 571 Patent that demonstrates its effectiveness at all. However, the 'White Paper' report demonstrates the effectiveness of the dampening design in slowing down the sleeve. Figure 1 shows a rapid deceleration where the

sleeve reaches the stop (i.e. the problem that Kobold was attempting to resolve), and Figure 2 shows a decrease in G forces and an increase in time because the dampening system is immediately engaged, thereby controlling the motion of the sleeve and tool.

[1542] Yet, as NCS points out, there are some gaps in the invention story as they pertain to specific embodiments. For example, there is no testing data in the 571 Patent to suggest that the embodiment in Claim 1 could work. Dr. Mennem noted the absence of documents that would have suggested the inventors tested any sliding sleeves where the first annular chamber was not fully sealed. Instead, the inventors tested sliding sleeves with a contiguous annular space wherein the annular space was fully sealed.

[1543] I accept Kobold and Mr. Angman's invention story. There is evidence of the testing protocol, diagram of testing setup, and videos of the testing. Mr. Angman was a candid and honest witness who clearly described the 571 Patent development. However, when it comes to specific embodiments (for example testing without a seal), there are some gaps in Kobold's "White Paper."

(2) *Mootness of Claims 1-5, 7-10, 13-15, and 17-27 of the 571 Patent*

[1544] Before turning to the 571 Patent analysis, it is necessary to deal with a preliminary issue that arose during the course of the trial. I briefly referenced this issue when determining whether a party can allege invalidity of non-asserted claims in a counterclaim. I now deal fully with the mootness issue raised by Kobold here.

[1545] Kobold says that any invalidity allegations pertaining to Claims 1-5, 7-10, 13-15, and 17-27 of the 571 Patent [Dropped Claims] are moot and do not need to be adjudicated by this Court. This is because Kobold limited its infringement allegations to Claims 6, 11, 12, and 16 (as they depend from Claims 1, 3 and 4) of the 571 Patent as against NCS's LP3 sleeve.

[1546] Kobold submits that there is therefore no longer any basis for a statutory defence against the 571 Patent's Dropped Claims, since infringement is no longer alleged with respect to those claims.

[1547] The procedural history of T-1420-18 is as follows. NCS filed its Third Amended Statement of Claim on November 30, 2021, where it alleged infringement of several of its patents. In response, Kobold filed its Fresh as Amended Statement of Defence and Counterclaim also on November 30, 2021, alleging infringement of Claims 1-27 of the 571 Patent. In its Third Amended Reply and Defence to Counterclaim, NCS pleaded that all 571 Patent Claims were invalid. NCS does not state specifically which provisions of the *Patent Act* it relies on for its invalidity pleading against the 571 Patent Claims. On February 22, 2022, Kobold restricted its infringement allegations only in relation to Claims 6, 11, 12, and 16 (as they depend from Claims 1, 3, and 4) of the 571 Patent.

(a) *Kobold and NCS Submissions*

[1548] Kobold argues that NCS's allegations of invalidity in relation to the 571 Patent are permitted under section 59 of the *Patent Act* but that provision does not entitle a party to a declaration *in rem* that the patent at issue is invalid. Instead, Kobold alleges that NCS must rely

on section 60 of the *Patent Act*, which must originate out of an original action or a counterclaim. Since NCS did not commence an original action or counterclaim under section 60 of the *Patent Act*, Kobold maintains that NCS can no longer pursue invalidity in relation to the Dropped Claims and the issues related to them are therefore moot.

[1549] NCS does not directly deal with the mootness issue but explained that even though Kobold is only suing on Claims 6, 11, 12, and 16, there are limitations that are imposed by antecedent claims. NCS's position is that unless there is some clear restriction on the limitations that Kobold is alleging infringement on, the features of the antecedent claims which Claims 6, 11, 12, and 16 are dependent on will be carried forward. As such, it appears that NCS disputes Kobold's position that any invalidity grounds made in relation to Claims 1-5, 7-10, 13-15, and 17-27 are moot.

[1550] The Court therefore must resolve whether NCS can argue invalidity grounds in relation to the Dropped Claims.

(b) *Can NCS argue invalidity of the 571 Patent's Dropped Claims?*

[1551] To resolve this issue, I must first address which statutory provision NCS relies on for its pleading that the 571 Patent is invalid, given that the Third Amended Reply and Defence to Counterclaim does not explicitly state this. Next, it must be addressed whether the provision of the *Patent Act* allows NCS to plead invalidity against the entire patent or only in response to the claims that Kobold alleges infringement in relation to.

[1552] Kobold relies on *Johnson & Johnson*, which explains how pleadings work under the *Patent Act*. *Johnson & Johnson* dealt with a summary judgment, where the Defendant requested dismissal of all claims in the action and a declaration that the patents were invalid.

[1553] In *Johnson & Johnson*, the Defendant relied on sections 59 and 60 of the *Patent Act*, alleging the Plaintiff's failure to correctly pay the filing fees rendered the patents void under section 30 of the *Patent Act*. However, the Defendant did not explicitly reference sections 59 and 60 of the *Patent Act* in its pleadings. The Plaintiff attempted to argue that since the Defendant neglected to cite the relevant sections of the *Patent Act* the summary judgment should be dismissed.

[1554] The Federal Court rejected this argument. It recognized the importance of pleadings but held the "essence of the pleadings" filed by the Defendant indicated the specific remedies sought: *Johnson & Johnson* at para 52. In addition, the Court found that the Plaintiffs were aware of the substance of the pleadings, as evidenced by the fact they responded to the pleadings.

[1555] In dealing with the pleadings issue in *Johnson & Johnson*, the Federal Court also explained the difference between sections 59 and 60 of the *Patent Act* as follows:

[49] ... Accordingly, a Defendant may rely upon section 59 as a matter of defence against the infringement action and may also obtain a declaration that the patent is invalid as between the parties, or, in reliance upon section 60 of the *Patent Act*, the Defendant may obtain a declaration *in rem* that the patent is invalid or void. That being said, a section 60 Claim must originate out of an original action or a counterclaim. Conversely, a section 59 Claim does not need to be pleaded as a counterclaim as it is a statutory defence, and may be pleaded in a statement of defence.

[Citations omitted, emphasis added]

[1556] As such, NCS can only raise an *inter partes* argument against the 571 Patent, not an *in rem* allegation. NCS's pleadings indicate that it relies on section 59 of the *Patent Act* for its invalidity allegations, since the invalidity allegations with respect to the 571 Patent are made via the "Third Amended Reply and Defence to Counterclaim." I note that Kobold has not raised any issues in relation to the deficiencies and has simply indicated that NCS's pleadings rely on section 59 of the *Patent Act*.

[1557] A proceeding is moot where there no longer remains any tangible or concrete dispute between the parties: *Borowski v Canada (Attorney General)*, [1989] 1 SCR 342, 1989 CanLII 123.

[1558] In my view, this is both a mootness issue and a procedural issue. Kobold is correct from a procedural standpoint that it is not open to NCS to make *in rem* claims against the 571 Patent. However, NCS is also correct that although Kobold only alleges infringement in relation to Claims 6, 11, 12, and 16, these claims are all dependent on antecedent claims, most of which are also dependent claims and all of which rely on Claim 1.

[1559] There continues to be a live dispute about antecedent claims as the dependent Claims 6, 11, 12, and 16 incorporate them and the Court may issue invalidity declarations *as between the parties*. In conducting the validity analysis, it is open to this Court to consider the antecedent claims that the Asserted Claims are dependent upon – if NCS has properly alleged invalidity of the Asserted Claims.

(3) *Pleadings, Joint Statement of Issues, and Issues Argued by the Parties*

[1560] There is another issue that relates to the mootness issue: the scope of the issues raised by the parties with respect to the 571 Patent. As previously noted in this decision, a Statement of Issues acts as a funnel that narrows the issues between the parties.

[1561] NCS's Third Amended Reply and Defence put all of the 571 Patent Claims at issue, alleging various grounds of invalidity. However, the Joint Statement of Issues narrowed the 571 Patent Claims that were at issue. Thus, the Joint Statement of Issues funnelled the 571 Patent issues from all of the claims to select claims.

[1562] In the Joint Statement of Issues, Kobold alleged infringement with respect to Claims 5, 10, 13-15, and 17-24 of the 571 Patent. Kobold later dropped the infringement allegations with respect to the Dropped Claims, leaving only the Asserted Claims. Unfortunately for NCS, it raised and argued invalidity issues in relation to claims no longer at issue, including the Dropped Claims.

[1563] To deal with Kobold's infringement allegations, NCS re-broadens the issues and goes beyond what was contained in its experts' reports and Joint Statement of Issues.

[1564] *Biogen FC* at paragraphs 117-120 dealt with a discrepancy between two versions of a Joint Statement of Issues, where the final version failed to include an additional prior art reference. In *Biogen FC*, the Defendant explained in closing that the prior art reference had simply been missed from the Joint Statement of Issues and it was never the Defendant's intention to exclude it. The Court held that "[t]o open the anticipation art up to additional documents after

the evidentiary phase and after written submissions were submitted would be unfair and prejudicial to Biogen” (*Biogen FC* at para 119).

[1565] Both Dr. Mennem’s reports and the Joint Statement of Issues defined the scope of issues at play and established the case that Kobold needed to respond to with respect to the invalidity allegations. What NCS cannot now do is re-broaden its invalidity allegations to claims beyond what was contained in the Joint Statement of Issues. Like in *Biogen FC*, it would be unfair and prejudicial to Kobold to allow NCS to re-broaden the issues.

[1566] NCS must have independently alleged invalidity of the Asserted Claims. For many issues, it has not done so. This is because validity is done on a claim-by-claim basis and dependent claims may be sufficiently narrow to escape invalidity attacks, even though the broader claims may be invalid: see for example *Zero Spill* at paras 94-95. Even if the Court were to find the antecedent claims invalid, the Court cannot consider the validity of the limitations added by the dependent Asserted Claims as their validity is not properly before the Court.

[1567] The Court will only consider the properly argued invalidity grounds against the Asserted Claims of the 571 Patent. Consequently, the following invalidity grounds will not be considered: anticipation, overbreadth, and inutility (issues 113, 114, and 116-117 in the Joint Statement of Issues). Those issues are not properly before the Court.

(4) ***Anticipation***

(a) ***Prior Art***

[1568] NCS relies on Desranleau, Ravensbergen, and King as prior art in addition to the CGK. Please see the Summary of Prior Art at paragraphs 273-279 above. I will also consider the prior art variously raised by the experts.

[1569] Preliminarily, I must note an issue with Dr. Mennem's discussion of prior art. His descriptions and analyses of the prior art are collectively for both the 830 and 571 Patents, and not very specific on which is his focus of discussion. Further, the claims Dr. Mennem analyzes for anticipation are not constrained to the claims currently at issue.

[1570] NCS's submissions, based on Dr. Mennem's analysis, allege anticipation for Claims 1, 2, 3, and 27 as disclosed and enabled by the King and Desranleau Patents. These claims are not at issue, and as discussed above, these submissions are therefore moot and shall not be analyzed.

(5) ***Obviousness***

[1571] As it pertains to obviousness, although all claims of the 571 Patent are alleged invalid by NCS, I only consider obviousness as it relates to Claims 6, 11, 12, and 16 as they depend on earlier antecedent claims.

(a) *Inventive Concept*

[1572] The 571 Patent's inventive concept is a downhole apparatus having a dampening mechanism able to control the speed of an inner sleeve as it moves toward a stop shoulder. I agree with Dr. Mennem that the dampening mechanism comprises one or more chambers containing dampening fluids capable of being controllably released to control the speed of the inner sleeve.

[1573] Dr. Fleckenstein did not directly outline the inventive concept but his view generally aligns with Dr. Mennem's. He added that the main aspect associated with the sleeve operations of the 571 Patent includes a gripper restraining mechanism. However, there is no gripper restraining mechanism in the claims themselves and the 571 Patent's detailed description explains that "[a] designer may choose to use any one or any combination of these mechanisms as needed."

(b) *Differences between the "State of the Art" and the inventive concept*

[1574] Both NCS's and Kobold's experts addressed the Desranleau and Ravensbergen prior art references as well as the common art.

[1575] NCS contends that King is citable for obviousness, "unless Kobold can establish it is entitled to benefit from the earlier priority application for the particular claim at issue." Dr. Mennem only analyzed King in relation to anticipation, not obviousness. Accordingly, Dr. Fleckenstein only analyzed whether Claims 1, 2, 3, and 25 of the 571 Patent are anticipated by

King. I therefore must decide whether NCS can rely on King as a piece of prior art in the obviousness analysis.

[1576] Although Dr. Fleckenstein did not deal with King in relation to obviousness, in my view, King may still be used in the obviousness analysis. Obviousness and anticipation are two distinct concepts – although both are essential requirements for patentability and require an analysis of the prior art. The principles at the core of these invalidity attacks differ, as summarized in *Beloit*:

They are, of course, quite different: obviousness is an attack on a patent based on its lack of inventiveness. The attacker says, in effect, “Any fool could have done that.” Anticipation, or lack of novelty, on the other hand, in effect assumes that there has been an invention but asserts that it has been disclosed to the public, prior to the application for the patent. The charge is: “Your invention, though clever, was already known.”

Beloit at p 293

[1577] While the fundamental questions the anticipation and obviousness analyses ask are different, the prior art plays a central feature in both analyses. Therefore, although how the Court uses the prior art differs between the analyses, the prior art itself does not change. As such, I will consider NCS’s obviousness arguments in relation to King.

[1578] Having decided that NCS may rely on King, NCS raises another issue with respect to the priority date of King. NCS maintains that King is “citable for obviousness unless Kobold can establish it is entitled to benefit from the earlier priority date for the particular claim at issue.”

NCS, again, asks for the Court to evaluate the 571 Patent priority date.

[1579] As I understand NCS's submissions, it says that only the claims that are limited to a barrier seal arrangement with metered passages should receive the priority application date. NCS explains that the priority patent will only support any claim that is specific to a barrier seal with or without metered passages. In NCS's view, all of the Asserted Claims include an unsealed annular barrier.

[1580] As stated earlier, I agree that it is possible to evaluate the claim date in the way NCS requests.

[1581] The rationale underlying NCS's position is that, where additional matter has been added to claims that broaden the invention beyond what was originally claimed in the priority application, the inventor should not be entitled to the earlier priority date but the filing date for the applicable claims.

[1582] NCS insists that Kobold must establish that it is entitled to benefit from the earlier priority application for the particular claim at issue. However, NCS bears the burden of establishing obviousness on a balance of probabilities: see for example *Western Oilfield* at para 152. NCS has not provided any jurisprudence that indicates Kobold bears any burden at this stage.

[1583] US provisional patent application 61/844,664 [644 Application] gives the 571 Patent its priority. A US provisional patent application permits the filing of a patent application with relaxed filing requirements and is typically based on disclosure provided by the inventor: *Aram Systems Ltd v Novatel Inc*, 2007 ABCA 100 at para 9.

[1584] I agree with NCS that the 644 Application describes a barrier seal arrangement with metered passageways across the barrier seal, through which an incompressible fluid is forced.

[1585] However, not all of the Asserted Claims cover an embodiment with a barrier ring and a gap. The barrier is first introduced in Claim 11 and is therefore not included in Claim 6 – to otherwise include it would be a claim differentiation violation. Claim 11 includes the barrier ring with a gap. Claim 12 does cover an embodiment with a barrier ring that is unsealed. Claim 16 can be read as either including a seal or no seal.

[1586] I find that the claim date for Claim 6 is the priority date of July 10, 2013. Claims 11, 12, and 16 have the claim date of July 10, 2014 (the filing date). Although Claim 16 can be read with or without a seal, its claim date should be read to include the newly added material. Therefore, its claim date is the filing date.

[1587] Having settled the claim date issue, I turn now to the difference between the “State of the Art” and the inventive concept.

[1588] NCS argues that each of Ravensbergen, Desranleau, and King disclose sleeves wherein some dampening fluid is forced through a restriction in the annular space of a sleeve. NCS relies on King and Desranleau as disclosing the fact that dampening mechanisms are intended to reduce or control the velocity of the movement of a sleeve.

[1589] The main difference between King and the 571 Patent is that King is a two-sleeve solution to the same problem the 571 Patent addresses. Dr. Mennem acknowledged that King has

a geometrically different arrangement than the 571 Patent. He also noted that the fluid does not go into the second chamber and remains in the annular space. King does not disclose an embodiment with a barrier seal that divides the annular space into the first and second chambers.

[1590] Ravensbergen discloses an annular valve with a sliding sleeve in the annular space. The 571 Patent does not include an annular valve. In addition, although grease is used, it is used to prevent the ingress of cement and other wellbore debris from outside of the sliding sleeve sub. Dr. Fleckenstein explained, and I accept, that Ravensbergen does not explicitly teach dampening and any dampening is incidental to the Ravensbergen invention.

[1591] As Dr. Fleckenstein highlights, a key difference between the prior art in hydraulic jars and the dampening technology in the 571 Patent is that the dampening used in hydraulic jars is designed to build the potential energy of the system prior to release.

[1592] Desranleau and the 571 Patent serve fundamentally different purposes. While the sleeve in Desranleau has a hydraulically sealed annular chamber that is divided into two chambers connected by a metering valve, it is used differently than in the 571 Patent. As Kobold emphasizes, Desranleau teaches the preferable use of a hydraulic fluid with a known viscosity and air in the other, in order to create a predictable time for the shift. Desranleau does not reference grease, nor does it suggest using grease.

(c) *Do the differences constitute steps that would have been obvious to the POSITA*

[1593] The differences between the “State of the Art” and the inventive steps do not constitute steps that would have been obvious to the skilled person. The evidence in this case indicates that the 571 Patent is an inventive concept that could not have been bridged by the skilled person.

[1594] I note that Claim 6, which has the earlier claim date, would not have been obvious, especially when excluding King.

[1595] Together, King, Desranleau, and Ravensbergen do not teach the 571 Patent, nor would the skilled person bridge the gap between those patents and the 571 Patent. Specifically, Claims 6, 11, 12, and 16 are inventive in creating an unsealed two chamber embodiment with grease. None of the prior art would have allowed the skilled person to cross the bridge to the 571 Patent.

[1596] NCS, in effect, commits the error that *Bridgeview* advises against at paragraph 51: it is unfair to a person claiming to have invented a combination invention to break the combination down into its parts and find that, because each part is known, the combination is obvious. NCS seeks to attack the 571 Patent insofar as the parts were known through various other patents. However, many of these parts (such as the use of grease) were incidental to the purpose of the other patents and those inventions were not directed at using these parts in the way the 571 Patent does.

[1597] I find that NCS’s position is permeated by hindsight bias. The Courts have repeatedly warned against a hindsight analysis in the obviousness inquiry: *Janssen v Teva Canada Limited*,

2020 FC 593 at para 169; *Bridgeview* at para 50; *Beloit* at 295. NCS's argument amounts to an attack on the 571 Patent in part because it is a simpler and more elegant design, therefore it must have been known. Although the 571 Patent is, to some extent, simple that does not render it obvious.

[1598] Accordingly, on this record, NCS has failed to establish on a balance of probabilities that the 571 Patent and its claims are invalid for obviousness

(6) *Ambiguity*

[1599] If I am wrong, I have considered NCS's remaining invalidity arguments.

[1600] As only the Asserted Claims are at issue, I only consider whether Claim 6 is invalid for ambiguity based on the term "fluid communication." Claims 26-27 are not considered.

[1601] NCS argues that Claim 6 is ambiguous as it fails to disclose:

- A. How the two chambers are divided;
- B. How the second chamber is in fluid communication with the first; and,
- C. How the first dampening fluid is "released" from the first chamber into the second.

[1602] Ambiguity has not been established on the basis that "fluid communication" is unclear, given the construction adopted above.

[1603] Although Claim 6 does not specify how, there are several possible ways in which the skilled person would know that the second chamber is in communication with the first. The issues that NCS raise with respect to how the chambers are in communication are, in reality, utility arguments. The term “fluid communication” is clear and both experts were able to properly construct it.

(7) ***Inutility***

[1604] I am cognizant of the fact that NCS did raise and argue inutility. However, NCS only alleged Claims 1, 25, and 27 were invalid for inutility, which are no longer at issue. Had NCS properly alleged invalidity of the Asserted Claims, I would have analyzed Claim 6 for inutility regarding the function of the Claim. Since they did not, I will not reach a conclusion on this issue.

(8) ***Double Patenting***

[1605] At the outset, I note that Kobold has not raised any objections to NCS’s double patenting arguments. As agreed on in the Joint Statement of Issues, NCS alleges that all of the 571 Patent Claims are invalid as a double patent of the 830 Patent. In my view, only Claims 6, 11, 12, and 16 are properly at issue before this Court given my finding that NCS may only raise *inter partes* grounds of invalidity.

[1606] NCS alleges that the 571 Patent is invalid for obviousness type double patenting based on the 830 Patent. As stated, the question for this Court is whether there is “invention” or

“ingenuity” in the move from the first patent to the second patent: *Whirlpool* at paras 63-67; *Mylan* at para 28.

[1607] The 571 Patent is a voluntary divisional of the 830 Patent, which Kobold does not contest. Dr. Mennem opined that Claims 1-27 of the 571 Patent are not patentably distinct from Claims 17-33 and 37 of the 830 Patent.

[1608] At a high level, both the 830 and 571 Patents attempt to resolve the same problem and act as shock absorbing sleeves, which prevent damage from shifting events.

[1609] Kobold points out, and I agree, that the question is not whether there is an overlap in the embodiments claimed. Rather, the key question is an inventive difference. In obviousness-type double patenting analysis, the invention is at the heart of the patent: *Eli Lilly Canada Inc v Mylan Pharmaceuticals ULC*, 2015 FC 17 at para 128, aff'd 2016 FCA 119.

[1610] NCS argues that while there is some difference in language between Claims 1-27 of the 571 Patent and Claims 17-33 and 37 of the 830 Patent, the claims are not distinct. NCS submits that the 571 Patent is broader than the 830 Patent and therefore wholly encompasses the 830 Patent. Dr. Mennem explained that the 571 Patent has three dampening mechanism geometries:

- A. A barrier seal with metered passages;
- B. A barrier ring that leaves an annular gap between the ring and the housing; and,
- C. A solid piston that forces grease out of a restriction in the annular space.

[1611] He opined that Claim 17 of the 830 Patent covers the first approach and Claim 1 of the 571 Patent is broader than Claim 17 of the 830 Patent and covers all three approaches.

[1612] NCS's position does not amount to double patenting in principle. It is possible for a voluntary divisional patent to 'wholly encompass' its parent patent; however, this does not necessarily amount to double patenting. As previously noted, evergreening of time is no longer a concern because the divisional patent has the same date as its parent patent; there is no extension of the time monopoly. The voluntary divisional can encompass the same embodiment as its parent patent and more. So as long as the divisional discloses a new invention to the public, it can contain or incorporate similar claims as its parent patent. The Federal Court of Appeal has clearly stated that the question is not whether the claims overlap between the two patents such that they cover the same embodiments: *Hospira* at para 99. The question is whether there is a patentable distinction: *Hospira* at para 99.

[1613] Before turning to the analysis, I wish to comment on NCS's focus on the 830 Patent file history. Although file histories are permissible under subsection 53.1(1), the file history is not evidence in and of itself of double patenting. NCS had a tendency to suggest that Kobold's motivation to divide the 830 Patent was to escape obviousness objections and therefore the 571 Patent is a double patent. That is not the question before the Court.

[1614] Claim 17 and onwards of the 830 Patent require a seal between the annular barrier and the housing. Whereas, the 571 Patent Claims include embodiments without a seal arrangement between the sleeve and the housing. As Kobold outlines, the 571 Patent includes embodiments where the restriction in the annular space that causes the controlled release of pressurized fluid is

an annular gap between the annular barrier and the housing, or between the sleeve itself and the housing if the sleeve is machined to have a radially enlarged portion.

[1615] Claim 16 of the 571 Patent covers two separate and distinct downhole apparatuses: one with an unsealed annular gap between the annular barrier and the housing (as it depends from Claim 12), and one with a seal arrangement on the annular barrier for sealing between the sleeve and the housing (as it depends from Claim 13).

[1616] Claim 16 can be read as follows:

	Claim 16 (as it depends from Claims 1, 3, 4, 6, 11, and 12)	Claim 16 (as it depends from Claims 1, 3, 4, 6, 11, 12, and 13)
1.	<p>A downhole apparatus comprising:</p> <p>a tubular housing along a tubing string;</p> <p>a sleeve located within the housing and axially moveable therein from a first position to a second position;</p> <p>and a first annular chamber radially intermediate the housing and the sleeve, said first annular chamber containing a first dampening fluid and being capable of controllably releasing the first dampening fluid under pressure;</p> <p>wherein when the sleeve moves from the first position to the second position, the first dampening fluid is pressurized and controllably released for controlling the speed of the sleeve movement.</p>	<p>A downhole apparatus comprising:</p> <p>a tubular housing along a tubing string;</p> <p>a sleeve located within the housing and axially moveable therein from a first position to a second position;</p> <p>and a first annular chamber radially intermediate the housing and the sleeve, said first annular chamber containing a first dampening fluid and being capable of controllably releasing the first dampening fluid under pressure;</p> <p>wherein when the sleeve moves from the first position to the second position, the first dampening fluid is pressurized and controllably released for controlling the speed of the sleeve movement.</p>
3.	<p>The apparatus of Claim 1 or 2 [Claim 1] wherein the first dampened fluid is grease.</p>	<p>The apparatus of Claim 1 or 2 [Claim 1] wherein the first dampened fluid is grease.</p>

4.	The apparatus of any one of Claims 1 to 3 [Claim 3] wherein the first dampened fluid has a viscosity index in the range between 80 and 110.	The apparatus of any one of Claims 1 to 3 [Claim 3] wherein the first dampened fluid has a viscosity index in the range between 80 and 110.
6.	The downhole apparatus of any one of Claims 1 to 5 [Claim 4] further comprising: a second annular chamber radially intermediate the housing and the sleeve, and axially immediately adjacent the first annular chamber; wherein the second annular chamber is in fluid communication with the first chamber for receiving the first dampening fluid released from the first chamber.	The downhole apparatus of any one of Claims 1 to 5 [Claim 4] further comprising: a second annular chamber radially intermediate the housing and the sleeve, and axially immediately adjacent the first annular chamber; wherein the second annular chamber is in fluid communication with the first chamber for receiving the first dampening fluid released from the first chamber.
11.	The downhole apparatus of any one of Claims 6 to 10 [Claim 6] wherein the first and second chambers are formed from an annular space radially intermediate the housing and the sleeve, and wherein an annular barrier divides the annular space into the first and second chambers.	The downhole apparatus of any one of Claims 6 to 10 [Claim 6] wherein the first and second chambers are formed from an annular space radially intermediate the housing and the sleeve, and wherein an annular barrier divides the annular space into the first and second chambers.
12.	The downhole apparatus of Claim 11 wherein the annular space is located at a fixed location with respect to the housing, and the annular barrier is fixed to the sleeve and moveable therewith, the movement of the annular barrier simultaneously reducing the volume of the first chamber and enlarging the volume of the second chamber.	The downhole apparatus of Claim 11 wherein the annular space is located at a fixed location with respect to the housing, and the annular barrier is fixed to the sleeve and moveable therewith, the movement of the annular barrier simultaneously reducing the volume of the first chamber and enlarging the volume of the second chamber.
13.		The apparatus of Claim 12 wherein said barrier comprises a seal arrangement for sealing between the sleeve and the housing.
16.	The downhole apparatus of any one of Claims 11 to 15 [Claim 12] wherein the apparatus further comprises at least one	The downhole apparatus of any one of Claims 11 to 15 [Claim 13] wherein the apparatus further comprises at least one

	metering passage fluidly connecting the first and second chambers across the barrier.	metering passage fluidly connecting the first and second chambers across the barrier.
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[1617] Even Kobold acknowledges that Claim 13 encompasses a seal arrangement between the sleeve and the housing.

[1618] Claim 17 of the 830 Patent states:

a tubular housing along a tubing string;

one or more ports in the tubular housing;

a sleeve located within the housing and axially moveable therein from a first closed position wherein the sleeve blocks the one or more ports to a second open position wherein the sleeve moves past the one or more ports to open the ports;

an annular space radially intermediate the housing and the sleeve located at a fixed location with respect to the housing;

a stop shoulder formed at a downhole end of the housing and extending radially into the annular space for delimiting axial movement of the sleeve at the second open position;

an annular barrier in the annular space, fixed to the sleeve and sealably moveable therewith for dividing the annular space into a first annular chamber and a second annular chamber axially immediately adjacent the first annular chamber, the first annular chamber containing a first, incompressible dampening fluid, the movement of the annular barrier simultaneously reducing the volume of the first chamber and enlarging the volume of the second chamber;

a seal arrangement on the annular barrier for sealing between the sleeve and the housing; and

at least one metering passage fluidly connecting the first and second chambers across the seal arrangement, wherein

when the sleeve moves from the first closed position to the second open position, the first dampening fluid is pressurized and controllably released through the at least one metering passage to

the second chamber for controlling the speed of the sleeve movement towards the stop shoulder.

[1619] Claim 17 of the 830 Patent consists of a sliding sleeve subassembly that has a dampening mechanism that helps control the speed of the inner sleeve's movement downhole, with a particular orientation of a stop shoulder. I agree with Dr. Mennem that the dampening mechanism consists of an annular space divided into a first annular chamber and a second annular chamber by a barrier seal arrangement having one or more metering passages in it. Importantly, Claim 17 prescribes that the barrier seal arrangement is fixed to the inner sleeve and therefore moves when the inner sleeve moves.

[1620] Even though Claim 13 is not at issue, it is the independent Claim depended on by Claim 16, which is at issue. Therefore, I must analyze whether Claim 13 is invalid for double patenting to analyze Claim 16.

[1621] The only difference between Claim 17 and Claim 13 is that Claim 13 requires the annular comprise the seal arrangement, whereas Claim 17 requires the seal arrangement on the barrier. In my view, Claim 13 of the 571 Patent shares the same inventive concept as Claim 17 of the 830 Patent. Whether or not Claim 13 may be invalid for double patenting, Claim 16 still stands as the embodiment with an unsealed annular gap between the annular barrier and the housing remains valid (for example Claim 16 as it depends from Claims 1, 3, 4, 6, 11, and 12).

[1622] I find that Claims 6, 11, 12, and 16 go beyond "mere design choices that would be known to the skilled person and would not require any degree of invention." In sum, other than Claim

13, the Asserted Claims of the 571 Patent provide a potentially simpler solution, and different inventive concept, to address the same issue as the 830 Patent.

X. **Infringement**

A. *Kobold's 571 Patent*

(1) *NCS's LP3 Sleeves*

[1623] Kobold alleges that NCS's LP3 sleeves infringe Claims 6, 11, 12, and 16 of the 571 Patent as they depend from Claims 1, 3, and 4. The LP3 sleeves are made and sold by NCS (except for assembly number 0030153). The LP3 sleeve is used in fracturing operations and is used to establish fluid communication between the inside of the wellbore and the rock formation.

[1624] NCS produces multiple assemblies of the LP3 sleeves and the following assemblies are alleged to infringe the 571 Patent: 0030564, 0018651, 0031746, 0031748, 0019916, 0024315, 0030926, 0031349, and 0034446.

[1625] The LP3 sleeve comprises: an outer housing having top and bottom subs for connecting to the casing of a completion string; one or more ports across the housing for creating fluid communication between the sliding sleeve and the rock formation; an inner sliding sleeve located in the bore of the housing which is moveable between a closed and open position; and an annular space located between the housing and inner sliding sleeve. The LP3 includes a garter ring, which NCS says provides radial support to the inner sleeve and prevents the sleeve from flexing outward or ballooning.

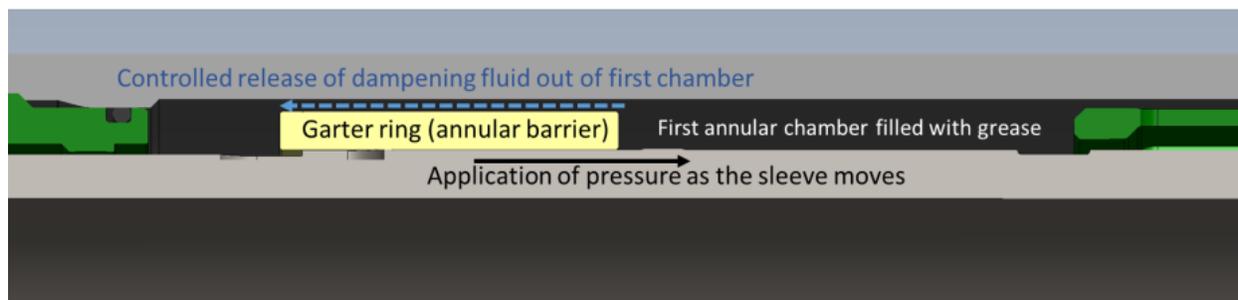
[1626] Mr. Finney spoke to the LP3 sleeves and their purpose. He explained that NCS used grease as it prevents cement invasion inside of the frac sleeve.

(2) *Do the LP3 Sleeves Infringe?*

[1627] Kobold explains that the infringement issue is very narrow and can be summed up with the following question: Do NCS's LP3 sleeves infringe enough? In its view, the LP3 sleeves infringe according to the test in *Monsanto*.

[1628] NCS says the LP3 sleeves do not infringe any of the Asserted Claims as the LP3 sleeves do not have at least one metering passage and are not capable of controlling or dampening the speed of the inner sleeve.

[1629] There was no real dispute between the experts that the LP3 sleeves and the 571 Patent are structurally the same [see: LP3 sleeve structure below from Dr. Fleckenstein's report] and Dr. Mennem agreed that the LP3 sleeves have the same structure as in the 571 Patent.



[1630] NCS disputes that the LP3 sleeves contain the following claim elements:

- A. Said first annular chamber containing a first dampening fluid and being capable of controllably releasing the first dampening fluid under pressure; wherein,

- B. When the sleeve moves from the first position to the second position, the first dampening fluid is pressurized and controllably released for controlling the speed of the movement.

[1631] Based on my construction of “controllably releasing” as above, the LP3 sleeve acts in the same manner as the 571 Patent Claims and controllably releases the grease through the annular gap.

[1632] NCS also disputes that the annular gap acts as a metered passage, as the space is too large.

[1633] Given that I constructed “metering passage” as meaning the controlled passage of fluid, for example through a small orifice, I also find that the LP3 sleeve falls under this construction. The annular gap acts similarly as the metering passage in the 571 Patent.

[1634] Accordingly, the only dispute is whether the LP3 sleeve dampens.

[1635] Dr. Fleckenstein opined that, based on the structure, there will undoubtedly be a dampening effect that slows the movement of the sleeve when it shifts. He based this opinion off of the fact that there is a $1/16^{\text{th}}$ of an inch annular gap surrounding the garter ring, which he explained would create a significant frictional pressure.

[1636] Both experts created models to estimate the amount of dampening. Dr. Fleckenstein ran a mathematical model that estimated the extent or scale of the dampening, which Kobold says was not to analyze whether the LP3 sleeves fell within the scope of the claims, rather, the model is a

litmus test of Dr. Fleckenstein's initial opinion of infringement based on the structure and grease properties of the LP3 sleeves.

[1637] Dr. Mennem also ran a mathematical model, which suggested that there may be up to a 5% dampening effect. However, NCS says this number is based on worst assumptions. In addition, NCS points out that Dr. Mennem said, in reality, there would be "minimal" dampening.

[1638] Both parties critique the other's model. For example, NCS complains that Dr. Fleckenstein's model is incomplete and he relies on arbitrary velocities. Dr. Mennem was unable to obtain the viscosity of the grease used in the LP3 sleeve. However, even with the experts' guidance it is not for this Court to critique the mathematics underlying these models. The central determination is whether the LP3 sleeves take all of the essential elements of Claims 6, 11, 12, and 16.

[1639] I agree with Dr. Fleckenstein that the LP3 sleeves dampen. Even though NCS disputes the dampening effect and that it is minimal, Dr. Mennem's own estimates indicate that there could be up to a 5% effect. Based on both experts' models it is clear that *some* amount of dampening will occur in the LP3 sleeve.

[1640] NCS critiques the 571 Patent because it does not specify *how much* dampening is required. Therefore, NCS cannot know whether the LP3 sleeve is infringing because the patent does not specify the bounds of how much dampening is required. In my view, this is an improper approach to the question of infringement. The 571 Patent and its Claim are valid, insofar as this action is concerned. No validity concerns were raised with respect to the amount of dampening

that the 571 Patent requires. Regardless, Claim 1 of the 571 Patent does not require the fluid to be significantly dampening; it requires a “dampening fluid.” The LP3 sleeves that contain grease fall within the scope of Claim 1.

[1641] Inventions which are not as efficient will not enable the infringer to escape the charge of infringement: *Lightning Fastener Co v Colonial Fasener Co et al*, 1934 CanLII 277, [1934] 3 DLR 737. This is not a dispute about *how much* dampening there is. Kobold is correct that the infringement analysis asks whether the essential elements of the Claims 6, 11, 12, and 16 of the 571 Patent are present in the LP3 sleeves.

[1642] There is evidence in support of the dampening effect. Mr. Finney explained that NCS’s sleeves were experiencing damage. On cross-examination, he agreed that the addition of the garter ring to the LP3 sleeves reduced damage to the sleeve. Although this is not dispositive evidence on the infringement issue, it certainly further supports the conclusion that there is a dampening effect.

[1643] Kobold has shown on a balance of probabilities that the LP3 sleeves infringe Claims 6, 11, 12, and 16 of the 571 Patent.

(3) *The Gillette Defence*

[1644] NCS’s Gillette defence cannot succeed. NCS’s allegations of invalidity due to anticipation are moot and, in some issues, not advanced properly. Therefore, NCS’s anticipation arguments did not succeed, nor were they considered. Like in *Sanofi-Aventis Canada v Apotex*

Inc, 2009 FC 676 at paragraph 348, the Gillette defence cannot be sustained in isolation as a defence to Kobold’s claims of infringement.

XI. **Other Legal Issues**

A. **Induced Infringement**

[1645] As stated at paragraph 48 of *Western Oilfield*, one who knowingly induces another to perform all of the steps of the claimed method (i.e. to directly infringe) may be liable for inducing infringement. The test for inducing infringement was usefully set out in *Corlac* at paragraph 162:

A determination of inducement requires the application of a three-prong test. First, the act of infringement must have been completed by the direct infringer. Second, the completion of the acts of infringement must be influenced by the acts of the alleged inducer to the point that, without the influence, direct infringement would not take place. Third, the influence must knowingly be exercised by the inducer, that is, the inducer knows that this influence will result in the completion of the act of infringement.

[1646] On the first prong, this equates to a requirement that the Court can surmise that the infringement – induced by the inducer – actually occurred. This requires evidence, allowing a Court to conclude on a balance of probabilities that direct infringement has occurred: *Guest Tek Interactive Entertainment Ltd v Nomadix, Inc*, 2021 FC 276 at para 57 [*Guest Tek*].

[1647] On the second prong, this creates a “but for test” asking whether the infringing conduct would have occurred but for the Defendant’s conduct: *Guest Tek* at para 58. This requires some

form of influence, whether proved (through evidence of instructions leading to infringement) or inferred from the conduct of the inducer and inducee: *Guest Tek* at para 58.

[1648] On the third prong, this does not mean that the inducer knows that the resulting activity will be an infringement: *Hospira* at para 45. Rather, the inducer must know that the influence is being exercised: *Hospira* at para 45, as well as what the third party is likely to do in response to this influence: *Guest Tek* at para 59.

[1649] The Plaintiff claimed both direct infringement as well as induced infringement and common design against the Defendants. Given that there was no infringement by the Defendants, there is no direct or induced infringement. There will be no further analysis of alleged induced infringement and the related claims are dismissed.

B. *Common Design*

[1650] The claim of common design also must have a patent infringement to be successful. Given there was no infringement of the Plaintiff's Patents, these claims must also fail and are dismissed.

C. *Does the Agreement affect this action?*

[1651] On January 7, 2016, a settlement agreement was reached between the parties with regards to the action in Federal Court T-1942-15. The infringement was alleged by the Plaintiff to be by the G3 technology owned by Kobold (or a related corporate body) against the 676 and 907 Patents specifically and other published NCS Patents. Given that I found that the NCS Patents

676 and 907 were invalid, I do not need to determine whether the settlement agreement applied to both sleeves and tools. Nor do I need to determine if the release applied to both Kobold and Promac. I will comment that after hearing the evidence there was sufficient evidence to conclude that the agreement applied to both sleeves and tools related to the G3 technology.

D. *Estoppel, Acquiescence, and Other Doctrines*

[1652] The legal doctrine of promissory estoppel as well as estoppel by acquiescence was put forth as a defence to the Plaintiff's claim that the Defendants infringed their Patents. Given my findings on the validity of the Patents these issues do not need to be dealt with.

[1653] Finally any other issues raised such as laches do not need to be considered.

XII. **Remedies**

[1654] On September 9, 2019, Associate Judge Kathleen Ring issued a bifurcation order (contested) for T-1420-18. On March 26, 2021 she issued a bifurcation order (on consent) for T-567-20. The terms of those orders were that the determination respecting the liability issues and the quantification issues were to be determined separately as set out in those orders.

[1655] Given the findings on validity and infringement, the Plaintiff is not entitled to any of the relief sought in their Statement of Claim.

[1656] The Defendants requested several forms of remedies, including:

- A. Permanent injunctive relief;

- B. Delivery up or destruction under oath;
- C. Electing an accounting of profits;
- D. Declarations that NCS's patents are and always have been invalid; and,
- E. That the quantification phase of this proceeding commence with Kobold being given the right to elect between damages and profits.

[1657] The Defendant Promac, in the fresh as amended Statement of Defence (dated November 30, 2021), seeks a declaration that NCS, through its officers, directors, representatives and agents has made false or misleading statements tending to discredit the business, wares, or services of Promac. I will decline to award that declaration as there was not sufficient evidence to support such a finding.

[1658] Following a finding of infringement, the normal remedy is a permanent injunction: *Apotex Inc v Merck & Co*, 2015 FCA 171 at para 72. Patent rights bring a strong presumption in favour of injunctive relief after a final determination of infringement has been made: Siebrasse et al, *Patent Remedies and Complex Products*, 1st ed by Biddle et al (Cambridge, UK: Cambridge University Press) at 115-116. I am also mindful of the observation that “[t]he Court should refuse to grant a permanent injunction where there is a finding of infringement, only in very rare circumstances”: *Valence Technology, Inc v Phostech Lithium Inc*, 2011 FC 174 at para 240. My attention has not been drawn to any reason that, if infringement has been found, such a remedy should not be granted. The Defendant, Kobold is entitled to a permanent injunction restraining NCS from further infringing the 571 Patent.

[1659] Likewise, an order for delivery up or destruction on oath of infringing products typically follows the award of an injunction. Such an order will issue. With respect to an accounting of profits, no evidence has been advanced to suggest the parties may not be entitled to this relief. With the bifurcated phase with respect to damages ahead, there is no reason to deny such relief given the Defendants came to the Court with clean hands.

[1660] Section 60(1) of the *Patent Act* permits this Court to declare a patent or claim invalid or void, and subsection 60(2) permits a declaration of non-infringement. I have found that Claims 1-34 of the 676 Patent are invalid; Claims 1-26 of the 652 Patent are invalid; Claims 1-28 of the 907 Patent are invalid; Claims 1-14 of the 026 Patent are invalid; Claims 1-23, and 28-30 of the 704 Patent are invalid. Claims 6, 11, 12, and 16 of the 571 Patent are valid and have been infringed by NCS.

[1661] As Kobold and Promac are the Defendants in this action, they are entitled to this without having given security for costs.

XIII. Costs

A. The Law on Costs

[1662] The Federal Court has two primary methods of assessing costs: unit value assessed through Tariffs, or a more “traditional” lump sum award.

[1663] Tariff awards improve foreseeability of costs and promote moderation in awards.

However, when cost outlays in a case have been significant, the approach of awarding costs by

Tariffs has been criticized for awarding costs that are “significantly lower than the prevailing party’s actual outlays”: *Whalen v Fort McMurray No 468 First Nation*, 2019 FC 1119 at para 9 [*Whalen*]; *Nova Chemicals Corp v Dow Chemical Co*, 2017 FCA 25 at para 13 [*Nova 2017*].

When considering a Tariff award in costly and complex litigation, the Court has to consider if the Tariff scale would be unjust for leaving the successful party insufficiently compensated: *Crocs Canada Inc v Holey Soles Holdings Ltd*, 2008 FC 384 at para 2 [*Holey Soles*].

[1664] In contrast, lump sum awards can provide increased indemnity to parties while considering the circumstances of a particular case. Lump sums are appropriate in “complex litigation conducted by sophisticated parties”: *Nova 2017* at para 13; see also *Sport Maska Inc v Bauer Hockey Ltd*, 2019 FCA 204 at para 50 [*Bauer FCA*]. While awarding a lump sum does not need to become an accounting exercise, the quantum should not simply be “plucked from thin air,” and is usually based on a percentage of the party’s reasonably incurred legal fees: *Nova 2017* at paras 11, 15-16. A lump sum award furthers the objective of securing “the just, most expeditious and least expensive determination” of proceedings: Rule 3 of the *Federal Courts Rules*.

[1665] In making a lump sum costs award, the norm established in the Federal Court is a general range of between one-quarter and one-third of fees: *Nova 2017* at paras 15, 22; *Philip Morris Products S.A. v. Marlboro Canada Limited*, 2015 FCA 9 at para 6. Recently, Chief Justice Crampton rightly noted that it has become increasingly common in patent litigation to award costs in the range of 25% to 50% of actual fees, plus reasonable disbursements: *Allergan* at para 27. He continued in *Allergan* that, with respect to patent litigation, it is better to adopt “the mid-point of the 25%-50% range as the starting point for determining a lump sum cost award”

because it incentivizes “parties to conduct their litigation in a manner that permits the Court to achieve its objective of shorter trials”: *Allergan* at para 35. In making a lump sum award, the amount can be calculated “at enhanced, lesser, or approximated values to those calculated by the parties or as based on the Tariff”: *Apotex Inc v. Shire LLC*, 2021 FCA 54 at para 18 [*Apotex*].

[1666] While the context in *Allergan* was specific to drug patents, the cases relied upon by Chief Justice Crampton when making these observations were a combination of complex intellectual property litigation cases of varying kinds. Two examples of cases he relied on were:

- A. *Nova 2017*: This case written by Justice Rennie gave us the path of broader considerations in awarding lump sum costs. Nova made and sold products covered by Dow’s patent for metallocene linear low-density polyethylenes, The trial judge, Justice O’Keefe, claimed the trial was “a most complex case with many complicated concepts and issues”: *Dow Chemical Company v. Nova Chemicals Corporation*, 2016 FC 91 at para 12. Written submissions were over 700 pages in length, with 22 allegations of invalidity and a 32 day trial. The award Justice O’Keefe arrived at was \$2.9 million, representing 30% of the Plaintiffs’ legal fees. In upholding the award of the Federal Court, Justice Rennie held that for these kinds of complex cases the range should be between 25% and 50%.
- B. *Loblaws Inc v. Columbia Insurance Company*, 2019 FC 1434 [*Loblaws*]: The crux of *Loblaws* was a series of causes of action under the *Trade-marks Act*. Chief Justice Crampton specifically cites paragraph 15 to support the 25% - 50% range. Here, *Loblaws* is citing paras 16-17 of *Nova 2017* and paragraph 50 of *Bauer FCA* as an apt summary of jurisprudence on costs for complicated cases with sophisticated commercial parties. It finishes with a determination that 25% - 50% is the tended range for these kinds of costs awards, although “there may be cases where a higher or lower percentage is warranted”: *Loblaws* at para 15.

[1667] After reviewing both cases relied upon in *Allergan* and subsequent use of its principles, as well as the Rule 400(3) factors and additional jurisprudence on the subject, a common theme has emerged. It is fit to depart from the norm and award elevated lump sum costs in cases that

are long or complex, with sophisticated commercial parties, considering restraint (or lack thereof) by parties in drafting multiple issues against one or more parties, and weighing the conduct of the parties. If a combination of these and other relevant factors are considered and a Judge determines a departure from the norm is warranted, the acceptable range should be 25% to 50% with an analysis starting at a mid-point between them.

B. *Submissions and Considerations*

[1668] At the end of the trial I had indicated my preference to order lump sum costs so the parties have based their detailed submissions on my direction. I will consider the sums submitted, rationale, as well as all of the relevant factors set out in the jurisprudence and Rule 400(3).

(1) *Actual Legal Fees*

[1669] The Plaintiff, NCS, proposed eight different scenarios for the percentage of legal fees and disbursements, with varying percentages in each depending on the result of this decision. All eight scenarios are lump sum awards.

[1670] The Defendants, Kobold and Promac, provided joint submissions under the assumption that they were successful in their defense and counterclaim, and requested costs in the amount of \$1,195,238.38 plus HST. This number was derived from counsel fees of \$621,820 based on the upper end of Column V of Tariff B (broken down as \$340,550 for T-1420-18 and \$281,270 for T-567-20). In addition there was disbursements in the amount of \$568,418.38 (comprising \$421,128.90 in T-1420-18 and \$147,289.49 in T-567-20), plus \$5,000 in costs for the submission

on costs. The Defendants concede that the amounts using the tariff are lower than the typical range of fees requested, and no exhibits were filed concerning the actual fees.

[1671] Rule 400(3) provides multiple factors which may be considered in the exercising of my discretion to determine and allocate costs. I have noted several relevant factors and their applicability on these facts below.

- A. Rule 400(3)(a): the result of the proceeding. After initiating this action, not only are NCS's patents at the core of this issue invalid, but I have found through counterclaim that they have themselves infringed upon Kobold's valid patent. Kobold and Promac have been entirely successful in their defence and counterclaim.
- B. Rule 400(3)(c): the complexity of the issues. There is agreement between the parties and myself that this was a highly complex matter. Indeed, as described by the Defendants, it involved two actions, six patents, approximately 145 asserted claims originally (approximately 123 after narrowing), and numerous other issues. Over the course of the proceedings spanning roughly three and a half years, there were at least 17 case management conferences, 15 pre-motions as well as other in-trial motions, 20 days of discovery, four trial management conferences, and 23 days of trial. While the subject matter is inherently complex, the multitude of claims and issues in this case unnecessarily enhanced the complexity of this case.
- C. Rule 400(3) (f): there were no formal settlement offers made by either party. This is a neutral factor in this case.
- D. Rule 400(3) (g): there was no doubt a significant amount of work involved for the parties, given the length and complexity of this matter. This factor points to costs in the higher range.
- E. Rule 400(3) (i): I must consider the conduct of the parties and whether it tended to shorten or unnecessarily lengthen the duration of the proceedings. I noted earlier that these proceedings were long and complex, and unduly complicated without a narrowing of issues and at times "a bar room brawl." All counsel are very good counsel and excellent advocates but some civility was lost on occasion. As such, this factor points toward a higher cost award.

[1672] The parties are all sophisticated, commercial actors with competent legal counsel. NCS made a deliberate choice in framing this action as widely as possible, and both parties made several choices that led to the lengthy saga of this proceeding. There is a clear window here for an elevated lump sum costs award to incentivize efficiencies while sanctioning conduct with so many issues making it more complex.

[1673] The calculation Kobold provided in their costs submissions suggests the amount calculated given their success under Column V of Tariff B, would be \$621,820 plus disbursements and taxes. From the two Defendants' submissions, their actual legal fees would be approximately \$4,250,000 and NCS's are approximately \$2,660,000 plus taxes and disbursements for both. The two Defendants both used the same counsel which would account for the Defendants' joint actual legal fees being more than NCS's. The use of the same counsel greatly shortened the trial and brought an innate efficiency not having any duplication in each of their defenses. A fair assessment of the Defendants' joint actual fees is \$4,000,000.00 plus taxes and disbursements.

[1674] Starting at the mid-point of the 25%-50% range suggested in *Allergan* is 37.5% of actual legal fees. But when all of the factors are considered then the upper portion of this range would best accomplish the goals of an award. I will use 45% of the actual legal fees.

(2) ***Disbursements***

[1675] The only concern NCS raised regarding disbursements was related to the "shop tour," and I will not reduce the disbursements related to the shop tour. As mentioned during the trial, I decided there was nothing untoward in the shop tour. The Defendants could have handled it

better, but that is no justification for disallowing the disbursement. Neither NCS nor Kobold can point directly to what portion of which invoice was allotted to the shop tour, further increasing the difficulty of this request.

[1676] The Defendants submitted reasonable disbursements of \$568,418.38. Approximately 80% of their disbursements were related to the three experts and these were all reasonable and benefited this proceeding.

C. Decision as to Costs

[1677] I will award lump sum costs to the Defendants comprising 45% of their actual legal costs based on the approximation of \$4,000,000.00, which would equal \$1,800,000.00. The Defendants shall receive the total amount of their claimed disbursements, which equals \$568,418.38. I will not award any additional costs requested arising from the preparation and submission of their costs submissions. The Plaintiff will pay forthwith the lump sum costs to the Defendants in the amount of \$1,800,000.00 plus disbursements of \$568,418.38 for a total of \$2,368,418.38 and taxes.

[1678] If the Defendants cannot come to an agreement on the apportionment of the costs award between themselves within 30 days of this decision then, they may seek further direction from the Court.

XIV. **Conclusion**

[1679] I am dismissing NCS's claims in T-1420-18 and T-567-20. Neither Kobold nor Promac infringed any of the claims asserted in NCS's patents, and importantly, the Asserted Claims of NCS's patents are invalid.

[1680] With respect to the 571 Patent, I will allow the Defendants' counterclaim and find NCS's LP3 sleeves infringe upon Claims 6, 11, 12, and 16 of the 571 Patent. Kobold is entitled to a permanent injunction enjoining NCS from the further use, manufacture, or sale of the LP3 sleeves. Kobold is further entitled to the delivery up or destruction under oath of the LP3 sleeves.

[1681] I declare the following:

- A. Claims 1-34 of the 676 Patent are and always have been invalid;
- B. Claims 1-26 of the 652 Patent are and always have been invalid;
- C. Claims 1-28 of the 907 Patent are and always have been invalid;
- D. Claims 1-14 of the 026 Patent are and always have been invalid;
- E. Claims 1-23, and 28-30 of the 704 Patent are and always have been invalid;
- F. None of either Kobold's nor Promac's activities constitute an infringement upon any claim asserted by NCS; and,
- G. Claims 6, 11, 12, and 16 of the 571 Patent are valid and have been infringed by NCS.

[1682] Determination of the quantum of damages will be subject to a separate trial, during which Kobold will have the right to elect between damages and an accounting of profits.

[1683] Costs will be awarded to the Defendants in the lump sum of \$1,800,000.00 in fees and \$568,418.38 in disbursements, plus taxes payable forthwith by the Plaintiff.

[1684] The record before the Court contained certain confidential information. To ensure that there is no inadvertent disclosure of the information, the parties will have 14 days from the release of these reasons to make submissions on the disclosure in the public version of these reasons.

JUDGMENT in T-1420-18 and T-567-20

THIS COURT'S JUDGMENT is that:

1. Claims 1-34 of the 676 Patent are and always have been invalid;
2. Claims 1-26 of the 652 Patent are and always have been invalid;
3. Claims 1-28 of the 907 Patent are and always have been invalid;
4. Claims 1-14 of the 026 Patent are and always have been invalid;
5. Claims 1-23, and 28-30 of the 704 Patent are and always have been invalid;
6. None of either Kobold's nor Promac's activities constitute an infringement upon any claim asserted by NCS; and,
7. Claims 6, 11, 12, and 16 of the 571 Patent are valid and have been infringed by NCS.
8. The Defendant, Kobold is entitled to a permanent injunction restraining NCS from further infringing the 571 Patent.
9. NSC should deliver up to Kobold or at the option of Kobold, destroy under oath all infringing articles, products, parts, components, attachments, drawings, specifications, moulds and tooling in its possession or power that infringe the asserted claims, or destruction on oath of infringing products.
10. The Defendants are entitled to an accounting of profits.
11. The Plaintiff will pay forthwith the lump sum costs to the Defendants in the amount of \$1,800,000.00 plus disbursements of \$568,418.38 for a total of \$2,368,418.38 plus taxes.

"Glennys L. McVeigh"

Judge

APPENDIX A

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

Mr. Lehr's Primer

The header on this primer indicates it is confidential. This was because it was extracted from Mr. Lehr's expert report and this primer is not confidential.

V. TECHNICAL PRIMER

A. Wellbores and Well completion

29. Oil and gas reservoirs exist deep below the earth's surface as dense deposits of hydrocarbons. These reservoirs are found in "tight" rock formations² that exist in strata spanning anywhere from tens of feet to hundreds of feet in depth/width.

30. In order to access these reservoirs and recover the hydrocarbon deposits, holes known as "wellbores" are drilled into the ground. The hydrocarbon deposits must then flow from the formation into the wellbore and eventually up to the surface for processing.

31. "Well completion" is a term used to describe the events and equipment necessary to bring a wellbore into production once drilling operations have been concluded. At a high level, completion includes the following steps: perforating, stimulating, and installing production tubing and packers (when used).

² Most commonly sandstone, shale, clay, or consolidation/unconsolidated sands.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

32. Wellbores may be either cased or uncased. Uncased wells are referred to as “openhole” wells. They have no structural support within the wellbore. However, wells are usually cased, with casing forming a major structural component of the wellbore.

33. Casing consists of large diameter metal (often steel) sections of pipe that are coupled (threaded together) at the surface and lowered into the wellbore. An assembled length of casing is referred to as a “casing string”.

34. After casing is lowered into the wellbore, the casing will most often be cemented in place. A volume of cement slurry will be pumped down the casing through what is known as a “float shoe” at the distal end of the casing. The cement slurry will exit the distal end to turn 180 degrees back along the outside of the casing before curing and forming a cement sheath between the outside of the casing and the open hole (i.e. the open hole annulus). This sheath allows for hydraulic isolation of a specific region of the formation where fracturing activities will take place.

35. Casing serves important functions, including:

- a. Preventing the wellbore from collapsing or caving in;
- b. Isolating different formations to prevent the flow or crossflow of formation fluid³
- c. Providing a means of maintaining control of formation fluids and pressure.

36. “Perforating” refers to the process of punching a hole in the casing of a well in order to establish a flow path for the fracturing fluid from the wellbore to the formation as well as between the oil or gas in the formation and the wellbore. Where a well has also been cemented, a hole must also be punched through the cement.

37. As I mentioned above, the cement sheath allows for the hydraulic isolation of a specific region of the formation. For example, if a specific region of the casing is perforated

³ Formation fluid is any fluid that occurs in the pores of a rock.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

and fluids are pumped through the perforation, that fluid will not flow up along the outside of the casing between the outside walls of the casing and the wellbore walls.

38. The most common methods of perforation include using perforation guns equipped with explosive charges⁴, as well as abrasive jet perforation devices. Both of these types of perforation devices can be referred to as “downhole tools” and operate in different manners but obtain the same result, namely to perforate casing and cement at predetermined locations to gain access to the reservoir.

39. A perforating gun uses explosives to punch holes through the casing and cement (if applicable). An abrasive jet perforation device will achieve the same result by jetting an abrasive liquid (usually sand and fluids) at high speed through nozzles in the jet perforation device against the casing walls. Fracturing fluid (discussed below) can then be sent through the perforations and into the formation to create fractures, which will allow fluid from the oil and gas reservoir to migrate to the wellbore.

40. Finally, “stimulation” is a treatment performed to enhance the productivity of a well. One example of well stimulation is hydraulic fracturing, discussed below.

B. Hydraulic Fracturing

41. Oil and gas reservoirs are often referred to as either “conventional” or “unconventional”. Characteristics of conventional reservoirs, including the higher permeability of the rock formation, typically permit oil or natural gas to readily flow into the wellbore.

42. However, many reservoirs exist in complex and very low permeability rock formations. In such “unconventional” reservoirs, the rock formation requires further “stimulation” in order to allow the hydrocarbon deposits to flow into the wellbore. Hydraulic fracturing is one method of stimulating a well.

43. In simple terms, hydraulic fracturing, also known as “fracking,” involves injecting fluids under high pressure through perforations in the casing and into the rock formations

⁴ These may also be referred to as “shaped charges”.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

to create new fractures (i.e. cracks) in the rock as well as to increase the size, extent and connectivity of existing fractures. This stimulation technique is routinely performed on oil and gas wells in low-permeability reservoirs.

44. Prior to the development of hydraulic fracturing, explosives were lowered into wells and detonated in order to shatter surrounding rock formations. Water was then pumped into the well with a view to increasing oil flow.

45. In or about the 1940s, explosives were replaced with liquids, which are sent at high-pressure into the wellbore. This “hydraulic” version of fracking has become the standard in the oil and gas industry.

46. Up until the early 1990s, hydraulic fracturing techniques involved solely the stimulation of vertical wells. However, in the 1990s, oil and gas engineers improved methods of drilling horizontal or “deviated” wells, which increased the exploitation of reservoirs because the horizontal wellbore increases the surface area of the formation that is accessed by the well. By early 2010, horizontal drilling was very well developed.

47. Horizontal wells are drilled vertically down to a “heel” point at which the well turns and runs horizontally towards the distal end, known as the “toe”. Even though the wellbore is horizontal, the convention is to refer to portions of the wellbore closer to the surface as being uphole whereas positions closer to the toe are referred to as downhole.

48. In both vertical and horizontal drilling, fracking fluids or “frac fluids” are pumped through perforations and into formation at high pressure and high flow rates. These fluids usually contain water, proppant, and a small amount of nonaqueous fluid lubricant designed to reduce fluid friction (expressed as friction pressure) while pumping the fluid into the wellbore.

49. “Proppants” are solid flowable particles mixed into the fracturing fluid to hold fractures open after a hydraulic fracturing treatment. In addition to naturally occurring sand, man-made or specially engineered proppants may also be used. As fractures will naturally “heal” or close at the conclusion of the fracturing treatment, proppants are an

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

essential feature in allowing hydrocarbon reserves to flow into the wellbore because they “prop open” the recently created fractures even after the frac pressure dissipates.

C. Getting Tools Downhole

50. In order to reach the region downhole where perforation is desired, tools such as perforating guns and abrasive jet perforation devices must be run downhole.

51. Several methods exist to deliver a tool downhole including slick line, wire line, and coiled tubing and jointed pipe.

52. Slickline is a thin nonelectric cable used for selective placement and retrieval of wellbore hardware, such as plugs, gauges and valves. Slickline have been used to adjust valves and sleeves from the surface and is normally used for conveyance of wellbore hardware through tubing.

53. Unlike slickline, wireline is an electrical cable. Allowing electrical communication between the surface and downhole tools can provide valuable information to the tool operator and allow for the tools to be controlled from the surface. Wireline is also used for lowering tools such as perforating guns, packers and plugs downhole. Also known as “electric line”, wireline is used in both cased wellbores and openhole.

54. Coiled tubing refers to a large reel of metal pipe that is often used to carry out operations similar to wireline. The presence of the tubing allows operators to pump fluids through the tube, as pressure within the tube can be controlled. In general, coiled tubing cannot be rotated at the surface and therefore the only movement of a downhole tool relative to casing on coiled tubing is to move the tool uphole or downhole.

55. Jointed tubing is similar to coiled tubing in that fluids can be sent through the tubing to a tool attached to the jointed tubing. Jointed tubing can be rotated at surface, although only a limited amount of rotation may reach the tool attached at the end, but this does offer greater relative movement capability at the tool as compared to coiled tubing. Like casing, lengths of jointed tubing are coupled at the surface and lowered into the casing section by section.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

D. Plug and Perf

56. Plug and perforation (“Plug and perf”) is a completion method that was developed in the early 2000s. By 2010, plug and perf was a commonly used, well understood and accepted completion method for horizontal wells.

57. Plug and perf entails the placement (or pumping down on wireline) of a bridge plug and perforation (perf) gun to the desired stage in a wellbore. Once the plug is set, the perf gun fires holes in the casing, penetrating the reservoir section above the set plug. Then, the wireline and spent guns are removed from the well. Hydraulic fracturing is initiated, with the frac fluid pumped into the same section above the plug. The process is repeated for each stage, starting at the toe of the wellbore and moving uphole in a series of stages until all stages have been perforated and fracked. Then the bridge plugs are drilled or milled out. I will explain this process in more detail with reference to images, below.⁵

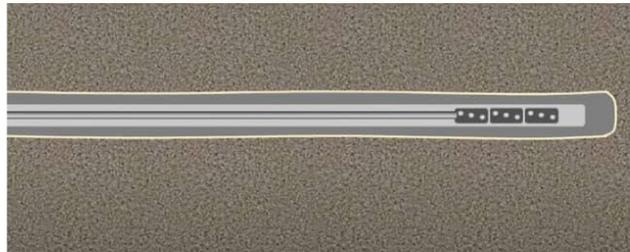
58. Plug and perf begins with a hole that has been cased and cemented, as shown below.



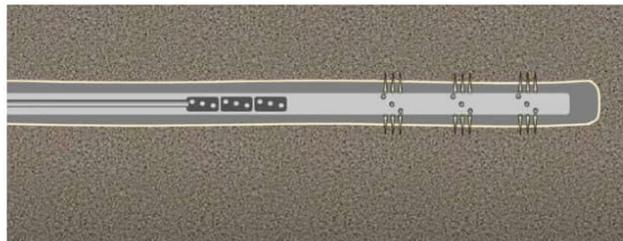
59. A perforating assembly is then lowered to the toe of the wellbore. The perforating assembly in the image below includes three perf guns that can each be independently fired to create clusters of perforations through the casing and cement.

⁵ These images are taken from the video entitled “A 5-Minute Overview of Plug-and-Perf”, which can be found at https://www.youtube.com/watch?v=LFQn_m0s0Ok.

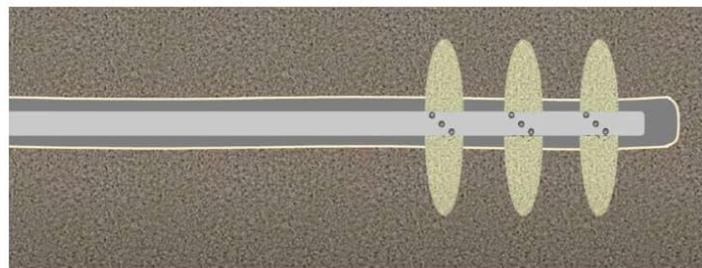
CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019



60. Once the perforating assembly has been lowered into the distal end of the wellbore (the toe), the operator moves and triggers each gun at selected intervals, punching holes through the cement and casing. This opens channels from the wellbore directly into the formation.



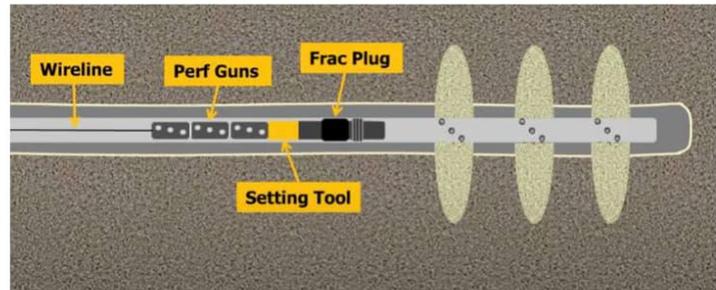
61. After the perforations have been made, the perforating guns are retrieved back to the surface and frac fluid can be pumped downhole, thus hydraulically stimulating the formations.



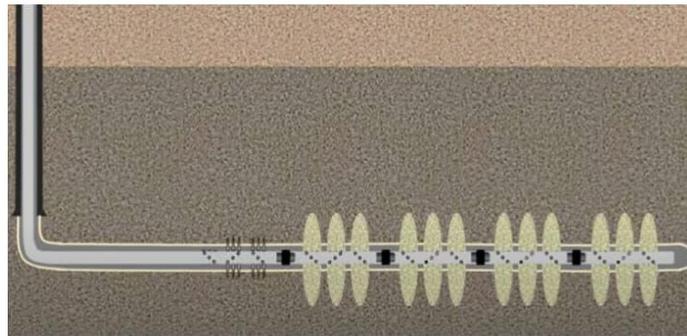
62. For all subsequent sets of perforations put into the casing, a frac plug and setting tool are included on the tool assembly. The frac plug provides hydraulic isolation of one set of perforations from the set of perforations that were punched and fractured previously.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

This means that when you're punching and hydraulically stimulating each subsequent set of perforations, the fracturing fluids go only into those new perforations and do not enter into the previously stimulated perforations located further down in the wellbore. Each set of perforations between successive frac plugs is referred to as a "stage".



63. This process is repeated until all stages have been perforated and stimulated. The plugs would then be milled or drilled out.



64. The main drawback with the "plug and perf" method is that each stage requires a new frac plug and perforating gun be run, meaning that the "spent" perforating gun must be pulled to the surface and replaced with a fresh gun and frac plug for the next stage to be stimulated. This increases the time required for completion, as well as the associated cost.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

65. One way to overcome this issue of requiring multiple trips out of the wellbore was patented by Exxon Mobil. I recall this technology specifically as the company I was working with at the time, BJ Services, licensed this technology from Exxon.

66. The Exxon method described a tool that could stimulate multiple regions in a single trip downhole – thus alleviating a primary downside to the plug and perf method. This new method combined a perforating device and a resettable packer. Unlike the plugs used in the plug and perf method, the resettable packer allowed multiple regions to be hydraulically isolated one at a time during one trip of the tool into the cased hole. No plugs were required to be left in between stimulated stages. The resettable packer was simply set to isolate one region before being unset and moved to the next region by the operator.

67. This method as well as other downhole tools typically include “locators” as part of the tool assembly. One category of commonly used are called mechanical casing collar locators (“MCCLs”), which are also known as casing collar locators. Sections of casing are coupled to each other at the surface by collars. Each section of the casing is threaded into a collar but there is a gap between the end of each casing. MCCLs have outwardly biased features that run along the smooth casing walls. When the MCCL encounters a gap in the casing, the outwardly biased feature of the MCCL springs into the gap so that additional force is required to move the MCCL through the gap. Because of this, the coiled tubing operator can monitor tubing string weights at the surface and will know when additional force is required to dislodge the MCCL from the gap under a collar and will therefore know that the downhole tool has traversed another length of casing.

68. While the coiled tubing operator will know how much coiled tubing has been unspooled from the coiled tubing unit on surface, the coiled tubing can bend in the well and therefore MCCLs can provide a more accurate estimate of a tools present location in the wellbore.

69. Thus, locators are used to help identify the present location of a tool assembly in a wellbore thus allowing the next perforation and stimulation to take place at the desired location.

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

E. Debris

70. “Debris” refers to particulate matter in a wellbore including cement slurry, sand, proppant or other debris such as casing shards, shavings or rubber pieces from packing elements.

71. Debris arises in both vertical and horizontal wells. However, its impact varies as between vertical and horizontal wells. For instance, in a vertical well gravity is a friend – it will pull debris downhole. However, in a horizontal well gravity will not be of benefit and debris can more readily build up.

72. Debris can arise in all stages from well drilling to well completion. Sources of debris can include:

- a. Cementing: cement matter may be left inside the casing from cement that is not fully displaced through the float shoe to form a cement sheath.
- b. Sand: any sand used in fracturing or jet perforation may remain inside the casing or sand that is produced by the formation may enter the wellbore.
- c. Perforating: during perforation there are many sources of debris. For example, charge guns leave metallic debris each time a charge is triggered. Likewise, the cement and casing that is punched through can leave metallic shards and cement pieces.
- d. Fluids: any fluids sent downhole can result in debris. This includes solids from drilling mud as well as from fracking fluid and proppant.
- e. Tools: pieces of tools are known to break and be a source of debris in the wellbore. Some tools such as cement retainers must be used to correct poor cementing of the casing, but are subsequently removed used a drill bit, which always leaves some metallic and rubber debris in the wellbore.

73. As of early 2010, there were limited methods to alleviate or remove debris. Generally speaking, those in the industry knew that keeping debris out of the tool as much

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

as possible was desired. However, it was also known that debris was inevitable and thus there was a need for products that were debris tolerant.

74. Methods to alleviate problems associated with debris in downhole tools in stimulation operations tended to be simplistic prior to 2010. These included attempting to dislodge debris or move it out of the way of the tool. For example, if using jointed tubing, the operator could attempt to rotate the tube to clear the path. Alternatively, circulating fluid could be used to try and flush out the debris from around the tool. In the event of a large piece of debris that caused the tool to be immobilized, a fishing operation could be attempted to remove the tool from a wellbore.

75. Debris can interfere with the proper operation of a downhole tool. In a worst-case scenario, the downhole tool can get stuck in the casing. If a fishing operation does not retrieve the tool, the stuck tool may need to be milled to clear the wellbore. However, this process will destroy the tool and the delays associated with a stuck tool significantly increase the costs of a fracturing operation.

76. In about 2010, particularly in coiled tubing operations, downhole tools would often get stuck downhole in deviated wells. As such, operators preferred to do fracturing operations other than by using coiled tubing deployed tools for fear of having the tools get stuck in the well due to debris issues.

F. Sliding Sleeves

77. As indicated above, in cased wells perforations will have to be introduced into casing walls to allow fracturing fluid to exit the cased wellbore and subsequently to allow the oil or gas to migrate into the wellbore for production.

78. Using explosive type perforating devices has inherent limitations. The types of tools deploying explosive charges (i.e. "guns") require the tool to be retrieved back to surface after perforation of each stage. This entails pulling the tool out of the wellbore, replacing it with a fresh perforating gun, and sending it back down hole with a new frac plug for the next stage. This becomes expensive given the number of workers, equipment, and time required for fracturing each zone. For context, using the plug and perf method for

CONFIDENTIAL INFORMATION SUBJECT TO ORDER DATED NOVEMBER 22, 2019

fracturing of 60 zones may require 15 days of continuous fracturing operations at the wellsite. Additionally, explosive perforating guns bring intrinsic safety risks with their use, such as accidental firing at surface which puts the operations personnel at risk of injury or fatality.

79. Sliding sleeves are another way of placing perforations in casing walls without having to directly punch perforations to the casing walls. In general, sliding sleeves are devices that are coupled to the casing as the casing is being made up at surface and installed in the well. Sliding sleeves have predrilled ports which are functionally equivalent to perforations.

80. These predrilled ports are protected by sleeves so that when the entire sleeve assembly is installed in the well as part of a casing string, the sleeve is in the closed position because the predrilled ports are covered by the sleeves. Before fracturing through the ports, the sleeves must be opened or “shifted”. Generally speaking, sleeve movement will be constrained by shear screws to ensure that the sleeve is not opened accidentally.

VI. THE 676 PATENT

A. Person Skilled in the Art

81. I have been advised by counsel for NCS that a Canadian patent is to be read from the perspective of a person skilled in the art to which the patent relates, as of the date of publication. I am informed by counsel for NCS that the publication date for the 676 Patent is July 23, 2010.

82. In providing my opinion as to the skilled person, I have been guided by the following legal principles which have been communicated to me by counsel for NCS:

- a. The skilled person may be a single individual or a team of individuals representing different disciplines;
- b. The skilled person is an average “worker” in the field relevant to the invention;
- c. The skilled person has sufficient skill and knowledge in the field(s) addressed by the 676 Patent to understand and apply the teachings of the 676 Patent;

21

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Mr. David's Primer

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The header on this primer indicates it is confidential. This was because it was extracted from Mr. David's expert report and this primer is not confidential.

4. BACKGROUND

i. Brief History of Oil and Gas Exploration

30. Almost a century after the first oil wells were drilled in the mid 1800's global oil production reached 10 million barrels per day in the 1950's. In 1949, the first commercial hydraulic fracturing operations were undertaken. Over the next two decades, oil exploration saw explosive growth, reaching 60 million barrels per day by the late 1970's. The unprecedented growth in oil production and consumption was due to technology developments that made exploration and production both lower risk and less costly.
31. The "permeability", or ease with which liquid flows, of an oil reservoir is dictated primarily by the quality of its constituent rock, with the size and shape of the holes in the rock ("pores") determined over millions of years by geological processes. In the early days of the oil and gas industry, large, high quality reservoirs which were prolific in the volume of oil they held as well as the rate they could be produced were discovered. These "elephant" pools can be found across the globe, with some famous deposits providing vast amounts of energy and wealth to the nations where they are located. A good example being the Ghawar field in Saudi Arabia, which despite being discovered in the 1940's, still produces one of the largest daily oil volumes of any single reservoir in the world.
32. Over decades, as high-quality assets were discovered and exploited, global consumption continued to increase rapidly, and is in the range of 90 million barrels per day.

33. As demand outstripped the supply capabilities of high-quality reservoirs, industry developed technology to produce oil and gas from reservoirs that would otherwise be unprofitable. The most effective way to increase the value of an oil reservoir is to increase the rate at which the oil is withdrawn. This can be done in a number of ways, including drilling more wells, injecting fluids to pressurize the reservoir or “drive” the oil and gas to the wells, by altering the fluid properties with chemicals or heat, allowing them to flow easier, or by increasing the permeability of the reservoir itself by altering the structure of the rock (fracturing).

ii. Hydraulic Fracturing Overview

34. Hydraulic fracturing or “fracking” is the most effective method for enhancing permeability of a reservoir. The concept of fracking is simple, it is the concept of introducing fractures into the rock by pumping fluid so that oil and gas can flow more easily into the well. The fractures create a large surface area in the rock, allowing it to drain out of the reservoir and into the well at higher rates. Sand “proppant” is added to the fluid to ensure that the fractures are highly permeable and do not collapse once the fluid pressure declines. The proppant is carefully selected, based on reservoir and fluid requirements, to ensure it has a high permeability to flow once the fracture faces close on it.

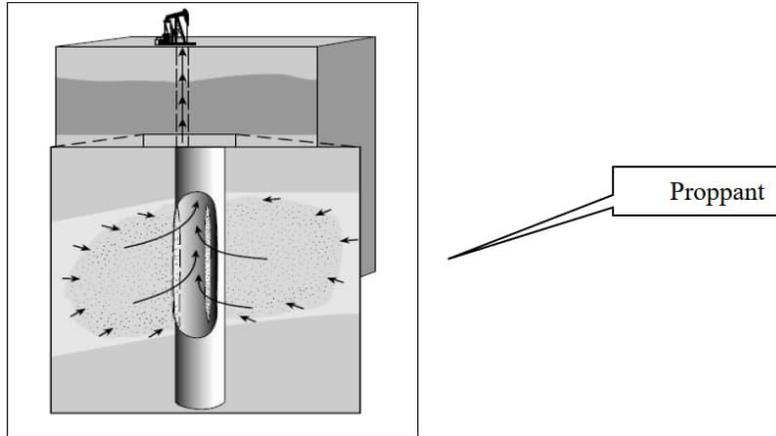


Figure 5-5. Increased flow area resulting from a fracture.

Source: Reservoir Stimulation, 3rd Edition

35. The first commercial hydraulic fracturing operation occurred in 1949, and quickly became the predominant method for producing oil and gas from lower quality reservoirs. Over the next 20 years commercial success of fracking was largely responsible for the almost doubling of US oil production. Over one million wells in North America have been fracked, and while the process is simple in concept, the pressures, pumping rates, and types of fluids involved require incredibly large, powerful pumps and equipment. The performance requirements of fracking equipment are some of the highest found in any industry, and as the quality of reservoirs available to exploit has dropped, the intensity of fracking and the demands placed on the equipment have grown.

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As shown in this historic photograph, the first hydraulic fracture treatment was performed by Halliburton under license to Stanolind Oil Company on March 17, 1949, east of Duncan, Ok. Hydraulic fracturing has since allowed commercial hydrocarbon recovery from more than 1 million wells that could not have produced economically, and that number grows by the day with nearly every U.S. gas well and the majority of all U.S. oil wells now being hydraulically fractured.

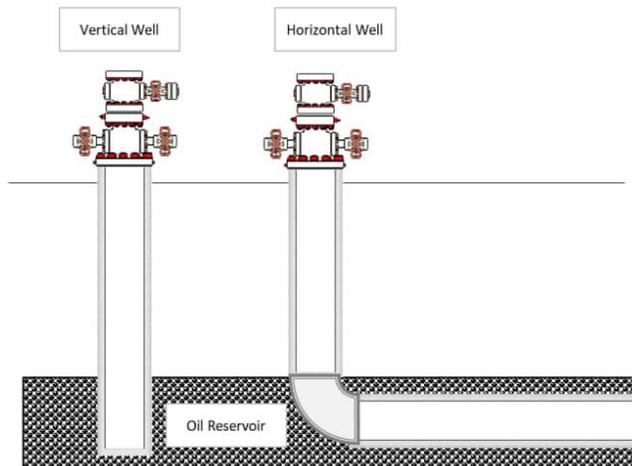
Source: American Oil and Gas Reporter



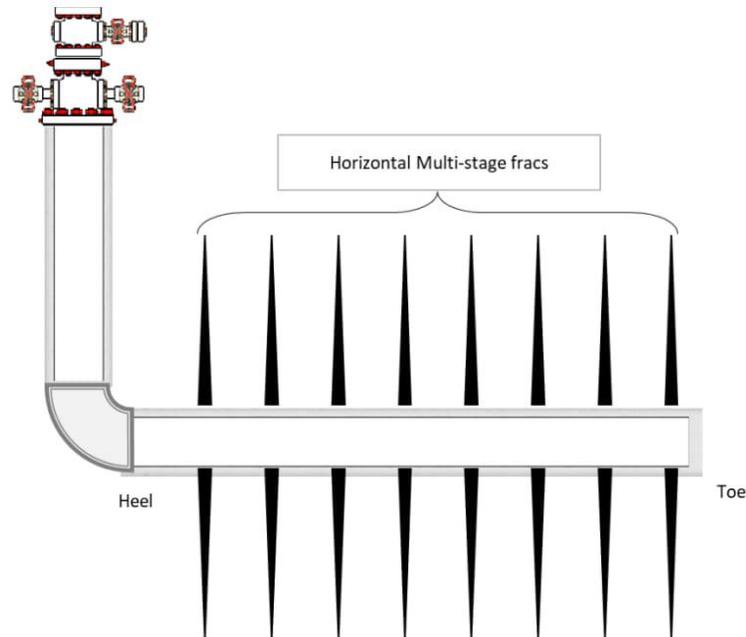
Modern fracturing operation

Source: Journal of Petroleum Technology

36. In the early days of oil and gas production, wells were drilled vertically. As technology improved, drillers learned how to steer the drill bit during the drilling process. This led to the first horizontal wells being drilled in the late 1980's. The principal benefit of horizontal wells is the increased contact area within the reservoir, which allows more flow of oil and gas into the well. Horizontal wells have a vertical portion and a horizontal or lateral portion as shown below:

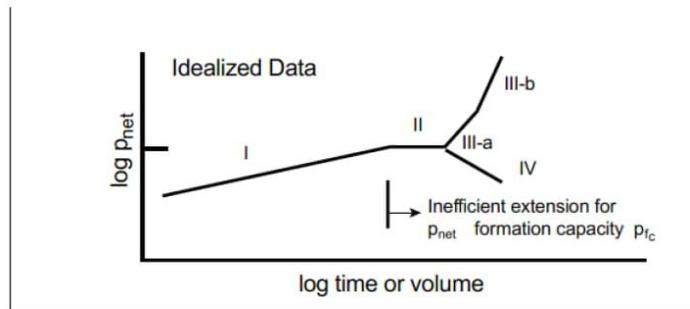


37. In order to reap the benefits of fracking in horizontal wells, producers developed the ability to fracture individual portions of a wellbore separately, in what is now commonly called horizontal multi-stage fracking ("HMSF"). This process involves pumping multiple fracs along the wellbore, usually starting at the distal end, or "toe", and working back towards the "heel" of the well in stages. At each stage the wellbore is isolated from the fractures that have already been pumped, to ensure the fluid enters the reservoir at the desired point.



38. Fracturing techniques are continuously trying to optimize the cost and performance of the operations. Variables like fluid type, proppant type, proppant concentration, pumping rates, volumes, tonnage of sand, etc, as well as how these variables are ramped or changed during the frac, are adjusted for the type of well and type of rock. Fracking is an expensive, dynamic process that is monitored and analyzed continuously in real time during the operation. One common way of monitoring the fracture is using specialized plots referred to as the “Nolte-Smith” plot that were introduced in 1982:¹

¹ Economides, Nolte, “Reservoir Stimulation”, 3rd edition, (2000, Chichester, England), Appendix Evolution of Hydraulic Fracturing Design and Evaluation, [Appendix E.52](#); SPE 10911, [Appendix E.35](#).



Appendix Figure 8. Log-log diagnostic plot for fracturing (Nolte, 1982).

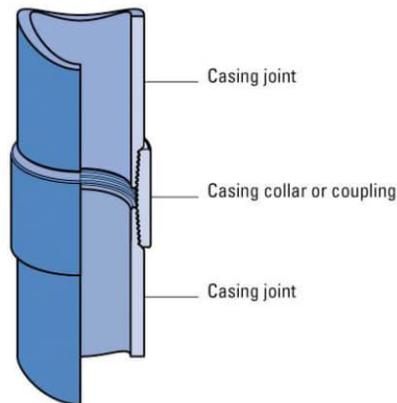
39. This plot is used to estimate the pressure limit for efficient fracture extension based on the pressure P_{net} at the entry point of the sand into the formation which is determined using the dead string. Slope I on the graph is the most efficient mode of fracture extension showing horizontal propagation. Whereas the slopes in III and IV show negative outcomes. Slope III shows that the fracture is overly restricted and likely to “screen out” and slope IV is indicative of unrestricted vertical fractures.
40. A “screen out” occurs when the sand and proppant can no longer enter the formation and piles up in the wellbore. This is problematic because, amongst other reasons, in operations where tools are in the well, the proppant accumulates around the tool and the tool can get stuck. Several techniques exist to try and dislodge the sand. In general they consist of pumping “clean” fluid to try and flush out the debris.
41. It is important to note that in a horizontal well, references to “up” and “down” are not used literally. Downward or downhole direction means towards the toe and upward or uphole direction means towards the heel or surface.

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42. Another consideration with horizontal wells is that when tools are in the horizontal portion, gravity is of little assistance to push on things. Additionally, tools in the lateral portion of the well do not move through the center of the well, they drag or slide against the bottom. Fluid is often pumped downhole while tools are being run and pulled out of hole to help the tool slide in the well.

iii. Well Construction

43. When a well is drilled, it is typically lined with pieces of pipe, called “casing”. The individual pieces of casing (“joints”) are typically connected by threading the ends of each piece of pipe together. This is done using a separate small section of pipe (“collar” or “coupling”) into which both pipes are inserted:



Source: Schlumberger

44. Casing in a well serves multiple purposes, including preventing collapse or caving of the external formations, providing a conduit for equipment to be run through below ground, and selectively allowing or preventing (by means of installed valves) fluid flow into or out of the reservoir. Depending on the well type and depth, multiple casing strings may be run concentrically.

45. Casing is typically cemented in place externally along the vertical portion of the well from ground level to the reservoir depth. This prevents fluids from flowing between external formations and provides a rigid, sealed structure for further operations. The horizontal portion of the casing in the formation may or may not be cemented in place, depending on the design of the wellbore.
46. Once a well has been drilled, a fluid pathway (“hydraulic connection”) must be created between the reservoir and the interior of the sealed casing before production of the oil and gas can be commenced. This is known as “completing the well” and various methods are available to accomplish it. Such methods include drilling or punching a hole in the casing with mechanical tools, cutting holes with a high pressure mixture of sand and water (“abrasive sand jets”, or “cutting”), detonating small charges to perforate (“perf”) the casing, or installing a pre-existing window or hole (“ports”) in the casing that can be opened. Common ways of opening ports include bursting with pressure, or sliding open a sleeve covering the port.
47. Abrasive jet perforating has been well known for decades, as noted in [SPE 4702](#)² “Hydraulic jet perforating was introduced to the industry in 1960 by Pittman et al. Penetration is achieved by pumping abrasive-laden fluid through tubing and then jetting it horizontally through a nozzle.”
48. Once the casing has been perforated, it can be used to fracture through. Usually starting from the toe of the well and working back towards the heel, large volumes of fluid at high pressure are pumped into the well and into the formation through these holes. Multiple perforations or ports can be fracked through at once or sequentially (by “stage”) if the application requires selectively treating different zones of the formation.

² [Appendix E.34](#)

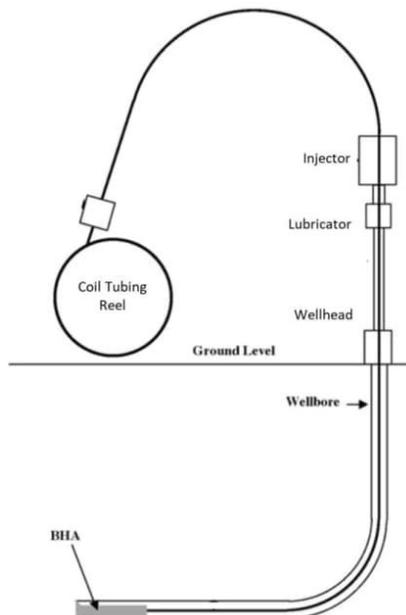
49. In some wells, fracking is done using specially designed tools, conveyed into the well on pipe or other tubing, that perform a variety of functions during the operation.

iv. Bottom Hole Assemblies, Sliding Sleeves, and locators:

50. “Tools” in well operations refer to devices that perform an intended function in a wellbore. Many oilfield tools perform single functions, in the same way a carpenter’s saw is meant only for cutting wood. Others are capable of multiple functions, similar to a Swiss army knife. Multiple tools attached together constitute a “bottom hole assembly”, or “BHA”. Well operations may require a variety of actions to be performed, and selection of tools for a BHA is a common task for well operations personnel.
51. A plethora of tools are available on the market, and BHA’s typically contain multiple tools that are assembled on a job-specific basis for whatever operations are necessary. The assembly of these tools is normally done at the well site by threading the individual components together in the desired configuration (“making up the BHA”). This process is analogous to assembling Lego pieces, in that the order of assembly can be varied and multiple pieces can be interchanged in a particular BHA. A poorly designed BHA can be disastrous to a well operation, and suitable experience in their selection on a frac operation is an absolute necessity.
52. Tools on BHA’s are often adjusted or modified onsite to function under different conditions as dictated by the wellbore conditions. The individuals that assemble and make these modifications are called “tool hands”. They often need to make changes to the configuration or the components of a BHA based on their own experience.

CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 20219
0021

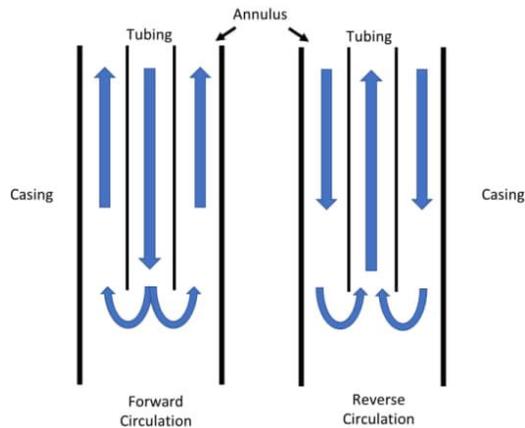
53. Once assembled, the BHA is “run” into the well by connecting it to the end of a deployment system. There a number of ways tools can be sent downhole including wireline, slickline, jointed tubing, coil tubing, etc. When deployed on pipe, the BHA and pipe assembly is called a “workstring”.
54. The workstring can consist of multiple joints of pipe threaded together (jointed tubing), or one continuous pipe that is fed from a reel, called “coiled tubing”. Both jointed tubing and coil tubing can carry fluids from the surface to wherever the BHA is located in the wellbore. A simplified schematic of a coiled tubing operation is shown below:



CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 20219
0022

55. Coil tubing is a long tube of flexible steel pipe that can be run into a well. The coil tubing is raised or lowered in the well by the injector, which grips the pipe and pushes or pulls it into or out of the well. It has the advantage that it is sealed at the wellhead which allows for continuous fluid flow while running in or out of the hole. However, a challenge with coil tubing is that it is not as durable as jointed tubing, and it cannot transfer rotational movement downhole. Additionally, because the entry and exit point of fluid is at the end of the reel, this means that fluid or materials in the coil has to travel around and around the coil reel before or after it is in the well.
56. Tubing strings have the advantage of providing an additional flow path in or out of the well separate from the annulus. This functionality allows for the design and use of hydraulically activated tools like inflatable packers or as described in [OTC 7354](#).³ It also allows tools to be included on the BHA that allow for fluid to be circulated in the well, i.e. pumped into the well and returned to surface through a valve.
57. When fluid is “forward circulated” it is pumped down the tubing string and comes back up to surface through the annulus. “Reverse circulation” implies the opposite direction, where fluid is pumped down the annulus and returned to surface up the coil. A simplified schematic of forward and reverse circulation is shown below:

³ [Appendix E.42](#)

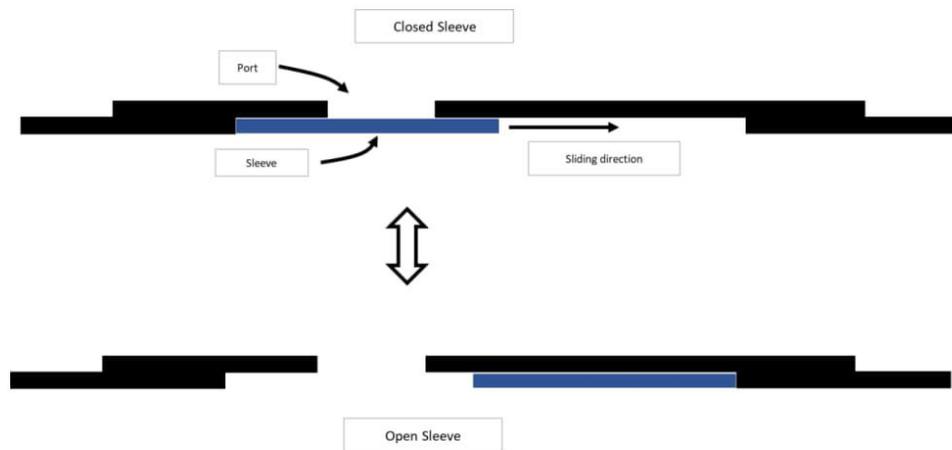


58. Where coiled tubing is being used, reverse circulating is generally used as a last resort. This is because it is undesirable, and potentially harmful to the coil tubing, to allow the coil to fill with sand and proppant. The sand and proppant have to travel up the entire coil, and through the spool around the reel in a process called “helixing”. This has the risk of sand accumulating in the coil on the reel and creating blockages. It is by far preferable to forward circulate so that the debris is brought to surface up the annulus, thereby protecting the coil.

Sliding Sleeves

59. Sliding sleeves provide a flow path into or out of a tubular and are commonly used in a wide variety of oilfield applications. In its simplest form, a sliding sleeve consists of one tubular with one or more ports that is covered by another, shorter, tubular (the sleeve) capable of sliding a fixed distance along the length of both tubulars such that when the sleeve is at one end of the sliding length, a fluid pathway through the port is open, and when the sleeve is at the other end the fluid pathway is closed. These devices function similarly to a valve which has an open position and a closed position. A simple schematic is shown below:

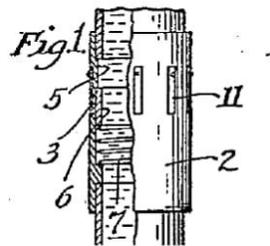
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0024



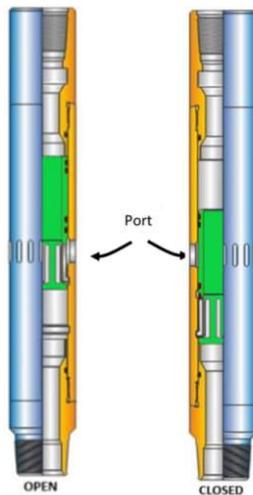
60. Some of the first sliding sleeves in the oil and gas industry were used to allow cement to flow from the interior to the exterior of the casing. Known as “stage cementing collars”, these devices are slightly longer than normal casing collars, with an integral sliding sleeve that allows an operator to run the casing into the well with the ports closed, then slide the sleeve open and pump cement through the collar to the exterior of the casing. Early references to such sleeves can be found in prior art, such as [US2071389 \(Crowell\)](#),⁴ partially reproduced below. The stage collar body tubular is labeled ‘2’, with the external ports identified as ‘11’ and the sliding sleeve as ‘6’:

⁴ [Appendix E.18](#)

Feb. 23, 1937.



61. Sliding sleeves are ubiquitous in industry, and are often used in production operations to allow flow between the interior of a tubing string and the annulus between the tubing and wellbore. A schematic of a commonly available sliding sleeve in the open and closed positions is shown below, with the sliding portion of the sleeve marked in green:



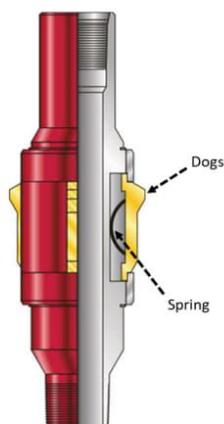
62. To be able to shift a particular sleeve in a well requires three key steps, namely:
- (1) physically locating a sleeve in the wellbore
 - (2) engaging the slidable portion of the sleeve with a tool
 - (3) applying a force to shift the sleeve
63. A considerable amount of sliding sleeve technology was developed from the 1950's to 1970's, which resulted in a variety of designs relating to the internal geometry (profiles) and positioning of the sliding sleeve. Some simple designs featured sliding tubulars with smooth internal surfaces, which could be engaged internally by friction, or pushed or pulled by engaging the top or bottom of the sleeve edge with flat edges ("dogs"). Other designs include complex profiles that would permit selective engagement with a specially designed tool as it passed through the sleeve, like a lock and key.
64. Locating a specific point in a wellbore is an essential part of conducting well operations. Typically, this involves including a "locator" on the BHA. In practical terms, any point in the well casing, including a sleeve, is locatable.

Locators

65. When a well is lined with casing, each joint of casing (or sleeve) that is run into the hole is numbered, measured in length, and recorded in a sheet known as a "casing tally", which lists all joints in the order in which they are run. From the tally, the depths of the collar gaps between each joint are known with a high level of certainty. When a workstring is run into the well it is common practice to have a "locator" tool in the BHA which confirms the location of the collar gaps.

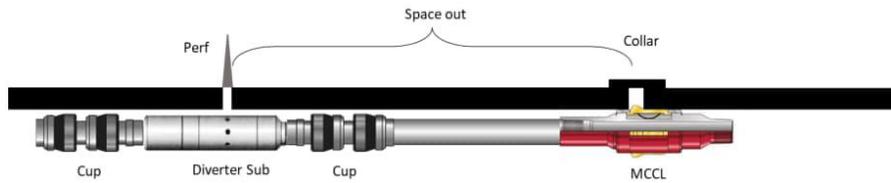
CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 20219
0027

66. A common locator is the mechanical casing collar locator, (“MCCL”). This tool contains spring-loaded dogs that expand into the gaps in casing collars and provide extra resistance to the movement of the pipe. This resistance is registered at the surface as a marked increase in the pull or push force necessary to move the workstring as it passes through the collar. An example of a MCCL is shown below:



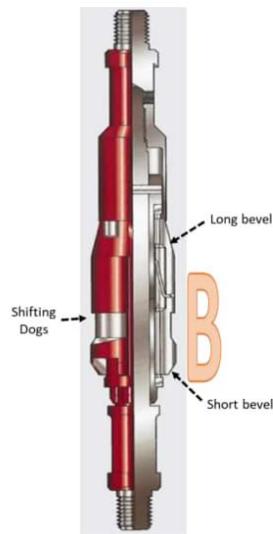
67. A MCCL can be run on the BHA to ensure the collar depths correspond to the tally. In the case of locating or positioning a tool at something other than a collar, it is straightforward to engage the MCCL in the collar gap closest to the desired location. Using the tally, a BHA can be assembled such that the distance from the MCCL to another tool in the BHA is the same as the distance from the collar gap to the desired location (“space out”), thereby ensuring the tool performs its function at the desired point in the well. This is a common practice for locating various tools at a specific desired depth. For example, the location of a cup-cup BHA to isolate and deliver treatment fluid to a specific perforation is shown below:

CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 20219
0028



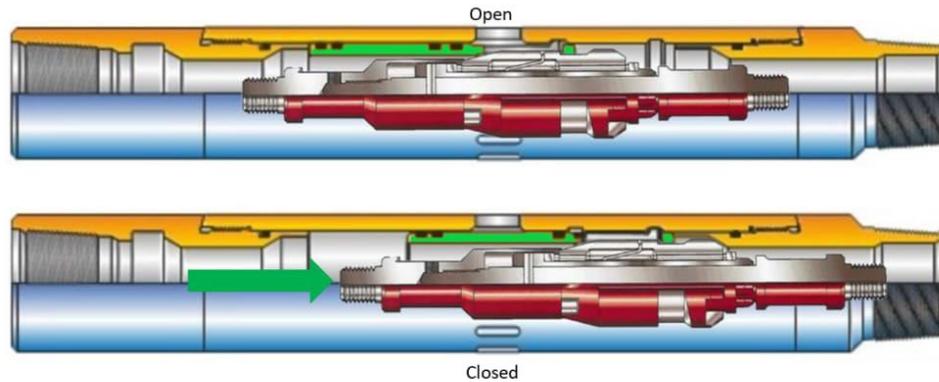
68. Given the high hourly cost of well operations, it is desirable to minimize time spent executing the job, so some tools are designed to perform the function of simultaneously locating and engaging sliding sleeves. One of the most well-known versions is the Otis B Shifting Tool (“Otis B”) which has been around since the 1970s. As the Otis B passes through a sliding sleeve, it automatically engages with the sliding portion, shifts it, and disengages as it reaches the other end of the sleeve travel. These tools are typically run in one orientation to shift a sleeve toward the bottom of the well (“downhole”), and the opposite orientation to shift a sleeve towards the surface (“uphole”).
69. The Otis B has spring loaded dogs, similar to a MCCL, that expand into a recess or inner profile in the housing of a sliding sleeve, and can engage the top or bottom edge of the sleeve, or a profile on the sleeve itself. A schematic of an Otis B is shown below, where the engagement portion of the dogs is in the middle of the “B”:

CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 2019
0029



70. The bevels at the top and bottom of the dogs force them to squeeze or compress into the tool as it runs through constrictions or profiles in the wellbore. One end of the dogs has a longer, gentler bevel that allows it to “skip” over small profiles when the tool is moving towards that end, allowing it to slide easily through the wellbore. When the tool moves in the other direction, the short beveled end will push into a small profile and the shifting dogs will engage and slide a sleeve. The tool is run into a well in one orientation to slide sleeves in one direction, and inverted to slide them in the other.
71. Sliding sleeves that are designed to be shifted by an Otis B have a recess or profile above and below the sleeve. As the sleeve shifts, the recess shortens, and the short bevel rides up the slope of the end of the recess so the dogs can disengage.

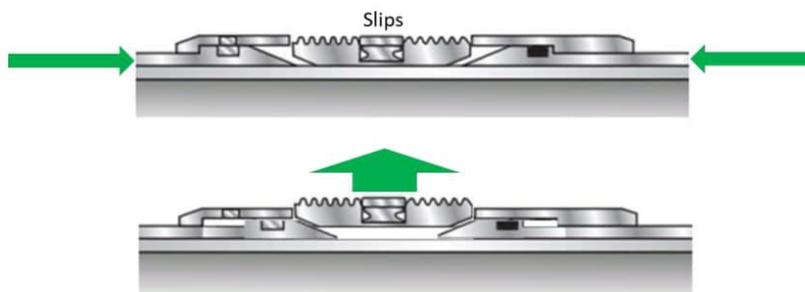
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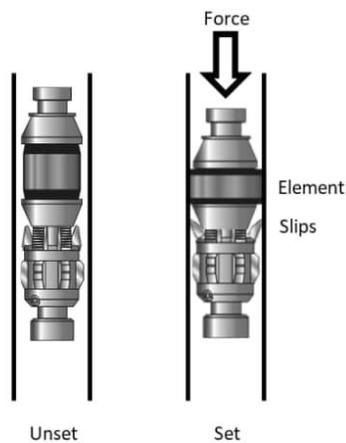
72. The Otis B tool is only one of a number of shifting tools that are well known in industry. Other tools, such as the Baker R shifting tool, are also widely available.

v. Anchors, sealing members, and J-slots:

73. Another common tool found in BHA's is an "anchor". Similar to the nautical term, an anchor in the oilfield is used for fixing the position of something (workstring, BHA, etc) relative to something external, much in the way a boat anchor fixes its position relative to land. Anchors typically have "slips" which are toothed elements that are driven radially outward by an inclined plane or mandrel, such that they engage with the interior surface of a pipe or casing.

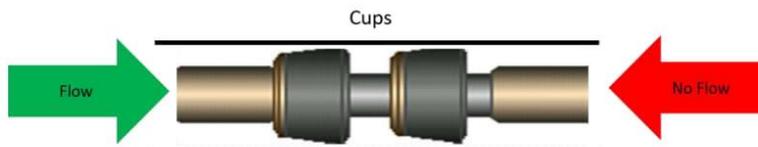


74. Sometimes it is desirable to block fluid flow, or maintain a higher pressure in a region of the wellbore, in which case sealing members are used or added to a BHA. “Sealing members” are normally comprised of a rubber-type or elastomer element that is deformable under pressure. They function similarly to a cork in a wine bottle, where the cork is compressed into the neck of the bottle and forms a tight seal. Sealing elements come in a variety of configurations, depending on whether the seal covers the entire diameter of the wellbore (“bridge plugs”) or an annular space between two pipes (“packer”). Similar to the functioning of slips in an anchor, the elastomer is compressed in the axial direction through the application of force, to create radially outward expansion of the element and engagement with the interior surface of a pipe or casing. Upon release of the compression the element returns to its original dimensions and can be re-used. These types of members are considered “resettable”. An example of a packer in the unset (“running”) and set position within a wellbore is shown below.



CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 20219
0032

75. The sealing elements in packers and bridge plugs can also be inflated with pressure, similar to blowing up a balloon, or the elastomer itself can be designed to absorb the fluids in the wellbore directly into the material, causing it to swell and expand radially outward.
76. Elastomer “cups” can also function as a one-way pressure sealing member, where the cup is flexible and angled so that fluid or pressure can pass by it in one direction, but in the other direction it expands and creates a seal. A schematic of a cup seal is shown below.



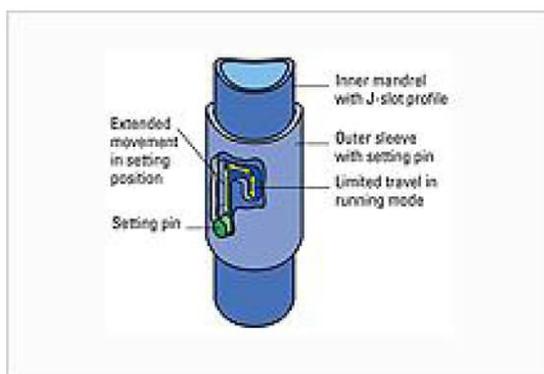
77. It is possible to engage a sliding sleeve with a sealing element. In the 1991 paper, [OTC 6755](#),⁵ the authors describe that an inflatable tool was designed to be able to pass through a restriction and then be inflated against the sleeve. Once in place and inflated, it “would allow mechanical shifting of the safety valve by applying pressure above the packer. This pressure would generate a force on the sleeve to shift it open.” This prior art provides an example of engaging a sliding sleeve with a resettable sealing member, and using hydraulic pressure to shift the sleeve. Engaging a shifting/movable member with an inflatable device is also documented in [US 6,024,173 \(Patel et al\)](#).⁶

⁵ [Appendix E.41](#)

⁶ [Appendix E.27](#)

CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 2019
0033

78. It should be noted that a cup tool, while effective for creating seals, is not a practical tool to engage and slide sleeves for two reasons. First, if the tool is moved in a direction towards the narrower portion of the cup, it will tend to collapse the cups, disengaging them from the wall of the pipe. Second, if the tool is run in the other direction it risks rolling the cups over, similar to pulling an umbrella into the wind. This can have disastrous consequences as the tool can then become stuck and an expensive retrieval operation, known as “fishing”, may then be required.
79. To prevent anchors and sealing elements from engaging as they are run into a well, they typically contain internal workings that prevent or allow travel of an internal functioning mandrel. This is accomplished with a “J-slot”, which is a groove or channel through which pins can travel. Much like the two sides of the letter ‘J’ have different lengths, a J-slot has pathways that allow internal components to move different lengths. In the short slot, for example, travel is limited, so it may be impossible to compress a sealing element or slips. By rotating the tool so the pins move to the longer slot, the full range of movement can be realized, allowing slips or elements to be activated:



Source: Schlumberger

80. In the case of coiled tubing, rotation of the work string is not possible, so the J-slot is continuous around the mandrel, with offsetting channels. This “Auto J” functions by moving the workstring up or down in the well, cycling it between different modes, similar to the clicker on a retractable pen. Auto J’s can be designed with a variety of different lengths of travel, in a continuous path around the tool, so that it can be cycled from one mode to another continuously by moving the workstring up and down. This function is similar to a retractable pen, where each successive click of the pen cycles the writing end in and out of the housing.
81. To function tools on coil tubing, the operator generally has two options at their disposal, either the sliding of the coil workstring uphole or downhole, or pumping fluid into the well to actuate tools hydraulically. Auto J slots are widely used in coil tubing applications for setting anchors and packers, where the tools are run into the well in an unset position, and once the desired depth is reached the workstring is moved uphole then back downhole to function the tool.

vi. Sliding Sleeves in Multistage Fracturing:

82. Sliding sleeves in horizontal wells, including multi-position sleeves, where different port sizes are accessible at different sleeve positions, have been well known in industry since the 1990’s. For example, in 1994’s [SPE 27929](#) “Feasibility Study for the Drilling of a Horizontal Well in the West Panhandle Field”⁷ the authors describe the practice of using external casing packers as alternatives to cemented casing. In such circumstances “[a] sliding sleeve is placed between the packers to allow access to the formation. This method has been used successfully on a number of horizontal wellbores.”

⁷ [Appendix E.37](#)

CEO Confidential Information Pursuant to the Protective Order in T-1420-18 of November 22, 20219
0035

83. In 1993's [OTC 7354](#) "Zone Isolation of Horizontal Wells by Coiled-Tubing Actuated Tools" an example of multiple sliding sleeves installed in a well for flow control is provided:⁸

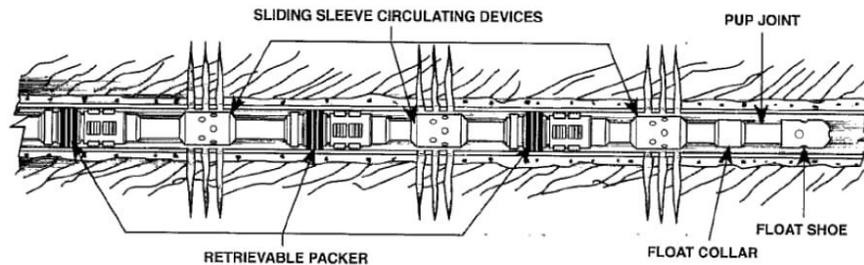


Figure 2
Circulating Sleeve/Retrievable
Packer Completion

84. Early use of sliding sleeves for HMSF was first disclosed in 1989 in [SPE 19090](#)⁹ "Production and Stimulation Analysis of Multiple Hydraulic Fracturing of a 2,000-ft Horizontal Well", where 14 sliding sleeves were installed in the wellbore for the purpose of testing 8 different zones with different frac designs. Multiple fracture treatments were pumped into the various zones, with the sleeves being opened or closed selectively to isolate the other portions of the wellbore as needed. In the schematic below, the sliding sleeves are labeled "Port Collar", and the 8 zones are numbered along the top side of the casing in the diagram:

⁸ [Appendix E.42](#)

⁹ [Appendix E.36](#)

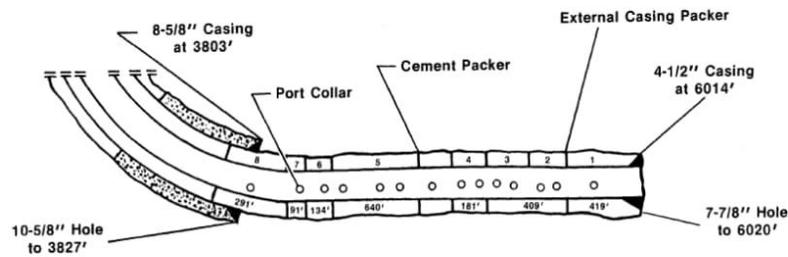


Fig. 2—Schematic diagram of completion configuration.

85. HMSF using sliding sleeves was well established by 1995, and in [SPE 29539](#)¹⁰ it was noted for the use of sliding sleeves and external casing packers (“ECP”) that “In this type of completion, sliding sleeves can be opened and closed using coiled tubing shifting tools. These tools are normally hydraulically activated so the shifting of the sleeves is very easy and selective. The use of the sliding sleeves also gives the operator the option of acid or low volume sand fracturing. The fracturing effectively increases the life of the well by increasing the payout.” A schematic of the sliding sleeve system used for fracturing is shown below:

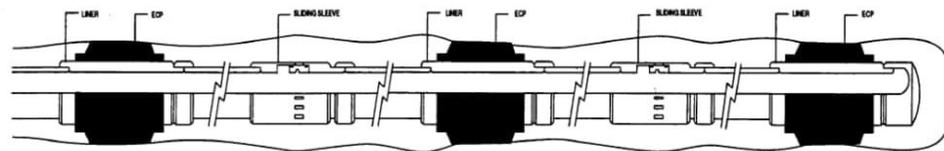


Fig.1

¹⁰ [Appendix E.38](#)

APPENDIX B

Patent Act, RSC, 185, c P-4

Definitions

2 In this Act, except as otherwise provided,

...

invention means any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter;

Specification

27 (3) The specification of an invention must

(a) correctly and fully describe the invention and its operation or use as contemplated by the inventor;

(b) set out clearly the various steps in a process, or the method of constructing, making, compounding or using a machine, manufacture or composition of matter, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it pertains, or with which it is most closely connected, to make, construct, compound or use it;

(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

(d) in the case of a process, explain the necessary sequence, if any, of the various

Définitions

2 Sauf disposition contraire, les définitions qui suivent s'appliquent à la présente loi.

...

invention Toute réalisation, tout procédé, toute machine, fabrication ou composition de matières, ainsi que tout perfectionnement de l'un d'eux, présentant le caractère de la nouveauté et de l'utilité.

Mémoire descriptif

27 (3) Le mémoire descriptif doit :

a) décrire d'une façon exacte et complète l'invention et son application ou exploitation, telles que les a conçues son inventeur;

b) exposer clairement les diverses phases d'un procédé, ou le mode de construction, de confection, de composition ou d'utilisation d'une machine, d'un objet manufacturé ou d'un composé de matières, dans des termes complets, clairs, concis et exacts qui permettent à toute personne versée dans l'art ou la science dont relève l'invention, ou dans l'art ou la science qui s'en rapproche le plus, de confectionner, construire, composer ou utiliser l'invention;

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;

d) s'il s'agit d'un procédé, expliquer la suite nécessaire, le cas échéant, des diverses

steps, so as to distinguish the invention from other inventions.

phases du procédé, de façon à distinguer l'invention en cause d'autres inventions.

Invention must not be obvious

28.3 The subject matter defined by a Claim in an application for a patent in Canada must be subject matter that would not have been obvious on the claim date to a person skilled in the art or science to which it pertains, having regard to

(a) information disclosed before the one-year period immediately preceding the filing date or, if the claim date is before that period, before the claim date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant in such a manner that the information became available to the public in Canada or elsewhere; and

(b) information disclosed before the claim date by a person not mentioned in paragraph (a) in such a manner that the information became available to the public in Canada or elsewhere.

Defence

59 The defendant, in any action for infringement of a patent may plead as matter of defence any fact or default which by this Act or by law renders the patent void, and the court shall take cognizance of that pleading and of the relevant facts and decide accordingly.

Objet non évident

28.3 L'objet que définit la revendication d'une demande de brevet ne doit pas, à la date de la revendication, être évident pour une personne versée dans l'art ou la science dont relève l'objet, eu égard à toute communication :

a) qui a été faite, soit plus d'un an avant la date de dépôt de la demande, soit, si la date de la revendication est antérieure au début de cet an, avant la date de la revendication, par le demandeur ou un tiers ayant obtenu de lui l'information à cet égard de façon directe ou autrement, de manière telle qu'elle est devenue accessible au public au Canada ou ailleurs;

b) qui a été faite par toute autre personne avant la date de la revendication de manière telle qu'elle est devenue accessible au public au Canada ou ailleurs.

Défense

59 Dans toute action en contrefaçon de brevet, le défendeur peut invoquer comme moyen de défense tout fait ou manquement qui, d'après la présente loi ou en droit, entraîne la nullité du brevet; le tribunal prend connaissance de cette défense et des faits pertinents et statue en conséquence.

Impeachment of patents or claims

60 (1) A patent or any claim in a patent may be declared invalid or void by the Federal Court at the instance of the Attorney General of Canada or at the instance of any interested person.

Declaration as to infringement

(2) Where any person has reasonable cause to believe that any process used or proposed to be used or any article made, used or sold or proposed to be made, used or sold by him might be alleged by any patentee to constitute an infringement of an exclusive property or privilege granted thereby, he may bring an action in the Federal Court against the patentee for a declaration that the process or article does not or would not constitute an infringement of the exclusive property or privilege.

Security for costs

(3) With the exception of the Attorney General of Canada or the attorney general of a province, the plaintiff in any action under this section shall, before proceeding therein, give security for the costs of the patentee in such sum as the Federal Court may direct, but a defendant in any action for the infringement of a patent is entitled to obtain a declaration under this section without being required to furnish any security.

Invalidation de brevets ou de revendications

60 (1) Un brevet ou une revendication se rapportant à un brevet peut être déclaré invalide ou nul par la Cour fédérale, à la diligence du procureur général du Canada ou à la diligence d'un intéressé.

Déclaration relative à la violation

(2) Si une personne a un motif raisonnable de croire qu'un procédé employé ou dont l'emploi est projeté, ou qu'un article fabriqué, employé ou vendu ou dont sont projetés la fabrication, l'emploi ou la vente par elle, pourrait, d'après l'allégation d'un breveté, constituer une violation d'un droit de propriété ou privilège exclusif accordé de ce chef, elle peut intenter une action devant la Cour fédérale contre le breveté afin d'obtenir une déclaration que ce procédé ou cet article ne constitue pas ou ne constituerait pas une violation de ce droit de propriété ou de ce privilège exclusif.

Cautionnement pour frais

(3) À l'exception du procureur général du Canada ou du procureur général d'une province, le plaignant dans une action exercée sous l'autorité du présent article fournit, avant de s'y engager, un cautionnement pour les frais du breveté au montant que le tribunal peut déterminer. Toutefois, le défendeur dans toute action en contrefaçon de brevet a le droit d'obtenir une déclaration en vertu du présent article sans être tenu de fournir un cautionnement.

APPENDIX C

FIGURES FROM PATENTS AND PRIOR ART

A. *Canadian Patent No. 2,693,676*

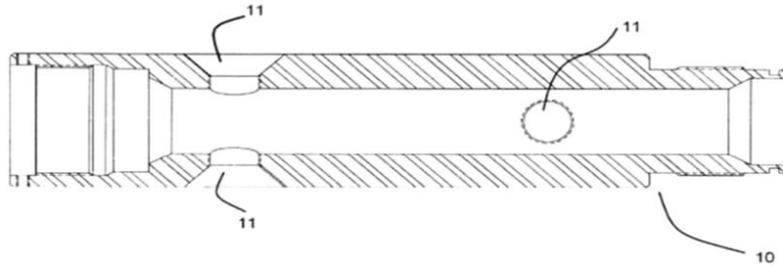


Figure 2

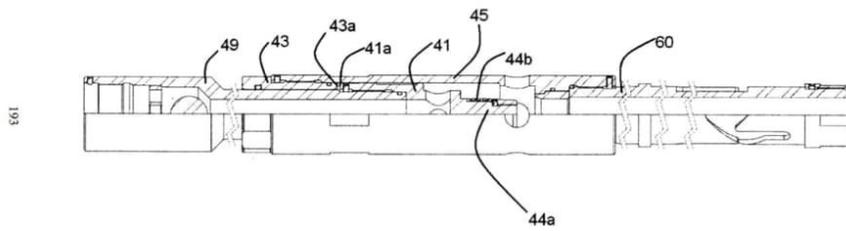


Figure 3

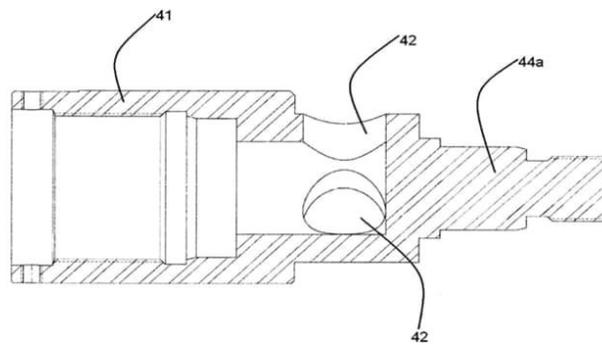


Figure 4a

CA 02693676 2010-02-18

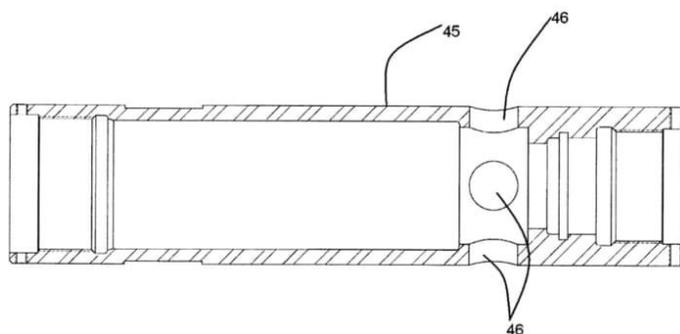


Figure 4b

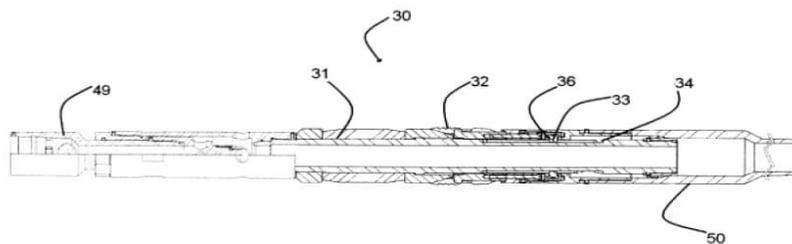


Figure 5

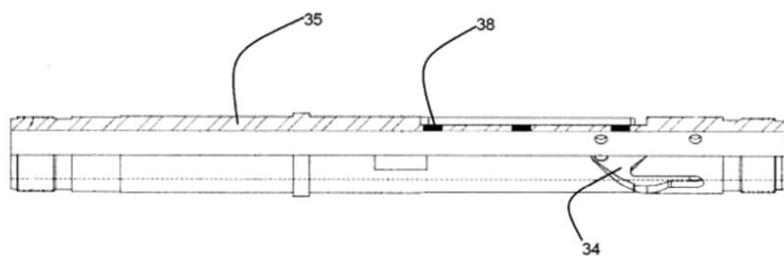


Figure 6a

CA 02693976 2010-02-18

CA 02693976 2010-02-18

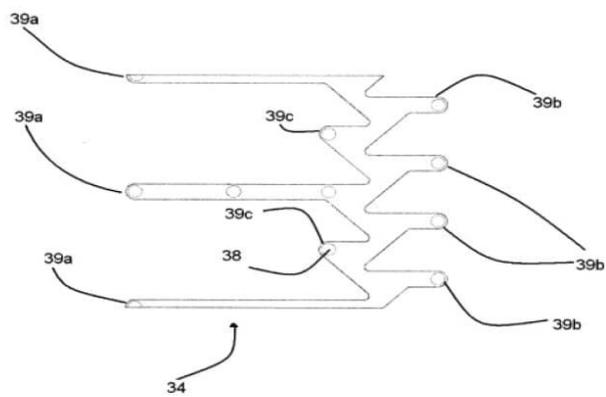


Figure 6b

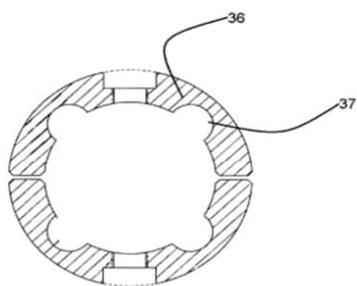


Figure 6c



Figure 6d

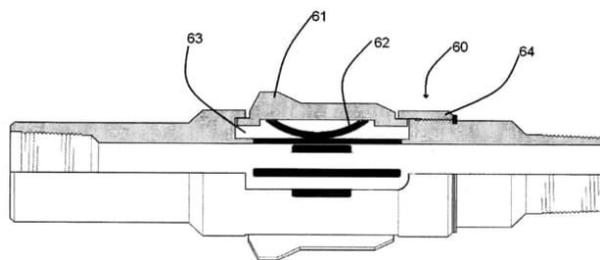


Figure 7

CA 0269376 2010-02-18

CA 0269376 2010-02-18

B. Canadian Patent No. 2,820,652

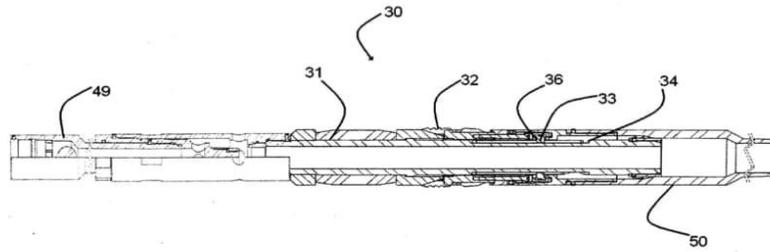


Figure 5

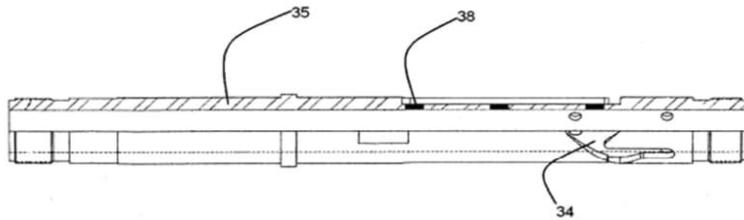


Figure 6a

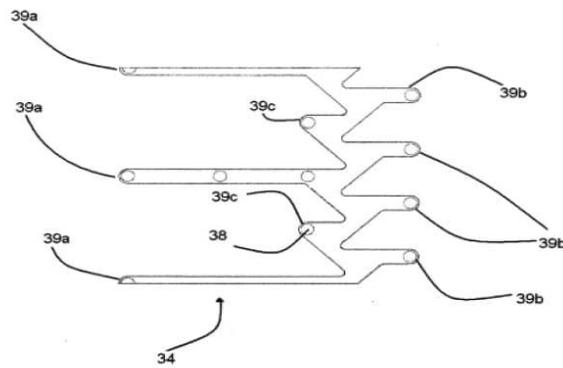


Figure 6b

CA 02820652 2013-07-11

CA 02820652 2013-07-11

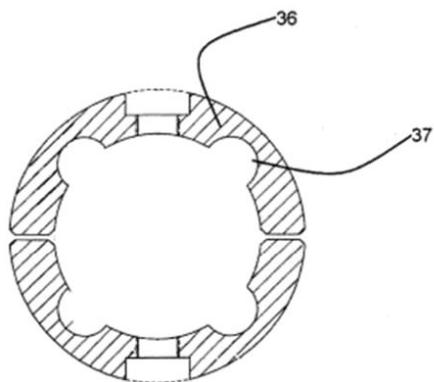


Figure 6c



Figure 6d

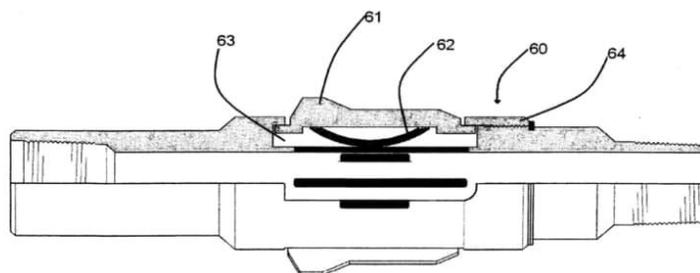


Figure 7

C. Canadian Patent No. 2,738,907

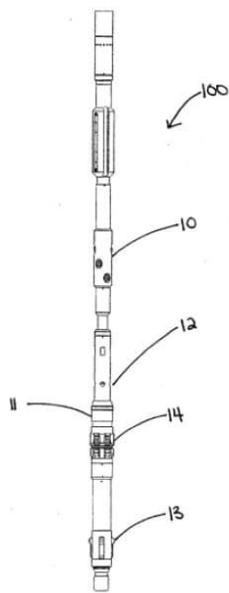


Figure 1a

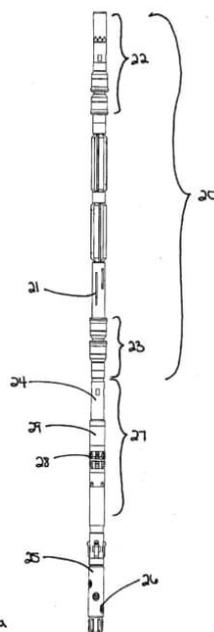


Figure 2a

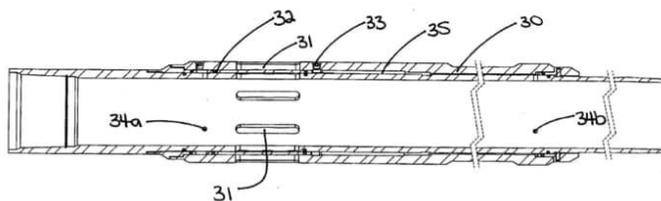


Figure 3

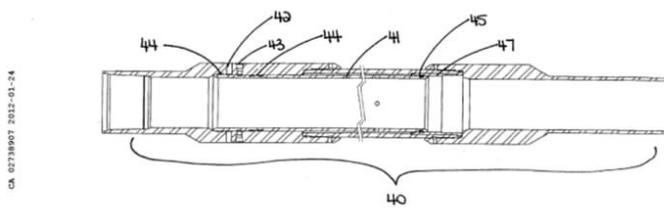


Figure 4a

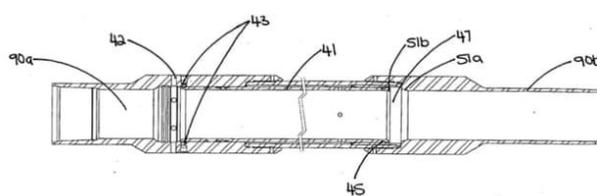


Figure 4b

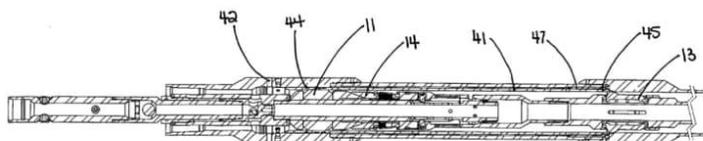


Figure 5b

D. Canadian Patent No. 2,766,026

CA 02766026 2012-01-24

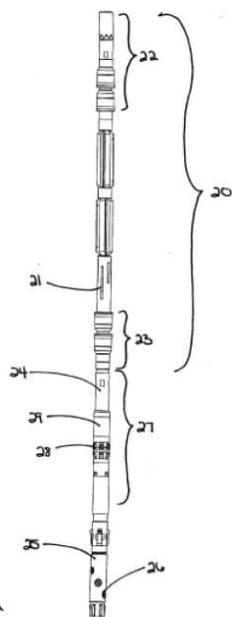


Figure 2a

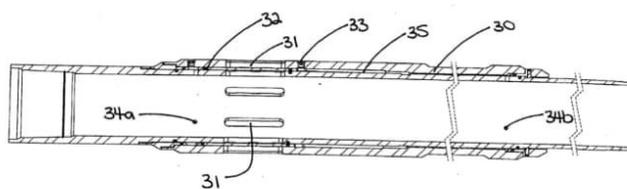


Figure 3

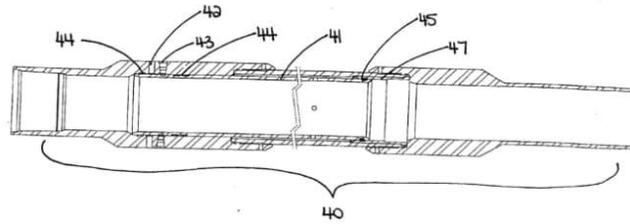


Figure 4a

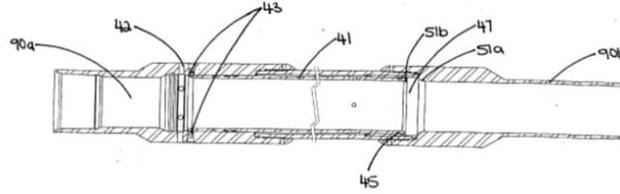


Figure 4b

E. Canadian Patent No. 2,820,704

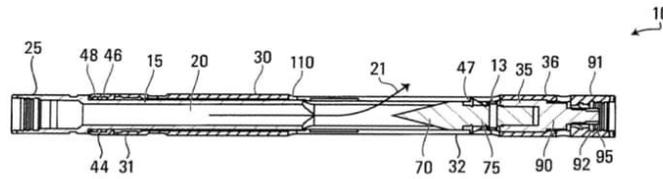


FIG. 1

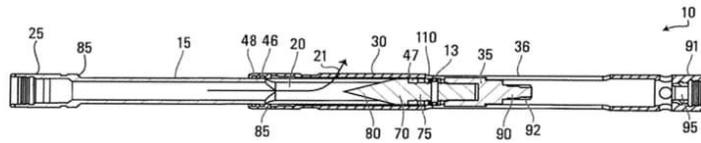


FIG. 2

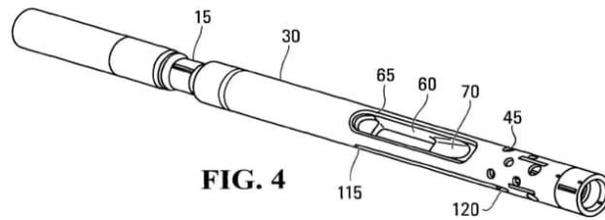


FIG. 4

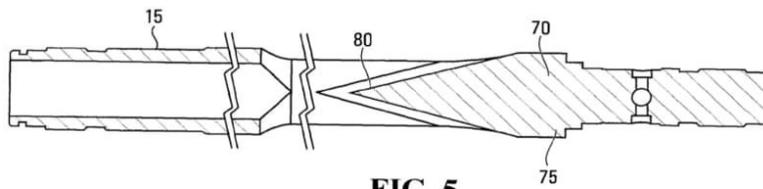


FIG. 5

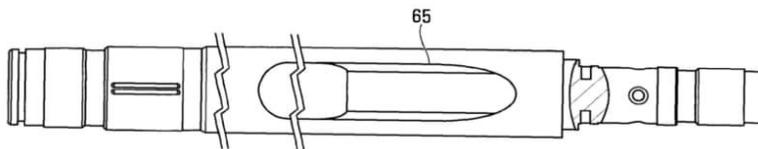


FIG. 6

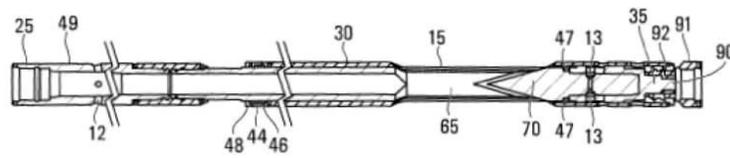


FIG. 7

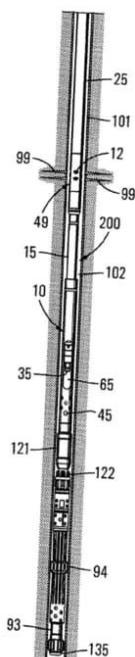


FIG. 10A

F. *Canadian Patent No. 3,027,571*

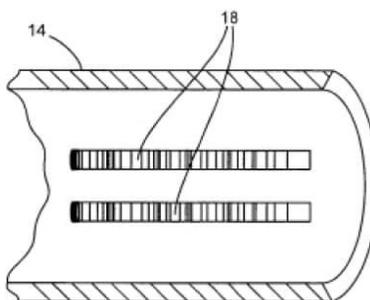
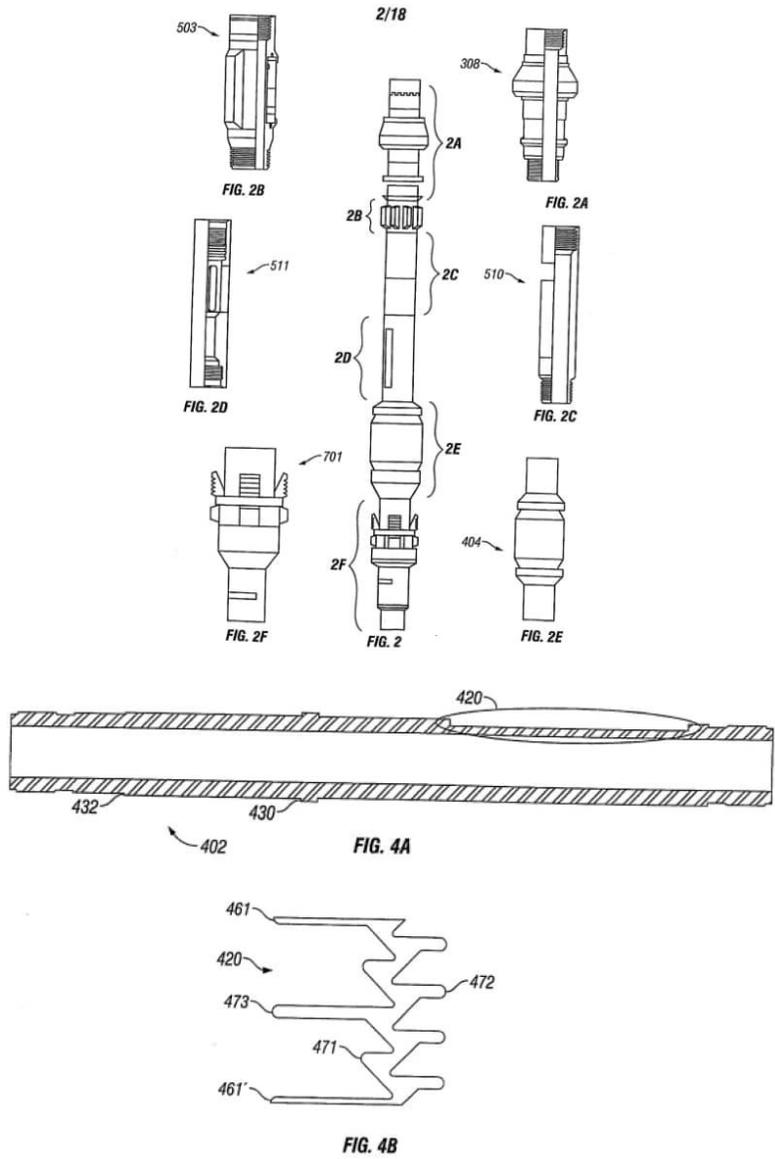


FIG. 2 Prior Art

G. *Mandrell Pioneer Application WO 2007/035745 and Provisional Applications 60/718,481 and 60/728,182 (Figures taken from WO 2007/035745)*



6/18

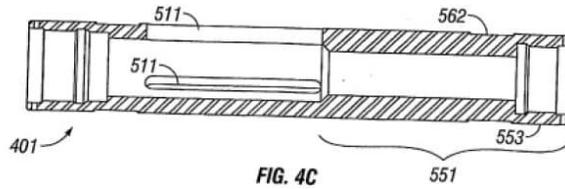


FIG. 4C

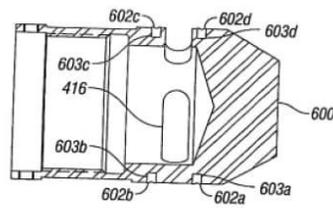


FIG. 4D

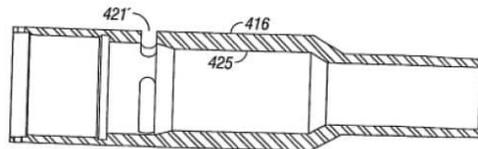


FIG. 4E

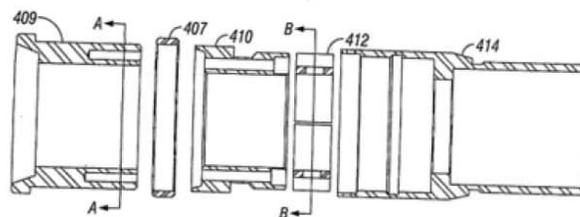
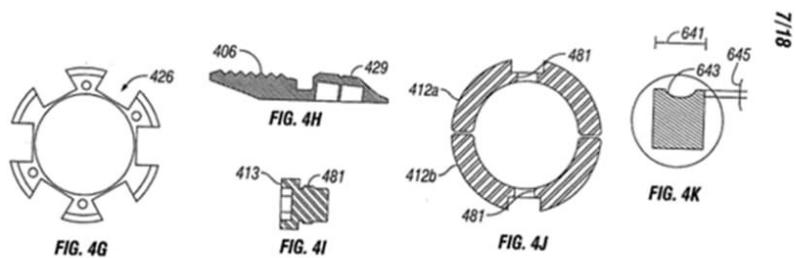
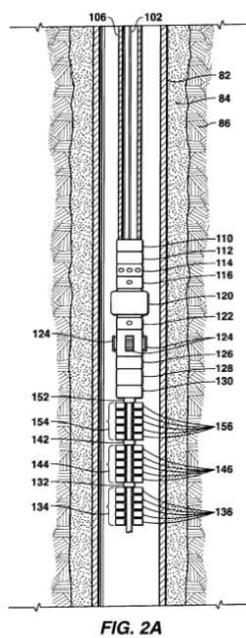


FIG. 4F



H. Tolman's US Patent 6,520,255



I. *Howell's US Patent 7,510,017*

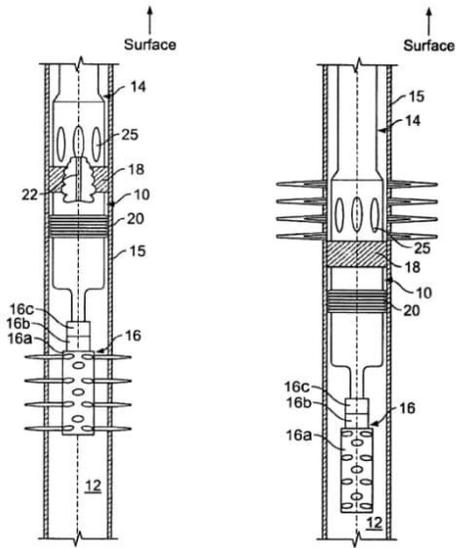


FIG. 1A

FIG. 1B

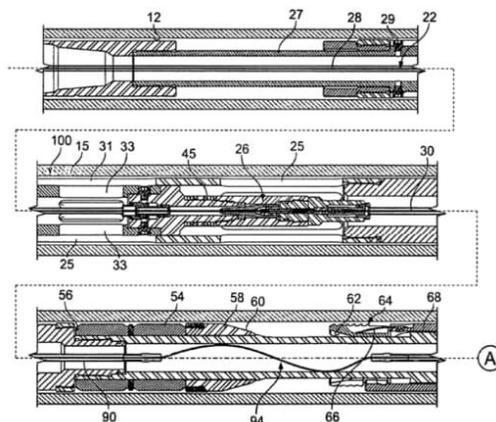


FIG. 3A

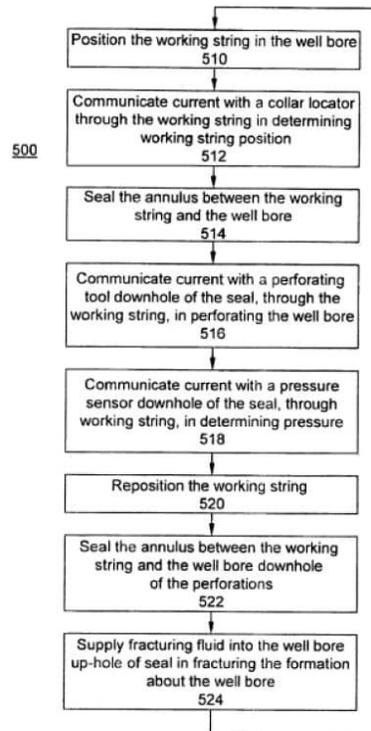


FIG. 6

J. *Gazda's US Patent 4,750,560*

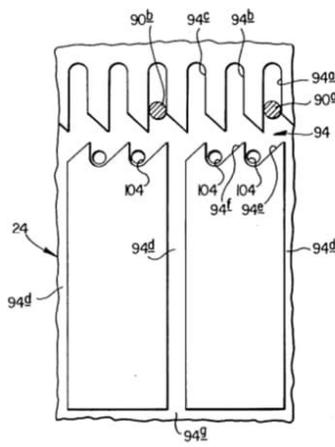
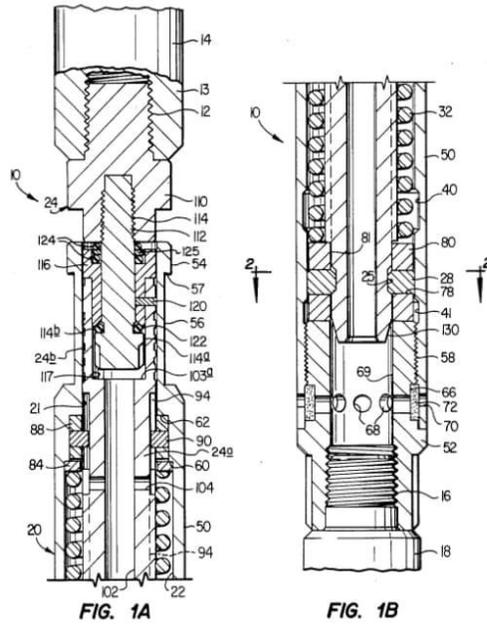


FIG. 3

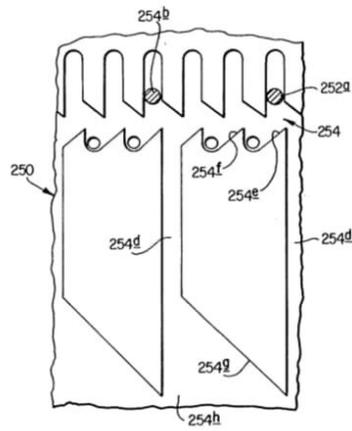
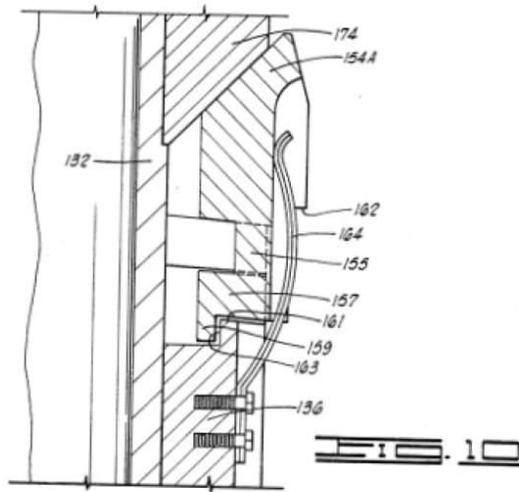
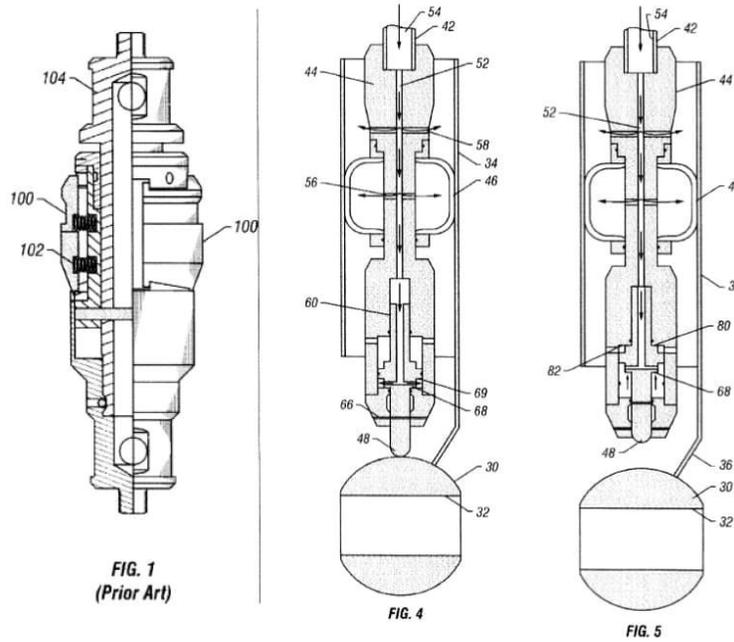


FIG. 5

K. Szarka's US Patent 4,949,788



L. Patel's US Patent 6,024,173



M. Ravensbergen's Canadian Patent No. 2,730,695

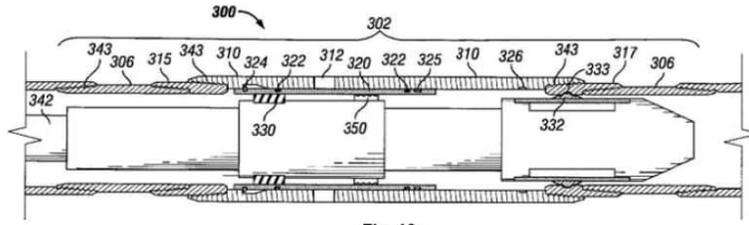


Fig. 10

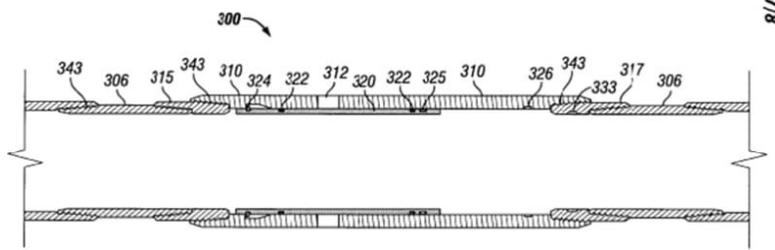


FIG. 17

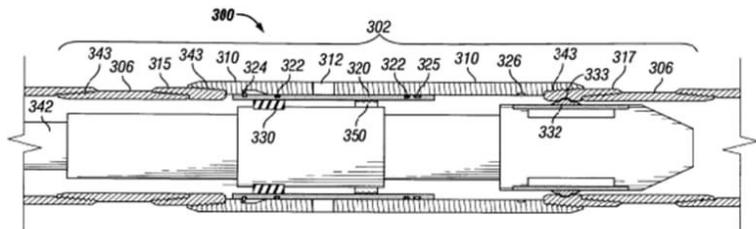


FIG. 18

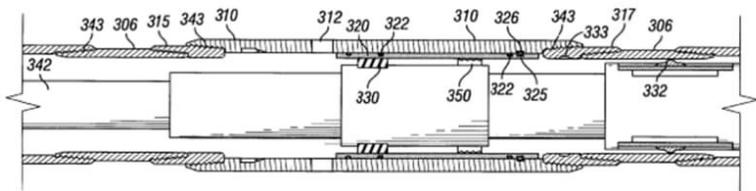


FIG. 19

7/8

8/8

APPENDIX D

ID 800

Court File No. T-1420-18

e-document		
F	FEDERAL COURT	D
I	COUR FÉDÉRALE	E
L		P
E	December 21, 2021	O
D		S
Kinnery Naik		E
Calgary, ALTA	Plaintiff/	

BETWEEN

FEDERAL COURT

NCS MULTISTAGE INC.

and

**KOBOLD CORPORATION,
KOBOLD COMPLETIONS INC.,
and 2039974 ALBERTA LTD.**

Defendant by Counterclaim

Defendants/
Plaintiffs by Counterclaim

Court File No: T-567-20

FEDERAL COURT

BETWEEN

NCS MULTISTAGE INC.

Plaintiff/
Defendant by Counterclaim

- and -

PROMAC INDUSTRIES LTD.

Defendant/
Plaintiff by Counterclaim

JOINT STATEMENT OF ISSUES

I. NCS PATENTS

676 Patent

POSITA and Claim Construction

1. Who is the person of ordinary skill in the art (“POSITA”) for Canadian Patent No. 2,693,676 (“676 Patent”)?
2. What is the proper construction of claims 1-34 of the 676 Patent?

Validity

Anticipation

3. Are any of claims 1, 4, 11, 12, and 16 of the 676 Patent invalid for anticipation based on WO 2007/035745 (Mandrell)?

Obviousness

4. Are any of claims 1-34 of the 676 Patent invalid for obviousness?

Overbreadth

5. Are any of claims 1-34 of the 676 Patent invalid for being broader than the invention made or disclosed based on the failure to claim one or more essential components?
6. Are any of claims 1-34 of the 676 Patent invalid for being broader than the invention made or disclosed based on the failure to be limited to the specific configuration and order of components on a tool assembly disclosed in the 676 Patent?
7. Are any of claims 1-32 of the 676 Patent invalid for being broader than any invention made or disclosed based on the failure to include a ball, check, or other forward flow stop valve in order to fluid jet perforate?
8. Are any of claims 1-7, 11-17 (to the extent they do not depend from claims 8-10), 18-27, 30, and 32 of the 676 Patent invalid for being broader than any invention made or disclosed based on the failure to include an equalization valve or other means to equalize pressure above and below a sealing device?

9. Are any of claims 1, 4-15, and 18-34 of the 676 Patent invalid for being broader than any invention made or disclosed based on the failure to include any structure to provide frictional resistance for actuating sliding members?

Inutility

10. Are any of claims 1-34 of the 676 Patent invalid for lack of demonstrated or soundly predicted utility?
11. Are any of claims 1-34 of the 676 Patent invalid for including inoperable embodiments?
12. Are any of claims 1-32 of the 676 Patent invalid for including inoperable embodiments based on the failure to include a ball, check, or other forward flow stop valve in order to fluid jet perforate?
13. Are any of claims 1-7, 11-17 (to the extent they do not depend from claims 8-10), 18-27, 30, and 32 of the 676 Patent invalid for including inoperable embodiments based on the failure to include an equalization valve or other means to equalize pressure above and below a sealing device?
14. Are any of claims 1, 4-15, and 18-34 of the 676 Patent invalid for including inoperable embodiments based on the failure to include any structure to provide frictional resistance for actuating sliding members?

Insufficiency

15. Are any of claims 1-34 of the 676 Patent invalid for insufficiency?
16. Are any of claims 1-17 of the 676 Patent invalid for insufficiency based on the term “sliding member”?
17. Are any of claims 1-17 of the 676 Patent invalid for insufficiency based on the term “operatively assembled”?
18. Are any of claims 1-17 of the 676 Patent invalid for insufficiency based on the term “operatively associated”?

Prior disclosure

19. Are any of claims 1-34 of the 676 Patent invalid for prior disclosure?

Infringement

20. Does any version of the G3, G5, or G5X-RC Tools fall within the scope of any of claims 1-17 of the 676 Patent?
21. Have any of the Kobold defendants or Promac practiced the methods of any of claims 18-32 of the 676 Patent?
22. Have any of the Kobold defendants or Promac induced others to infringe any of claims 1-32 of the 676 Patent?

652 Patent

POSITA and Claim Construction

23. Who is the person of ordinary skill in the art (“POSITA”) for Canadian Patent No. 2,820,652 (“652 Patent”)?
24. What is the proper construction of claims 1-26 of the 652 Patent?

Validity

Anticipation

25. Are any of claims 1, 4-6, 8-10, 13, 18, and 24 of the 652 Patent invalid for anticipation based on US Patent No. 7,510,017 (Howell)?
26. Are any of claims 4, 6, 8, and 24 of the 652 Patent invalid for anticipation based on US Patent No. 4,750,560 (Gazda)?

Obviousness

27. Are any of claims 1-26 of the 652 Patent invalid for obviousness?

Overbreadth

28. Are any of claims 1-26 of the 652 Patent invalid for being broader than the invention made or disclosed?
29. Are any of claims 19-23 of the 652 Patent invalid for being broader than the invention made or disclosed based on:

- a. The failure to include an abrasive jet perforating device or forward flow-stop valve
- b. The failure to include an equalization valve or other means to equalize pressure above and below a sealing device
- c. The inclusion of a “debris relief feature” that is not limited to a passageway in the J-slot
- d. The inclusion of method steps of performing a “first downhole function” (claims 19, 20, 22, and 23) and a “second downhole function” (claims 20 and 21)

Inutility

- 30. Are any of claims 1-26 of the 652 Patent invalid for lack of demonstrated or soundly predicted utility?
- 31. Are any of claims 1-26 of the 652 Patent invalid for including inoperable embodiments?
- 32. Are any of claims 19-23 of the 652 Patent invalid for including inoperable embodiments based on:
 - a. The failure to include an abrasive jet perforating device or forward flow-stop valve
 - b. The failure to include an equalization valve or other means to equalize pressure above and below a sealing device
 - c. The inclusion of a “debris relief feature” that is not limited to a passageway in the J-slot

Insufficiency

- 33. Are any of claims 1-26 of the 652 Patent invalid for insufficiency?
- 34. Are any of claims 19-23 of the 652 Patent invalid for insufficiency based on the inclusion of method steps of performing a “first downhole function” (claims 19, 20, 22, and 23) and a “second downhole function” (claims 20 and 21)?

Ambiguity

- 35. Are any of claims 19-23 of the 652 Patent invalid for ambiguity based on the description of the claimed method steps?

36. Is claim 22 of the 652 Patent invalid for ambiguity based on the term “the second downhole function is fracturing”, when the claim it depends from (claim 19) does not include a second downhole function?

Double Patenting

37. Are any of claims 1-18 and 24-26 of the 652 Patent invalid for double patenting based on claim 17 (as it depends from claims 1, 4-6, and 11-16) of the 676 Patent?

Prior disclosure

38. Are any of claims 1-26 of the 652 Patent invalid for prior disclosure?

Infringement

39. Does any version of the G3, G5, or G5X-RC Tools fall within the scope of any of claims 4, 6-18, or 24-26 of the 652 Patent?
40. Have any of the Kobold defendants or Promac practiced the methods of any of claims 19-23 of the 652 Patent?
41. Have any of the Kobold defendants or Promac induced others to infringe any of claims 4 or 6-26 of the 652 Patent?

907 Patent

POSITA and Claim Construction

42. Who is the person of ordinary skill in the art (“POSITA”) for Canadian Patent No. 2,738,907 (“907 Patent”)?
43. What is the proper construction of claims 1-28 of the 907 Patent?

Validity

Anticipation

44. Are any of claims 16-23 of the 907 Patent invalid for anticipation based on US Patent No. 6,024,173 (Patel)?

Obviousness

45. Are any of claims 1-28 of the 907 Patent invalid for obviousness?

Overbreadth

46. Are any of claims 1-28 of the 907 Patent invalid for being broader than the invention made or disclosed?
47. Are any of claims 1-28 of the 907 Patent invalid for being broader than the invention made or disclosed based on the failure to be limited to the method of shifting a smooth, unprofiled sleeve using a tool with a locator, a compressible seal, and an anchor?
48. Are any of claims 16-28 of the 907 Patent invalid for being broader than the invention made or disclosed based on:
- a. The inclusion of sealing members that cannot be used to shift a sleeve
 - b. The failure to describe how to make or use a BHA with the various claimed sealing members in order to shift a sleeve, many of which will not work for this purpose
49. Are any of claims 25-28 of the 907 Patent invalid for being broader than the invention made or disclosed based on the failure to invent or describe how to make or use a BHA that can be used to close a sleeve?

Inutility

50. Are any of claims 1-28 of the 907 Patent invalid for lack of demonstrated or soundly predicted utility?
51. Are any of claims 1-28 of the 907 Patent invalid for including inoperable embodiments?
52. Are any of claims 16-28 of the 907 Patent invalid for including inoperable embodiments based on:
- a. The inclusion of sealing members that cannot be used to shift a sleeve
 - b. The failure to describe how to make or use a BHA with the various claimed sealing members in order to shift a sleeve, many of which will not work for this purpose

Insufficiency

53. Are any of claims 1-28 of the 907 Patent invalid for insufficiency?
54. Are any of claims 16-28 of the 907 Patent invalid for insufficiency based on the failure to describe how to make or use a BHA with the various claimed sealing members in order to shift a sleeve, many of which will not work for this purpose?
55. Are any of claims 25-28 of the 907 Patent invalid for insufficiency based on the failure to describe how to make or use a BHA that can be used to close a sleeve?

Ambiguity

56. Are any of claims 23 and 26-28 of the 907 Patent invalid for ambiguity based on the term “setting the anchor”?
57. Is claim 22 of the 907 Patent invalid for ambiguity based on the term “engaging the inner profile”?

Infringement

58. Have any of the Kobold defendants or Promac practiced the methods of any of claims 1-3, 8-10, 12-18, or 20-28 of the 907 Patent?
59. Have any of the Kobold defendants or Promac induced others to infringe any of claims 1-3, 8-10, 12-18, or 20-28 of the 907 Patent?

026 Patent

POSITA and Claim Construction

60. Who is the person of ordinary skill in the art (“POSITA”) for Canadian Patent No. 2,766,026 (“026 Patent”)?
61. What is the proper construction of claims 1-14 of the 026 Patent?

Validity

Anticipation

62. Are any of claims 1, 2, 6, 7, 11, or 12 of the 026 Patent invalid for anticipation based on the methods used to shift the BJ Optiport Sleeve?

Obviousness

63. Are any of claims 1-14 of the 026 Patent invalid for obviousness?

Overbreadth

64. Are any of claims 1-14 of the 026 Patent invalid for being broader than the invention made or disclosed based on:

- a. The failure to cover any operable methods to shift a sleeve
- b. The failure to include upper or lower sleeve ports

Inutility

65. Are any of claims 1-14 of the 026 Patent invalid for lack of demonstrated or soundly predicted utility?

66. Are any of claims 1-14 of the 026 Patent invalid for including inoperable embodiments based on:

- a. The failure to cover any operable methods to shift a sleeve
- b. The failure to include upper or lower sleeve ports

67. Are any of claims 8-10 of the 026 Patent invalid for including inoperable embodiments based on the inability to apply mechanical force to the claimed sleeve?

Insufficiency

68. Are any of claims 1-14 of the 026 Patent invalid for insufficiency based on the failure to describe any operable methods to shift a sleeve?

Infringement

69. Have any of the Kobold defendants or Promac practiced the methods of any of claims 1 or 6-14 of the 026 Patent?

70. Have any of the Kobold defendants or Promac induced others to infringe any of claims 1 or 6-14 of the 026 Patent?

704 Patent

POSITA and Claim Construction

71. Who is the person of ordinary skill in the art (“POSITA”) for Canadian Patent No. 2,820,704 (“704 Patent”)?
72. What is the proper construction of claims 1-30 of the 704 Patent?

Validity

Anticipation

73. Is claim 1 of the 704 Patent invalid for anticipation based on US Patent No. 6,776,239 (Eslinger)?

Obviousness

74. Are any of claims 1-30 of the 704 Patent invalid for obviousness?

Overbreadth

75. Are any of claims 1-30 of the 704 Patent invalid for being broader than the invention made or disclosed?
76. Are any of claims 1-30 of the 704 Patent invalid for being broader than the invention made or disclosed based on the failure to include the essential components of a wedge, lower seal, and equalizing plug?
77. Are any of claims 1-30 of the 704 Patent invalid for being broader than the invention made or disclosed based on the failure to include the structural components necessary to block fluid flow from exiting the valve in the second position?
78. Are any of claims 1-10, 16-19, 22-25, and 27-30 of the 704 Patent invalid for being broader than the invention made or disclosed based on the failure to include the structural components necessary to allow fracturing to occur through the claimed fracturing valve?
79. Are any of claims 13 and 24-27 of the 704 Patent invalid for being broader than the invention made or disclosed based on the claimed fracturing valve being actuated by pushing to close and pulling to open?

80. Are any of claims 28-30 of the 704 Patent invalid for being broader than the invention made or disclosed based on the failure to include the structural components necessary to perform the claimed methods?
81. Are any of claims 24-27 of the 704 Patent invalid for being broader than the invention made or disclosed based on the failure to include the structural components necessary to perforate the casing?
82. Are any of claims 1-6 and 8-30 of the 704 Patent invalid for being broader than the invention made or disclosed based on the failure to include an alignment mechanism?

Inutility

83. Are any of claims 1-30 of the 704 Patent invalid for lack of demonstrated or soundly predicted utility?
84. Are any of claims 1-30 of the 704 Patent invalid for including inoperable embodiments?
85. Are any of claims 1-30 of the 704 Patent invalid for including inoperable embodiments based on the failure to include the essential components of a wedge, lower seal, and equalization plug?
86. Are any of claims 1-30 of the 704 Patent invalid for including inoperable embodiments based on the failure to include the structural components necessary to block fluid flow from exiting the valve in the second position?
87. Are any of claims 1-10, 16-19, 22-25, and 27-30 of the 704 Patent invalid for including inoperable embodiments based on the failure to include the structural components necessary to allow fracturing to occur through the claimed fracturing valve?
88. Are any of claims 28-30 of the 704 Patent invalid for including inoperable embodiments based on the failure to include the structural components necessary to perform the claimed methods?
89. Are any of claims 24-27 of the 704 Patent invalid for including inoperable embodiments based on the failure to include the structural components necessary to perforate the casing?
90. Are any of claims 1-6 and 8-30 of the 704 Patent invalid for including inoperable embodiments based on the failure to include an alignment mechanism?

Insufficiency

91. Are any of claims 1-30 of the 704 Patent invalid for insufficiency?

92. Are any of claims 13 and 24-27 of the 704 Patent invalid for insufficiency based on the claimed fracturing valve being actuated by pushing to close and pulling to open?

Ambiguity

93. Are any of claims 18 and 21 of the 704 Patent invalid for ambiguity based on the terms “the wedge” and “the wedge member”, respectively?
94. Are any of claims 4 and 5 of the 704 Patent invalid for ambiguity based on claim 5 describing the lower seal as sliding axially with the tubular, and claim 4 (from which claim 5 depends) saying that the lower seal is in a fixed position at a lower end of the sleeve?
95. Is claim 10 of the 704 Patent invalid for ambiguity based on the discrepancy between the disclosure and the drawings of the 704 Patent regarding the positioning of the claimed circulation ports?

Double Patenting

96. Are any of claims 1-30 of the 704 Patent invalid for double patenting based on any of the 676, 652, 636, and 619 Patents?

Infringement

97. Does any version of the G3, G5, or G5X-RC Tools fall within the scope of any of claims 1-16 or 18-23 of the 704 Patent?
98. Have any of the Kobold defendants or Promac practiced the methods of any of claims 28-30 of the 704 Patent?
99. Have any of the Kobold defendants or Promac induced others to infringe any of claims 1-16, 18-23, or 28-30 of the 704 Patent?

Liability and Other Issues

100. If any claims of the NCS Patents are found valid and infringed, which of the Kobold defendants, if any, are liable for infringement?
101. If any claims of the NCS Patents are found valid and infringed, is Promac liable for infringement?

102. Is common design a viable cause of action under Canadian patent law?
103. If common design is a viable cause of action under Canadian patent law:
 - a. Did any of the Kobold defendants engage in a common design to infringe any of the NCS Patents?
 - i. If so, with whom?
 - b. Did Promac engage in a common design to infringe any of the NCS Patents?
 - i. If so, with whom?
104. Is NCS estopped by acquiescence, laches, delay, or any other legal or equitable grounds from asserting patent rights and claiming a remedy?
105. Is NCS estopped by *res judicata*, cause of action estoppel, issue estoppel, abuse of process, or unclean hands from asserting patent rights and claiming a remedy?
106. Is NCS the owner or sole owner of any of the 676, 652, 907, 026, and 704 Patents?
107. Is NCS entitled to enforce any of the 676, 652, 907, 026, and 704 Patents against the Kobold defendants and Promac?
108. Has NCS wilfully made misrepresentations for the purpose of misleading the patent office and the public contrary to section 53(1) of the *Patent Act*, rendering any of the following NCS Patents void and unenforceable against the Kobold defendants and Promac:
 - a. 676 and 652 Patents – failure to name Trahan Oilfield Consulting as owner and failure to name Kevin Trahan as inventor
 - b. 907 and 026 Patents – failure to name BJ Services as owner and failure to name the inventors of Canadian Patent No. 2,730,695 as inventors
 - c. 704 Patent – failure to name Stang Technologies Ltd. as owner and failure to name Jonathan Stang as inventor

II. KOBOLD PATENTS

830 Patent

109. Are NCS's invalidity allegations in relation to Canadian Patent No. 2,856,830 ("830 Patent") moot?

571 Patent

POSITA and Claim Construction

110. Who is the person of ordinary skill in the art ("POSITA") for Canadian Patent No. 3,027,571 ("571 Patent")?
111. What is the proper construction of claims 1-27 of the 571 Patent?

Validity

112. Are NCS's invalidity allegations in relation to claims 5, 10, 13-15, and 17-24 of the 571 Patent moot?

Anticipation

113. Are any of claims 1, 2, 3, and 25 of the 571 Patent invalid for anticipation based on Canadian Patent No. 2,860,317 (King)?
114. Is claim 27 of the 571 Patent invalid for anticipation based on Canadian Patent No. 2,810,423 (Desranleau)?

Obviousness

115. Are any of claims 1-27 of the 571 Patent invalid for obviousness?

Overbreadth

116. Are any of claims 1-27 of the 571 Patent invalid for being broader than the invention made or disclosed based on:
- a. The dampening fluids and first annular chamber of claims 1, 25, and 27 (and all dependent claims thereupon)

- b. The omission of a sealed annular chamber in claims 1 and 25 (and all dependent claims thereupon)
- c. The omission of a stop shoulder in claims 1, 25, and 27 (and all dependent claims thereupon)

Inutility

- 117. Are any of claims 1, 25, and 27 of the 571 Patent invalid for covering inoperable embodiments based on:
 - a. The dampening fluids and first annular chamber of claims 1 and 25
 - b. The incompressible dampening fluids and two annular chambers of claim 27
 - c. The sealed annular space of claims 1 and 25
 - d. The missing stop shoulder of claims 1, 25, and 27

Insufficiency

- 118. Are any of claims 1, 25, and 27 of the 571 Patent invalid for insufficiency based on the inclusion of embodiments relating to a first annular chamber or annular space with no seal arrangement or metering passages, being capable of controllably releasing a dampening fluid under pressure?
- 119. Is claim 24 of the 571 Patent invalid for insufficiency based on the inclusion of embodiments having a stop shoulder for receiving an annular end surface of the inner sleeve, wherein such end surface has a predefined angle?

Ambiguity

- 120. Are any of claims 1 and 25 of the 571 Patent invalid for ambiguity based on the term “controllably releasing”?
- 121. Are any of claims 6, 26, and 27 of the 571 Patent invalid for ambiguity based on the term “fluid communication”?

Double Patenting

- 122. Are any of claims 1-27 of the 571 Patent invalid for obviousness type double patenting based on claims 17-33 and 37 of the 830 Patent?

Infringement

123. Has NCS infringed any of the following claims of the 571 Patent by making, using, renting, or selling any of the following devices:
- a. NCS LP3 sleeve with assembly numbers 0030564, 0018651, 0031746, 0031748, 0019916, 0024315, 0030926, and 0031349 – claims 1-4, 6, 8-9, 11-12, and 16 of the 571 Patent
 - b. NCS LP3 sleeve with assembly number 0034446 – claims 1-4, 6-9, 11-12, and 16 of the 571 Patent
124. Has NCS practiced the method of any of claims 25-27 of the 571 Patent?
125. Has NCS induced others to infringe any of claims 1-4, 6-9, 11-12, 16, and 25-27 of the 571 Patent?

III. REMEDIES

126. Are the Kobold defendants entitled to:
- a. injunctive relief;
 - b. declaratory relief;
 - c. delivery up; and/or
 - d. elect an accounting of profits.
127. Is NCS entitled to:
- a. injunctive relief;
 - b. declaratory relief;
 - c. delivery up; and/or
 - d. elect an accounting of profits.

IV. COSTS

128. Which party is entitled to costs, and in what amount?

FEDERAL COURT

SOLICITORS OF RECORD

DOCKET: T-1420-18

STYLE OF CAUSE: NCS MULTISTAGE INC. V KOBOLD CORPORATION ET AL

AND DOCKET: T-567-20

STYLE OF CAUSE: NCS MULTISTAGE INC. V PROMAC INDUSTRIES LTD.

PLACE OF TRIAL: CALGARY, ALBERTA

DATES OF TRIAL: JANUARY 12, 2022 TO MARCH 1, 2022

JUDGMENT AND REASONS MCVEIGH J.

DATED: NOVEMBER 7, 2023

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