[redacted]

the level of ordinary skill in the art and whether the experts satisfy it, and so forth), and need not be revisited.

A. The Asserted Claim of the 306 Patent

Independent claim 15 is the only asserted claim of the 306 patent:

> 15. A polycrystalline diamond compact, comprising:
> a substrate; and
> a polycrystalline diamond table including a first polycrystalline diamond layer bonded to the substrate and at least a second polycrystalline diamond layer, the second polycrystalline diamond layer exhibiting a second average diamond grain size that is less than a first average diamond grain size of the first polycrystalline diamond layer, at least an unleached portion of the polycrystalline diamond table including:
> a plurality of diamond grains defining a plurality of interstitial regions;
> a metal-solvent catalyst occupying at least a portion of the plurality of interstitial regions; and
> wherein the plurality of diamond grains and the metal-solvent catalyst collectively exhibit a coercivity of about 115 Oe or more and a specific magnetic saturation of about 15 $G \cdot cm^3/g$ or less.

JX-0001 (306 patent).

B. Infringement

Similar to the other patents, USS chose one representative product for the infringement analysis, in this case a model within the [redacted] *See* CX-0383C.4; Tr. (German) at 237:15-19. Furthermore, SF Diamond's [redacted] products do not infringe claim 15 because the [redacted] is not met. *See* RX-0622C.8. And again, USS annotates independent claim 15 with identifiers.

1. [306.15.a] A polycrystalline diamond compact, comprising:

Dr. German testified that Exhibit CX-6219C shows the 1613 RC to be "a diamond table. It is affixed to the substrate . . . so it is a polycrystalline diamond compact." Tr. (German) at 233:6-14; CX-7383C.

2. [306.15.b] a substrate; and

The [redacted] contains a substrate. *See* Tr. (German) at 233:16-20; CX-7383C.

[redacted]

3. [306.15.c] a polycrystalline diamond table including a first polycrystalline diamond layer bonded to the substrate and at least a second polycrystalline diamond layer, the second polycrystalline diamond layer exhibiting a second average diamond grain size that is less than a first average diamond grain size of the first polycrystalline diamond layer, at least an un-leached portion of the polycrystalline diamond table including:

This limitation is the one principally disputed between the parties. *See* RIB at 147-49; CRB at 80-86. It is seemingly true, as Respondents imply, that an actual measurement and comparison of grain sizes would have been the most reliable evidence. *See* RIB at 147. USS had the resources to do this in connection with claim 1 of the 565 patent, for example, where Dr. German employed a standard line-intercept method for determining whether grain size was less than [redacted] micrometers in an Iljin UP8N sample. *See* Tr. (German) at 183:7-12; CDX-0003C.90. Dr. German explained that this method involves "a scanning electron microscope and then an electron backscatter detector . . . [that] allow[] the electrons to go in the crystal lattice . . . to generate[] an image . . . [showing] where the crystal orientation changes and the new grain starts," a process that takes "an hour" for each image. Tr. (German) at 150:20-152:1, 394:18-25. Thus, "any time two neighboring measurements have the exact same crystal structure, they're given the same color," with, in this case, "over a million measurements made":

[redacted]

Id. at 152:2-17; CX-7321C.

As shown in this image, "[h]orizontal lines are placed . . . spaced about the grain size apart" and where the "horizontal line crosses the grain boundary from one crystal orientation to another crystal orientation, we get a measurement of what's called the intercept length." Tr. (German) at 152:18-153:19. After a statistically sufficient number of measurements are made – the applicable standard, ASTM E-112, specifies 500 – the average grain size is calculated, as well as other parameters such as standard deviation. *Id*. at 152:18-154:12. The image above, for instance, documents [redacted] measurements, resulting in an average grain size of about [redacted] *See id*. at 152:18-153:19; CX-7321C.

As Dr. German candidly admitted, he and his team "ran out of time," so this procedure was not used for determining grain size for purposes of analyzing infringement of claim 15 of the 306 patent. Tr. (German) at 394:18-395:12. Instead, Dr. German based his grain size opinions on data about the manufacturing process, combined with visual inspection of electron micrographs. *See*

[redacted]

id. at 395:13-19. The manufacturing process theory is actually best articulated by Respondents' expert, Dr. Andrew Barron:

> So what I found was that there was a relationship between the diamond particle size, as described, that's the size of the diamond – the powder that's used, and the diamond grain size, which is the crystal grain in the [PDC].
>
> And in all cases that – the particle size decreases to the grain size. So the grain size is smaller than the particle size. And this is exactly what you would expect from fundamentals of science in that in this case the diamond undergoes fracture, because it's under high pressure, with high temperature, but also because there is what's called a dissolution precipitation process, where the cobalt actually dissolves some of the carbon and then reprecipitates it, which causes the fusing together, but that also contributes to decreasing the grain size.

Tr. (Barron) at 632:15-633:7. According to Dr. Barron's analysis, the resulting diamond grain size is proportional to the input diamond particle size: "the mathematical equation is that the grain size after processing, divide[d] by the grain particle size before processing, is equal to .6915." *Id*. at 634:24-635:16.

Admittedly, Dr. Barron's calculation may be limited to the specific manufacturing parameters of the diamond tables reported in the paper he relied on; this point is addressed below, regarding inherency. *See* RDX-0006C.35. It is reasonable to conclude, as Dr. Schaefer cautioned, that "[redacted]" including HPHT, affect the resulting product, so one cannot "[redacted]" in the general case. Tr. (Schaefer) at 891:23-892:17. But Dr. Schaefer's opinion does not undermine Dr. Barron's opinion that particle size and grain size are directly proportional for a given set of manufacturing conditions. And it is further reasonable to suppose that this principle would apply to separate layers within a PDC, because those separate layers are subject to the same manufacturing conditions, and differ only in the input particle sizes. Dr. Schaefer's additional opinion, that because all the grain sizes measured in this investigation using EBSD came out between 3.4 and 8.1 micrometers, [redacted]

[redacted] between input particle size and grain size, would be more persuasive if it were supported by a comparison of actual grain sizes in actual PDCs. *See* RIB at 149 (citing Tr. (Schaefer) at 891:23-892:17).

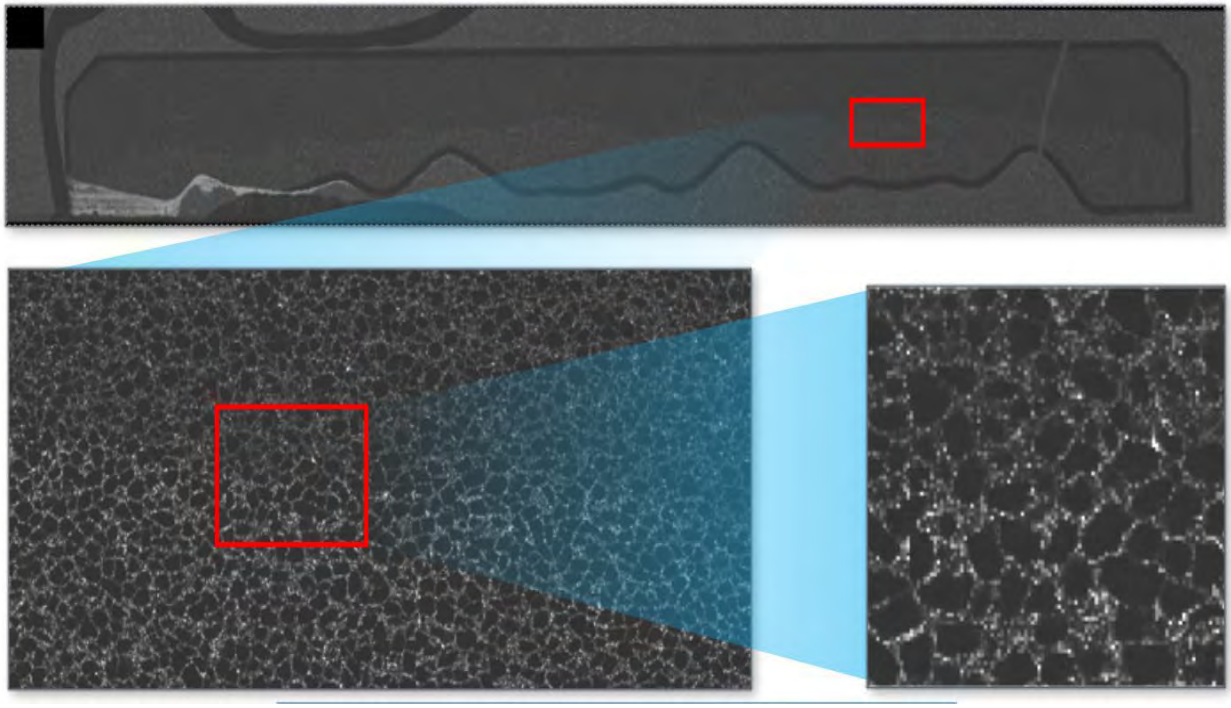
So Dr. Barron's opinion that grain size is smaller than, but proportional to, input particle size, is supported by the record and not inconsistent with Dr. Schaefer's opinion. And apparently a PDC with multiple diamond layers is fabricated by sintering multiple layers of diamond powder, with one such layer adjacent to the substrate, and with the different layers having different particle sizes (otherwise it would presumably all end up being one layer). *See* Tr. (German) at 239:3-22 ("the input formulation shows a smaller working layer of grain size than the transition layer because of the particle sizes they elected to use"). Therefore, it is reasonable to assume that different layers with different input particle sizes will result, after sintering, in a PDC with distinct diamond layers having grain sizes proportional to their corresponding input particle sizes.

To aid his analysis of the grain sizes in such multiple-layer PDCs, Dr. German "requested . . . input particle size information on the cutters." *Id*. at 184:12-16. That information was produced by Haimingrun and Juxin only. *See* JX-203C.2 (Haimingrun S18); CX-2059C.5-.7 (Juxin RC, Z1, and Z2 series). For the [redacted] the "cutting" layer formulation was a blend of different-sized particles, and the "transition" layer formulation, although also a blend, had a markedly greater proportion of the largest particle size than did the cutting layer formulation; Juxin's production does not provide units, but Dr. German reasonably interpreted the recipes as referring to particle sizes in micrometers. *See* CX-2059C.7; Tr. (German) at 239:3-22 ("the transition layer is going to be made of the particles that are between 15 and 25 microns, largely"). For the [redacted] the "Superficial layer" and "interlayer" are manufactured with different diamond particle formulations, although the evidence produced by [redacted] does not

[redacted]

clearly quantify the sizes of each formulation's ingredients. *See* JX-203C.2. So the record is not clear why Dr. German, in concluding that "much smaller particles are showing up in the superficial layer," based his opinion on the assumption that 90% of the superficial layer particle formulation was in the range of 8-12 micrometers. Tr. (German) at 247:12-248:1 (citing CDX.0003C.236).

But that particular gap in the evidence is of little consequence because inspection of the electron microscope imagery shows a striking visual commonality between the three Juxin PDCs. CX-7266C is an image of the diamond table of a [redacted] (BMMMM.08) showing "first" and "second" PCD layers in an unleached portion of the diamond table. *See* CDX-0003C.219. Dr. German understood the language of claim 15 to mean that "[t]he first polycrystalline layer is the one that is going to be closest to the substrate." Tr. (German) at 233:21-234:22. He observed that the first layer on the bottom of the image, with the larger grain size, is "brighter," which is easily seen even by a layperson:



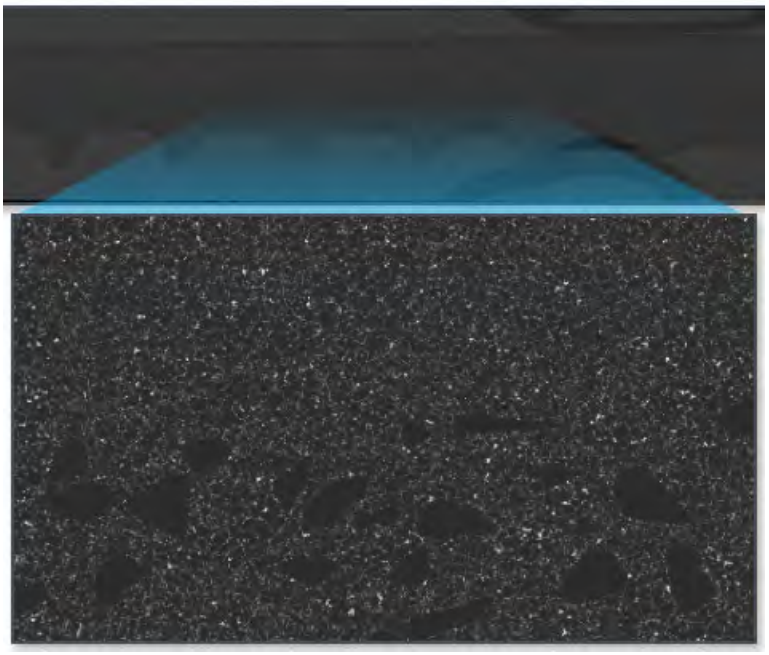
[redacted]

Id. (citing CX-7266C). The same distinction between layers, with a brighter bottom layer, is visible (again, even to a layperson) in the micrographs of the [redacted] products, and those products both have bottom layers with relatively larger input particle sizes (and therefore relatively larger grain sizes). *See* CDX-0003.C.225-.226 (citing CX-2059C, CX-7269C, and CX-7290C0).

Based on these three examples, it is reasonable to infer that if electron microscopy of other multiple-layer PDCs shows brighter bottom layers, it is likely the result of larger grain sizes in the bottom layers. *See* Tr. (German) at 184:5-11. And that is exactly what is clearly seen in four of the five multiple-layer SF Diamond products accused of infringing claim 15. *See* JX-0135.45; CDX-0003C.228 (1613 [redacted]); CDX-0003C.230 (1310 [redacted]); CDX-0003C.231 (1613 [redacted]); CDX-0003C.232 (1613 [redacted]). As to the fifth SF Diamond Accused Product, the 1613 [redacted], the layer boundary is visible, but only barely. *See* CX-7284C. The Haimingrun 1613 S18 also shows a bottom layer that is barely brighter, and therefore possessing a relatively larger grain size. *See* CDX-0003C.236; CX-7253C.

Respondents criticize this analysis by disputing Dr. German's explanation for why the layer with the larger grain size appears brighter in an electron micrograph. *See* RIB at 147-49. Dr. German opined that the brighter regions result from larger pools (or "inclusions") of catalyst, as opposed to greater concentration of catalyst, because larger pools are correlated with larger surrounding diamond grains. *See* Tr. (German) at 233:21-234:22. ("So the brighter region, which is in the lower half, is going to be the larger grain size, just because the [inclusion] of the interstitials being larger."). In fact, this theory does not explain all the observed evidence, as the [redacted] shows:

[redacted]



CDX-0003C.234 (citing CX-7239C). Here the bottom layer appears to have a notably larger average grain size than the top layer, but the difference in brightness is, if anything, the opposite of the other multiple-layer PDCs. Neither Dr. German nor Dr. Schaefer offers any explanation for this anomaly. *See* Tr. (German) at 246:9-25; Tr. (Schaefer) at 889:22-892:17.

Nonetheless, the electron microscopy is enough to conclude that the [redacted] has two layers, with the bottom layer (the one adjacent to the substrate) plainly having a larger average grain size. *See* Tr. (German) at 246:15-21 ("it is very evident that the lower layer has got some very large grains in it"). Dr. Schaefer's point that simple visual inspection is not always reliable is well-taken, but carries little weight here; under a preponderance of the evidence standard, the image in CX-7239C (with no countervailing evidence) is enough to conclude that the lower layer has a larger grain size. *See* RIB at 149 (citing Tr. (Schaefer) at 889:22-890:3. As for the other Accused Products, it may well be that the brightness differential results from something other than larger catalyst pools, such as a higher cobalt concentration or tungsten infiltration, as Respondents contend. *See* RIB at 148-49 (citing JX-0350C (Bertagnolli Dep. Tr.) at 56:15-24; Tr.

[redacted]

(Schaefer) at 891:23-892:17). But in view of the general consistency of the evidence across PDC samples (again, except for the anomalous Dragon 2), this point would have been more persuasive had it been corroborated by, say, line intercept data.

On balance, therefore, the 1613 RC and all other products accused of infringing claim 15 meet this limitation.

4. [306.15.d] a plurality of diamond grains defining a plurality of interstitial regions;

Dr. German explained that "[w]e can see through the EBSD, the grains are evident. It is polycrystalline. So polycrystalline grain structure with the black being the interstitial region." Tr. (German) at 236:14-19; CX-6201C.

5. [306.15.e] a metal-solvent catalyst occupying at least a portion of the plurality of interstitial regions; and

NSL Analytical reported a cobalt weight of 8.5% for the unleached portion of sample BMMMM.01, which is a [redacted]. *See* Tr. (German) at 236:16-19; CX-7106C.3; CX-0383C.4. Furthermore, Dr. German explained that the cobalt can be seen in the interstitial regions, as shown in enlargements of CX-7266C. *See* Tr. (German) at 236:25-237:6; CDX-0003C.222.

6. [306.15.f] wherein the plurality of diamond grains and the metal-solvent catalyst collectively exhibit a coercivity of about 115 Oe or more and a specific magnetic saturation of about 15 Gcm^3/g or less.

Dr. German's testing of the unleached portion of sample BMMMM.01 showed a coercivity of 195.2 Oe and a specific magnetic saturation of 12.91 Gcm^3/g. *See* Tr. (German) at 237:7-15; CX-6113C. Testing resulted in similar infringing results for two other [redacted]. *See* CX-0383C.4.

7. Other Accused Products

USS prepared a tabular summary of some of Dr. German's testing:

[redacted]

			Coercivity	Specific Magnetic Saturation
			about 115 Oe or more	about 15 G·cm3/g or less
Ijin	UP8N	BAAAA		
	UP9N	BBBBB		
[redacted]		BCCCC	3/3	2/3
SF Diamond	[redacted]	BWWWW	3/3	3/3
		BVVVV	3/3	3/3
		BEEEE	3/3	3/3
		BBBBE	3/3	3/3
[redacted]		BXXXX	3/3	3/3
[redacted]		BLLLL		
		BHHHH	3/3	3/3
		BBBBG		
		BMMMM		
		BBBBC		
		BPPPP	3/3	3/3
		BYYYY	3/3	3/3
Jingrui	R22	BGGGG		
Wanlong	ZT2-B	BIIII		

CIB at 144.

The table below summarizes each Accused Product, and citations to Dr. German's testimony and relevant demonstratives as evidence on which USS relies:

Respondent	Product	'306 Claim	10.18 Transcript	Demonstratives
[redacted]		15	233:2-237:22	CDX-0003C.217-224; CDX-0008
		15	237:23-238:23	CDX-0003C.225; CDX-0009
		15	238:24-240:16	CDX-0003C.226; CDX-0010
SF Diamond	[redacted]	15	240:22-242:2	CDX-0003C.228 CDX-0011
		15	242:3-243:2	CDX-0003C.229; CDX-0012

[redacted]

	[redacted]	**15**	243:3-243:25	CDX-0003C.230; CDX-0013
		15	244:1-245:4	CDX-0003C.231; CDX-0014
		15	245:5-245:16	CDX-0003C.232; CDX-0015
[redacted]		**15**	245:22-247:11	CDX-0003C.234; CDX-0016; CDX-0017
		15	247:12-248:22	CDX-0003C.236; CDX-0018

CIB at 144-45.

Certain details should be noted. First, it is not entirely clear that USS accuses the [redacted] of infringing, but if it does, infringement has been proven. *Compare* CDX-0003C.82 *with* Tr (German) at 237:15-19. Second, the table prepared by USS accurately reports the magnetic measurements, that is, two of three samples of the [redacted] satisfied the specific magnetic saturation limitation, which still establishes infringement, and otherwise all Accused Products met these limitations. *See* CX-0383C.3. Third, the primary summary of Dr. German's test results records whether a particular sample is "layered" or not, but does not record any difference in grain size. *See generally* CX-0383C. As explained above, however, the preponderance of the evidence demonstrates that all products accused of infringing claim 15 satisfied element 306.15.c.

In summary, USS has proven infringement of the claims of the 306 patent by certain Accused Products, as well as by those Accused Products as to which representativeness applies. The record demonstrates that the infringing Accused Products are accurately listed in the demonstrative Dr. German prepared, except that the [redacted] is also infringing:

[redacted]

Party	Infringing Product Series	Asserted Claims Practiced		
		'565	'502	'306
Iljin	UP8N	**1**, 2, 4	**1**, 2, 11	
	UP9N	**1**, 2, 4, 6, **18**	**1**, 2, 11	
[redacted]		**1**, 2, 4, 6	**1**, 2, 11	**15**
SF Diamond	[redacted]		**1**, 2, 11	**15**
			1, 2, 11	**15**
		1, 2, 4	**1**, 2, 11	**15**
			1, 2, 11	**15**
[redacted]		**1**, 2, 4, **18**	**1**, 2, 11, **15**, 21	**15**
[redacted]		**1**, 2, 4	**1**, 2, 11	
		1, 2, 4, 6	**1**, 2, 11	**15**
			1, 2, 11	
			1. 2, 11	
			1, 2, 11	
			1, 2, 11	**15**
			1, 2, 11	**15**
Jingrui	R11A	**1**, 2, 4, 6, **18**	**1**, 2, 11, **15**, 21	
	R22	**1**, 2, 4, 6, **18**	**1**, 2, 11, **15**, 21	
Wanlong	ZT2-B	**1**, 2, 4, 6, **18**	**15**	
	ZTA-B	**1**, 2, 4, **18**	**15**	
	RPA-B	**1**, 2, 4, 6, **18**	**15**	
	RP2-B	**1**, 2, 4, 6, **18**	**15**	
CR Gems*	GPCD-CRM	**1**, 2. 4, 6	**1**, 11	
	GPCD-My69	**1**, 2, 4, 6	**1**, 11	

CDX-0003C.82.

8. Doctrine of Equivalents and Indirect Infringement

USS does not allege that any accused product infringes the 306 patent under the doctrine of equivalents or under any theory of indirect infringement. *See* CIB at 140-45.

X. DOMESTIC INDUSTRY TECHNICAL PRONG

The DI Products are, again, four categories of PDCs – [redacted]. *See* CX-0383C.2. Dr. German tested the DI Products, [redacted]

[redacted]

using the same test protocols and procedures that he used for testing the Accused Products. *See* Tr. 189:22-25, 392:25-393:4. In the [redacted] he tested only the [redacted], and although there is some evidence of representativeness within that series, Dr. German provided no opinion to that effect. *See* CX-1131 (G-Ratio is roughly consistent across [redacted] Tr. (German) at 264:15-25. So the [redacted] is the only DI Product within its series that might qualify under the technical prong. *See* RIB at 151.

Respondents raise an objection to USS' evidence based on a different representativeness issue: whether the [redacted] are representative of [redacted] *See* RIB at 47-48. Specifically, Respondents argue that (1) [redacted] and (2) Dr. German did not opine that the [redacted] therefore (3) there is no evidence that the products as sold practice the claims of the patents in suit. *See id*. The first two points are undisputed. *See* Tr. (German) at 393:5-10; Tr. (Bertagnolli) at 103:1-5.

The third point is a non sequitur, however. A domestic industry exists if it "relat[es] to the articles protected by the patent." 19 U.S.C. § 1337(a)(2). This means it must relate to an article that, were it instead accused of infringement, would be found to infringe a valid claim of the patent in suit. *See Alloc*, 342 F.3d at 1375. Infringement includes "mak[ing] . . . any patented invention." 35 U.S.C. § 271(a). And it is undisputed that USS makes the DI Products.

So it is immaterial that [redacted] Respondents offer no authority for the proposition that the domestic industry is limited to the protected article as sold, rather than as made, and instead rely on an inapt hypothetical. *See* RRB at 26-27. And although the cost of [redacted] might not qualify as part of

[redacted]

the economic prong of domestic industry, on the theory that such costs are insufficiently "related" to the DI Products, Respondents do not make this argument.

So on balance Respondents' DI Product-specific objection to Dr. German's testing is unpersuasive. And Respondents' other objections to Dr. German's testing have been rejected above in the infringement discussion.

A. The 565 Patent

The table below summarizes the results of Dr. German's testing of the DI products for the quantitative elements of the independent claims of the 565 patent:

			Average Grain Size	Coercivity	Average Electrical Conductivity	G-Ratio	Thermal Stability
			about 50 µm or less	about 115 Oe or more	less than about 1200 S/m	at least about 4.0×10^6	at least about 1300 m
US Synthetic	[redacted]	**ABBBB**	3/3	3/3	10/10	3/3	[redacted]
		ABABA	3/3	3/3	6/10	3/3	[redacted]
		ACCCC	3/3	3/3	10/10	3/3	[redacted]
		ACACA	3/3	3/3	10/10	3/3	1/1

CDX-0003C.78; CX-0383C.

The table below summarizes each Accused Product, and citations to Dr. German's testimony and relevant demonstratives as evidence on which USS relies:

Party	Product	'565 Claim	10.18 Transcript	Demonstratives
USS DI	[redacted]	**1**	198:21-199:7	CDX-0003C.119
		2,4,6	200:5-200:11	CDX-0003C.123
		1	199:9-199:14	CDX-0003C.120
		2,4	200:5-200:11	CDX-0003C.123
		1	199:15-199:23	CDX-0003C.121
		2,4,6	200:5-200:11	CDX-0003C.123
		18	207:8-207:208:6	CDX-0003C.143
		1	199:24-200:3	CDX-0003C.122
		2,4,6	200:5-200:11	CDX-0003C.123

[redacted]

CIB at 57.

A thorough review of the test data shows that these tables are accurate, and in particular that the various additional limitations of the dependent claims are satisfied, and the fact that a bare majority of tested [redacted] PDCs meet the conductivity limitation still results in infringement. *See* CX-0383C.2. Therefore, USS has established that its DI Products practice the asserted claims of the 565 patent as shown in the table above.

B. The 502 Patent

The table below summarizes the results of Dr. German's testing of the DI products for the quantitative elements of the independent claims of the 502 patent:

	Parameter	Average Grain Size	Coercivity	Specific Permeability	Lateral Dimension	Specific Magnetic Saturation	Thermal Stability
	Range	about 50 µm or less	about 115 Oe to about 250 Oe	less than about 0.10 $G \cdot cm^3/g \cdot Oe$	about 0.8 cm or more	about 10 $G \cdot cm^3/g$ to about 15 $G \cdot cm^3/g$	about 1300 m to about 3950 m
[redacted]	**ABBBB**	3/3	3/3	3/3	10/10		
	ABABA	3/3	3/3	3/3	10/10		
	ACCCC	3/3	3/3	3/3	10/10		
	ACACA	3/3	3/3		10/10	2/3	1/1

CDX-0003C.77; CX-0383C.

The table below summarizes each DI Product, and citations to Dr. German's testimony and relevant demonstratives as evidence on which USS relies:

[redacted]

Party	Product	'502 Claim	10.18 Transcript	Demonstratives
USS DI	[redacted]	**1**	223:14-224:13	CDX-0003C.187
		2,11	225:2-225:8	CDX-0003C.190
		1	224:15-224:20	CDX-0003C.188
		2,11	225:2-225:8	CDX-0003C.190
		1	224:21-225:1	CDX-0003C.189
		2,11	225:2-225:8	CDX-0003C.190
		15	229:13-230:14	CDX-0003C.211
		21	230:15-230:20	CDX-0003C.212

CIB at 132-33.

A thorough review of the test data shows that these tables are accurate, and in particular that the various additional limitations of the dependent claims are satisfied, and the fact [redacted] meet the specific magnetic saturation limitation still results in infringement. *See* CX-0383C.2. Therefore, USS has established that its DI Products practice the asserted claims of the 502 patent as shown in the table above

C. The 306 Patent

Dr. German's testing of the [redacted], the only DI Product asserted to practice claim 15 of the 306 patent, is summarized in CDX-0003C.238 and CDX-0019. *See also* Tr. (German) at 248:23-250:12; CX-0383C.2. In particular, the coercivity and specific magnetic saturation limitations were met by all tested samples (*see* CX-0383C.2), and the different average grain sizes were established by a combination of evaluating the input particle size and examining the electron micrograph (*see* Tr. (German) at 248:23-250:12). Thus, the DI Product [redacted] practices claim 15 of the 306 patent.

XI. VALIDITY

A. Inherency

A prior art reference anticipates a patent claim if it discloses every element of the claim, either expressly or inherently. *See King Pharmaceuticals, Inc. v. EON Labs, Inc.*, 616 F.3d 1267,

[redacted]

1274 (Fed. Cir. 2010) (citation omitted). Inherency may also supply a missing element in an obviousness analysis where the limitation at issue is a natural result of the combination of prior art elements. *See Persion Pharmaceuticals LLC v. Alvogen Malta Ops. Ltd.*, 945 F.3d 1184, 1191 (Fed. Cir. 2019) (citation omitted). An element is inherent if it is necessarily present, not merely probably or possibly present. *See Rosco, Inc. v. Mirror Life Co.*, 304 F.3d 1373, 1380 (Fed. Cir. 2002) (citation omitted). It is not sufficient that a "certain thing *may* result from a given set of circumstances," or that it "would be obvious over what is expressly disclosed." *See Persion*, 945 F.3d at 1191 (emphasis in original); *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997).

The issue of inherency permeates Respondents' invalidity case. *See, e.g.*, RIB at 66-79. For example, on the theory that if two PDCs "are made in the same way, but just simply different in diameter, . . . the material properties like average grain size are going to be the same," Respondents argue in various places that certain allegedly prior art products "inherently exhibit" certain limitations of the claims in suit. RIB at 80, 97; Tr. (German) at 253:15-254:10. In general these inherency arguments are considered on a case-by-case basis.

One recurring argument, however, does not hold up under scrutiny and is categorically rejected: that certain measurable (but burdensome to test) properties of prior art PDCs can be "predict[ed] . . . based upon scientific principles and empirical relationships." RIB at 72. These predictions are made through mathematical modeling developed by Dr. Barron. *See id.* at 72-79.

It may well be that some properties can be predicted based on empirical data, but the particular models advanced by Respondents are inconsistent with other evidence in the record. The models for coercivity and specific magnetic saturation are both single-variable linear equations, with weight percent of cobalt as the single variable, and specific permeability, as noted,

[redacted]

is simply the ratio of those two parameters. *See* RIB at 73-76. Dr. Barron testified that he reviewed the prior art, including an article by R. Porat and J. Malek ("Porat"), and concluded that there was a relationship between the cobalt content and the coercivity. *See* Tr. (Barron) at 636:13-637:5 (citing RX-0491 (Porat)); RDX-0006C.39. When it was pointed out to Dr. Barron on cross-examination that, according to the "Results and discussion" section of Porat, "[f]or a given cobalt volume percentage, the coercive force Hc increases as the grain size decreases," his only response was that he "[didn't] need to" take into account grain size. Tr. (Barron) at 739:13-740:6; RX-0491.4. He did observe that Porat analyzes cemented carbides, which are "a little different" from PDCs, but he otherwise had no explanation for this omission. Tr. (Barron) at 636:13-637:5. His specific permeability analysis is similarly unreliable, because that parameter is inversely proportional to coercivity, and therefore also presumably depends on grain size. *See* Tr. (Barron) at 644:17-646:11.

For specific magnetic saturation, Dr. Barron relied on the testimony of two inventors, Dr. Bertagnolli and Dr. Debkumar Mukhopadhyay. *See* Tr. (Barron) at 641:15-23. Dr. Bertagnolli testified that "magnetic saturation . . . is proportional to . . . the amount of magnetic material" (JX-0350C (Bertagnolli Dep. Tr.) at 53:2-13), and [redacted] (JX-0517C (Mukhopadhyay Dep. Tr.) at 45:18-46:9). So Dr. Barron used the tables in the patents to generate his linear equation, with the unsurprising result that specific magnetic saturation is found by multiplying cobalt percent by approximately 2.01, plus a small constant. *See* Tr. (Barron) at 643:3-644:1; RDX-0004C.44. Although USS does not expressly dispute this result, other evidence in the record undermines confidence in it. *See* CIB at

[redacted]

68-72. For instance, Dr. Schaefer agrees that specific magnetic saturation is proportional to cobalt content, but opines that the proper proportionality constant is 1.43 rather than 2.01. *See* Tr. (Schaefer) at 832:21-835:17. And Dr. German's infringement and technical prong test data is much more scattered than either the data Dr. Schaefer considered or the data in the patent tables; the ratio of specific magnetic saturation to cobalt weight percent includes 1.70 (for the New Asia 1613 Dragon 2 (BCCCC.01), 1.18 (for the [redacted] (ACACA.02)), and a wide range of other values. *See* CX-0383C.2-.3. Dr. Barron offers no explanation for this variability.

For grain size, as noted above Dr. Barron's opinion that it is proportional to the input diamond particle size is reasonable, at least for a given set of manufacturing conditions. *See* Tr. (Barron) at 634:24-635:16. But Dr. Schaefer's opinion that [redacted] affect the resulting product, so one cannot [redacted] in the general case, is borne out by the record. Tr. (Schaefer) at 891:23-892:17. As one example, applying his formula for average grain size – i.e., the ratio of grain size to input particle size is 0.6915 – to the data reported in a paper by M. Akaishi, et al. ("Akaishi"), Dr. Barron predicted the grain size for that study to be between 1.38 and 2.76 micrometers. *See* Tr. (Barron) at 736:14-20; RDX-0006C.38; RX-0493 (Akaishi). In fact, the average grain size was reported as "about 4 [micrometers]," which is unequivocally inconsistent with Dr. Barron's prediction. RX-0493.3. As another example, according to my own calculation the formulation for the [redacted] "cutting" layer has a weighted average input particle size of approximately 12.8 micrometers (assuming the particle size for each "powder" is in the middle of the reported range), and the average grain size varies between 4.6 and 5.0 micrometers, so the ratio between them is approximately 0.375. *Compare* CX-0383C.4 *with* CX-2059C.7. A similar analysis of [redacted]

[redacted] yields a ratio for both of approximately 0.28. *Compare* CX-0383C.5-.7 *with* CX-2059C.7. So Dr. Barron's formula for grain size is clearly not reliable.

For G-Ratio, Dr. Barron relied on data in an article by Jack L. Wise, et al. ("Wise") to formulate an equation with grain size as the only variable. *See* Tr. (Barron) at 647:23-649:18; RDX-0006C.50-.51. Dr. Barron acknowledged that sintering pressure also affects G-Ratio, but testified without explanation, comparison, or quantification that "the effect is smaller" than the effect from diamond grain size. Tr. (Barron) at 744:25-745:4. Although he was able to rule out sample dimensions and chamfer as correlating to G-Ratio, he was impeached with his deposition testimony, where he stated that he otherwise did not analyze whether other parameters affected G-Ratio, because he did not have the data to do so. *See id*. at 745:20-746:18. The Wise data came from tests employing a "granite log" rather than VTL, and Dr. Barron admitted that he did not know if the difference in test equipment made a difference to the results. *See id*. at 741:14-21. And Dr. German's test samples exhibiting the smallest G-Ratios (i.e., less than $4x10^6$) had grain sizes ranging from 4.1 micrometers [redacted] (BBBBA.03)) to 5.8 micrometers [redacted] (BBBBG.02) and [redacted] (BOOOO.02)), while the DI Products [redacted] – the opposite of what Dr. Barron's model predicts. *See generally* CX-0383C. So there is no reason to ascribe any confidence to Dr. Barron's model, nor is there any reason to accept Respondents' assertion that Dr. Barron's model "can determine at least a minimum G-Ratio . . . from the diamond grain size." RIB at 78.

Lastly, USS does not expressly challenge Dr. Barron's model for electrical conductivity, and his opinion regarding thermal stability does not include a mathematical model. *See* CIB at 68-72; Tr. (Barron) at 650:19-652:7. His model for electrical conductivity does include a

[redacted]

mathematical formula, although his ultimate opinion appears to be limited to analyzing a single allegedly anticipatory prior art reference. *See* Tr. (Barron) at 681:18-684:4. Respondents characterize his testimony as "any sample with a [cobalt] content of less than about 20% will have an electrical conductivity of less than 1200 S/m." RIB at 78. In fact, Dr. Barron does not appear to say this anywhere, and with good reason – it is conclusively refuted by Dr. German's testing. *See generally* CX-0383C. The cobalt concentration of every tested sample was significantly less than 20 weight percent, but dozens of samples displayed a conductivity exceeding 1200 S/m, in some cases by wide margins. *E.g.*, CX-0383C.07 [redacted] (BBBBA.03) had 10.2% cobalt and electrical conductivity of 5306 S/m).

In sum, Respondents' inherency arguments will be considered on a case-by-case basis, but insofar as they rely on predictions based on mathematical models, they are unpersuasive.

B. The 565 Patent

1. Priority Date Under 35 U.S.C. § 120

USS asserts that the 565 patent is entitled to an effective filing date of October 3, 2008, based on the filing date of U.S. Patent No. 7,866,418 ("418 patent"), which is in evidence as JX-0365. CIB at 63. The 418 patent does not specifically discuss average electrical conductivity, however, so USS asserts that "the 418 Patent inherently discloses a PDC with an average electrical conductivity of less than about 1200 S/m." *Id.* at 63. If this is not the case, as Respondents contend, then the correct effective priority date for the 565 patent is June 1, 2012, which is the date of the 565 patent's continuation-in-part application, in which electrical conductivity was first explicitly mentioned. *See* RIB at 67.

"Under the doctrine of inherent disclosure, when a specification describes an invention that has certain undisclosed yet inherent properties, that specification serves as adequate written description to support a subsequent patent application that explicitly recites the invention's

[redacted]

inherent properties." *Yeda Rsch. & Dev. Co. v. Abbott GMBH & Co. KG*, 837 F.3d 1341, 1345 (Fed. Cir. 2016); *Therma-Tru Corp. v. Peachtree Doors Inc.*, 44 F.3d 988, 993 (Fed. Cir. 1995). As noted, for a disclosure to be inherent, the missing descriptive matter must necessarily be present in the parent application's specification, such that one skilled in the art would recognize the disclosure. *See Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1159 (Fed. Cir. 1998). USS submits that the PDCs disclosed in Table 1 of the 418 patent and Table 1 of the 565 patent are identical, the two patents' specifications contain the exact same 14 working examples, and the two patents teach the "exact same fabrication method for the examples in Table 1." CIB at 64 (*comparing* JX-0002 (565 patent) at 19:49-20:14 and Table 1 *with* JX-0365 (418 patent) at 12:30-51 and Table 1); *see also* Tr. (German) at 1245:22-1246.6; 1247:3-6. Thus, USS asserts that the PDCs disclosed in Table 1 are manufactured using the same input materials under the same conditions, such that "even Respondents' expert agrees they will have the same microstructure, and therefore the same properties, including average electrical conductivity." CIB at 64-65 (citing Tr. (Barron) at 619:1-25 ("[I]f you use the same starting materials and the same conditions, . . . you make something with the same structure. . . . [A]s you create something . . . with the same structure, that will . . . have the same properties. . . . They'll have the same electrical properties, which in this case is measured by electrical conductivity.")).

There are two problems with USS' argument: (1) it has not shown that the 418 patent disclosure adequately teaches the same starting materials and the same manufacturing conditions, and (2) Dr. German's testing did not include the samples described in the 418 patent, and the results of his testing otherwise call the inherency argument into question. On the first point, USS contends that the 418 and 565 patents "disclose the exact same fabrication method for the examples in Table 1" of each patent. CIB at 64. But the only parameters actually disclosed are sintering

[redacted]

pressure and temperature, average diamond particle size, and use of a niobium container; there is no disclosure of sintering time at any particular pressure/temperature combination, the cobalt concentration in the tungsten carbide substrate, or of any other parameter. *See* JX-0365 (418 patent) at 12:30-51 & Table 1; Tr. (German) at 1272:18-1273:4. As particularly relevant for electrical conductivity, there is no disclosure of actual cobalt concentration, because the concentrations given in Table 1 are simply the specific magnetic saturation measurements divided by 2.01. *See* JX-0517C (Mukhopadhyay Dep. Tr.) at 45:18-46:9. And as noted above, this is not a clearly reliable measure of cobalt concentration. So Dr. German's opinion that the 418 patent adequately supports the electrical conductivity limitations of the 565 patent is not consistent even with Dr. German's other testimony. *See, e.g.*, Tr. (German) at 128:14-129:21 ("when it's leached, the electrical conductivity drops down").

On the second point, USS' inherency argument would be stronger if [redacted] The various non-USS

[2] The cited specifications are for 1608-size PDCs, and it is assumed that the same input particle sizes hold for other products in the same series. Also, the idenitification of the [redacted] specification is based on USS' exhibit list; the specification itself states that it is for [redacted] CX-2141C.1.

[redacted]

samples Dr. German tested vary widely in their electrical conductivity. *See generally* CX-0383C. The SF Diamond 1613 [redacted] for instance, exhibits cobalt concentrations only slightly higher than that of [redacted] but electrical conductivity uniformly exceeding 1200 S/m. *See* CX-0383C.6. For all these tested samples, [redacted] *See* CIB at 63-67; CRB at 36-45. And even for tested samples where most relevant parameters can be ascertained, it is not clear that electrical conductivity is necessarily below 1200 S/m. For example, the Iljin UP8N and UP9N manufacturing parameters are particularly complete in the record, and show a striking consistency (namely, identical sintering pressure and temperature, relatively [redacted] grain size, and relatively [redacted] cobalt concentration), but their electrical conductivities vary between [redacted] *See* CX-0383C.2-.3.

In short, it cannot be concluded that the 418 patent discloses even a single example that necessarily possesses an electrical conductivity of 1200 S/m or below. Therefore, inherency has not been proven and the 565 patent is accorded a priority date of June 1, 2012.

2. Patent Eligibility Under 35 U.S.C. § 101

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor." 35 U.S.C. § 101. Implicit in this provision is the principle that "abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014). The Federal Circuit has made clear that "[e]ven a specification full of technical details about a physical invention may nonetheless conclude with claims that claim nothing more than the broad law or abstract idea underlying the claims." *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 769 (Fed. Cir. 2019). As a result, even claims directed to extensive structure are invalid as abstract under *Alice* if "what is claimed is simply a generic environment in which to carry out the abstract idea." *Yu v. Apple Inc.*, 1 F.4th

[redacted]

1040, 1043-44 (Fed. Cir. 2021)) (citing *In re TLI Commc'ns LLC Pat. Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016). "The Federal Circuit has admonished that a claim must have the specificity required to transform it from one claiming only a result to one claiming a way of achieving it to avoid ineligibility." *Certain Light-Emitting Diode Products, Fixtures, and Components Thereof*, Inv. No. 337-TA-1213, ID at 22 (Aug. 17, 2021) (public) (citations and quotations omitted) ("*Light-Emitting Diodes*"), *aff'd in pertinent part*, Comm'n Op. at 4-5 (Jan. 14, 2022).

a. *Alice* Step 1

The first step in the *Alice* analysis requires an examination of the claims to determine if, as applicable here, they are directed to a result or effect. *See Light-Emitting Diodes* at 21. Respondents assert that the claims fail step one because "[i]nstead of claiming a novel PDC, the claims recite how the PDC behaves in a magnetic field (coercivity, specific magnetic saturation, specific permeability), how the PDC responds to a voltage (average electrical conductivity), and how the PDC wears when used to cut something (G-ratio and thermal stability)—regardless of how the PDC is made." RIB at 49.

USS argues that the asserted claims are valid under § 101 because "all asserted claims are directed to a man-made product: PDCs comprising a PCD table attached to a substrate," and thus the PDCs do not occur in nature. CIB at 58. USS further argues that the asserted claims recite magnetic and electrical properties, which in turn relate "to the higher quantity of diamond grains in the microstructure and the lower quantity of cobalt [and] merely claiming certain aspects of a synthetic diamond microstructure by way of its magnetic and electrical properties does not convert a man-made object into a law of nature." *Id.* (citing *Carnegie Inst. of Wash. v. Pure Grown Diamonds, Inc.*, 459 F. Supp. 3d 502, 507 (S.D.N.Y. 2020)). USS thus submits that the asserted claims pass *Alice* step 1 because various claim elements "are not directly associated with the amount of the metal-solvent catalyst[, including] specific ranges of average grain size (e.g., 50 μm

[redacted]

or less), G-Ratio (e.g., at least about 4.0 x 106), thermal stability (e.g., at least of about 1300 m), and lateral dimension." CIB at 59-60. USS further argues that the asserted claims are "structurally defined" because each claim "recites a polycrystalline diamond compact comprising a [PCD] bonded to a substrate, and the PCD table having an unleached portion," and the PCD table is "structurally defined as having the average diamond grain size, coercivity, average electrical conductivity, and G-Ratio within the claimed numerical ranges." CRB at 32. And USS notes that "patent law has long accepted claiming a feature by way of its extrinsic and intrinsic properties." CIB at 59.

The asserted claims of the 565 patent obviously do recite compositions of matter that are not found in nature, but they also recite certain features of those compositions – most notably G-Ratio (as in claim 1 and its dependent claims) and thermal stability (as in claim 18) – that are not merely results or effects, but are actually performance measures. The 565 patent teaches that the problem it purports to solve is "PCD materials that exhibit improved mechanical and/or thermal properties" via "enhanced diamond-to-diamond bonding." JX-0002 (565 patent) at 2:22-28. And according to one of Dr. Bertagnolli's published papers, there are three "properties relevant to drilling": "wear resistance," "thermal resilience," and fracture toughness. CX-0394.3. Plainly, the first two properties are measurable as G-Ratio and thermal stability, respectively. *See* JX-0002 (565 patent) at 6:64-66, 7:16-39.

That same paper explains that electrical conductivity is not itself a performance measure, and is instead a side effect or result of the fabrication processes and microscopic characteristics of a PDC:

> If cutters could be tested non-destructively for desirable properties, they could be more effectively employed in demanding applications, such as hard rock drilling.
>
> . . .

[redacted]

> Noting that polycrystalline diamond is electrically conductive and the conductivity is 3-4 orders of magnitude lower than that of metals, it was deemed reasonable to explore the possibility of using electrical conductivity measurements for NDT.
>
> . . .
>
> It was reasoned that the macroscopic electrical conductivity of polycrystalline diamond should be closely related to metal content. Metal content is known to correlate with mechanical properties of polycrystalline diamond. Tests have indicated that higher metal content correlates with lower thermal resilience, wear resistance, and fracture toughness of the cutter, the properties relevant to drilling. The primary mechanisms for metal content contributing to cutter degradation appear to be diamond-metal differential thermal expansion and diamond graphitization at higher temperatures, which mostly influence wear.
>
> . . .
>
> Fracture toughness is mostly a function of grain size. However, metal content has also been observed to [decrease] with increasing grain size under the same manufacturing conditions. The amount of residual cobalt and its distribution in polycrystalline diamond can be controlled in the process through the diamond powder feedstock and high pressure, high temperature sintering conditions. However, irregularities in diamond powder particle size distribution, impurities, and localized differences in pressure can yield irregularities in the amount and distribution of residual cobalt. These irregularities are expected to be detectable in electrical conductivity images.

CX-0394.2-.3. In other words, electrical conductivity is not a design choice or manufacturing variable, but is instead an indirect measure of the effectiveness of other design choices and manufacturing variables. A low electrical conductivity is not a desirable feature as such; it is just a result of other desirable features.

The 565 patent explains that the same is true of the claimed magnetic limitations:

> Many physical characteristics of the PCD may be determined by measuring certain magnetic and electrical properties of the PCD because the metal-solvent catalyst may be ferromagnetic. The amount of the metal-solvent catalyst present in the PCD may be correlated with the measured specific magnetic saturation of the PCD. A relatively larger specific magnetic saturation indicates relatively more metal-solvent catalyst in the PCD.

[redacted]

> The mean free path between neighboring diamond grains of the PCD may be correlated with the measured coercivity of the PCD. A relatively large coercivity indicates a relatively smaller mean free path. The mean free path is representative of the average distance between neighboring diamond grains of the PCD, and thus may be indicative of the extent of diamond-to-diamond bonding in the PCD. A relatively smaller mean free path, in well-sintered PCD, may indicate relatively more diamond-to-diamond bonding.

JX-0002 (565 patent) at 5:32-49. And specific permeability, as noted, is simply magnetic saturation divided by coercivity.

In short, nothing in the asserted patents, or the rest of the record, suggests that any of these parameters solve any problems, rather than simply being measures of other, actually beneficial characteristics. Nor are the electrical and magnetic parameters sufficiently tied to any such beneficial characteristics through inherency, as explained above. There may be some causal connection between grain size, catalyst concentration, and other, unspecified design and fabrication choices, on the one hand, and electrical and magnetic behavior, on the other hand. But that causal connection is so loose and generalized that the claimed limitations appear to be little more than side effects; thus, the recitation of, say, an electrical conductivity of less than 1200 S/m appears to be gratuitous rather than inventive.

On the whole, then, the claims of the 565 patent do not simply recite "extrinsic and intrinsic properties," as USS asserts. CIB at 59. They instead recite certain structural and design features (for example, a particular grain size and a catalyst), performance measures (G-Ratio in claim 1 and its dependent claims and thermal stability in claim 18), and side effects (the various electrical and magnetic parameters). The structural and design features are clearly not problematic under *Alice*.

The performance measures clearly are problematic, however, as *Light-Emitting Diodes* illustrates. Claim 1 of the relevant patent in that case covered a lighting device "comprising at least one solid state light emitter," wherein the device emitted light with a "wall plug efficiency of

[redacted]

at least 85 lumens per watt of [input] electricity." *Light-Emitting Diodes* at 21. That claim encompassed ineligible subject matter at *Alice* step 1 because it was "not limited to any particular structure, but instead read on any and all means of achieving the claimed efficienc[y] in a lighting device that uses a solid-state emitter." *Id*. at 22. In other words, the claim was "directed to an abstract goal . . . however achieved." *Id*. The claims of the 565 patent, too, incorporate the goal or result of a particular measure of wear resistance (i.e., G-Ratio) or thermal resilience (i.e., thermal stability), however achieved. The claims are not, in fact, "entirely structurally defined," as USS argues in attempting to distinguish *Light-Emitting Diodes*. CRB at 32.

The side effects claimed in the 565 patent are similarly problematic. A claim "directed to a result or effect that itself is the abstract idea and [that] merely invoke[s] generic processes and machinery" is patent-ineligible at *Alice* step 1. *Free Stream Media Corp. v. Alphonso Inc*., 996 F.3d 1355, 1363 (Fed. Cir. 2021) (citation omitted). Instead, the claim must "have the specificity required to transform it from one claiming only a result to one claiming a way of achieving it." *Light-Emitting Diodes* at 22 (quoting *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1167-68 (Fed. Cir. 2018)). The claims of the 565 patent require certain electrical and magnetic side effects that themselves are simply imperfect proxies for unclaimed features.

Admittedly, the claims recite somewhat more specific structure than was at issue in *Light-Emitting Diodes*, including a particular grain size and the presence of a catalyst. *E.g.*, JX-0002 (565 patent) at cl. 1. But this makes no difference, as *Yu* illustrates. *See* 1 F.4th at 1043-44. There, claim 1 recited a digital camera possessing certain specific components, including image sensors, lenses, a signal converter, memory, and an image processor, all to produce first and second digital images. *See id*. at 1042. The claim also required, however, that the processor "produce[] a resultant digital image from said first digital image enhanced with said second digital image," with

[redacted]

no limitation on how to perform the enhancement. *Id*. This element rendered the claim abstract: "claim 1's solution to [the problems outlined in the specification] is the abstract idea itself – to take one image and 'enhance' it with another." *Id*. at 1044. That the rest of the claim recited several concrete elements did not save the claim, because those elements were "well-known," "conventional," and "perform[ed] only their basic functions." *Id*. at 1043.

There is no principled distinction between the claims at issue in *Yu* and the asserted claims of the 565 patent. As in *Yu*, claims 1, 2, 4, 6, and 18 recite concrete but conventional elements combined with abstract results – in *Yu*, image enhancement, and here, performance standards and certain electrical and magnetic side effects. And under *Yu*, the fact that the claims in suit incorporate multiple concrete but otherwise conventional elements is irrelevant, so there is similarly no principled distinction between the claims of *Light-Emitting Diodes* (which covered a performance standard involving lighting efficiency) and the asserted claims of the 565 patent (which cover performance standards for wear resistance and thermal resilience). To be sure, *Yu* did not require the enhancement to be quantified as it is in the claims here, but USS, in attempting to distinguish *Yu*, does not explain why this makes a difference. *See* CRB at 33.

The cases on which USS relies do not require a different result. *Carnegie Inst*., 459 F.Supp.3d at 505-06, for instance, involved patents covering methods for producing a certain type of diamond "at a higher growth rate," and for "annealing" diamonds to improve their optical properties. *See* CIB at 59. The question presented under *Alice* step 1 was whether the claims were "directed to a law of nature," and the court found that they were not. 459 F.Supp.3d at 507. The claims of the 565 patent, by contrast, are problematic not because they are directed to a law of nature, but because they are directed to a result or effect. Other cases on which USS relies deal with the same question, and are equally beside the point. *See* CRB at 31 (collecting cases). Still

other cases on which USS relies do not address *Alice* at all, and instead stand for the proposition that an invention can be claimed by reciting its properties. *See* CIB at 59 (collecting cases). This is true but immaterial; the problem is not that the claims of the 565 patent recite properties, but that the properties they recite are results or effects, and thus abstract.

Lastly, USS is correct that "claims need not recite [their] utility." CRB at 31. The problem, though, is not that the claims fail to recite a utility, or that they lack utility, it is that the objectionable limitations are simply results or effects. And utility is in any event context-dependent. One can imagine a composition of matter identical to that of claim 1 used for a different purpose, where the claimed electrical and magnetic properties are not results or effects. For instance, a PDC might have an application as a component in a larger apparatus (that is, other than as a part in a drill bit), where its electrical insulating properties are needed, and where electrical conductivity below a particular value or falling within a particular range improves the performance of the apparatus. In such a context, electrical conductivity is a design parameter, that is, a means to an end, rather than merely a result or effect.

But that is not the context here. Instead, this "case isn't as much about . . . the structure of PDCs as it is about the measurable characteristics of sintered materials." Tr. (German) at 1294:1-6. And under step 1 of *Alice*, the measurable characteristics here render the claims patent-ineligible.

b. *Alice* Step 2

On balance, therefore, the asserted claims of the 565 patent are directed to patent-ineligible subject matter and must be further considered under step 2 of *Alice*. That step requires examination of claim elements, both individually and as an ordered combination, to determine whether the claim contains an "inventive concept." *Free Stream*, 996 F.3d at 1361.

[redacted]

Respondents argue that "the only claim elements that stray from conventional structure" are the abstract ones, and the abstract elements cannot qualify as "inventive concepts." RIB at 62. In fact, the lack of inventive concepts in the challenged claims is partially explained by USS:

> Each asserted claim recites various favorable properties associated with a higher percentage of diamond grains and lower amount of cobalt in the diamond microstructure. These features help the PDC resist failure in drilling applications, transforming the invention into a patent-eligible application.

CIB at 61. As explained above, though, particular grain microstructures and cobalt concentrations may "help the PDC resist failure," but those features are not claimed. Instead, the claims are directed to properties "associated with" such features only in a loose way, and the properties themselves are not clearly either "favorable" or unfavorable.

USS further asserts that the asserted claims recite an inventive concept because the claimed PDCs "exhibit different microstructures and wear resistance properties, demonstrating the potential for significant utility in oil drilling applications." CRB at 34-35. USS cites to Dr. German's testimony that the claimed PDCs have "enhanced diamond-to-diamond bonding, meaning 'more bonding, stronger bonding, [and] larger bonds' between diamond particles, leading to longer lasting drill bits." *Id.* at 35; Tr. (German) at 116:11-118:23; 119:5-25. USS argues that the asserted patents' specifications teach how the recited properties of the PDC "are associated with the physical structures of the claimed PDCs, such as a relatively smaller mean free path between neighboring diamond grains" and a relatively smaller catalyst concentration, which are associated with "an increased nucleation and growth of diamond between diamond particles (i.e., enhanced diamond-to-diamond bonding)." CRB at 35 (citing JX-0002 (565 patent) at 4:41-49, 5:40-48; 6:63-7:39). Thus, USS argues that "the Asserted Claims are directed to PDCs having quantitatively and qualitatively different, superior characteristics than the conventional PDCs." *Id.*

[redacted]

While the inventors may have discovered methods of manufacturing PDCs that have the specific improved properties claimed, they failed to recite these manufacturing steps in the claims that have been found to be ineligible. The asserted claims, therefore, do not recite any limitations that would "transform the nature of the claim[s] into a patent eligible application" under *Alice* step 2. *Alice*, 573 U.S. at 217 (citation omitted). And "the eligibility inquiry must remain squarely on the claims themselves." *Light-Emitting Diodes* at 23. The claims here recite several structural limitations (a polycrystalline table, an unleached portion, a plurality of diamond grains, a catalyst, and a substrate) that are generic to all PDCs. *See* RIB at 51-52 (table presenting admissions by USS expert that all claimed structures are generic). But the claims fail to recite structures, methods, or any other inventive feature to achieve the objectionable claimed limitations (G-Ratio, thermal stability, electrical and magnetic parameters). *See Free Stream*, 996 F.3d at 1363 ("a claim is ineligible if it fail[s] to recite a practical way of applying an underlying idea . . . and instead is drafted in such a result-oriented way that it amounts to encompassing 'the principle in the abstract' no matter how implemented").

USS quotes *Nat. Alternatives Int'l, Inc. v. Creative Compounds, LLC*, 918 F.3d 1338, 1348 (Fed. Cir. 2019), where the Federal Circuit stated that "[a] claim to a manufacture or composition of matter made from a natural product is not directed to the natural product where it has different characteristics and 'the potential for significant utility.'" CRB at 34. In that case, however, the claims were found patent eligible because they were directed to "specific treatment formulations that incorporate natural products, but [with] different characteristics and [usable] in a manner that beta-alanine as it appears in nature cannot." *Nat. Alternatives*, 918 F.3d at 1348-49. In the present case, by contrast, the claims do not recite specific "formulations" or a particular usage that "can be used in a manner" that the generic PDCs cannot. The claims merely "recite that the abstract

[redacted]

idea [of improved coercivity, electrical conductivity, G-Ratio] will be implemented using conventional components and functions generic to the technology." *Free Stream*, 966 F.3d at 1366. And while USS correctly states that the patent specification may teach one skilled in the art how to make the PDC having the recited characteristics, the claims read on any PDC structure that achieves the claimed improvements. This "mismatch between the specification" and "the breadth of claim 1 underscores that the focus of the claimed advance is the abstract idea and not the particular configuration discussed in the specification that allegedly departs from the prior art." *Light-Emitting Diodes* at 26.

Therefore, the asserted claims of the 565 patent "invoke[] well-understood, routine, [and] conventional components to apply the abstract idea[s]" recited in the claims. *Yu*, 1 F.4th at 1045. They thus fail both steps of *Alice*, are directed to ineligible subject matter, and are invalid on that basis.

3. Anticipation and Obviousness Under 35 U.S.C. §§ 102 and 103

a. [redacted]

[redacted] USS' only argument on this point is that the priority date of the 565 patent is October 3, 2008. *See* CIB at 92.

Under the on-sale bar of pre-AIA 35 U.S.C. § 102(b), [redacted] qualifies as prior art to the asserted claims of the 565 patent, because that patent's priority date is June 1, 2012, as explained above. Therefore, claims 1, 2, 4, 6, and 18 of the 565 patent are invalid as anticipated by [redacted]

b. Mercury and Mars PDCs

[redacted]

The Mercury and Mars PDCs, manufactured by Diamond Innovations, Inc., are alleged to anticipate claims 1, 2, and 4 of the 565 patent. *See* RIB at 89. Respondents specifically contend that Mercury and Mars were "known or used by others in this country" under pre-AIA 35 U.S.C. § 102(a), and are therefore prior art to the 565 patent. *See id*. at 90.

As applicable here, an article qualifies as prior art if it was "known or used by others in this country . . . before the invention thereof by the applicant for patent." 35 U.S.C. § 102(a) (pre-AIA). The "invention thereof by the applicant" is determined based on the pre-AIA Section 102(g) test based on conception, reduction to practice, and abandonment, suppression, or concealment. *See Mahurkar v. C.R. Bard, Inc*., 79 F.3d 1572, 1576-77 (Fed. Cir. 1996). Respondents offer little on this point, but seemingly do not dispute that all claims of the 565 patent were reduced to practice no later [redacted] demonstrates that there was no abandonment, suppression, or concealment. *See* RIB at 88-90 (citing JX-0034C.179).

And USS does not assert any particular date of conception, so for Section 102(a) purposes the date of invention is January 4, 2008. *See* CIB at 66 (identifying the priority date as the filing date of the 418 patent). The only evidence to which Respondents point in support of a Mars PDC existing before that date is a reference in a spreadsheet indicating that [redacted] *See* RIB at 89-90; RX-1133C at row 869. The Diamond Innovations trial witness, Mr. Andrew Gledhill, was not asked whether the "Mars" and the "Mars Ultra" were the same product, nor is there any other evidence in the record on this point. *See generally* Tr. (Gledhill) at 519:10-540:19; RRB at 43. And as USS notes, some Mars PDCs were "not commercial products," which supports an inference that Diamond Innovations PDCs with similar or even identical names may well possess different characteristics. On the whole, this evidence

[redacted]

does not show knowledge or use by others under the clear and convincing evidence standard, and Respondents therefore have not proven that the Mars product is prior art to the 565 patent.

As for the Mercury PDC, there is evidence it was reduced to practice by April 2007 and that a sample was subjected to a VTL test in December 2007. *See* RX-0554C.3. And Mr. Gledhill testified that he personally retrieved some of the relevant documentation, and other information was obtained by a staff member querying Diamond Innovations' "system." Tr. (Gledhill) at 530:20-531:9. This is sufficient to establish that the Mercury PDC was reduced to practice before January 4, 2008. [redacted] This is sufficient to establish that the Mercury PDC was not abandoned, suppressed, or concealed. Thus, the Mercury is prior art to the 565 patent under Section 102(a).

Three sample Mercury PDCs were obtained by Respondents pursuant to a subpoena to Diamond Innovations, and then tested by Mr. Bellin. *See* Tr. (Gledhill) at 521:20-522:21; Tr. (Bellin) at 960:0-16. Mr. Bellin testified that they met all the limitations of claims 1, 2, and 4. *See* Tr. (Bellin) at 955:20-956:3. He prepared a chart summarizing the results of his testing:

[redacted]

	Mercury PDC
A polycrystalline diamond compact, comprising:	✓
a polycrystalline diamond table, at least an unleached portion of the polycrystalline diamond table including:	✓
a plurality of diamond grains directly bonded together via diamond-to-diamond bonding to define interstitial regions, the plurality of diamond grains exhibiting an average grain size of about 50 µm or less;	✓
a catalyst occupying at least a portion of the interstitial regions;	✓
wherein the unleached portion of the polycrystalline diamond table exhibits a coercivity of about 115 Oe or more;	187.57 Oe
wherein the unleached portion of the polycrystalline diamond table exhibits an average electrical conductivity of less than about 1200 S/m; and	0.2546 S/m
wherein the unleached portion of the polycrystalline diamond table exhibits a G_{ratio} of at least about 4.0×10^{6}; and	More than 4 M after 50 passes
a substrate bonded to the polycrystalline diamond table.	✓

CDX-0004C.63. He also testified that, as to claim 4, the specific magnetic saturation was 15.62 Gcm^3/g. *See* Tr. (Bellin) at 1007:13-20; CDX-0004C.64.

USS challenges Mr. Bellin's results on several grounds. *See* CIB at 85-92. First, Respondents assert that Mr. Bellin did not perform his tests on "unleached portion[s]" of the Mercury PDCs. *See id*. at 85-88. Mr. Bellin's principal basis for opining that the Mercury PDCs he tested were entirely unleached was that he tested for "electrical resistance of the diamond tables" using an LCR meter, which "measure[s] different electrical properties." Tr. (Bellin) at 990:8-12. He measured a resistance "between top and bottom," indicating that cobalt was present and no leaching had occurred; had there been any leaching, he could have measured capacitance but not resistance, because with a leached (that is, nonconductive) diamond layer, the "cutter behaves exactly like a capacitor." *Id*. at 990:13-992:12. He then corroborated his resistance measurement by examining electron micrographs, comparing VTL performance to that of a control, and inspecting the wear scars on the Mercury PDCs, which would show a "clearly visible" layer if there had been leaching. *Id*. at 994:17-19, 1084:25-1086:22. Although Mr. Bellin's

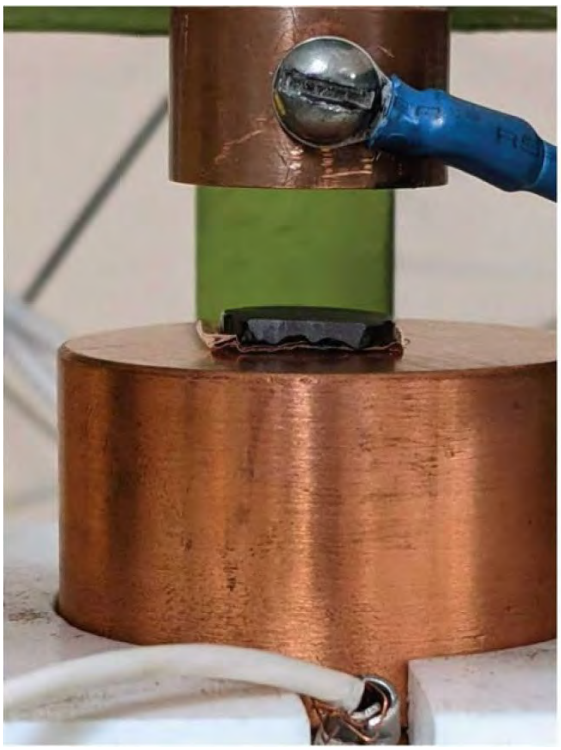
[redacted]

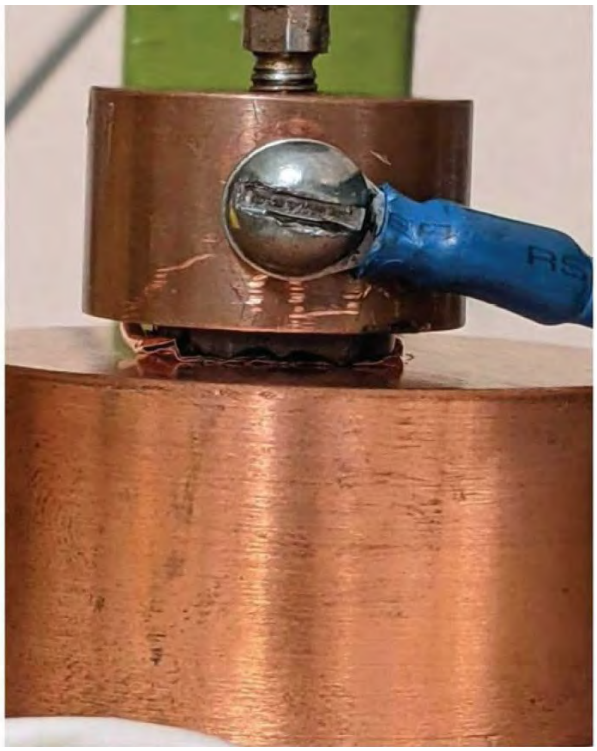
quantitative conductivity test results are curious, as discussed below, most of USS' criticism of his testing otherwise pertains to his corroborative evidence, and so does little to undermine the results of the resistance measurements. *See* CIB at 85-88. USS also notes that it is possible to measure resistance in a diamond table if a dopant is introduced, but there is no evidence of that here. *See id*. at 87-88; Tr. (Bellin) at 1082:7-25. On balance, Mr. Bellin provided a credible opinion that the entire diamond tables of the tested Mercury PDCs were unleached.

Second, USS criticizes Mr. Bellin's protocol for determining average grain size. *See* CIB at 88. His technique was, in fact, different from that of Dr. German, who followed the protocol in the ASTM. *See* Tr. (German) at 1290:14-22. Mr. Bellin's procedure, however, was mathematically reasonable: he examined electron micrographs of the Mercury to identify the largest grains, and then measured their sizes to confirm that the average grain size could not have exceeded 50 micrometers. *See* Tr. (Bellin) at 994:20-996:1.

Third, USS alleges that Mr. Bellin did not properly measure electrical conductivity. *See* CIB at 88-89. Mr. Bellin's protocol involved removing the diamond table and sandwiching it between two copper cylinders, measuring the resistance of the entire combination with the LCR meter, and then plugging the resistance measurement into a formula for resistivity that accounts for the table's geometry:

[redacted]





RX-0567; *see* Tr. (Bellin) at 996:6-999:12; RDX-0004C.47-.49. The soft copper pistons were pressed against the diamond table to ensure full contact across the entire top and bottom surfaces. *See* Tr. (Bellin) at 996:6-997:8. The result, which was calculated by dividing one by the resistivity and applying a conversion factor to get units of S/m, was almost four orders of magnitude less than 1200. *See id*. at 997:9-24, 999:13-1000:1.

One USS critique of this procedure is that Mr. Bellin did not correct his calculation by factoring in the resistances of the various test components. *See* CIB at 88-89 (citing Tr. (German) at 1289:22-1290:8). But it is difficult to see how this would make a difference; by far the largest contributor to resistivity would surely be the diamond table rather than the copper sandwich and conductive wiring. Another critique is that the measured conductivity was "several hundredfold smaller than what you would expect" with an unleached PCD table. Tr. (German) at 1286:23-1287:2; *see* CIB at 87. This is indeed puzzling, because there is no reason to expect the Mercury would exhibit an electrical conductivity so different from the rest of the PDCs tested in this

[redacted]

investigation, even the ones with low cobalt content, and Respondents do not even attempt to explain this anomaly. *See* RRB at 47-48; *e.g.*, CX-0383C.2 [redacted] (ACACA.02) had [redacted] Nonetheless, Mr. Bellin opined that such measurements were "in line" with his other test results, and, again, any resistance measurement at all is consistent with a lack of leaching (which was the thrust of Dr. German's opinion on the unusually low conductivity). Tr. (Bellin) at 999:13-1000:1. So on balance, Mr. Bellin's electrical conductivity testing was reliable.

Fourth, USS points out that Mr. Bellin's G-Ratio testing procedure deviated from Dr. German's, which was, with some gap-filling, the procedure outlined in the 565 patent. *See* CIB at 89-90. In fact, Mr. Bellin's procedure was identical in most respects to Dr. German's. *See* Tr. (Bellin) at 966:15-968:18; CDX-0004C.13-.15. Mr. Bellin provided reasonable explanations for his deviations, including that the rock he used was more "abrasive" than the Barre granite specified in the 565 patent, so he compensated for that by slowing the rotational speed. Tr. (Bellin) at 966:19-967:21. Although he admitted that his method of measuring the volume of PDC removed during the G-Ratio test involved a "subjective element" and was not as precise as the method Dr. German used, his G-Ratio results were relatively consistent across multiple tests, and he otherwise went to considerable lengths to "calibrate" his process to obtain precise measurements. Tr. (Bellin) at 976:24-979:24, 981:22-985:17, 1056:6-1057:1. Of greatest probative value is his calibration of his own results with those of Dr. German; both tested the same SF Diamond 1613 [redacted] product, with Mr. Bellin measuring a G-Ratio of 7.78 million and Dr. German a G-Ratio of 11.7 million. See Tr. (Bellin) at 970:17-971:22. Although there is a difference between them, in context it is relatively insignificant, and Mr. Bellin's results are conservative, that is, they are less likely to satisfy the claimed G-Ratio. Therefore, Mr. Bellin's G-Ratio testing may be relied on.

[redacted]

Lastly, USS argues that the specific magnetic saturation measurements of 15.63, 15.60, and 15.62 are not "about 15 Gcm^3/g or less" as recited in claim 4. As found in the claim construction order, the term "about" is determined by "the record[, which] provides an indication as to what range is covered by the [about] term." *Markman* Order at 21 (internal citations omitted). In this case, "data in the specification distinguishes the claimed numerical parameters from prior art parameters [and] [a]voiding prior art and accounting for measurement variability are both recognized methods of limiting the scope of relative terms such as 'about.'" *Id.* The specification of the 565 patent excludes any number above 15.19 Gcm^3/g from the claimed range by listing that value as the specific magnetic saturation of a "conventionally sintered PCD." *See* JX-0002 (565 patent) at Table III. Respondents assert that the value of 15.62 is "only about 4 percent [higher], reasonably within the nature of variations between samples." RIB at 94. However, all measurements were well over the 15.19 prior art measurement, and thus, even if considered within the nature of variation, are nonetheless within the prior art limits and thus not within the claimed "about" value.

Therefore, this limitation is not met by the Mercury PDCs. Otherwise, however, the Mercury exhibits all the limitations of claims 1 and 2 of the 565 patent, as explained by Mr. Bellin. Accordingly, the Mercury product anticipates claims 1 and 2 of the 565 patent, but not any other claims.

c. Other Prior Art

Respondents assert several other prior art references against the claims of the 565 patent, as follows:

Reference	Exhibit No.	Claims Asserted	Argument
Akaishi	RX-0493	1, 2, 4, 6, 18	102(b) (RIB at 79-84)
Lima	RX-0500	1, 2, 4, 18	102(b) (RIB at 84-88)

[redacted]

Cyclone, B52, Lightning (USS PDCs)	RX-0461C RX-0462C RX-0479C JX-0524C	1, 2, 4, 6	102, 103 (RIB at 94-97)
[redacted]	RX-1314C RX-1319C RX-1320C RX-1321C	1, 2, 4, 6	102, 103 (RIB at 97-100)
Akaishi, Lima, and/or Wise	RX-0437 (Wise)	1, 2, 4, 6, 18	103 (RIB at 100-02)
Mercury and [redacted] PDCs		1, 2, 4, 6	103 (RIB at 102-03)

Respondents have failed to meet their burden of proving invalidity on any of the listed grounds, in many instances for the same recurring reasons. For example, Respondents do not analyze the obviousness evidence in light of the first three Graham factors (*see generally* RIB at 94-106), nor in many cases do they analyze or even identify the statutory basis for a reference qualifying as prior art (*e.g.*, RIB at 97-100). Most importantly, inherency has not been demonstrated. Nonetheless, each reference and combination of references has been scrutinized individually in light of the record.

Akaishi

Akaishi is a paper published in October 1987 and therefore qualifies as prior art under 35 U.S.C. § 102(b). *See* RX-0493.2. It discloses a PCD table manufactured using a cobalt catalyst and diamond particles no larger than four micrometers, with resultant diamond-to-diamond bonding and cobalt in the interstitial regions, and with no mention of leaching. *See id*. It reports a range of resistivities, and it is undisputed that at least one such resistivity corresponds to a conductivity of less than 1200 S/m. *See* CIB at 75-76. However, it does not expressly disclose coercivity, specific magnetic saturation, G-Ratio, or thermal stability. *See* Tr. (Barron) at 713:24-714:2, 717:4-10, 719:13-19, 729:16-730:8. Nor, as explained above, is Dr. Barron's inherency analysis reliable with respect to coercivity, magnetic saturation, and G-Ratio, and his inherency

[redacted]

analysis with respect to thermal stability is based on the assumption that PDCs fabricated the same way will have the same thermal stability, an assumption that is not reasonable in light of Akaishi's disclosure of a sintering time of one hour and no substrate. *See* Tr. (Barron) at 650:24-652:7; RX-0493.2. Therefore, Akaishi does not anticipate any claim of the 565 patent.

Lima

Lima is a paper published no later than November 2005 and therefore qualifies as prior art under 35 U.S.C. § 102(b). *See* RX-0500.2. It discloses a PCD table manufactured using a cobalt catalyst and diamond particles no larger than forty micrometers, with diamond-to-diamond bonding in one instance and cobalt in the interstitial regions, and with no mention of leaching. *See* RX-0500.2, .6. It does not, however, expressly disclose coercivity, electrical conductivity, magnetic saturation, or G-Ratio. *See* Tr. (Barron) at 755:18-23. Nor, as explained above, is Dr. Barron's inherency analysis reliable. Therefore, Lima does not anticipate any claim of the 565 patent.

USS Products

Respondents assert that three USS products, [redacted] qualify as prior art, although they do not specify on what basis. *See* RIB at 94-97. There is evidence that USS had manufactured at least the [redacted] *See* RX-0461C.3. The evidence that Respondents present, however, does not establish by clear and convincing evidence that any of these products qualify as prior art on any basis, or that the technical data they cite is related to them. Respondents piece together a USS internal testing document (JX-0524C) and certain USS [redacted] (RX-0461C; RX-0462C), but fail to present evidence showing that the same products were the actual subjects in the documents. JX-0524C, for example, is [redacted]

[redacted] *See* CRB at 60. Nor does it contain evidence of [redacted] *See* JX-0524C. Respondents could seemingly have asked testifying USS employees, including Dr. Bertagnolli, to explain what these documents reveal, but they did not. Instead, the documents and explanations amount to little more than speculation. This evidence does not clearly and convincingly establish that any of the three asserted USS products qualify as prior art, or that any claim of the 565 patent is invalid as anticipated or obvious in light them.

New Asia Products

Respondents assert that two New Asia PDCs, designated the RNC and the 1313, are prior art to the 565 patent, although they do not identify the basis for that assertion. *See* RIB at 97-98. New Asia's vice president for production, research, and development, Mr. Jun Heng,[3] testified that his company has been selling PDCs in the United States since 2006, including the RNC. *See* Tr. (Heng) at 567:21-23, 580:19-24. Moreover, [redacted] RX-1319C. Therefore, both New Asia products qualify as prior art under the on-sale bar of Section 102(b).

There is evidence that the 1313 PDC exhibited coercivity, specific magnetic saturation, and G-Ratio values as recited in the claims, as well as most other claimed limitations. *See* JX-0370C.62; JX-0422C.1; RIB at 97-99. However, Respondents point to no evidence that the 1313

[3] As noted, at the end of the hearing USS moved to strike Mr. Heng's testimony. Motion (1236-056). USS has suffered no prejudice from the admission of his testimony because, as explained below, the prior art products as to which he testified neither anticipate any claim in suit nor contribute to any finding of obviousness. Therefore, the motion is denied.

[redacted] exhibited [redacted] *See* RIB at 97-100. Instead, they rely on mathematical model-based inherency to support those limitations, and as noted, such inherency evidence is unreliable. *See id*. Therefore, Respondents have not proven that the New Asia RNC or 1313 PDCs anticipate any claim of the 565 patent.

Obviousness

Respondents assert that combinations of certain prior art PDCs (namely, the Mercury and New Asia products) render claims 1, 2, 4, and 6 obvious. *See* RIB at 103. Their argument is entirely conclusory, however, and they do not identify any motivation to combine or even cite the first three Graham factors. *See* id. at 102-04.

Respondents also assert that the combination of Akaishi, Lima, and Wise renders claims 1, 2, 4, 6, and 18 obvious. *See* RIB at 100-02. Here, at least, they identify motivations to combine, but they continue to rely on mathematical model-based inherency to demonstrate G-Ratio and average electrical conductivity, do not mention thermal stability, and, again, do not cite to the first three Graham factors. *See id*. And Wise does not help; as a paper published in 2005 it is prior art at least under Section 102(b), and it discloses the required grain size and G-Ratio, but it is silent as to the electrical and magnetic limitations. *See* RIB at 101; RX-0437.3, .7.

Therefore, even accepting that, given the level of skill in the art, a POSITA would be motivated to combine as to all claims, the scope and content of the cited prior art weighs very heavily against obviousness, because the references are entirely lacking in the disclosure of multiple limitations, including coercivity, magnetic saturation, G-Ratio, and thermal stability. The differences between the claims and the prior art also weigh against obviousness, for the same

[redacted]

reason. Respondents accordingly have not established a prima facie case of obviousness as to any asserted claim.

d. Secondary Considerations of Non-Obviousness

Notwithstanding the lack of a prima facie case of obviousness, secondary considerations of non-obviousness will be addressed because the parties vigorously dispute them. *Compare* CIB at 101-09 *with* RIB at 104-06. USS asserts five objective indicia of nonobviousness: failure of others, copying, skepticism by others, praise by others, and commercial success. CIB at 101-09.

Failure by Others

USS points to the prior art references discussed above, Akaishi and Lima, as demonstrating how "the industry tried to manufacture high-performance PDCs using high-pressure and high-temperature conditions but ended up with low-quality diamond tables with many cracks (Akaishi, RX-0493.0002) or incomplete sintering (Lima, RX-0500.0006), rendering them unsuitable for hard rock drilling applications." CIB at 102; *see* Tr. (German) at 1262:7-15, 1263:14-1265:4. The claims, however, cover a mix of manufacturing parameters (grain size, cobalt catalyst) and results (G-Ratio, thermal stability, electrical and magnetic properties) rather than the pressure and temperature. So there is no nexus between the claims and failure by others.

Copying

USS asserts that its "competitors, including Respondents in this Investigation, did not obtain the superior performance of the patented inventions until after the disclosures of the Asserted Patents had published and were accessible to them." CIB at 102. The record does not support a finding of copying.

As for Iljin, USS asserts that it first sold [redacted] and a few months later, USS filed a patent application (Appl. No. 12/244,960), which was published on April 8, 2010 and issued as the 418 Patent on January

[redacted]

11, 2011. *Id.*; CX-2385C.1; JX-0365. Then, a month after the 418 patent issued, [redacted]

[redacted] Thus, the record does not show copying by Iljin.

USS also asserts copying by [redacted] CIB at 103; JX-0235C.1-.2. USS points out that this statement contains [redacted] CIB at 103; JX-0002 at 4:34-67, 7:40-52, 21:17-29. The [redacted] further states that the [redacted] JX-0235C.2. [redacted] that

[redacted] which embodies claims 1, 2, 4, and 6. JX-0188C (Guo Dep. Tr.) at 163:21-164:6. However, the [redacted] when searching for scientific and technological literature. *Id*. at 174:10-175:11. Some of the exhibits on which USS relies cite patents that are not in the family of the patents in suit. *See* CIB at 104 (citing JX-0236, JX-0237, JX-0238). USS also cites JX-0205C, a [redacted] in which credit actually is given to [redacted] *See* JX-0205C.5. On the whole, USS fails to show copying by [redacted]

The evidence shows that SF Diamond [redacted] CX-1939C is an SF Diamond report entitled [redacted] CX-1939C.12, .14, .16-.17; *see* Tr. (German) at 321:19-322:9. But the document is not dated and no specific product is identified in the report. USS cites to a number of other SF Diamond documents showing that [redacted] but these, too, lack dates and names. *See* CIB at 104-05 (citing CX-0612C; CX-0613C; CX-1938C; CX-1940C; JX-0324C; JX-0325C). One particular document does identify [redacted] *See* JX-0332C. Therefore, USS has not shown copying by SF Diamond.

Nor is there evidence of copying by [redacted] analyzed various PDCs by USS for layering, leaching status, and the composition of carbon, cobalt, and tungsten in the leached layer, work layer, and transition layer, but none were the DI Products. *See* JX-0295C.1. Moreover, the document states that the [redacted] *Id*. And the fact

[redacted]

that [redacted] by itself irrelevant. *See* CIB at 105.

Skepticism by Others

USS asserts that "people in the PDC industry were initially skeptical of the claimed invention but later adopted it following the publication of USS's technology reflected in the Asserted Patents." CIB at 105. There is some evidence of skepticism about the manufacturing process. Dr. Bertagnolli stated that even USS was skeptical about increasing press pressures because "the conventional wisdom was you just needed to be in the diamond stable region, that you didn't need to be, you know, any higher than that or you would take on extra cost, put extra stress on your equipment that wasn't very useful." Tr. (Bertagnolli) at 68:5-11, 70:20-71:9; 72:24-73:21. But skepticism about the press pressures is not the same as skepticism about the claimed invention, which does not recite press pressure.

USS also cites a master's thesis dated July 13, 2009, by Neil Haddock, an employee at USS who worked with the inventors of the asserted patents ("Haddock paper"), in which he describes high-pressure PDC sintering resulting in good thermal stability and wear resistance (which he measured using VTL). *See* CX-0531.10, .12. The Haddock paper was published almost nine months before the April 2010 publication of the application for the 418 patent. *See* JX-0365. USS does not, however, point to anything in the Haddock paper reflecting skepticism about the claimed invention. Instead, USS presents a 2017 email to an employee at USS from Mr. Steve Webb, in which he notes that the Haddock paper was "a big gasp moment" for him when he worked at GE, leaving him wondering "[w]hy USS managers let that out" because "[t]he Chinese [competitors] hesitated with pressure before. Not after." CX-1312C.1. The statement regarding Mr. Webb's "big gasp" does not clearly refer to the use of high pressure, but appears to refer to a "universal

[redacted]

curve" that Mr. Webb believed he had invented. CX-1312C.1-.2. Thus, Mr. Webb's email, which contains a cryptic message about him and hearsay about Chinese competitors and was written eight years after the Haddock paper, is not evidence of skepticism by others. And Dr. German's interpretation of this email amounts to no more than speculation, which even Dr. German recognized. *See* Tr. (German) at 327:5-19 ("I'm reading a lot into that [email], but that's the way I would interpret it."). On balance, therefore, whatever skepticism may have existed about the manufacturing process, there is no clear nexus to the claimed invention.

Praise by Others

USS also asserts that it "received a significant amount of praise by others in the industry, including Respondents in this Investigation." CIB at 106. USS cites an email from Iljin's CEO, Mr. Gerald Shin, in which he states that USS is "an industry leader in [the] PDC market." CX-0072C.5. USS also cites an email [redacted]," because USS is [redacted] CX-0181C.2. [redacted] JX-0276C (Xu Dep. Tr.) at 53:1-54:4. USS also received the Shingo Prize award for operational excellence in PDC manufacturing, which honored USS "as an enterprise award recipient, recognizing excellence across all of its products and brands including US Synthetic (drill bit inserts) USS Bearings (process-lubricated bearings) USS Wire Dies (wire drawing dies), Brady Mining (underground mining tools), and Suncrest Diamonds (natural gem diamond color enhancement)." CX-0490C.1. All of this demonstrates that USS enjoys the respect of its competitors, but it has no nexus at all to the asserted patents.

Commercial Success

[redacted]

As explained in greater detail below, [redacted] *See* Tr. (Reed) at 495:3-496:13; JX-0174C; JX-0175C. [redacted] CIB at 107; *see* Tr. (Reed) at 495:21-25. Respondents argue that [redacted] RIB at 104. No such comparison is needed, though, to ascertain that [redacted] Moreover, the features of the claimed invention need not be the "but for" cause of commercial success, so the fact that [redacted] has good customer relations, is not especially important. *See* RIB at 104-05; *Immunex Corp. v. Sandoz Inc.*, 964 F.3d 1049, 1067 (Fed. Cir. 2020) (if the objective evidence is "tied to a specific product" embodying the claimed invention, a nexus is presumed). In sum, USS' DI Products have earned the company [redacted] over many years, which is solid evidence of commercial success.

e. Summary

Respondents have shown anticipation of all claims in suit by clear and convincing evidence. Specifically, the [redacted] anticipates claims 1, 2, 4, 6, and 18, and the Mercury PDC anticipates claims 1 and 2. But in light of Respondents' failure to demonstrate a prima facie case of obviousness, combined with Complainants' evidence of commercial success, Respondents have not shown the obviousness of any claim by clear and convincing evidence.

4. Other Issues Related to Obviousness

[redacted]

Respondents raise two other issues that they contend are related to obviousness. First, they argue that the claims of the 565 patent are invalid "because they are product-by-process claims claiming a known composition obtained through an allegedly novel process, *i.e.* a process that excludes leaching." RIB at 106. A product-by-process claim is one where a product is claimed by the process through which it is made. *See SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1315 (Fed. Cir. 2006). As already stated in connection with claim construction, every claim in suit "covers a composition of matter, as opposed to a method or product by process." *Markman* Order at 19. Respondents point to no claim language or other intrinsic evidence that warrants revisiting this issue. *See* RIB at 106-11.

Second, Respondents argue that the asserted claims are both not enabled (a point addressed below) and obvious, and that because USS' arguments in opposition to these points are "irreconcilable," USS "cannot successfully overcome both arguments at the same time." RIB at 131-32. To be sure, there is some tension between the two doctrines; a claimed invention that a skilled artisan would not know how to make and use would likely not be obvious, and conversely, an obvious invention would likely fall within the skill of such an artisan. But the two doctrines do not entirely overlap: enablement is primarily about the specification and obviousness is primarily about the prior art. *See Allergan, Inc. v. Sandoz Inc.*, 796 F.3d 1293, 1310 (Fed. Cir. 2015). So although Respondents' arguments that the claims are both obvious and not enabled should be (and have been) scrutinized carefully, there is nothing inherently inconsistent about advancing both arguments at the same time, and there is certainly nothing inherently inconsistent about a patentee advancing contrary arguments. *E.g.*, *Certain Smart Thermostats, Smart HVAC Systems, & Components Thereof*, Inv. No. 337-TA-1185, Initial Determination at 576 (Apr. 20, 2021) (finding

[redacted]

two asserted claims invalid as both obvious and not enabled), *aff'd with modifications*, Notice of Comm'n Determination, 86 Fed. Reg. 40077, 40078 (July 20, 2021).

5. 35 U.S.C. § 112

Respondents argue that all asserted claims are invalid under Section 112 for lack of enablement, lack of written description, and indefiniteness.

a. Enablement

Respondents' arguments regarding enablement do not satisfy their burden largely because they do not discuss, or even cite to, the *Wands* factors. *See* RIB at 111-16. And although they do cite to specific expert testimony from Dr. German, their own expert did not analyze the *Wands* factors, either. *See id.*; *see generally* RDX-0002C.

Respondents do raise two points that merit discussion, however. First, they argue that the full scope of the claims is not enabled because the claims cover "*all* possible methods of manufacturing a PDC except those involving leaching." RIB at 114-15 (emphasis in original). To the contrary, the claims do not cover any method of manufacture at all, so Respondents' argument is beside the point. Second, Respondents argue that the full scope of the claims is also not enabled because the specification lacks sufficient disclosure to practice limitations with open-ended ranges, particularly coercivity, G-Ratio, and thermal stability. *See id.* at 115-16. But as USS points out, "open-ended ranges are not inherently improper, and they are enabled if there is 'an inherent, albeit not precisely known, upper limit and the specification enables one of skill in the art to approach that limit.'" CIB at 113 (quoting *Andersen Corp. v. Fiber Composites, LLC,* 474 F.3d 1361, 1376-77 (Fed. Cir. 2007)). The only record evidence on an inherent upper limit is Dr. German's test results, which weigh in favor of enablement because the tested articles are actual PDCs, so Respondents have not carried their burden on this point, or on enablement in general. *See* CIB at 114.

[redacted]

b. Written Description

Respondents assert that the 565 patent fails to provide a sufficient written description of a PDC with a PCD table having an unleached portion exhibiting an average electrical conductivity below 1200 S/m (including between 25 S/m and 1000 S/m). *See* RIB at 116-119. In view of the priority date, which has been determined to be 2012, when that limitation was added to the specification, this assertion is incorrect. *See* JX-0002 (565 patent) at 5:64-6:10.

c. Indefiniteness

Respondents assert that all claims are indefinite because all claims incorporate either G-Ratio or thermal stability, which are indefinite limitations. *See* RIB at 119-30. For G-Ratio, they argue that the 565 patent does not describe "a specific methodology for accurately determining wear resistance . . . [but instead] the specification references an optional VTL methodology which provides . . . exemplary parameters that can purportedly be used to accomplish a G-Ratio calculation via VTL testing." RIB at 121. Respondents further argue that the written description "lacks the rigor necessary to provide sufficient guidance to a person of skill in the art to perform VTL testing that will provide anything close to consistent results." *Id.* Respondents' main argument is that the testing variables are "given only as estimates (*e.g.*, *about* 20 degrees rake angle, *about* 101 RPM rotary speed, etc.)" and changing any of the variables "can potentially greatly impact the results." *Id.* at 121-122. Respondents further argue that there is no standard way of addressing the variables of VTL testing (for example, length of testing, rock workpiece used, temperature at the PDC cutting edge), and thus the G-Ratio testing methodology does not properly address the high degree of variability inherent in VTL testing, such that skilled artisans attempting to measure the G-Ratio of the same model of PDC – even if they utilized the 565

[redacted]

patent's own suggested protocol – would arrive at materially different measurements. *See* RIB at 122-23, 127.

For thermal stability, Respondents argue that the claimed protocol, which is recited in claim 18 as the "distance cut, prior to failure in a vertical lathe test," suffers from the same defect as the testing of G-Ratio. *See id*. at 127-128. Respondents submit that the 565 patent only provides a limited set of some machine parameters which could be used in testing the thermal stability (citing the specifications' use of the word "may" when describing the testing protocol), and thus, the specification does not "adequately [address] the sources of unpredictability inherent in VTL testing, including variations in the granite workpiece used, the chamfer of the PDC being tested, and other differences between operators." RIB at 128. Thus, "two skilled artisans measuring the thermal stability of the same PDC using the guidance set forth in the Asserted Patents would be unlikely to come to the same or, even, similar result." *Id.*; Tr. (Cook) at 1121:7-18; 1147:8-1148:25. Respondents also assert that thermal stability is defined in part by "failure," which is unduly subjective. *See* RIB at 129-30.

Respondents' criticism of the specification's use of the word "may" is misplaced. The specification provides a description of a testing protocol, which if followed by one skilled in the art, would properly test the G-Ratio and thermal stability of a PDC. The 565 patent expressly states that a VTL test is a preferred method of measuring G-Ratio and thermal stability, and also teaches a standard set of parameters, including a depth of cut, a back rake angle, an in-feed, a rotary speed of the workpiece, and the workpiece type and dimensions, for both G-Ratio and thermal stability VTL tests. *See* JX-0002 (565 patent) at 7:2-39. And Respondents acknowledge that one skilled in the art would know how to operate a VTL. *See* RIB at 124 ("In establishing the

[redacted]

number of passes to be used, a POSA will make assessments based on the VTL unit itself, the PDCs being examined, and – most importantly – the POSA's personal experience.").

As USS states, the other considerations for running a VTL that Respondents cite as variables in the testing, "such as the compositional variation in a given type of workpiece, the length of testing, the age and type of the VTL equipment used, and the flow rate of coolant . . . [are] logistics . . . not different methodologies." CRB at 70. Nor is it clear how significant some of these considerations are, or even that they are material at all; for instance, there is no logical reason why variations in the test sample, such as chamfer, have any bearing on the definiteness of G-Ratio, nor is it clear that all variability is due to the VTL testing itself rather than variations in the test sample. *See* RIB at 122-23, 126-27. USS further points out that Respondents' expert, Mr. Bellin, was able to perform VTL tests to measure G-Ratio relying "on his experience and expertise with VTL testing" and "adopted a set of testing parameters that accommodated his use of a harder and bigger rock, but at the same time are still consistent with the exemplary testing parameters of the patent." CRB at 73. Mr. Bellin testified that he used Indian rock rather than the disclosed Barre granite, for instance, but was able to account for the rock variation "using a well-known rock calibration method, choosing the right coolant flow rate to sufficiently cool the temperature of the PDC and flush the rock debris, and adjusting the coolant pipe location, and choosing the appropriate VTL equipment." CRB at 73. And although Respondents emphasize that Mr. Bellin's measurements allegedly never "'settled' on a particular value," he also did not clearly stop his tests in the "steady state" region, as Dr. German did. RIB at 124-25; *see* Tr. (German) at 144:16-146:13.

"[A] claim is not indefinite if a person of skill in the art would know how to utilize a standard measurement method . . . to make the necessary measurement. A patent need not explicitly include information that is already well known in the art." *Presidio Components, Inc.*

[redacted]

v. American Technical Ceramics Corp., 875 F.3d 1369, 1376 (Fed. Cir. 2017). And "there is no requirement for the specification to identify a particular measurement technique" if one of ordinary skill in the art understands how to measure the claimed parameter. *Ethicon Endo-Surgery, Inc. v. Covidien, Inc.*, 796 F.3d 1312, 1316, 1319 (Fed. Cir. 2015) ("an average predetermined clamping pressure" is sufficiently definite because how to measure it was within the scope of a POSITA's knowledge) (citation omitted). The dispute here, it seems, actually is related to the proper application of the test taught in the 565 patent, not whether a method is taught at all. As the Federal Circuit held in *Presidio*, "disputes between the parties as to the proper application of the test methodology" are "disputes about whether there is infringement, not disputes about whether the patent claims are indefinite." 875 F.3d at 1377.

Moreover, the 565 patent discloses a VTL methodology for measuring G-Ratio, as well as a specific set of standard parameters for both G-Ratio and dry VTL testing for measuring thermal stability. *See* JX-0002 (565 patent) at 7:2-15, 7:24-36. That Mr. Bellin was able to carry out G-Ratio tests, combined with the express teachings of the specification, shows that G-Ratio is not indefinite. To be sure, his results were not precisely the same as Dr. German's, but the two experts' sets of data are not so different that they call into question the definiteness of the claim limitation, as opposed to the credibility of each expert's opinion. *See* RIB at 126.

Lastly, one skilled in the art, reading the term "failure" in claim 18, and looking to the specification for guidance, would recognize that the term refers to "catastrophic" failure; inasmuch as this implicates claim construction, an issue the parties do not address, the claim is so construed. JX-0002 (565 patent) at 7:16-39. Dr. German understood the term that way, and testified that he "think[s]" catastrophic failure is well-understood in the art and that it refers to graphitization of the diamond table, that is, conversion of the diamond to graphite. *See* Tr. (German) at 1279:2-

[redacted]

1280:8. The specification even describes that conversion (as well as other failure modes). *See* JX-0002 (565 patent) at 2:1-12 ("At elevated high temperatures, portions of the diamond grains may transform to . . . graphite . . . thus degrading the mechanical properties of the PDC."). Respondents' expert, Mr. Matthew Cook, testified that some other failure modes would be considered catastrophic, would be familiar to a skilled artisan, and would not involve graphitization. *See* Tr. (Cook) at 1149:7-1150:18. But Mr. Cook did not testify that these different modes would, if applied to thermal stability testing, yield materially different thermal stability measurements, the allegation of which was a decisive factor in deferring consideration of indefiniteness until the evidentiary hearing. *See id*.; *Markman* Order at 35. That allegation is now established to be merely attorney argument. *See* RIB at 130.

On balance, therefore, the claims of the 565 patent are not indefinite.

C. The 502 Patent

1. Patent Eligibility Under 35 U.S.C. § 101

All asserted claims of the 502 patent include a combination of limitations that do not raise Section 101 issues (grain size and lateral dimension, for instance) and that do. *See* JX-0003 (502 patent). Specifically, all claims require a numerical coercivity, claims 2, 15, and 21 require a magnetic saturation, claims 1, 2, 11, and 21 require a specific permeability, and claims 15 and 21 require a thermal stability. *See id*. Respondents raise the same points here that they raised in connection with the 565 patent, and further argue that specific permeability presents the same problems under Section 101 as the limitations it derives from, coercivity and magnetic saturation. *See* RIB at 135-38. USS stands on its response to the same issues presented in connection with the 565 patent. *See* CIB at 133.

For the reasons explained above, the claims of the 502 patent are as patent-ineligible, under both steps of *Alice*, as the claims of the 565 patent. In particular, specific permeability is as much

[redacted]

as result or effect as coercivity and specific magnetic saturation because it is simply a ratio of the two, and the claims otherwise recite only well-understood, routine, and conventional elements. Therefore, all asserted claims of the 502 patent are invalid under 35 U.S.C. § 101.

2. Anticipation and Obviousness Under 35 U.S.C. §§ 102 and 103

Respondents apparently do not dispute that the priority date of the 502 patent is October 3, 2008, and Akaishi therefore qualifies as prior art. *See* RIB at 79; RX-0493. They assert that Akaishi anticipates claims 15 and 21 of the 502 patent in part on the same basis it allegedly anticipates the claims of the 565 patent, that is, on inherency based on Dr. Barron's mathematical models for coercivity and specific magnetic saturation, and on his opinion that Akaishi was fabricated using the same parameters as disclosed in the 502 patent, and the thermal stability limitation is therefore satisfied. *See* RIB at 139. These inherency arguments continue to be unpersuasive, and although the graphite heater taught by Akaishi is eight millimeters wide, the actual fabricated sample is only 5.5 millimeters wide, which is too narrow to qualify as "about 0.8 centimeters or more." JX-0003 (502 patent) at cl. 15; *see* RX-0493.2-.3. So anticipation by Akaishi has not been proven.

As with the 565 patent, the Diamond Innovations Mercury PDC is prior art and the Mars PDC is not. *See* RIB at 139-40. Unlike with the 565 patent, though, the challenged claims of the 502 patent (namely, claims 1, 2, and 11) all require cobalt as a catalyst, a substantially planar topography, a specific permeability of "less than about 10 Gcm^3/gOe," and a lateral dimension of about 0.8 to 1.9 centimeters (or 1.3 to 1.9 centimeters as to claim 11). JX-0003 (502 patent) at cls. 1, 2, 11. Of these, the permeability and lateral dimension elements are satisfied, and USS challenges only the cobalt and planarity elements. *See* CIB at 136-38; RDX-0004C.65.

Mr. Bellin testified that he had tested the Mercury PDC "in [his] previous life" and confirmed that it possessed cobalt rather than some other catalyst, and the record otherwise

[redacted]

suggests that modern manufacturers only use cobalt; this is sufficient to satisfy the claim. Tr. (Bellin) at 1047:18-1048:8. Mr. Bellin also testified that the interfacial surface of the Mercury has "no protrusions or other geometric features," so its planarity ratio is self-evidently very close to unity; no calculation is necessary to ascertain this. *Id*. at 1009:4-12; see RDX-0004C.67. Therefore, the Mercury PDC anticipates claims 1 and 11 of the 502 patent. It does not, however, anticipate claim 2, which requires a specific magnetic saturation of "about 15 Gcm^3/g or less," for the same reason it does not anticipate claim 4 of the 565 patent. JX-0003 (502 patent) at cl. 2.

Respondents argue that the New Asia RNC and 1313 PDCs anticipate claims 1, 2, and 11. *See* RIB at 140-41. As with the 565 patent, however, they rely on unreliable mathematical model-based inherency to demonstrate [redacted] *See id*. These elements are therefore not proven to be present, and the New Asia PDCs do not anticipate any claim of the 502 patent.

As to obviousness, Respondents renew their unpersuasive product-by-process argument, and otherwise advance a patchwork of combinations of various prior art publications and products. *See* RIB at 140-45. They do not expressly address the Graham factors, however, and although they make an effort to show planarity and linear dimension in the prior art, they do not make a similar effort to overcome the lack of express or inherent disclosure of the magnetic properties claimed in the 502 patent, including whether it would have been obvious to adjust the Mercury's specific magnetic saturation to "about 15 Gcm^3/gm or less," as required by claim 2. *See id*. Nor do they even allude to secondary considerations, particularly commercial success. *See id*. Obviousness has therefore not been proven as to any claim.

3. 35 U.S.C. § 112

[redacted]

Respondents' Section 112 arguments continue to be unpersuasive. *See* RIB at 145-46. Only one new point merits discussion: they contend that a lateral dimension of "about 0.8 cm or more" is indefinite because it is open-ended. *See id*. at 146. A skilled artisan would surely recognize, however, that there is an upper limit to the size of a PDC in view of its manufacturing technique (that is, using a hydraulic press to generate very high pressures), and that the limit is most likely about 19 millimeters, which is apparently [redacted] *See* Tr. (Bertagnolli) at 106:23-107:23. So no claim of the 502 patent is invalid under Section 112.

D. The 306 Patent

1. Priority Date Under 35 U.S.C. § 120

USS asserts that the 306 patent is entitled to an effective filing date of October 3, 2008, based on the filing date of the 418 patent. *See* CIB at 146. Respondents assert that as to claim 15, the "layer limitation" – "a first polycrystalline diamond layer bonded to the substrate and at least a second polycrystalline diamond layer, the second polycrystalline diamond layer exhibiting a second average diamond grain size that is less than a first average diamond grain size of the first polycrystalline diamond layer" – is not taught in the 418 patent. *See* RIB at 154 (quoting JX-0001 (306 patent) at cl. 15). Thus, Respondents contend that the correct effective priority date for the 306 patent is January 21, 2010, which is the date of the 306 patent's continuation-in-part application, in which the layer limitation was first explicitly mentioned. *See id.* at 154.

The 418 patent teaches that "the mass of diamond particles may include a portion exhibiting a relatively larger size . . . and another portion exhibiting at least one relatively smaller size." JX-0365 (418 patent) at 7:59-64. The patent further teaches that "the phrases 'relatively larger' and 'relatively smaller' refer to particle sizes." *Id.* at 7:56-58. Both Dr. Barron (albeit by

[redacted]

way of impeachment) and Dr. German stated that they understood this to refer to layers in diamond particles before sintering. *See* Tr. (Barron) at 771:12-773:1; Tr. (German) at 1248:25-1249:11.

USS asserts that the 418 patent teaches the layer limitation "by the incorporation by reference of U.S. Patent Appl. No. 11/545,929." CIB at 146 (citing Tr. (German) at 1249:15-1250:1). But as Respondents correctly observe, that patent application was not published until August 7, 2012 (when it issued as U.S. Patent No. 8,236,074), after the 418 patent issued, so it does not qualify as "essential material" incorporated by reference. *See* RIB at 157; 37 C.F.R. § 1.57(d). USS also asserts an inherency argument, but this has been waived because it was not raised in its Prehearing Brief. *Compare* CIB at 14 *with* CPB at 163-65. And although in his expert report Dr. Barron appeared to agree that the layer limitation is disclosed in the 418 patent, at the hearing it was clear that he had changed his mind. *See* Tr. (Barron) at 771:12-773:6. USS' principal arguments on this point, therefore, are that one skilled in the art at the time of the invention would understand the disclosure in the 418 patent to teach a layered PCD table, and also to teach different average grain sizes, because different input particle sizes result in different sintered grain sizes. *See* CIB at 148-49; Tr. (German) at 233:21-234:22, 1248:19-1249:11.

Respondents, however, identify two specific gaps in the teaching of the 418 patent: (1) it teaches different particle sizes but does not actually teach different average grain sizes, and (2) it "does not provide any description of an embodiment where the 'portion' or 'layer' bonded to the substrate has an average grain size that is larger than a second portion or layer." RIB at 155. As to the first point, the specification of the 418 patent mentions "average grain size" in two paragraphs. *See* JX-0365 (418 patent) at 3:61-4:3, 4:44-67. The most pertinent passage in these two paragraphs states that "[t]he diamond grain size distribution . . . may exhibit a single mode, or may be a bimodal or greater grain size distribution." *Id*. at 4:1-3. But nothing suggests that

[redacted]

"bimodal or greater" refers to physically distinct volumes or layers, each comprising grains of uniform size, as opposed to one layer comprising a "bimodal or greater" mix of grains of different sizes. The passage USS identifies as most pertinent states that "[a]ccording to various embodiments, the mass of diamond particles may include a portion exhibiting a relatively larger size . . . and another exhibiting at least one relatively smaller size." *See* CIB at 147-48 (citing JX-0365 (418 patent) at 7:59-64). Here, too, nothing suggests that "portion" refers to a physically distinct volume or layer, as opposed to simply an ingredient in a particle formulation. In fact, two sentences thereafter the specification omits "portion" entirely: "the mass of diamond particles may comprise three or more different sizes." JX-0365 (418 patent) at 8:2-3. The next sentence is even more revealing, because it references only a single "diamond grain size": "the as-sintered diamond grain size may differ from the average particle size of the mass of diamond particles prior to sintering." *Id*. at 8:5-7. On the whole, then, the specification discloses an average grain size resulting from a mix of different particle sizes, but does not clearly disclose different average grain sizes in different physical volumes.

Even accepting Dr. German's testimony to the contrary, however, Respondent's other point – that there is no disclosure of a portion or layer bonded to the substrate and having a relatively larger average grain size – is well taken. The section of the specification describing particle "portions" refers to the substrate only to note that the metal-solvent catalyst "may be provided . . . from a cemented carbide substrate." JX-0365 (418 patent) at 8:12-15. That section is entitled "Embodiments of Methods for Fabricating PCD" (*id*. at 7:44-9:20), while the next section, entitled "PDC Embodiments and Methods of Fabricating PDCs" (*id*. at 9:29-15:59), describes methods of bonding PCDs to substrates. And that next section omits not only any mention of a larger average grain size in the PCD portion abutting the substrate, but also any mention of any differences in the

[redacted]

PCD at all; in fact, it seems to assume that the PCD is uniform. *See id*. There is no reference to inhomogeneities in the PCD table, orientation of the PCD table relative to the substrate, selection of which side of the PCD table to bond to the substrate, or any other relevant factor indicating that bonding one particular surface of the PCD table to the substrate is preferable to any other surface. *See id*.

So the specific feature of the layer limitation requiring that the layer with the larger average grain size be adjacent to the substrate is not disclosed in the 418 patent. It may be obvious to a skilled artisan to sinter a PDC with the diamond particles on top of the substrate, such that the larger particles naturally settle near the substrate, but an obvious variant of what is expressly disclosed does not substitute for an actual express disclosure. *See Lockwood*, 107 F.3d at 1572; Tr. (German) at 1330:18-1331:5. To be sure, there is some flexibility in the required teaching, because "every conceivable and possible future embodiment" need not be disclosed in the specification. CRB at 87 (citing *Cordis Corp. v. Medtronic AVE, Inc*., 339 F.3d 1352, 1365 (Fed. Cir. 2003)). But that flexibility exists because, for example, a "specification may . . . contain a written description of a broadly claimed invention without describing all species that the claim encompasses." *Cordis*, 339 F.3d at 1365. Here, there is no genus/species issue, or any other circumstance that might warrant flexibility; there is instead a complete lack of disclosure of an essential element of the claim. The 418 patent therefore does not provide support for the layer limitation, and the priority date of the 306 patent is January 21, 2010.

2. Patent Eligibility Under 35 U.S.C. § 101

Claim 15 of the 306 patent includes some limitations that do not raise Section 101 issues (layers having different average grain size and the presence of a catalyst, for instance) and two that do. *See* JX-0001 (306 patent) at cl. 15. Specifically, it requires coercivity and specific magnetic saturation, both possessing particular numerical values. *See id*. Respondents raise the same points

[redacted]

here that they raised in connection with the other patents in suit, and further argue that a PDC having two layers is well-understood, routine, and conventional. *See* RIB at 151-54. Claim 15 does, in fact, have the same defects as the other claims in suit, and USS offers no new arguments in opposition. *See* CIB at 146. Therefore, claim 15 of the 306 patent is invalid under 35 U.S.C. § 101.

3. Anticipation and Obviousness Under 35 U.S.C. §§ 102 and 103

The [redacted] qualifies as prior art to claim 15 under pre-AIA 35 U.S.C. § 102(b) for the same reason it qualifies as prior art to the 565 patent, and USS does not dispute that it "embodie[d] the asserted claims" of the 306 patent. JX-0034C.179; *see* CIB at 149, 153. Therefore, claim 15 of the 306 patent is invalid as anticipated by the [redacted].

Respondents assert that the previously-analyzed three USS products [redacted] and two New Asia prior art products (RNC and 1313) anticipate claim 15. *See* RIB at 157-59. They offer no new evidence that the USS products qualify as prior art, however, and Dr. Schaefer testified that [redacted] *See id.*; Tr. (Schaefer) at 870:9-23.

Respondents' obviousness case is cursory; in fact, their starting point for analysis is a comparison of claim 15 to claim 4 of the 565 patent. *See* RIB at 159-62. They do cite references disclosing diamond compacts possessing multiple layers of different grain sizes, but they combine them with prior art references which do not anticipate claim 4 of the 565 patent, so all the combinations they identify are missing at least one required element. *See id.* And, again, they fail to reference the Graham factors. *See id.* So Respondents have not proven the obviousness of claim 15 of the 306 patent.

4. 35 U.S.C. § 112

[redacted]

Respondents' case under Section 112 adds nothing to their analysis of the claims of the 565 and 502 patents, and is otherwise entirely conclusory. *See* RIB at 162-63. Claim 15 of the 306 patent is therefore not invalid under 35 U.S.C. § 112.

XII. DOMESTIC INDUSTRY - ECONOMIC PRONG

The economic prong of the domestic industry requirement is defined in subsection (a)(3) of Section 337 as follows:

> (3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark or mask work concerned –
>
> (A) Significant investment in plant and equipment;
>
> (B) Significant employment of labor or capital; or
>
> (C) Substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). The economic prong of the domestic industry requirement is satisfied by meeting the criteria of any one of the three factors listed above. The Commission has clarified that investments in plant and equipment, labor, and capital that may fairly be considered investments in research and development are eligible for consideration under subsections (A) and (B), in addition to subsection (C). *See Certain Solid State Storage Drives, Stacked Electronics Components, and Products Containing Same*, Inv. No. 337-TA-1097, Comm'n Op. at 14 (June 29, 2018) ("*Solid State Storage*").

[redacted] RIB at 163; *see* CIB at 163-64. [redacted] Tr. (Bertagnolli) at 52:17-53:8. It is headquartered in Orem, Utah, and in 2020 employed approximately [redacted]

[redacted] in all corporate divisions. *See id*. at 55:22-25; Tr. (Reed) at 476:4-23; CDX-0004C.22. [redacted]

CDX-0001C.2; *see* Tr. (Bertagnolli) at 55:5-21. All three buildings shown above house [redacted] *See* Tr. (Bertagnolli) at 55:5-21.

As noted, the DI Products are three specific products and one product line. *See* Tr. (Reed) at 452:24-453:13. The [redacted][4] *See id*. USS' revenues

[4] [redacted] *See generally* JX-0178C. As noted above, however, the only product actually proven to qualify under the technical prong of domestic industry is [redacted] So Mr. Reed's assumption that the domestic industry extends to [redacted] models other than the [redacted] appears to be unwarranted. Respondents make no issue of this, however, and the revenue data Mr. Reed relies on suggests that, on a unit basis, about [redacted] *See* JX-0178C. Moreover, revenues from [redacted]

[redacted]

[redacted] *id*. at 456:22-457:18; CDX-0004C.11.

USS asserts that its activities qualify as a domestic industry under all three subsections, that is, plant and equipment, labor and capital, and research and development. *See* CIB at 154. [redacted] *See* Tr. (Reed) at 456:13-22. The Commission has, however, recognized revenues as an acceptable method of allocating investments and expenses. *See Certain Mobile Device Holders*, Inv. No. 337-TA-1028, Comm'n Op. at 18-19 (Mar. 22, 2018). [redacted] and as explained by Mr. Brent Reed, its economic prong expert, [redacted] Tr. (Reed) at 512:15-513:17. This is because the [redacted] *Id*.; *see* CDX-0001C.4; JX-0180C (Rhodes Dep. Tr.) at 56:7-9. Mr. Reed quantified the revenues for the DI Products relative to USS' PDC-related revenues and total revenues, for calendar years 2018-2020 (i.e., the three years preceding the filing of the complaint on November 20, 2020):

[redacted] *See* JX-0176C [redacted] JX-0177C [redacted] and [redacted]

See Tr. (Reed) at 456:22-457:18; CDX-0004C.11.

Respondents generally do not contest USS' allocation method. *See* RIB at 166; RRB at 83. However, they do contest USS' qualifying expenses. *See generally* RIB at 165-70. Respondents also assert that USS has shown neither significance nor substantiality. *See id*. at 171-72. Additionally, USS has presented two alternative DI cases, called DI I and DI II. *See* CIB at 157; CDX-0004C.9. DI I covers all four sets of DI Products, while DI II only covers [redacted] (the only PDC asserted to practice claim 15 of the 306 patent). *See* CDX-0004C.9.

A. Qualifying Expenditures

1. Subsection (A) - Plant and Equipment

USS' physical plant consists of the Orem complex, which covers [redacted] *See* Tr. (Reed) at 458:13-18. Applying the allocation percentages (apparently without rounding), and then averaging over 2018-2020 without

[redacted]

weighting, the square footages dedicated to DI I and DI II come to [redacted] respectively. *See id*. at 459:18-460:4; CDX-0004C.12. The total acquisition value of the facility, including improvements, was [redacted] *See* Tr. (Reed) at 460:5-462:6 (citing JX-0184C). Multiplying these numbers by the allocated square footage yields plant investments of [redacted] for DI I and [redacted] for DI II. *See id*. at 463:20-464:6; CDX-0004C.14.

USS' equipment is housed in [redacted] *See* Tr. (Reed) at 464:7-465:14 (citing JX-0184C). Mr. Reed calculated the total equipment investment in the same two ways as for plant investment: replacement cost, based on recent purchase prices for each device, and average purchase price, based on prices which in some cases date back several years. *See id*. at 466:24-467:7. The totals from this calculation are [redacted] and [redacted] *See id*. at 467:18-22, 469:23-471:9; CDX-0004C.15, .18-.19. Because the equipment considered is [redacted] Mr. Reed applied the DI allocations [redacted] for DI I and [redacted] for DI II. *See id*. at 467:23-469:9; CDX-0004C.11. Multiplying the costs by the allocation percentages yields equipment investments of [redacted] and [redacted] for DI I and [redacted] and [redacted] for DI II. *See id*. at 469:10-22; CDX-0004C.17.

In sum, USS' total claimed plant and equipment investments are:

[redacted]

CDX-0004C.20; *see* Tr. (Reed) at 471:10-19.

In contesting USS' case under subsection (A), Respondents complain that USS overstates plant investments because it counts facilities that have no nexus to the DI Products, including the cafeteria and parking lot. *See* RIB at 166. Counting such areas as part of the plant is indeed improper, because they seemingly qualify as "administrative overhead," but here they account for only a small portion of the total claimed investments. *Certain Bone Cements, Components Thereof and Products Containing the Same*, Inv. No. 337-TA-1153, Comm'n Op. at 22 (Jan. 25, 2021); *see* Tr. (Reed) at 462:15-463:5; JX-0184C at Sys Nos. 1528, 1639, 2125, 2478, 2806, 2852, 2896 [redacted] So this oversight is of little consequence.

Nonetheless, Respondents are correct that USS overcounts the allocated square footage of the qualifying plant investments. *See* RIB at 82-83. This is because Mr. Reed allocates the entire USS complex cost (either [redacted] or [redacted]) by multiplying it by the allocated square footage and then dividing it by the square footage of only the [redacted] which necessarily has an acquisition cost/replacement cost that is [redacted] *See* Tr. (Reed) at 459:18-460:4; CDX-0004C.12. Instead, USS should have applied the allocated square footage to the entire [redacted] of the complex (e.g., for DI I using replacement cost: [redacted]

[redacted] Although the record is sufficiently clear that this oversight could have been easily remedied, USS does not even address this issue in its post-hearing reply brief. *See* CRB at 92-95.

Respondents' other criticisms rely heavily on two precedents: *Certain Crawler Cranes and Components Thereof*, Inv. No. 337-TA-887, Initial Decision (Feb. 12, 2014) (public) ("*Crawler Cranes*"), *aff'd in pertinent part*, Notice (Mar. 20, 2014), and *Certain Thermoplastic-Encapsulated Electric Motors, Components Thereof, and Products and Vehicles Containing Same*, Inv. No. 337-TA-1073, Comm'n Op. (Aug. 12, 2019) ("*Thermoplastic-Encapsulated Electric Motors*"). *See* RIB at 163-68; RRB at 83-84. Under *Crawler Cranes*, Respondents assert, "depreciation approximates current investment." RRB at 84; *see* RIB at 167. *Crawler Cranes* does not hold that depreciation approximates current investment; in fact, depreciation was only one expense considered, along with rent, taxes, and factory overhead and support costs. *See Crawler Cranes* at 4. Nonetheless, the use of [redacted] should be factored into the economic prong calculus by, for instance, amortizing the purchase price over the actual period of equipment use, as opposed to over whatever depreciation period the accounting rules specify. *See* Tr. (Sheridan) at 1184:1-20, 1185:23-1186:3. But USS neither amortized nor depreciated the purchase prices of the claimed equipment, so equating investment with unadjusted purchase price is not a reliable methodology.

Respondents' methodology is also unreliable, however. For example, at least [redacted] claimed hydraulic presses, although fully depreciated, continue to perform their function and possess a resale value. *See* Tr. (Sheridan) at 1225:5-11; *see also* Tr. (Reed) at 472:15-473:19 (citing JX-0184C). Respondents' expert, Dr. Sean Sheridan, forthrightly admitted that his own analysis completely ignored [redacted]

[redacted]

even though [redacted] and thus seemingly contribute significantly to USS' domestic industry under subsection (A). *See* Tr. (Sheridan) at 1193:15-1195:16; Tr. (Bertagnolli) at 61:23-63:15 [redacted] And contrary to their representations, Respondents' own calculations do not overstate equipment investments because [redacted] such that Dr. Sheridan necessarily did not consider them. *Compare* RIB at 166 *with* JX-0184C at Sys Nos. 1528, 1639, 2125, 2478, 2806, 2852, 2896 (total book value for cafeteria and parking lot of [redacted] Most importantly, accepting Respondents' own depreciation-based calculation, applied to both plant and equipment, Dr. Sheridan's analysis still yields total 2018-2020 investments of [redacted] for plant and [redacted] for equipment) and [redacted] for plant and [redacted] for equipment) for the DI I and DI II products, respectively. *See* Tr. (Sheridan) at 1193:15-1194:14, 1196:4-20; RDX-0011C.8-.9.

As for *Thermoplastic-Encapsulated Electric Motors*, Respondents assert that under that precedent it is "inappropriate to credit replacement costs of equipment used to manufacture the domestic industry products as current 'investments.'" RIB at 163. In fact, that case states that "replacement costs, with appropriate adjustments, may be used to determine the current value of equipment." *Thermoplastic-Encapsulated Electric Motors* at 15. Although this statement is arguably dicta, USS' attempt to distinguish *Thermoplastic-Encapsulated Electric Motors* is otherwise unpersuasive because it focuses too much on immaterial facts. *See* CRB at 89-91. So although replacement costs cannot be entirely rejected as evidence of investment (as Respondents urge), an acceptance of replacement costs without "appropriate adjustments" (as Complainant urges) is also unwarranted. *See* RIB at 165; CIB at 160.

[redacted]

Moreover, it is Complainant's burden to prove economic prong, and it has failed to offer a sufficiently reliable measure of it under subsection (A). The correct quantity for analysis of the significance of plant and equipment investment is thus Respondent's proposed measure: [redacted] for the DI I products and [redacted] for the DI II product.

2. Subsection (B) - Labor or Capital

Under subsection (B), USS relies entirely on labor expenses. *See* CIB at 161-63. Its [redacted] *See, e.g.*, JX-0187C [redacted] USS relies specifically on direct labor, indirect labor, and R&D labor to prove economic prong under subsection (B). *See* CIB at 161-63.

Direct labor is [redacted] and USS' operations controller, Mr. Brandon Rhodes, testified that workers in this category are [redacted] -0180C (Rhodes Dep. Tr.) at 7:1-4, 79:4-7. Mr. Reed testified that he understood direct labor to refer to [redacted] which is consistent with Dr. Bertagnolli's description of [redacted] Tr. (Bertagnolli) at 79:6-80:6; Tr. (Reed) at 474:23-475:2. This is sufficient to conclude that direct labor cost equates to manufacturing labor cost; Respondents' assertion that "direct labor" is "vague" and that USS should have "identif[ied] any employees involved with the production of the DI Products" is not well-founded. RIB at 168.

The R&D labor category refers to workers at USS' [redacted] Tr. (Reed) at 475:14-23. Dr. Bertagnolli testified that USS has [redacted]

[redacted] USS manufactures. Tr. (Bertagnolli) at 51:18-52:1, 64:9-18. Mr. Rhodes testified that [redacted] *See* JX-0180C (Rhodes Dep. Tr.) at 91:4-22.

Respondents complain that USS did not "identify [redacted] the DI Products, but this is not strictly correct; the DI II product [redacted] and it stands to reason that it was [redacted] RIB at 169; *see* Tr. (Reed) at 481:20-482:17, 511:24-512:14. It similarly stands to reason that [redacted] *See* Tr. (Linford) at 148:6-149:23. In fact, Mr. Brandon Linford, general manager of USS' "PDC insert business," testified that USS [redacted] *Id*. at 6:14-16, 159:19-25. Nor is it especially pertinent that much of USS' R&D emphasizes [redacted] *See Certain Integrated Circuit Chips and Products Containing the Same*, Inv. No. 337-TA-859, Comm'n Op. at 39 (Aug. 22, 2014) ("'Exploitation' is a generally broad term that encompasses activities such as efforts to improve, develop, or otherwise take advantage of the asserted patent."); RIB at 170 (citing Tr. (Reed) at 483:11-17). On balance, therefore, it is reasonable to prorate R&D labor across all products, using the same revenue-based allocation applied in the subsection (A) analysis, because [redacted] RIB at 169.

[redacted]

So direct labor and R&D labor costs properly count in evaluating economic prong under subsection (B); the same cannot be said, however, for indirect labor. Dr. Bertagnolli testified that [redacted] such that [redacted] but he did not otherwise define "indirect labor." Tr. (Bertagnolli) at 79:6-80:6. Mr. Rhodes defined the category vaguely: [redacted] JX-0180C (Rhodes Dep. Tr.) at 79:4-7. Mr. Reed understood the category to include [redacted] Tr. (Reed) at 475:3-13. Based on such descriptions, indirect labor would seemingly cover every sort of worker not otherwise covered by a category, that is, any employee not involved in direct labor, R&D labor, sales, and administration. Although this might include personnel maintaining the [redacted] whose expenses would probably qualify under subsection (B), it might also include personnel maintaining [redacted] whose expenses would probably not so qualify. And as Mr. Reed mentioned, it includes [redacted] whose expenses may or may not qualify, depending on their precise job duties. *See id.* In short, the indirect labor category of labor costs is not defined sufficiently precisely to determine that it is properly counted toward domestic industry.

USS is thus left with the direct labor and R&D labor categories, and both sides' experts quantify those costs. Mr. Reed's analysis started with USS' income statements, broken out by year and category, which itemize labor costs including insurance expenses, with expenses [redacted] *See* Tr. (Reed) at 474:12-22; CDX-0004C.21; CX-0354C. Mr. Reed then calculated the percentage of personnel working just on PDCs, based on headcount, again broken out by year and category. *See*

[redacted]

Tr. (Reed) at 476:4-23; CDX-0004C.22. He lastly incorporated into his analysis the same revenue-based percentages used for subsection (A), broken out by DI I and DI II products as a percentage of all PDC revenues:

CDX-0004C.23; *see* Tr. (Reed) at 476:24-477:16. Dr. Sheridan's analysis was similar, although only for direct labor and R&D labor, and he discounted labor costs for both DI I and DI II products as a percentage of revenues from all products, thus omitting consideration of headcount. *See* Tr. (Sheridan) at 1198:10-1200:10. His results were broadly the same as Mr. Reed's, although lower in every category. *See* RDX-0011C.10-.11.

As noted, indirect labor costs should not be counted. Otherwise, Mr. Reed's calculations are more reliable, for two reasons. First, for no reason apparent from the record, Dr. Sheridan started with a different [redacted] cost, even though his other costs all match the numbers reported on USS income statements. *Compare* RDX-0011C.10 [redacted] *with* CDX-0004C [redacted] *and* CX-0354C [redacted] Second, although Dr. Sheridan's allocation method

[redacted]

is reasonable, Mr. Reed's is more reasonable, because in addition to allocating based on revenue, it allocates based on headcount.

In sum, the total labor and capital investments for [redacted] are [redacted] for the DI I products and [redacted] for the DI II product.

3. Subsection (C) - Exploitation [of the patents], including engineering, research and development, or licensing

Under subsection (C), USS relies on an allocation of plant expense to R&D (as in subsection (A)), R&D labor costs (as in subsection (B)), and investment in equipment used specifically for R&D. *See* CIB at 163. Mr. Reed applied the same plant expense allocation methodology as for subsection (A), with an additional allocation to account for the [redacted] (what Mr. Reed calls [redacted] *See* Tr. (Reed) at 508:18-23; JX-0034C.48. Thus, Mr. Reed's calculation for R&D plant expense is simply [redacted] of his calculation for overall plant expense. *See id*. at 479:5-22; CDX-0004C.26. For R&D equipment, Mr. Reed identified [redacted] totaled their purchase prices, and applied a weighted average revenue-based allocation percentage of [redacted] for the DI I and DI II products, respectively. *See* Tr. (Reed) at 479:23-480:23; CDX-0004C.16, .27-.28; JX-0184C.

USS' allocation methodologies for R&D plant and equipment suffer from the same defects as under subsection (A): they do not amortize purchase price or adjust replacement cost, and (for the plant expense calculation) the square footage adjustment overstates expenses by assigning the full purchase/replacement price to only [redacted] of the plant. *See* RIB at 170. Respondents' allocation methodology is similarly inappropriate, because it is again based entirely on depreciation, and also simply takes 10% of their calculation for overall plant expense. *See* Tr. (Sheridan) at 1202:1-1203:15; RDX-0011C.12-.13. Nonetheless, as with subsection (A),

[redacted]

Respondents' calculation establishes a minimum for R&D plant and equipment investment: total 2018-2020 investments of [redacted] for plant and [redacted] for equipment) and [redacted] for plant and [redacted] for equipment) for the DI I and DI II products, respectively. *See* RDX-0011C.12-.13.

As noted, it is straightforward to correct USS' square footage adjustment – namely, multiply the plant expenses by the ratio [redacted] – but such a correction still applies to a fundamentally unreliable method of counting investment expense. It is also possible to identify [redacted] Tr. (Reed) at 506:17-24 (citing CDX-0004C.27-.28). The total purchase price of these [redacted] *See* CDX-0004C.27-.28; JX-0184C (sorting by Class (RD) and Acquisition Date [redacted] Nevertheless, USS does not attempt to count that total purchase price separately, and instead (again, improperly) treats all R&D equipment the same, regardless of when it was acquired. *See* CIB at 164-65.

As with subsection (A), it is Complainant's burden to prove the properly qualified subsection (C) investments, and it has offered only a partially reliable measure of it. The correct quantity for analysis of substantiality under subsection (C) is thus Complainant's proposed measure for labor (which is reliable) combined with Respondent's proposed measure for plant and equipment: [redacted] for the DI I products and [redacted] = [redacted] for the DI II product.

B. "Significant" or "Substantial"

The next step in the evaluation of domestic industry is to determine if the investment amounts identified above are "significant," as in subsections (A) and (B), or "substantial," as in

[redacted]

subsection (C). The statutory terms "'significant' and 'substantial' refer to an increase in quantity, or to a benchmark in numbers," and "[a]n 'investment in plant and equipment' therefore is characterized quantitatively, i.e., by the amount of money invested in the plant and equipment." *Lelo Inc. v. ITC*, 786 F.3d 879, 883 (Fed. Cir. 2015). This requires a "quantitative analysis in order to determine whether there is a 'significant' increase or attribution by virtue of the claimant's asserted commercial activity in the United States." *Id.* Thus, "[q]ualitative factors cannot compensate for quantitative data that indicate insignificant investment and employment." *Id.* at 885. Moreover, "significant" and "substantial" are relative terms, so some sort of comparative investment analysis must also be made to assess the "*relative* importance of the domestic activities." *See, e.g.*, *Certain Carburetors and Products Containing Such Carburetors*, Inv. No. 337-TA-1123, Comm'n Op. at 17-19 (Oct. 28, 2019) (emphasis in original) ("*Carburetors*").

Two comparison metrics are supported by the record: domestic investment compared to foreign investment, and revenues resulting from DI Product investments relative to other revenues. The first metric is especially significant here, because it is "undisputed that [redacted]" RIB at 163. There is [redacted] This is not necessarily dispositive, because the Commission takes a flexible approach to evaluating domestic industry. *See* RRB at 86 (citing *Certain Television Sets, Television Receivers, Television Tuners, and Components Thereof*, Inv. No. 337-TA-910, Comm'n Op. at 66 (Oct. 30, 2015)). It does weigh heavily in favor of finding one, however. *See Certain Road Construction Machines and Components Thereof*, Inv. No. 337-TA-1088, Initial Determination at 78 (Feb. 14, 2019) (public), *aff'd in pertinent part*, Comm'n Op. at 1 (June 27, 2019), *aff'd sub nom*. Wirtgen GMBH v. ITC, 829 Fed. App'x 528 (2020) ("The DI product would not even exist without the domestic input, which necessarily

[redacted]

represents a significant [research and development] contribution to the finished product, regardless of where the manufacturing steps take place."); *Oligosaccharides*, Initial Determination at 112 (Sep. 9, 2019) (public) ("There is simply no other source but domestic activity to credit.").

As for revenues, the relevant percentages are generally small, ranging from [redacted] (DI I product's revenue share for [redacted] relative to all USS products) to [redacted] (DI II products' revenue share for [redacted] relative to USS PDC revenue). *See* CDX-0004C.16. Taken out of context, such numbers might suggest a lack of domestic industry across the board. But in the context of a complete lack of foreign investment, even for USS' non-DI Products, it is not clear that these percentages should be given much weight, because the fact that USS has other products should not count against it in assessing domestic industry. *See Carburetors* at 28 ("The fact that a complainant may have substantial sales of other products is not pertinent to [the significance] analysis.").

In sum, the two comparisons of domestic to foreign investment and DI-related revenues relative to all revenues point in different directions. And on the one hand, the first comparison far outweighs the second, both in importance and in validity, but on the other hand there is a notable divergence between the subsections and product categories. Specifically, the reliable evidence shows that total labor investment for the DI I products is approximately [redacted] whereas total plant and equipment investment for the DI II product is [redacted] or [redacted] DI I labor investment. Even in view of the fact that the DI II product is [redacted] By the same metric its [redacted] of DI I labor investment. Otherwise, however, the remaining categories of investment total [redacted] the DI

[redacted]

II R&D investment and [redacted] of DI I labor: for DI I [redacted] for plant and equipment, [redacted] for labor, and [redacted] for R&D, and for DI II [redacted] for labor.

Respondents have little to say about this. Although the investment numbers for which they argue have not been fully adopted, Respondents apparently contend that even similar DI I expenses [redacted] for plant and equipment, approximately [redacted] for labor, and [redacted] for R&D) are not significant. *See* RIB at 171. Their only argument in support of this contention, though, is that such evidence is unreliable, an argument rejected above. *See id*.

On balance, the weight of the evidence demonstrates that economic prong has been satisfied for the DI I products under all three subsections, and for the DI II product only under subsection (B).

XIII. CONCLUSIONS OF LAW

No violation has been proven. Specifically:

A. All asserted claims of U.S. Patent Nos. 10,507,565, 10,108,502, and 8,616,306 are infringed by at least one Accused Product.

B. All asserted claims of U.S. Patent Nos. 10,507,565, 10,108,502, and 8,616,306 are invalid.

C. Except for the invalidity of the asserted claims, a domestic industry within the meaning of 19 U.S.C. § 1337 exists.

XIV. RECOMMENDED DETERMINATION ON REMEDY AND BOND

The Commission's Rules provide that subsequent to an initial determination on the question of violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, the administrative law judge shall issue a recommended determination concerning the appropriate remedy in the event that the Commission finds a violation of section 337, and the amount of bond

[redacted]

to be posted by respondent during Presidential review of the Commission action under section 337(j). *See* 19 C.F.R. § 210.42(a)(1)(ii).

The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding. *Viscofan, S.A. v. Int'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986). Under Section 337(d)(1), if the Commission determines as a result of an investigation that there is a violation of section 337, the Commission is authorized to enter either a limited or a general exclusion order. 19 U.S.C. § 1337(d)(1). A limited exclusion order ("LEO") instructs the U.S. Customs and Border Protection ("CBP") to exclude from entry all articles that are covered by the patent at issue and that originate from a named respondent in the investigation. A general exclusion order instructs the CBP to exclude from entry all articles that are covered by the patent at issue, without regard to source. *Certain Purple Protective Gloves*, Inv. No. 337-TA-500, Comm'n Op. at 5 (Dec. 22, 2004).

Under section 337(f)(1), the Commission may issue a cease and desist order ("CDO") in addition to, or instead of, an exclusion order. 19 U.S.C. § 1337(f)(1). Such orders "are generally issued when, with respect to the imported infringing products, respondents maintain commercially significant inventories in the United States or have significant domestic operations that could undercut the remedy provided by an exclusion order." *Certain Microfluidic Devices*, Inv. No. 337-TA-1068, Comm'n Op. at 22-23 (Jan. 10, 2020).

Additionally, during the 60-day period of Presidential review under 19 U.S.C. § 1337(j), "articles directed to be excluded from entry under subsection (d) . . . shall . . . be entitled to entry under bond prescribed by the Secretary in an amount determined by the Commission to be sufficient to protect the complainant from any injury." *See* 19 U.S.C. § 1337(j)(3). "The Commission typically sets the bond based on the price differential between the imported infringing

[redacted]

product and the domestic industry article or based on a reasonable royalty. However, where the available pricing or royalty information is inadequate, the bond may be set at one hundred (100) percent of the entered value of the infringing product." *Certain Industrial Automation Systems and Components Thereof Including Control Systems, Controllers, Visualization Hardware, Motion and Motor Control Systems, Networking Equipment, Safety Devices, and Power Supplies*, Inv. No. 337-TA-1074, Comm'n Op. at 13 (Apr. 23, 2019) ("*Automation Systems*") (citation omitted).

A. Limited Exclusion Order

Should a violation be found, a limited exclusion order is recommended per statute. *See* 19 U.S.C. § 1337(d). Respondents seek to add a certification provision. *See* RIB at 172. "Certification provisions aid U.S. Customs and Border Protection ('CBP') in enforcing Commission orders but 'do not mandate that CBP accept certification as proof that the articles in question are not covered' by the limited exclusion order." *Certain Robotic Vacuum Cleaning Devices and Components Thereof Such as Spare Parts*, Inv. No. 337-TA-1057, Comm'n Op. at 55 (Feb. 1, 2019) ("*Robitic Vacuums*"). Additionally, "it has been Commission practice for the past several years to include certification provisions in its exclusion orders to aid CBP." *See Certain Mobile Devices*, Inv. No. 337-TA-744, Comm'n Op. at 21 (June 5, 2012). Complainant argues that unadjudicated products should not be permitted to be certified, but as noted, the SF Diamond [redacted] products have been adjudicated to be noninfringing. *See* CRB at 98. Because Respondents do not appear to argue for any non-standard certification provision, it is my recommendation that any limited exclusion order should include the Commission's standard certification provision.

B. Cease and Desist Order

[redacted]

USS seeks a cease and desist order against Respondents IDS, SF Diamond, Haimingrun, and Iljin. *See* CIB at 172. SF Diamond maintains "[redacted]" of Accused Products in the United States, and SF Diamond does not expressly dispute that this is a commercially significant inventory, so if a violation by SF Diamond is found, a cease and desist order against it is recommended. *See* Tr. (Reed) at 487:5-489:3; RIB at 172-74.

It is undisputed that [redacted] and although it does have a domestic affiliate that maintains a [redacted] of other products, USS offers no particularized evidence that the domestic affiliate could undercut the remedy provided by an exclusion order. *See* CIB at 171-72; CRB at 99. So no cease and desist order is recommended [redacted]

Iljin maintains a small domestic inventory of Accused Products – [redacted] as of May 2021. *See* Tr. (Reed) at 487:5-489:3. It is undisputed that its inventory is not commercially significant. *See id*. at 509:20-510:5. And as with Haimingrun, USS offers no particularized evidence that Iljin's domestic affiliate could undercut the remedy provided by an exclusion order. *See* CIB at 171-72; CRB at 99. So no cease and desist order is recommended against Iljin.

IDS is a distributor of New Asia's PDCs, and [redacted] *See* Tr. (Horswell) at 591:23-592:11. As of the time of the hearing, [redacted] *See id*. at 596:10-12. Because IDS merely receives and distributes New Asia products, and would therefore be subject to the same limited exclusion order as every similarly situated distributor, there is no basis for a cease and desist order against IDS, so none is recommended.

C. Bond

[redacted]

The Commission has held that "[t]he complainant bears the burden of establishing the need for a bond" during the Presidential Review period. *See Robotic Vacuums* at 68. The purpose of the bond is to protect the Complainant from injury. *See Certain Non-Volatile Memory Devices and Products Containing the Same*, Inv. No. 337-TA-1046, Comm'n Op. at 67 (Oct. 26, 2018). There is little evidence that Respondents' products compete with USS' products, so there is similarly little evidence that domestic sales of those products would injure Complainant. USS itself characterizes Respondents' products as [redacted] CIB at 173. Mr. Reed opined that the Accused Products compete with the DI Products, but he offered no specific product examples and his opinion was otherwise generalized. *See* Tr. (Reed) at 490:6-491:19. Nor did Mr. Linford identify any specific competing product; at best he testified only that some of the Respondents are USS' competitors, and that Iljin has a product (again, unidentified) that [redacted] *See* JX-0168C (Linford Dep. Tr.) at 104:19-107:14, 164:2-15. And USS otherwise offers no evidence of price erosion or specific examples of loss of market share arising from competition with the Accused Products. See CIB at 172-74. Therefore, no bond during the Presidential Review period is recommended.

D. Public Interest

The Commission has not delegated the public interest analysis to me. *See* 85 Fed. Reg. 85661.

XV. INITIAL DETERMINATION AND ORDER

Based on the foregoing, it is my Initial Determination that there is no violation of Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain

[redacted]

polycrystalline diamond compacts and articles containing same in connection with the asserted claims of U.S. Patent Nos. 10,507,565, 10,108,502, and 8,616,306.

I certify to the Commission this Initial Determination, together with the Record of the hearing in this investigation consisting of the following: the transcript of the evidentiary hearing, with appropriate corrections as may hereafter be ordered; and the exhibits accepted into evidence in this investigation.[5]

Pursuant to 19 C.F.R. § 210.42(h), this Initial Determination shall become the determination of the Commission sixty (60) days after the date of service of the Initial Determination, unless a party files a petition for review of the Initial Determination within twelve (12) business days after service of the Initial Determination pursuant to 19 C.F.R. § 210.43(a) or the Commission, pursuant to 19 C.F.R. § 210.44, orders on its own motion, a review of the Initial Determination or certain issues therein. Any issue or argument not raised in a petition for review, or response thereto, will be deemed to have been abandoned and may be disregarded by the Commission in reviewing the Initial Determination pursuant to 19 C.F.R. § 210.43(b) and (c).

Confidentiality Notice:

This Initial Determination is being issued as confidential, and a public version will be issued pursuant to Commission Rule 210.5(f). Within seven (7) days of the date of this Initial Determination, the parties shall jointly submit: (1) a proposed public version of this opinion with any proposed redactions bracketed in red; and (2) a written justification for any proposed redactions specifically explaining why the piece of information sought to be redacted is confidential and why disclosure of the information would be likely to cause substantial harm or

[5] The pleadings of the parties filed with the Secretary need not be certified as they are already in the Commission's possession in accordance with Commission rules.

likely to have the effect of impairing the Commission's ability to obtain such information as is necessary to perform its statutory functions.[6]

SO ORDERED.

Cameron Elliot
Administrative Law Judge

[6] Under Commission Rules 210.5 and 201.6(a), confidential business information includes information which concerns or relates to the trade secrets, processes, operations, style of works, or apparatus, or to the production, sales, shipments, purchases, transfers, identification of customers, inventories, or amount or source of any income, profits, losses, or expenditures of any person, firm, partnership, corporation, or other organization, or other information of commercial value, the disclosure of which is likely to have the effect of either impairing the Commission's ability to obtain such information as is necessary to perform its statutory functions, or causing substantial harm to the competitive position of the person, firm, partnership, corporation, or other organization from which the information was obtained, unless the Commission is required by law to disclose such information. *See* 19 C.F.R. § 201.6(a). Thus, to constitute confidential business information the disclosure of the information sought to be designated confidential must likely have the effect of either: (1) impairing the Commission's ability to obtain such information as is necessary to perform its statutory functions; or (2) causing substantial harm to the competitive position of the person, firm, partnership, corporation, or other organization from which the information was obtained.