

Nos. 18-1725, -1784

IN THE
United States Court of Appeals
FOR THE FEDERAL CIRCUIT

GREEN MOUNTAIN GLASS, LLC, CULCHROME, LLC,
Plaintiffs - Cross-Appellants,

v.

SAINT-GOBAIN CONTAINERS, INC., DBA VERALLIA NORTH AMERICA,
Defendant - Appellant.

On Appeal from the United States District Court
for the District of Delaware, in No. 1:14-cv-392-GMS

**SECOND CORRECTED RESPONSE AND OPENING
CROSS-APPEAL BRIEF FOR PLAINTIFFS - CROSS-APPELLANTS
GREEN MOUNTAIN GLASS, LLC AND CULCHROME, LLC**

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UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Green Mountain Glass, LLC, Culchrome, LLC v. Saint-Gobain Containers, Inc. dba Verallia North America

Case No. 18-1725, -1784

CERTIFICATE OF INTEREST

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certifies the following (use "None" if applicable; use extra sheets if necessary):

| 1. Full Name of Party Represented by me | 2. Name of Real Party in interest (Please only include any real party in interest NOT identified in Question 3) represented by me is: | 3. Parent corporations and publicly held companies that own 10% or more of stock in the party |
|---|---|---|
| Green Mountain Glass, LLC | None | G R Technology, Inc. (privately held; no publicly held companies) |
| CulChrome, LLC | None | GRT Holdings, Inc. (privately held; no publicly held companies) |
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| | | |

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court (**and who have not or will not enter an appearance in this case**) are:

Please see attached.

FORM 9. Certificate of Interest

Form 9
Rev. 10/17

5. The title and number of any case known to counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal. *See* Fed. Cir. R. 47.4(a)(5) and 47.5(b). (The parties should attach continuation pages as necessary).

None.

2/4/2019

Date

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Please Note: All questions must be answered

cc: All counsel by ECF

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CERTIFICATE OF INTEREST

Plaintiffs - Cross-Appellants Green Mountain Glass, LLC and CulChrome, LLC state that the following partners or associates have appeared on their behalf before the trial court or are expected to appear in this court:

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STATEMENT OF RELATED CASES

Pursuant to Federal Circuit Rule 47.5, Plaintiffs - Cross-Appellants Green Mountain Glass, LLC and CulChrome, LLC note that:

- (a) there have been no other appeals in this case; and
- (b) there are no other cases pending in this or any other court that will directly affect or be directly affected by this Court's decision in Nos. 18-1725, -1784.

STATEMENT OF THE ISSUES

1. Whether the district court correctly construed the phrase “unsorted mixed color glass cullet.”
2. Whether the evidence was sufficient to sustain the jury’s infringement determination with respect to the “selectively” limitation.
3. Whether Ardagh’s invalidity case was both preserved and so overwhelming that no reasonable juror could have thought Ardagh failed to meet its clear-and-convincing burden of proof.
4. Whether substantial evidence supports the damages verdict.

INTRODUCTION

For decades, glassmakers faced a serious obstacle to reusing glass. Glass “cullet”—recycled glass—typically includes multiple colors. But using more than a minimal amount of mixed-color cullet would yield “off-color” bottles. Color-sorting the cullet was ineffective: Colors could not be separated entirely, and a large quantity of mixed-color cullet remained—typically ending up in landfills. *See Appx6372-6377.*

The invention at issue—U.S. Patent No. 5,718,737 (“the ’737 patent”)—resolved that problem. Its novel use of colorizers and decolorizers allows glassmakers to use mixed-color cullet to generate properly colored bottles, yielding enormous cost-savings. The evidence showed that Ardagh “deliberate[ly]

cop[ied]” the patent and then knowingly infringed for years without any “‘good faith belief’ that the ’737 patent was invalid” or “not infringed.” Appx31-32. The jury found Ardagh’s infringement “especially worthy of punishment”—“egregious . . . wanton, malicious, consciously wrongful, or done in bad faith.” Appx75.

Ardagh challenges the construction of one claim term—“unsorted mixed color cullet.” The court, it argues, should have given “unsorted mixed color cullet” a different construction than “mixed color cullet.” But Ardagh told the district court they mean the same thing, and the court agreed. The court’s refusal to credit Ardagh’s 11th-hour about-face, just before trial, was not error. The specification and claims repeatedly use “unsorted mixed color cullet” and “mixed color cullet” interchangeably. Ardagh’s contrary view would turn the abstract and summary of invention into nonsense. And Ardagh’s construction—that “unsorted mixed-color cullet” means cullet that has never been subjected to any kind of sorting, even wholly unsuccessful sorting—is incorrect. Glass that remains a disordered jumble of mixed colors is “unsorted mixed color cullet.” Ardagh’s construction makes infringement depend on what happened to the cullet—its potentially unknowable history—as opposed to its current condition. And Ardagh’s construction directly contradicts the prosecution history Ardagh invokes.

Ardagh otherwise asks this Court to reweigh the evidence and second guess jury determinations. This Court does not “reweigh the evidence or consider what

the record might have supported, or investigate potential arguments that were not meaningfully raised.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1062 (Fed. Cir. 2016) (en banc). Ardagh’s non-infringement position reduces to a waived claim-construction argument that is chemically impossible and grammatically incorrect. There was substantial proof that Ardagh practiced every limitation—including expert testimony, Ardagh employees’ concessions, and Ardagh’s own records.

Ardagh’s remaining challenges, to validity and damages, are waived and without merit. Its prior-use argument rested on shaky foundations; overwhelming evidence disproved it; and the jury was not required to find Ardagh met its clear-and-convincing burden. Substantial evidence supported the damages award.

STATEMENT OF THE CASE

I. TECHNOLOGICAL BACKGROUND

U.S. Patent No. 5,718,737 (“the ’737 patent”) revolutionized glass recycling, making it possible to recycle “mixed colored cullet glass, *i.e.*, broken pieces of glass of mixed colors and types,” to make “useful glass products” with commercially acceptable colors. Appx139, 1:13-16.

A. The Limited Use of Cullet Before the ’737 Patent

For years, glassmakers used two different sets of materials to make bottles. They used raw materials like sand, soda ash, and limestone. And they melted existing glass—broken pieces called “cullet”—together with that raw material.

Appx1708. Cullet has significant advantages. Appx1394. It is cheaper than raw materials; requires less energy to melt; is less taxing on furnaces; reduces environmental emissions; and “[m]ake[s] more glass with less raw materials.” Appx1394-1398.

For decades, however, most cullet could not be used in large quantities. During the manufacturing process, some bottles break or are otherwise unusable. Those become “internal” or “glass producer waste” cullet, Appx140, 4:14-16, which is typically a single color, Appx1173-1175. Such single-color cullet could be used to make bottles of that same color. Appx1218-1219. But cullet from other sources (such as consumer recycling) typically contains glass of various colors—“mixed color cullet”—including “amber,” “green,” and “flint” (clear). Appx139, 1:29-37. Using anything but a minimal amount of mixed-color cullet produces unacceptable “off colors” in the finished product. Appx1398-1399.

Thus, in 1994 (just months before the ’737 patent’s priority date) a trade association observed: “Glass manufacturers require cullet that’s separated by color—clear, amber or green.” Appx6373. “[V]ery little . . . mixed color cullet [could] be used in the making of glass.” Appx1399. It was dumped in landfills or blended into asphalt. *Id.* Demand for mixed-color cullet was so low that recyclers considered “discontinu[ing] recycling glass cullet because of the poor economics.” Appx4481 (1995 letter from Ardagh Senior Vice President).

Color-sorting techniques—*e.g.*, by hand or optical methods—were “not wholly effective for the separation and color sorting of all the glass.” Appx139, 1:55-58; *see* Appx1570; Appx1174. “Since sorting is not fully effective,” Appx139, 2:13, the resulting cullet would include off-color glass, Appx1570; Appx1650; Appx1174. Moreover, because sorting small pieces is difficult, “a by-product of . . . recycling, even when an attempt is made to sort the glass by color, is a quantity of mixed colored pieces.” Appx139, 1:64-67.

The inclusion of any appreciable quantity of off-color glass could ruin the batch. Appx1175. Bottle makers could use only “amber cullet for amber glass,” etc. Appx1218. Diluting a small quantity of cullet with off-color pieces into a larger batch could prevent the resulting color from being perceptibly changed. Appx1174; Appx1570. But that “dilution is the solution” approach allowed glassmakers to use only some relatively well-color-sorted cullet, if it contained small quantities of off-color glass. Appx1174; Appx1570. The vast majority of mixed-color cullet remained unusable. Appx6373.

B. Mosch Overcomes the Barriers To Using Mixed-Color Cullet and Obtains a Patent

All of that changed in 1995, when an engineer named Duane Mosch invented a method of making glass from mixed-color cullet. The invention “us[ed], in a novel way, existing technology, decolorizers, colorizers . . . to make unsorted color glass any color you want.” Appx1370 (Mosch testimony); *see*

Appx140, 3:29-40. Chemical decolorizers “pick[] a color” from the cullet “that you don’t want, say, green,” and remove it. Appx1176-1177. For example, to produce amber-colored glass from mixed-color cullet, green glass in the mixed-color cullet is decolorized by adding chemical or physical decolorizing agents. Appx141, 5:67-6:34. A remaining color can be enhanced with colorizers. Appx141, 6:35-48.

When Mosch applied for a patent, Appx3010, the Examiner initially rejected the application. The Examiner pointed to the application’s statement that cullet can be used after it is “sort[ed] ... by color,” Appx3011:11-12, mistakenly construing that as an admission that “mixed color cullet is used in the glassmaking art” already, Appx3040; Appx44. In response, Mosch explained that existing methods required “sort[ing] by color,” which “is imprecise” and leaves otherwise unusable “mixed color pieces as a by-product” anyway. Appx3142-3143. Mosch then distinguished between sorted single-color cullet and unsorted mixed-color cullet: “[W]hile *sorted single color glass cullet* has indeed been recycled into new glass products, the *unsorted mixed color glass cullet has not* ... been recycled into new glass products of a particular color.” Appx3142 (emphasis added). Consistent with that explanation, the patent was amended to use “mixed color cullet” and “unsorted mixed color cullet” interchangeably—and as distinct from sorted, single-color cullet. Appx3126-3139.

The '737 patent—titled “[m]ethod of recycling mixed colored cullet into amber, green, or flint glass”—issued on February 17, 1998, Appx138, with a March 3, 1995 priority date, Appx83. It explains that mixed-color cullet can be “reclaimed, post-consumer glass” or a mix of “glass producer waste cullet” (*i.e.*, a mix of single-color cullet). Appx140, 4:12-15; *see* Appx142-143. Independent claim 18 is illustrative:

18. A method of creating recycled glass products, comprising the steps of:

obtaining unsorted mixed color glass cullet having glass of at least two different colors;

adding an amount of the unsorted mixed color glass cullet to a raw virgin soda-lime glass batch mixture for glass of a particular color;

adding to said virgin batch mixture at least one of a decolorizing agent which selectively decolorizes at least one of the colors of said unsorted mixed color glass cullet other than said particular color and a coloring agent which enhances said particular color of said unsorted mixed color glass cullet;

melting the virgin batch mixture with said mixed color glass cullet and any agent added in said adding step to a molten state; and

creating a recycled glass product of said particular color from the selectively colorized/decolorized virgin batch mixture.

Appx142-143, 8:61-12. The patent defines “mixed color glass cullet” as “broken pieces of glass of mixed colors and types.” Appx139, 1:14-15.

Plaintiffs CulChrome, LLC and Green Mountain Glass, LLC (collectively, “Green Mountain”) are, respectively, the owner and exclusive licensee of the ’737 patent. Appx1303.¹ The benefits of the advance were immediately recognized—including by defendant. When Ardagh’s then-Senior Vice President of Technical Services, Roger Erb, learned of the advance in July 1995, he declared that, if Green Mountain “could take 50% Green Glass and 50% Amber Glass and successfully make Amber Glass,” that “would impress [me]!” Appx4479.

C. Ardagh Implements the Claimed Process Without a License

In 1995—months after Green Mountain filed the application that issued as the ’737 patent—Green Mountain and Ardagh met to discuss the technology. Appx1372-1374. Green Mountain touted its capacity to “produce a color accepted Amber Beer Bottle out of a vast supply of an inexpensive material[!]” Appx4479. Green Mountain provided results from testing the patented method at Corning. *Id.*

1. After learning of the invention from Green Mountain, Ardagh secretly began working toward using the invention. It drafted 19 technical questions about how to implement the invention. Appx5683. Ardagh’s VP Roger Erb asked Ardagh scientists that “to initiate” a test to see “whether . . . [Ardagh] could utilize more three-color mixed color in our batches” by adding decolorizers and colorizers (as the patent specified). Appx4481. He wanted to test “whether . . . copper

¹ Mosch’s company, later renamed Green Mountain Glass, preceded CulChrome in ownership. Appx1307.

oxide”—one of Green Mountain’s “best” additives “to adjust the color of amber glass,” Appx4540—could turn mixed-color cullet into amber glass. Appx4481. Ardagh never disclosed those tests to Green Mountain.

In 1998, Green Mountain’s technical consultant, Dr. Richard Lehman, approached Ardagh again. Pursuant to a confidentiality agreement, Appx1374-1375; Appx1312, Lehman explained that Green Mountain’s patented technology would let Ardagh use “large quantities of commingled recycled glass in the production of glass containers.” Appx4501. He enclosed test results, pictures of Corning test glass, and a copy of the ’737 patent. Appx4503-4513; Appx1189. Ardagh responded that it was “certainly interested” in exploring this “possible opportunity.” Appx4516; Appx1192. Ardagh, it explained, was “actively working” on cullet in glass production and would “contact [Green Mountain] soon.” Appx4516. Green Mountain reached out to Ardagh several times but received no response. Appx1193-1194.

2. In November 1998, Green Mountain sent Ardagh a letter explaining that anyone using “mixed cullet in glass manufacturing need[ed] to obtain a license.” Appx3483; Appx1194. The parties met in January 1999. Appx1279-1280. This time Ardagh told Green Mountain that it already used colorizers and decolorizers to make glass from mixed-color cullet. Appx4540; Appx1201. Ardagh employees confirmed they used copper oxide “to adjust the color of amber

glass, when they use mixed cullet stream.” Appx4540; Appx1201. Copper oxide was the additive Roger Erb wanted tested *after* he learned of Green Mountain’s invention. See pp. 8-9, *supra*. One Ardagh employee said Ardagh had used decolorizers that way for “about a year” (*i.e.*, since 1998—three years after the ’737 patent’s priority date). Appx1201-1202. Another employee interjected that it was “closer to two years” (*i.e.*, 1997—two years after the priority date). Appx4540; Appx1201-1202.

Green Mountain and Ardagh worked together under confidentiality agreements for over a decade. Appx1204-1206; Appx6018-6118. During that time, Ardagh maximized its use of mixed-color cullet. It launched “Recycling Initiatives” to increase cullet use. Appx5729; Appx3485. By replacing raw materials with cullet, Ardagh reduced energy consumption “by 23-30%,” “increase[ed] furnace life by 10%,” “save[d] natural resources,” and reduced pollution. Appx5729; Appx3487; Appx1206-1209. By 2010, Ardagh used “23% average recycled content,” which “reflect[ed] a 20% savings.” Appx5729. By 2012, cullet was crucial: “We have one objective: maximise the cullet in our furnaces.” Appx5724. Ardagh documents estimated that using mixed-color cullet saved Ardagh tens of millions of dollars in energy costs *alone*. Appx1615-1617.

Ardagh refused to license the ’737 patent. Sometimes Ardagh said it did not infringe. Appx4338 (“We will not be using the . . . methodology claimed” in the

patent). Green Mountain’s president believed those denials. Appx1325-1326. Inside Ardagh, the story was different: Intra-company emails stated Ardagh “would not seek to license any color control technology (‘CulChrome,’ which uses copper oxide to mask high levels of green cullet) because *we are already doing it.*” Appx6016 (emphasis added). Emails stated that Ardagh had been using cuprous oxide, a decolorizer, “since 1996”—a year *after* Green Mountain’s first meeting with Ardagh to discuss the then-patent-pending technology. Appx4291; Appx6017.

II. PROCEEDINGS BELOW

Green Mountain filed suit against Ardagh on March 28, 2014, asserting infringement of the ’737 patent and U.S. Patent No. 6,230,521. Appx105. The case was stayed pending Ardagh’s petition for *Inter Partes* Review. Appx116-117. The Patent Trial and Appeal Board denied institution because Ardagh had not established a reasonable likelihood the ’737 patent’s claims were unpatentable. *Ardagh Glass Inc. v. CulChrome, LLC*, IPR2015-00944, Paper 9 (P.T.A.B. Sept. 29, 2015). Ardagh’s references did not disclose “adding a decolorizing agent, which selectively decolorizes at least one color of unsorted mixed color glass cullet, or a colorizing agent, which enhances a ‘remaining color’ of unsorted mixed color glass cullet . . . as recited in the [’737 patent’s] independent claims.” *Id.* at 11, 13-16.

A. Claim Construction

The parties requested the court to construe “mixed color glass cullet” and “unsorted mixed color glass cullet.” Appx4002; Appx4008. Ardagh stated without equivocation that those terms have the same meaning. It “agree[d] that ‘unsorted mixed color glass cullet’ and ‘mixed color glass cullet’ and variations thereof mean the same thing.” Appx4064; *see* Appx4004. Ardagh urged that both terms mean “post-consumer broken pieces of glass of mixed colors that have never been sorted by color.” Appx4008. The district court rejected that construction. The patent defined “mixed colored cullet” to mean “broken pieces of glass of mixed colors,” and the district court accepted that definition. Appx39 (citing Appx139, 1:14-16). The court gave “unsorted” its “plain and ordinary meaning.” Appx39.

Five days before trial, Ardagh asked the district court to construe “unsorted mixed color cullet” as *different* from “mixed color cullet.” Appx4113. It now argued that “unsorted mixed color cullet” was narrower, encompassing only mixed-color cullet that was “not sorted for color” or “never subject to color sorting,” even unsuccessfully. Appx42; *see* Appx4114. Ardagh accuses (at 20) the district court of a “late switch on claim construction.” But it was Ardagh that made the 11th-hour change, belatedly asserting that “mixed color cullet” and “unsorted mixed color cullet” are different.

The district court rejected Ardagh's construction. It found that "[t]he specification and the claims provide overwhelming evidence for the conclusion" that "unsorted mixed color cullet and mixed color cullet" "mean the same thing," Appx44, as Ardagh previously argued. The court rejected Ardagh's reliance on prosecution history, finding that it supports Green Mountain's construction. *Id.* "Ardagh believes that even imperfectly color-sorted glass—glass that has undergone some type of color sorting, albeit to little or no avail—qualifies as color sorted glass." *Id.* "There is nothing in the patent that supports Ardagh's construction." *Id.*

B. Destruction of Evidence and False Testimony

Ardagh issued no document-preservation notice until six months after litigation began, and limited its notice to just eight of its 5,500 employees. Appx6485-6486. Ardagh sent no notice to multiple employees identified in Green Mountain's initial disclosures; to any infringing plants; or half of its trial witnesses. *Id.* Ardagh produced *no* pre-suit emails from its servers. *Id.*

Ardagh's witnesses generally denied knowledge. For example, Katie Flight, an Ardagh cullet procurement manager, answered that she "did not know" or "remember" 47 times during her testimony, including to basic questions. Appx1285-1302. She purported not to know what "mixed color cullet" is, despite being the corporate representative for a company that repeatedly used the term.

Appx1299-1300. Other witnesses did likewise. *E.g.*, Appx1590-1591; Appx1677-1686.

Discovery and trial uncovered false testimony. For example, Ardagh submitted a declaration by Ms. Flight stating that “Ardagh does not use”—and that “no glass manufacturers use”—“‘mixed color cullet’ (as that term is described in U.S. Patent Nos. 5,718,737 and 6,230,521) to make recycled glass products.” Appx5986. Those (and other statements) were false. In her deposition (played at trial), Ms. Flight admitted she did not write the declaration, Appx1284-1296; agreed she could not testify to what “mixed color cullet” means, as described in the patents, Appx1296; and conceded she could not today “sign [that] declaration . . . under oath, subject to the penalty of perjury,” *id.* It would have to “say something completely different.” Appx1294-1295. Other Ardagh witnesses gave similarly inexplicable testimony. Appx1677-1686; Appx6468-6470. Later, in closing, counsel for Ardagh apologized for its “terrible witnesses.” Appx2332-2333.

C. The Trial

1. Infringement

The infringement evidence at trial was extensive. It included an Ardagh email stating that Ardagh “would not seek a license on any color control technology . . . because [we] are already” using it. Appx6016. It included

testimony from Ardagh's Corporate Head, James Keener, who admitted that Ardagh practiced each limitation of claim 18:

Q: But Ardagh uses cullet containing broken pieces of mixed colors; is that right?

A: Yes.

Q: Okay. And isn't it true that Ardagh adds this cullet to the soda lime glass batch mixture to make glass of a particular color?

A: Yes.

Q: Are Ardagh's colorizers and decolorizers [added] to that mixture to selectively colorize or decolorize one of the colors of the cullet so that the bottle is the desired color?

A: Yes.

Q: Ardagh melts the batch mixture, all that together, with the cullet and colorizers and decolorizers so that it reaches a molten state?

A: Yes.

Q: Then Ardagh creates a glass bottle of that particular color. Right?

A: That's correct.

Appx1711-1712. Ardagh never challenged those concessions.²

Expert testimony showed infringement. Relying on Ardagh's batch records, Green Mountain's expert, Dr. Martin, explained that Ardagh adds "foreign cullet"—mixed-color cullet—to virgin materials. Appx1405-1408. Ardagh adds

² Ardagh objected to counsel's later question about whether Mr. Keener understood he had just "proven infringement." Appx1712. Ardagh declined to move for a mistrial and sought a curative instruction, which was given. Appx1713-1714.

decolorizers and colorizers to the batch, as the claim provides. Appx1412-1414. The decolorizer selectively decolorizes a color of the cullet: It “goes in and absorbs or masks [an] unwanted color from the [molten] glass,” Appx1413, “decoloriz[ing] the particular region of the electromagnet[ic] spectrum.” Appx1414; Appx1415. Colorizers “enhance the particular color you have chosen.” Appx1413. Ardagh mixes these materials to create single-color recycled glass bottles. Appx1416-1421.

Dr. Martin rejected Ardagh’s argument that there is no “selective decolorization,” because decolorizers act on the batch and not just cullet, declaring it unsound “as a matter of glass science.” Appx1415. The claims address decolorizing “*a color of* the cullet,” not decolorizing cullet: “We are decolorizing the color.” *Id.* The decolorizing occurs “once everything is melted,” so “[t]he glass cullet is gone. It’s dissolved” *Id.* Consequently, decolorizers must act on “the particular region of the electromagnetic spectrum”—colors—not on glass molecules originating in the cullet. *Id.*

2. *Invalidity*

Ardagh argued anticipation, asserting that it had used the claimed method before the patent’s priority date. The district court counseled Ardagh on the risks: “[A]sserting a defense of anticipation based on Ardagh’s prior public use could seriously undermine [Ardagh’s] infringement position in the eyes of the jury.”

Appx1762. Ardagh pressed the defense nonetheless. Appx15-16; *see* Appx2325-2328.

Green Mountain presented evidence that Ardagh's infringing activities began after the '737 patent's 1995 priority date. That included Ardagh employee admissions that Ardagh began using the technology in 1997 or 1998. *See* pp. 9-10, *supra*. A 1994 document from Ardagh's trade association made clear that, before the invention, mixed-color cullet could not be used. "Glass manufacturers require cullet that's separated by color—clear, amber or green." Appx6373; Appx2125.

Some Ardagh employees testified, without corroborating documents, that Ardagh had used mixed-color cullet before 1995. *See, e.g.*, Appx1812-1814. The sole document Ardagh presented—DX-16—allegedly consisted of 1992 and 1993 batch records showing Ardagh's supposed use of mixed-color cullet to make amber bottles. Appx2074-2081; Appx3460-3479 (exhibit DX-16). But Ardagh's expert admitted that DX-16 did not disclose mixed-color cullet; he had simply "assumed" the cullet was mixed-color. Appx2078-2079; Appx2127-2129. On cross-examination, Dr. Carty compared the batch record to Ardagh's chemical-analysis records for amber bottles, from the same plant, in the same time period. The analysis showed no chrome. *See* Appx2146-2147; *see also* Appx6381-6383. Dr. Carty had admitted that using mixed-color cullet leaves traces of chrome that would appear in

a chemical-analysis record. Appx2088-2089. The absence of chrome in the finished bottles made it impossible that mixed-color cullet was used. Appx2148.

Green Mountain also presented evidence that any prior use was not public. Ardagh kept its glassmaking processes secret: Batch information “is very, very confidential and not shared with anyone.” Appx1392-1394. “What Ardagh was doing in 1994” “would not have been” publicly known. Appx1571-1572. Batch formulas are “not shared with anybody outside the company”; “[y]ou would get fired” for doing so. Appx1883-1884. Ardagh’s expert conceded that he “can’t demonstrate” “that any of these batch records . . . were ever shared with anyone.” Appx2127.

Ardagh also asserted obviousness, invoking a 1979 article by Joseph Duckett (“Duckett”). But Dr. Carty testified about Duckett for just three minutes and only discussed a single claim (18). Appx2090-2094. He never mentioned claims 1 or 20—which the jury found infringed. *Id.* His entire testimony regarding the dependent claims was that “[a]ll the claims are met by Duckett. He doesn’t miss anything.” Appx2094. For independent claim 18, Dr. Carty testified that Duckett “says initially recovered by municipal waste blah-blah-blah.” Appx2093. He was then asked, “[i]f we march through the rest of the limitations for Claim 18, do you find any of [*sic*] limitation that has not been disclosed in Duckett for Claim 18?” He responded, “No, I do not.” *Id.*

3. *Damages*

Green Mountain's damages expert, Mr. Lasinski, testified that Ardagh had used the infringing process on 4,192,815 tons of mixed-color cullet. Appx1663-1664. To determine the applicable royalty rate, Lasinski began by comparing the cost of using mixed-color cullet "versus the next best alternative." Appx1622-1623. Internal Ardagh documents showed cost-savings, from 2008 to 2014, of \$20 to \$40.32 per ton of mixed-color cullet in energy and raw materials alone. Appx1615-1619. Mr. Lasinski estimated that Ardagh would share those savings with Green Mountain, but that others, such as reduced furnace wear, would be Ardagh's alone. Appx1625-1629. He calculated a royalty rate of \$25 per ton. Appx1622-1623. A license agreement—introduced and invoked by *Ardagh*—showed a \$15-per-ton royalty on glass producers. Appx1359-1360; Appx4246. Other Ardagh documents suggested higher figures, showing savings of \$186 million over 7 years, Appx6000-6006, and \$70 per ton, excluding energy benefits, Appx5714; p. 64, *infra*.

Ardagh proposed a royalty base of 4,192,817 tons, Appx2188, 2 tons more than Green Mountain's proposed base, Appx1663-1664. But Ardagh proposed a \$3-per-ton royalty. Appx2188.

D. The Jury Finds the Patent Valid and Willfully Infringed, Awarding an Effective \$12-Per-Ton Royalty

The jury found that Ardagh infringed the '737 patent, awarding Green Mountain \$50,313,779.04 (about \$12 per ton). Appx8. Under an enhanced willfulness instruction that Ardagh requested, Appx1997-1998, a finding of “willful infringement” was “reserved only for the most egregious behavior, such as where the infringement is wanton, malicious, consciously wrongful, or done in bad faith.” Appx75. After considering whether Ardagh had “intentionally copied” the invention, had “a reasonable belief of non-infringement or invalidity,” and “tried to cover up its infringement,” Appx2251, the jury found Ardagh’s infringement willful and egregious, Appx5. It rejected Ardagh’s invalidity defenses. Appx6. The jury found no infringement of the '521 patent.

E. Post-Trial Motions

1. *Enhanced Damages*

The district court acknowledged the jury found Ardagh ““especially worthy of punishment,”” Appx32, but declined to enhance damages. Citing the nine factors in *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 826-27 (Fed. Cir. 1992), the court found that “[o]nly three factors [favor] enhancement,” four “disfavor enhancement,” and two factors “are essentially neutral.” Appx31; Appx35.

2. *JMOL*

The district court denied Ardagh's request for a new trial and for judgment as a matter of law. Appx9-20. The court found the "exhibits, facts, and expert testimony" supporting infringement sufficient. Appx16.

On invalidity, the court found that Ardagh "did not, and cannot, prove anticipation for six distinct reasons." Appx20. Among them:

- Ardagh offered insufficient proof that its supposed pre-1994 batch records showed the use of mixed-color cullet;
- Ardagh's expert ignored another claim limitation; and
- Ardagh's process was secret.

Appx20-21.

On obviousness, Ardagh's evidence "regarding Duckett ... was conclusory." Appx24. The court did not address any combination of Duckett and Ardagh's prior process, as Ardagh had not raised it. Appx14; Appx6427-6429. And the court found "that substantial evidence support[ed]" the jury's award of \$50,313,779.04. Appx27.

SUMMARY OF ARGUMENT

I. The district court correctly construed "unsorted mixed color cullet." The patent defines "mixed color cullet" as "broken pieces of glass of mixed colors." Appx139, 1:13-14. Ardagh does not contend otherwise. As the district court observed, the "patent uses the phrase 'unsorted mixed color cullet' and

‘mixed color cullet’ interchangeably.” Appx43. Indeed, Ardagh initially “agree[d] that ‘unsorted mixed color glass cullet’ and ‘mixed color glass cullet’ and variations thereof *mean the same thing.*” Appx4064 (emphasis added). It was proper for the court to construe both phrases the same way—as “broken pieces of glass of mixed colors.”

The specification uses “mixed color cullet” and “unsorted mixed color cullet” interchangeably. The abstract, for example, describes “mixed color cullet” when discussing amber bottles but switches to “unsorted mixed color cullet” a sentence later to describe making green bottles. That would make no sense unless the phrases mean the same thing.

II. The jury’s infringement verdict is amply supported by the record. Ardagh urges that it did not “selectively decolorize a color of the cullet.” Ardagh seems to construe that limitation as requiring the process to decolorize only molecules originating in cullet, and not other things in the molten mix that becomes glass. That makes grammatical hash of the limitation, which requires selectively decolorizing “a color” of the cullet—not selectively decolorizing cullet. Ardagh’s proposed construction is also scientifically impossible. Overwhelming batch-by-batch evidence from Ardagh’s own records, and the accompanying expert testimony, showed that Ardagh selectively decolorized a color of the cullet.

Ardagh's corporate representative testified that Ardagh practiced the limitation. Ardagh itself argued that it practiced each limitation in its invalidity case.

III. Ardagh does not show that every reasonable juror would be compelled to find that it proved invalidity through its own alleged prior, public use. There was ample evidence that Ardagh started using the patented method only after it learned of Green Mountain's invention. Ardagh's contrary evidence was thin and unpersuasive. And evidence showed that, whatever Ardagh's prior process, it was secret. Ardagh's obviousness argument—combining the Duckett reference with Ardagh's supposed prior use—is waived. Ardagh did not raise it under Rule 50(a) or 50(b). Its expert's testimony concerning Duckett was “conclusory.” And it fails to establish claim elements and motivation to combine.

IV. The damages verdict, which awarded a royalty halfway between what each party proposed, is well supported. The parties' respective royalty bases were virtually identical. There was more than sufficient evidence—including documents relied on by Ardagh at trial—to support the jury's royalty rate.

ARGUMENT

I. THE DISTRICT COURT CORRECTLY CONSTRUED “UNSORTED MIXED COLOR CULLET”

The district court properly construed “unsorted mixed colored cullet” as “broken pieces of glass of mixed colors.” Appx41; Appx70. Ardagh argues (at 19-25) that the court erred by giving “unsorted mixed colored cullet” and “mixed

colored cullet” the same meaning. But Ardagh conceded below that they are one and the same. “[U]nsorted mixed color glass cullet’ and ‘mixed color glass cullet’ and variations thereof,” it declared “*mean the same thing.*” Appx4064 (emphasis added). Every source of claim meaning—“the claim language, specification, and prosecution history,” *MasterMine Software, Inc. v. Microsoft Corp.*, 874 F.3d 1307, 1312 (Fed. Cir. 2017)—supports that construction.

The phrase “unsorted mixed color cullet” is naturally understood to encompass jumbled mixtures of different-colored glass shards. And, as the district court observed, the “patent uses the phrase ‘unsorted mixed color cullet’ and ‘mixed color cullet’ interchangeably.” Appx41. Ardagh’s contrary construction makes no sense. Ardagh construes “even imperfectly color sorted glass—glass that has undergone some type of color sorting, albeit to little or no avail— . . . as colored sorted glass.” Appx44. But a jumble of mixed-color glass shards—no matter how they came to be mixed—are not “sorted.” No observer looking at the jumbled colors would pronounce them sorted. *See, e.g.*, Appx5897. Ardagh’s construction, moreover, contradicts the prosecution history Ardagh invokes. That history and multiple embodiments make clear that the invention *targets* cullet that, despite sorting efforts, still includes significant foreign colors.

A. The Court’s Construction Is Compelled by the Claims and Specification—and Ardagh’s Concession

There is no dispute about the meaning of “mixed color cullet.” A “patentee’s ‘use of “*i.e.*” signals an intent to define the word to which it refers.’” *SkinMedica, Inc. v. Histogen Inc.*, 727 F.3d 1187, 1195 (Fed. Cir. 2013). The ’737 patent uses precisely such an “‘*i.e.*’ signal[.]” to define “mixed color cullet” as “broken pieces of glass of mixed colors and types.” The patented methods and components, it explains, transform “mixed color cullet glass (*i.e.*, broken pieces of glass of mixed colors and types)” into usable glass products. Appx139, 1:13-15. The district court thus properly construed “mixed color cullet” to “mean ‘broken pieces of glass of mixed colors.’” Appx39.

1. Ardagh nowhere challenges that construction. Instead, Ardagh argues that the district court was required to give “unsorted mixed color cullet” a different and “narrower scope.” Ardagh Br. 19. Treating “unsorted mixed color cullet” and “mixed color cullet” as interchangeable, Ardagh contends, accords the word “unsorted” “no meaning” and renders it “superfluous.” *Id.* at 19, 20, 23-25.

Ardagh argued the opposite to the district court: It agreed that “‘unsorted mixed color glass cullet’ and ‘mixed color glass cullet’ and variations thereof *mean the same thing.*” Appx4064 (emphasis added). When asked to provide a construction for “mixed color cullet,” Ardagh responded: “*See Claim Construction provided for ‘unsorted mixed color glass cullet,’ supra.*” Appx4004. Thus,

Ardagh has agreed that “unsorted mixed color cullet” means the same thing as “mixed color cullet”—“*i.e.*, broken pieces of glass of mixed colors.” Ardagh attempted to change its tune just before trial. Appx4115. Having previously invited the district court to construe the phrases identically, however, it cannot challenge the court’s decision to do so as error. *Key Pharms. v. Hercon Labs. Corp.*, 161 F.3d 709, 715 (Fed. Cir. 1998) (party cannot “assert[] as ‘error’ a position that it had advocated”).

2. Ardagh’s concession was warranted. The claims and specification are the surest guide to the meaning of claim terms. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314-15 (Fed. Cir. 2005) (en banc). In construing a patent, “different phrases . . . may be construed identically” when “neither the plain meaning nor the patent itself commands a difference in scope.” *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (construing “contacting” and “directly contacting” identically); *Bid for Position, LLC v. AOL LLC*, 601 F.3d 1311, 1317 (Fed. Cir. 2010) (construing “bid” and “value of the bid” interchangeably).

Here, the patent uses “mixed color” cullet and “unsorted mixed color” cullet interchangeably. For example, independent claim 1 recites “obtaining ***unsorted mixed color glass cullet.***” Appx142, 7:42-43 (emphasis added). But dependent claim 2 recites the “method as in claim 1, wherein said obtaining step comprises

the step of obtaining *mixed color cullet*” with specified characteristics. *Id.* at 7:56 (emphasis added). Independent claim 9 and dependent claim 11, along with independent claim 18 and dependent claim 20, repeat that pattern. In each, the independent claim recites “unsorted mixed color cullet,” while the dependent claim uses the synonym “mixed color cullet.” Appx142-143, 7:55-56, 8:16-17, 8:33-34, 8:63-64, 9:17-18. Even within independent claims, “unsorted mixed color cullet” and “mixed color cullet” are used interchangeably. Claim 1 uses “unsorted mixed cullet” three times, Appx142, 7:41, 7:46, 7:48, and “mixed color glass cullet” three times, *id.* at 7:43, 7:50, 7:54, in no apparent order.

The specification is clearer still. The “summary of the invention,” which describes nearly identical applications of the invention, begins: “It is an object of the invention to provide a method of producing one color homogenous glass from *mixed colored cullet* glasses.” Appx140, 3:47-50 (emphasis added). It thus starts with “mixed colored cullet”—not “unsorted” cullet. The summary then states that it is “another object of the invention to decolorize the green component in *mixed color cullet* . . . for use in the manufacture of amber colored glass.” *Id.* at 3:50-61. Again, “mixed colored cullet”—not “unsorted” cullet. It then declares, in the next sentence: “Alternatively, the amber colored glass in *the unsorted* mixed color cullet may be decolorized” for use in making “green colored glass.” *Id.* (emphasis added). Ardagh never explains why, if “mixed color cullet” and “unsorted mixed

color cullet” are different inputs, the earlier object of making amber glass, by decolorizing green, would invoke “mixed color cullet,” but making green glass, by decolorizing amber, would suddenly require the supposedly different input of “unsorted mixed color cullet.” To state the interpretation is to reveal its absurdity.

The patent’s abstract—“a potentially helpful source of intrinsic evidence” as “to the meaning of claims,” *Hill-Rom Co. v. Kinetic Concepts, Inc.*, 209 F.3d 1337, 1341 (Fed. Cir. 2000)—makes that equally clear. The first two sentences use “mixed color cullet” four times to describe making amber bottles using the invention. Appx138. The third sentence then states that the “technique of the invention is also used to produce recycled green or flint glass from *unsorted* mixed colored cullet glass.” *Id.* (emphasis added). If Ardagh’s argument were correct, the abstract begins by specifying ordinary mixed-color cullet to make amber bottles, but shifts to the supposedly different “unsorted mixed-color cullet” to make green or clear bottles. That is incoherent. “[M]ixed color cullet” and “unsorted mixed color cullet” mean the same thing—as Ardagh previously conceded.

The title of the patent, moreover, is “method of recycling mixed colored cullet.” Appx138. The specification regularly refers to the invention as a method for transforming “mixed color cullet” into glass. The detailed description of the invention speaks of obtaining, transforming, and using “mixed colored cullet” no

fewer than 31 times in the span of 15 paragraphs.³ It would make no sense to construe the object of the patent’s independent claims—“unsorted mixed color cullet”—as anything but the “mixed color cullet” referenced throughout.

3. Ardagh cannot explain away the patent’s interchangeable use of “unsorted mixed color cullet” and “mixed color cullet.” Ardagh asserts that any reference to “*the*” or “*said* mixed color glass cullet,” after earlier mention of “unsorted mixed color glass cullet,” signals an intent to reference (and incorporate limitations from) the prior phrase. Ardagh Br. 25-26. In Ardagh’s words, the subsequent use of “the” or “said” “refer back to the ‘unsorted mixed color cullet.’” *Id.* Ardagh thus suggests that, in those contexts, “unsorted mixed color glass cullet” and “mixed color glass cullet” mean the same thing—not that they are different.

Regardless, Ardagh’s effort to invoke use of “the” and “said” to incorporate a prior mention of “unsorted” here (or “red” in the case of apples, Ardagh Br. 26), ignores the dependent claims and specification. Dependent claim 2 does not first

³ See Appx138, Abstract (“Mixed colored cullet glass . . . is recycled”; “selectively decolorized from the mixed colored cullet”; “the mixed colored cullet may be colorized”; “rendering the decolorized mixed colored cullet”); Appx139, 1:16-17 (“According to a preferred aspect . . . mixed color cullet is admixed”), 2:1-5, 2:10-11 (“re-using mixed colored glass”), 2:13-17 (“selectively to colorize and/or decolorize one of the colors in the mixed colored cullet”); Appx140, 3:29-32 (“It is an aspect of the present invention that mixed color cullet . . . is . . .”), 4:12-13 (“a quantity of mixed colored cullet glass is provided”); Appx141, 5:7-8 (“ . . . amber colored glass . . . is produced from the mixed colored cullet”), 6:59-63 (similar).

recite “unsorted mixed color cullet” and later reference “the” or “said” “mixed color cullet.” It recites “obtaining mixed color cullet” of particular hues—*sans* a “the” or “said” antecedent. Appx142, 7:55-57. The same is true of claims 11 and 20. Appx142-143, 8:33-35, 9:16-18. The absence of “the” or “said” before “mixed color cullet” in those dependent claims, purportedly to refer back to and incorporate “unsorted” from the phrase “unsorted mixed color cullet,” refutes Ardagh’s argument and shows that “mixed color cullet” is its synonym. Ardagh’s argument is premised on a misreading of the claim language.

Ardagh’s theory also defies the specification. Without the word “unsorted” having yet appeared in the patent, the abstract begins by describing the use of “mixed color cullet” to make amber glass. *See* p. 28, *supra*; Appx138. Its first two sentences describe “[m]ixed colored cullet” four times; there is no “the” or “said” that incorporates some prior mention of the allegedly narrowing term “unsorted.” Appx138. There is no prior mention of “unsorted” at all. That term does not appear until the abstract’s third sentence, which uses “unsorted mixed color cullet” as a synonym for “mixed color cullet” to describe making green glass. *Id.*

Similarly, the summary of the invention begins with “mixed colored cullet.” It does not say “the” or “said.” *See* pp. 27-28, *supra*. Only later in the paragraph is the phrase “the unsorted mixed colored cullet” used—and it is used as a

synonym for “mixed color cullet.” Appx140, 3:59. Ardagh offers no answer to those interchangeable uses of the phrases.

The canon that “different words or phrases” receive different meanings “is not inflexible.” *Power Mosfet*, 378 F.3d at 1409-10. It does not “supersede[] all other principles of claim construction.” *SimpleAir, Inc. v. Sony Ericsson Mobile Commc’ns AB*, 820 F.3d 419, 429 (Fed. Cir. 2016). This Court reads claim terms “in view of the specification, of which they are a part.” *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014).

Here, the specification expressly defines “mixed colored cullet” as “broken pieces of glass of mixed colors.” The specification uses the term “unsorted mixed glass cullet” interchangeably with “mixed glass cullet.” Ardagh conceded that equivalence early on. The district court did not err in giving the same construction. Ardagh’s contrary view, that “unsorted mixed cullet” is different from “mixed cullet,” makes nonsense of the abstract and the summary of invention alike. As the district court observed, “[t]here is nothing in the patent that supports Ardagh’s construction.” Appx44.

B. Ardagh’s Construction Defies the Patent, Its Embodiments, and Prosecution History Alike

Ardagh’s challenge fails for a second reason: Its construction defies the patent and its history. According to Ardagh, “unsorted mixed color cullet” means cullet that “has not been sorted for color at all” or was “never sorted for color.”

Appx42; *see* Ardagh Br. 20 (“not sorted for color”). As the district court observed, Ardagh insists that even *unsuccessfully* sorted glass, which “has undergone some type of color sorting, *albeit to little or no avail*,” is “color sorted glass.” Appx42 (emphasis added). In Ardagh’s view, even “[c]hanging the mix” of colors—by plucking out some pieces without *sorting* the cullet into different colors—makes a jumbled mixture into “sorted” cullet. Ardagh Br. 20.

1. Ardagh cites *nothing*—no claim, no specification passage, no exhibit—to support that construction. Ardagh identifies no intrinsic source defining “sorted” to encompass a disorganized jumble of different-colored shards. Ardagh cites nothing for the proposition that such a jumbled pile counts as “sorted” whenever something “[c]hange[d] the mix.” It identifies nothing that would permit one skilled in the art to distinguish such “unsorted” “broken pieces of glass of mixed colors” from the supposedly very different input of “mixed color cullet” (they would look identical, because they are identical). Nor does Ardagh suggest that such a mixture of colored shards could be converted to commercially acceptable bottles *without* the invention. Ardagh expressed interest in, experimented with, and then copied the patented process because it made such mixtures usable.

For claim construction, the “plain claim language marks the starting point,” *Sumitomo Dainippon Pharma Co. v. Emcure Pharms. Ltd.*, 887 F.3d 1153, 1157

(Fed. Cir. 2018), and words are given meaning “in the context of the claim and the whole patent document,” *Atlas IP, LLC v. Medtronic, Inc.*, 809 F.3d 599, 605 (Fed. Cir. 2015). This Court has thus rejected “heavy reliance on the dictionary divorced from the intrinsic evidence.” *See Phillips*, 415 F.3d at 1321. Yet Ardagh proposes precisely such an acontextual, dictionary-style approach to construing “unsorted mixed color cullet” (for which Ardagh cites no dictionary). Ardagh’s effort to construe “unsorted mixed color glass” as different from “mixed color glass”—and to deem jumbled piles of mixed-colored shards as “sorted”—makes nonsense of the claims and specification alike.

2. Ardagh’s construction defies two further principles. First, under Ardagh’s construction, infringement does not depend on the cullet’s present character or condition (whether it is a jumbled mixture or color-segregated). It depends instead on what happened to the cullet in the past—whether it was subjected to a process Ardagh characterizes as sorting. This Court resists such constructions. Limitations that can equally connote a “structural characteristic” or “a process of manufacture are commonly and by default interpreted in their structural sense.” *3M Innovative Props. Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1371 (Fed. Cir. 2003); *see Application of Garnero*, 412 F.2d 276, 279 (C.C.P.A. 1969).

Ardagh's construction violates that principle by making infringement turn on an input's provenance—what was once *done* to cullet as opposed to its present state. Such a construction “frustrates the ability of both the patentee and potential infringers to ascertain the propriety of particular activities.” *Paragon Sols., LLC v. Timex Corp.*, 566 F.3d 1075, 1091 (Fed. Cir. 2009). Whether cullet is “unsorted mixed color cullet” should depend on its character—whether it remains a salmagundi of different-color shards—not what happened to it previously.

Second, Ardagh's construction reads out central embodiments. The specification explains that, because “sorting of smaller pieces is more difficult,” even efforts “to sort the glass by color” generate “a quantity of mixed color pieces of glass.” Appx139, 1:65-67; *see* Appx3142. An advantage of the patent was that it made those otherwise unusable materials usable. Appx3143. Ardagh's construction would exclude that embodiment—an output of sorting where the “mix” has changed—from the claims. Such a construction is “rarely, if ever, correct.” *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996). Likewise, the patent identifies an embodiment in which “glass producer waste cullet” (internal, single-color cullet) “can also be mixed.” Appx140, 4:14-16. Ardagh would call that mixture “sorted mixed color cullet” and exclude it as well. Br. 13-14.

3. As the district court observed, prosecution history “support[s] Green Mountain’s proposed construction,” Appx44, not Ardagh’s. In the prior art, “sorted amber glass[,] green glass, or flint glass”—“single-color cullet”—could be recycled under the “dilution-is-the-solution” approach. *Id.* Although some off-color pieces might remain, minimizing the quantity could make the decolorizing/colorizing process of the ’737 patent unnecessary. *See* p. 5, *supra*. But the claimed invention allows glassmakers to use significant amounts of mixed-color cullet (where “dilution is the solution” would not work) through a colorizing/decolorizing step. In other words, it makes “recycled glass in mixed colors . . . substantially as useful . . . as sorted amber glass[,] green glass, or flint glass.” Appx140, 3:40-44.

The amendment cited by Ardagh (at 21-25) resulted from the fact that, as originally filed, the patent application stated that cullet was “sort[ed] . . . by color” before being used to form new glass products. Appx3011, 2:21-23. As the district court explained, Appx44, the Examiner misunderstood that as an “admission” that “mixed color cullet is used in the glassmaking art.” Appx3040. The inventor denied making that admission. Appx3142. He inserted the term “unsorted” sporadically to correct the Examiner’s misunderstanding: “[W]hile sorted *single color* glass cullet has indeed been recycled into new glass products, the *unsorted mixed color* glass cullet has not, to Applicant’s knowledge, been recycled into new

glass products of a particular color.” *Id.* (emphasis added). Thus, the presence or absence of some “sorting” effort is not the dividing line. The line is between “sorted *single color* glass” that was “useful for the production of recycled glass containers” in the prior art (by reducing off-colors to insubstantial quantities), and the “unsorted mixed color glass” that requires use of the ’737 patent. Appx140, 3:40-44.

Indeed, the prosecution history shows that the patent specifically targets imperfectly color-sorted glass as an input “the patent seeks to utilize.” Appx44. Because sorting is “imprecise,” it generates a quantity of “mixed color pieces.” Appx3142. Despite having gone through sorting, such cullet previously could be used only “in paving materials and as land fill,” *id.*, *i.e.*, “disposed of and not recycled,” Appx3143. The inventor emphasized that the invention’s novel “decolorizing” and “colorizing” process made that product of the sorting process usable. *Id.* Thus, far from seeking to exclude glass that had been through a sorting process, the patented technique utilizes an output of sorting—“mixed glass that was unsuccessfully color sorted.” Appx42.

The Examiner understood that. Following the amendment, the Examiner used “mixed glass cullet” and “unsorted mixed color cullet” interchangeably. *See* Appx3344 (describing step in claim directed to “unsorted mixed color cullet” as “mixed glass cullet”). The specification and claims likewise use the phrases

interchangeably. The district court properly construed both to mean the same thing: “broken pieces of glass of mixed colors.” Appx39 (citing Appx139, 1:14-16).

II. THE JURY’S INFRINGEMENT VERDICT SHOULD BE AFFIRMED

The jury found that Ardagh infringed each asserted claim. Appx1. Ardagh falls well short of meeting the heavy burden of proving that “no reasonable jury” could find infringement. *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1368 (Fed. Cir. 2018).

A. The ’737 Patent Recites Selectively Decolorizing a Color of the Cullet, Not Selectively Decolorizing Cullet

Ardagh insists there is no evidence it uses decolorizers to “selectively decolorize[] at least one of the colors of said unsorted mixed color glass cullet.” Br. 28 (citing Appx142, 7:44-49). But Ardagh’s argument rests on a peculiar construction of the “selectively” limitation. Ardagh insists there is no selective decolorization unless the decolorizer acts on the cullet *alone*, as opposed to acting on the entire molten glass mixture. Ardagh’s expert insisted that the decolorizer must “decolorize *the cullet*” and not “address color wherever it shows up in the batch.” Appx2067 (emphasis added); *see* Appx1155-1156 (“we . . . use decolorizer on the whole thing, use colorizer on the whole thing”). Reprising that contention, Ardagh insists (at 29) that its decolorizers act by “decolorizing a color in the batch as a whole.”

Ardagh, however, never asked for that construction—that decolorizers must act solely on cullet and not on other ingredients in the batch—below. It “cannot reserve a new claim-construction argument for [its] post-trial motion[s]” or appeal. *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 894 F.3d 1258, 1266 (Fed. Cir. 2018). As a result, “the only question is one of substantial evidence.” *Asetek Danmark A/S v. CMI USA Inc.*, 852 F.3d 1352, 1359 (Fed. Cir. 2017). The claim and charge by their terms require “a decolorizing agent which selectively decolorizes at least ***one of the colors of*** said unsorted mixed color glass cullet.” Appx142, 7:45-47 (emphasis added). In that phrase, the object that must be “selectively decolorize[d]” is “at least one of the colors.” The next phrase, “of said . . . cullet,” specifies that the decolorized color must be a color “of the cullet.” The “color” thus is the thing that is selectively decolorized. The phrase “of said cullet” tells the reader which color (a color of the cullet).

Ardagh’s argument that it did not decolorize only “the cullet” rewrites “selectively decolorize ***a color of*** the cullet” to mean “selectively decolorize pieces (or molecules) of glass from the cullet only, without decolorizing anything that originates elsewhere.” The claims will not bear that construction. As Green Mountain’s expert explained, the claims address selectively decolorizing “a ***color of the cullet***”—“we are decolorizing color.” Appx1415 (emphasis added). There

is no requirement that the decolorization somehow selectively decolorizes only materials originating in cullet.

As Green Mountain’s expert explained, moreover, Ardagh’s reading is impossible “as a matter of glass science.” Appx1415. Colorizers and decolorizers act on molten, not solid, glass. *Id.* Once the cullet is melted together with other ingredients, “[t]he glass cullet is gone.” *Id.*; see Appx141, 5:65-67 (“In the method of the invention, the mixed colored cullet is melted into the molten glass batch, forming a homogenous mixture.”). In that undifferentiated molten mass, the decolorizer acts on the whole batch. As a scientific matter, it cannot seek out molecules that originated in cullet so as to act on them alone. Appx1425-Appx1426.⁴ Claim 18—which requires the batch to include both mixed-color cullet and virgin raw material—thus describes the ultimate end-product as “a recycled glass product . . . from the selectively colored/decolorized **virgin batch mixture**”—not decolorized cullet. Appx143, 9:10-12 (emphasis added). Because Ardagh’s theory would render the claims inoperable—and defies claim 18—it cannot be accepted. *Power Integrations*, 894 F.3d at 1265.

⁴ Ardagh’s effort to avoid infringement by arguing that its decolorizers do more than the patent requires—decolorizing “a color of the cullet” in the whole batch—is particularly inappropriate given the ’737 patent’s use of “compris[ing]” in the claims. See, e.g., Appx142, 7:39-47; *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 811 (Fed. Cir. 1999); Appx68 (instructions).

B. The Evidence of Infringement Was Overwhelming

The evidence of infringement was overwhelming. Ardagh's witnesses and counsel effectively admitted infringement. Indeed, Ardagh's *position* was that it practiced the invention. It merely claimed to have done so for a longer period— from before 1995—than the jury accepted.

1. Ardagh insists (at 27-34) it did not practice the selective-decolorization limitation. But its corporate representative, James Keener, conceded each limitation, one by one. Pp. 14-15, *supra* (quoting Appx1711-1712). He specifically admitted that Ardagh selectively decolorizes colors of the cullet:

Q. Are Ardagh's colorizers and decolorizers [*sic*] to that mixture *to selectively colorize or decolorize one of the colors of the cullet* so that the bottle is the desired color?

A. Yes.

Appx1712:5-9 (emphasis added). Keener agreed that Ardagh “practiced every limitation of the '737 Patent's independent claims.” Appx15 (citing Appx1711:22-Appx1712:20). Obviously, “[b]ased on this testimony, a reasonable jury could have concluded that” Ardagh infringes. *See Power Integrations*, 894 F.3d at 1267.

Ardagh points to a different, final question that was found objectionable: whether Mr. Keener realized he had just “proven infringement.” Ardagh Br. 32-33 (citing Appx1712:21-22). But Ardagh never objected to the earlier questions and admissions quoted above. Any objection to those is doubly waived. *See Gov't of*

Virgin Islands v. Archibald, 987 F.2d 180, 184 (3d. Cir. 1993); *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1319 (Fed. Cir. 2006) (matters “not raised in the opening brief are waived”). Even with respect to the one objected-to question, Ardagh sought and received curative instructions. Appx1713-1714. The district court found the instructions “sufficed to adequately ameliorate” any impropriety, Appx16—a ruling Ardagh nowhere challenges.

Ardagh also ignores its expert’s concession that Ardagh practices each limitation. *See* p. 46 n.6, *infra*. It does not address the 2003 internal Ardagh email declaring that it “would not seek a license on any color control technology” from Green Mountain “because we are already doing it.” Appx6016; Appx6551. It ignores emails showing that Ardagh used cuprous oxide—a decolorizer—to decolorize the green color of mixed cullet. Appx4291; Appx6017. And Ardagh employees told Green Mountain that Ardagh had been using mixed-color cullet with decolorizers since 1997 or 1998. Appx1201-1202; pp. 9-10, *supra*.⁵ Ardagh cannot dismiss those admissions as “hearsay.” Br. 33. No hearsay objection was raised, with reason: Party admissions are not hearsay. Fed. R. Evid. 801(d)(2).

2. Expert testimony and examination of Ardagh’s batch records confirm that Ardagh selectively decolorized a color of the cullet, as the claims require.

⁵ To the extent Ardagh urges (at 34) that testimony concerned colorizer, the patent (Appx139, 2:47-51) and testimony (Appx1416:2-6; Appx1349:1-3) identify copper or cuprous oxide as a “decolorizer” that masks green.

Green Mountain’s expert, Dr. Martin, testified that *all* of Ardagh’s “foreign” (*i.e.*, purchased) cullet contained green, amber, and flint glass—as proven by Ardagh’s own color specifications, Appx1407-1408; “very detailed records,” Appx1408; “cullet quality manager” testimony that “amber cullet purchase[d] by [his] plant was composed of . . . mixed colors,” Appx1410; and internal presentations detailing use of “[m]ixed color cullet” “contain[ing] a mixture of flint, amber[,] and green glass,” Appx5703. *See* Appx1408-1409. Even when labelled “amber,” foreign cullet was mixed-color cullet in “every instance.” Appx1407.

Dr. Martin explained that batch records showed that, for each relevant batch, Ardagh used a decolorizer to remove a color of the mixed-color cullet. Appx1419-1423; Appx6331. For example, Dr. Martin explained that, on December 16, 2009, Ardagh’s Milford 16 furnace used “Foreign Amber” cullet, Appx1412-1413; Appx4596; Appx6339 (summarizing Jan.-Dec. 2009 date-range), which includes green, amber, and flint glass, p. 4, *supra*; Appx1421 (“amber [foreign] . . . is a mixed color cullet . . . a mixture of three colors”). For that batch, Ardagh added iron oxide and cuprous oxide, which act as “a *color specific* sunshade” that selectively “blocks the green color,” for producing amber glass, Appx1414 (emphasis added).

| | A | B | C | BQ |
|----|----------------------|---------------|------------------|------------------|
| 1 | Milford 16 | | Color: | AM |
| 2 | | | Batch ID: | 605Amber16 |
| 3 | | | Batch Date: | 12/16/2009 |
| 4 | | | Batch Time: | 8:00 AM |
| 5 | | | Reason: | Color adjustment |
| 6 | | | | |
| 7 | Raw Materials | | Supplier | |
| 20 | | Cuprous Oxide | Amer. Chem. | 2.9 |
| 21 | | Selenium | Keaney Min. | |
| 22 | | Iron Oxide | Ironics | 15.4 |
| 23 | | Iron Pyrites | Calumite | |
| 24 | | Decolor Mix | 300 Carbon/50 Se | |
| 25 | | Decolor Mix | 240 Carbon/50 Se | |
| 26 | | | | |
| 27 | | Cullet | Flint Internal | |
| 28 | | Cullet | Flint Foreign | |
| 29 | | Cullet | Amber Foreign | 4000 |
| 30 | | Cullet | Amber Internal | 5800 |

Appx4596 (excerpted and highlighted); *see* Appx6339 (summarizing).

Conversely, Ardagh’s Seattle 2 batch from December 29, 2013, used “Gramer 70/30” cullet (which again includes green, amber, and flint). Appx4640; Appx4670; Appx6355. For that batch, Ardagh added cobalt oxide, which “walks [*sic*] off the long wavelength re[d]”—blocking or masking amber from the mixed cullet—to produce green glass. Appx1429.

| | A | B | C | EA |
|-----|----------------------|--------|----------------------------|------------------|
| 1 | Seattle 2 | | Color: | CH |
| 2 | | | Batch ID: | SEA02CH122913 |
| 3 | | | Batch Date: | 12/29/13 |
| 4 | | | Batch Time: | 5:00 PM |
| 5 | | | Reason: | Color Adjustment |
| 6 | | | | HL |
| 7 | Raw Materials | | Supplier | |
| 25 | | Cullet | Internal DLG | |
| 26 | | Cullet | Gramber 70/30 | 5000 |
| 27 | | Cullet | Processed Flint / Amber | |
| 28 | | Cullet | Int EG blend (50/50) | |
| 29 | | Cullet | Internal DLG/Processed Ar | 1500 |
| 30 | | Cullet | Internal CHG / PTB / AT | 3000 |
| 31 | | Cullet | Internal EG/ATG/Skyy | 200 |
| 98 | | | Concentration (ppm) | |
| 99 | | | Colorants | |
| 100 | | | MnO | 0 |
| 101 | | | Cr2O3 | 2466 |
| 102 | | | Co3O4 | 10 |
| 103 | | | NiO | 0 |

Appx4640 and Appx4670 (excerpted and highlighted); see Appx6355 (summarizing). Dr. Martin explained that every batch reflects that same correspondence—foreign cullet with an unwanted color, combined with a decolorizer that selectively removes that color of the cullet. Appx1419-1423; Appx6331-6364 (summarizing). When asked whether “all of the accused batches practice the colorizing and/or decolorizing step,” Dr. Martin answered: “Yes, they very much do.” Appx1423.

Ardagh invokes Dr. Martin’s statement that decolorizing “has nothing to do with the cullet.” Br. 30. But he was merely responding to Ardagh’s chemically and grammatically impossible argument that “the decolorizing agent must selectively *act only on the cullet* in the furnace”—*i.e.*, that somehow decolorizer

must act only on molecules originating with cullet. Appx1415 (emphasis added). That fails for the reasons above. The decolorizer must be selective as to “color,” not cullet. *See pp. 38-39, supra.*

Ardagh misses in declaring (at 30) that Dr. Martin did not consider whether the color was “in the glass cullet . . . [or a color] in the glass batch as a whole.” Decolorization takes place in the batch, after cullet and raw materials are melted together. Appx1426. Consequently, the targeted color “of the cullet” (from colored shards “in the glass cullet”) is necessarily “in the batch.” Dr. Martin understood that the claim “talks about the undesired color *of the mixed color cullet*,” Appx1535 (emphasis added); explained how Ardagh used a decolorizer to selectively decolorize the undesired *color of the cullet* for each accused batch, pp. 42-44, *supra*; Appx6331-6364; and thus explained that the selectively decolorizing limitation was satisfied, Appx1422-1424; *see* Appx15 & n.7. That testimony, the batch records, Ardagh’s admissions, documents, and concessions of Ardagh employees amply support the verdict.

3. Ultimately, Ardagh’s counsel conceded that Ardagh practiced the claims. Ardagh argued that the ’737 patent is invalid *because Ardagh practiced the claimed invention*, supposedly before the 1995 priority date. Appx2326 (“[W]e did it first.”); Appx2335 (“[W]e were doing the major elements of

[plaintiffs’ process] before they were.”). Its expert conceded as much.⁶ The district court warned Ardagh that its “defense of anticipation based on [its alleged] prior public use” threatened to establish infringement at trial. Appx1762. The jury was free to accept Ardagh’s concession that it practiced the patented process, without accepting Ardagh’s further position that it started before 1995. Indeed, as explained below (at 47-52), the evidence showed that Ardagh began practicing the invention after the 1995 priority date.

III. THE JURY WAS NOT COMPELLED TO FIND THAT ARDAGH PROVED INVALIDITY BY CLEAR-AND-CONVINCING EVIDENCE

A. The Jury Could Properly Find Ardagh Failed To Clearly and Convincingly Prove Anticipation Through Prior Public Use

Ardagh attempts to retry its failed contention that it publicly practiced the invention before the patent’s 1995 priority date. “Anticipation is a question of fact.” *Minn. Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1301 (Fed. Cir. 2002). This Court “presume[s] the jury resolved underlying factual disputes in favor of the verdict winner.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047 (Fed. Cir. 2016) (en banc). Ardagh, moreover, had the burden of proving invalidating prior use by clear-and-convincing evidence. *Id.* “JMOL in favor of” such a party “may be granted only where (1) the movant ‘has established [its] case

⁶ Dr. Carty testified that Ardagh practiced every limitation of claims 1 and 18, except his agrammatical and chemically impossible view of “selectively.” Appx2073-2085.

by evidence that the jury would not be at liberty to disbelieve’ and (2) ‘the only reasonable conclusion is in [the movant’s] favor.’” *Nobelpharma AB v. Implant Innovations, Inc.*, 141 F.3d 1059, 1065 (Fed. Cir. 1998). The district court properly found Ardagh failed in its burden for “six distinct reasons.” Appx20.

1. *Ardagh’s Contention That It Practiced the Invention Before the Priority Date*

Ardagh insists that it practiced the invention before the 1995 priority date. As the district court found, however, there was “more than sufficient” reason “for a reasonable jury to reject” Ardagh’s position. Appx21. For example:

- In a 1999 meeting, one Ardagh employee said Ardagh had been using decolorizers with mixed-color cullet for “about a year” (*i.e.*, since 1998—three years *after* the ’737 patent’s priority date). Appx1201-1202.
- At that meeting, Ardagh’s Manager of Glass Technology interjected that Ardagh had been using mixed-color cullet with decolorizers for “closer to two years” (*i.e.*, 1997—two years after the priority date). Appx4540; Appx1201-1202.
- An internal Ardagh email states that Ardagh has used mixed-color cullet with decolorizers “since 1996”—one year after the priority date. Appx4291; Appx1796.
- Ardagh’s trade association agreed that, as of 1994, mixed-color cullet could not be used: “Glass manufacturers require cullet that’s separated by color—clear, amber or green.” Appx2125; Appx6373; Appx1798-1799.

See also Appx2125-2126 (Ardagh’s expert admitting that 1993 newspaper article, Appx6322, stated that “mixed color cullet is a big problem . . . for a material that is

otherwise easily recyclable”).

Indeed, when Ardagh’s then-Senior Vice President of Technical Services, Roger Erb, learned of Green Mountain’s invention months after the priority date, he declared that, if Green Mountain “could take 50% Green Glass and 50% Amber Glass and successfully make Amber Glass,” that “would impress [me]!” Appx4479. That would be inexplicable if Ardagh was practicing the invention already. So would the decision to have his team draft technical questions about how to implement the invention. Appx19; Appx5683. Nor would he have sent a letter to Ardagh scientists “ask[ing] to initiate” a test of “whether or not [Ardagh] could utilize more three-color mixed color in our batches” by adding decolorizers and colorizers (as the patent specified). Pp. 8-9, *supra*; Appx4481. A reasonable juror could easily find Ardagh did not meet its clear-and-convincing burden.

Ardagh insists (at 37-40) that the ’737 patent is anticipated because some mixed-color cullet could be used in the prior art, and the ’737 patent contains no “limitation on the amount of cullet used,” Br. 39. That is insufficient: “Anticipation requires a showing that each element of the claim at issue, properly construed, is found in a *single* prior art reference.” *Zenith Elecs. Corp v. PDI Comm’n Sys., Inc.*, 522 F.3d 1348, 1363 (Fed. Cir. 2008) (emphasis added). While Ardagh asserts that mixed-color cullet was used, it points to no reference disclosing the elements of the method disclosed in the ’737 patent. Besides, the

jury was not required to accept Ardagh's supposed proof—especially given the contrary evidence and factual disputes.⁷

Ardagh's evidence was highly suspect. It invokes (at 40-42) testimony of suppliers and Ardagh employees. But “oral testimony . . . [of] prior knowledge or use . . . must be regarded with suspicion and subjected to close scrutiny.” *Carella v. Starlight Archery & Pro Line Co.*, 804 F.2d 135, 138 (Fed. Cir. 1986). The jury was not required to accept such suspect testimony, particularly when contradicted by the evidence above.

Even if Ardagh kept some quantity of mixed-color cullet and decolorizers in its plant, Ardagh Br. 47, that does not prove that Ardagh combined the elements in the manner required by the '737 patent. Despite access to batch records and documents from three other manufacturers, Ardagh's expert invoked none of them as anticipating. Appx2130-2132; Appx2134. Ardagh thus insists that it alone practiced the patented method before 1995—with none of the required corroboration. *See Juicy Whip, Inc. v. Orange Bang, Inc.*, 292 F.3d 728, 737-38

⁷ For example, Ardagh asserts that Dr. Carty testified about a 1949 Popular Science article—not introduced into evidence—in which “the amount of mixed color cullet used in 1949 was 40%.” Ardagh Br. 39 (citing Appx2060). But the 40-percent figure was a theoretical maximum; supposedly “*up to* 40 percent *cullet* can be used.” Appx2060 (emphasis added). And Dr. Carty conceded that, according to the article, the technique still required “hand sorting.” *Id.* Nothing compelled the jury to accept that article as anticipating.

(Fed. Cir. 2002) (“Generally, oral testimony of prior public use must be corroborated”).

Ardagh’s expert identified only one batch record—DX-16 (Appx3460-3479)—to support his contention that Ardagh used mixed-color cullet before 1995. Appx2127-2129. Even apart from its dubious origins—it was part of a file dated **1996**, containing **1996** batches, in a mysterious file tab labeled “old,” Appx6627 (screenshot showing tab); *see* Appx6621-6628 (other DX-16 tabs); Appx1884-1908—the district court explained why that was insufficient. First, “Dr. Carty admitted that [DX-16] does not explicitly disclose mixed color cullet.” Appx20. Dr. Carty “assumed” the cullet was mixed-color. Appx2078-2079; Appx2127-2129. Second, Dr. Carty admitted his assumption rested on an incorrect premise. Appx21.⁸ Third, Dr. Carty “admitted on direct examination that he predicated his anticipating opinions on ignoring the ‘selectivity limitation.’” Appx20. Anticipation that omits a limitation is not anticipation. *Zenith*, 522 F.3d at 1363.

Moreover, chemical analysis proved the cullet in DX-16 was not mixed-color cullet. Dr. Carty testified that “chemical analysis” could determine whether

⁸ Dr. Carty assumed the cullet in DX-16 was foreign (and thus mixed color) because he thought Ardagh could use a maximum of 10% internal (and thus single-color) cullet. DX-16 showed 40% cullet in some batches, and therefore Dr. Carty **assumed** it was mixed-color, foreign cullet. Appx2078. But Dr. Carty admitted that other records showed Ardagh using **internal** cullet as more than **half** of the inputs in a batch. Appx2130; Appx4587 (showing roughly 50% internal cullet in batch). Consequently, his basis for assuming the cullet was mixed was unfounded.

mixed-color cullet had been used. Appx2088. “Chrome comes from green,” so if “there is chrome in that chemistry in an amber bottle . . . you will know that mixed color cullet” had “been used to make that bottle.” Appx2088-2089; *accord* Appx2135. But Dr. Carty conceded that Ardagh’s own chemical-analysis records for amber bottles from the same plant as DX-16, during that same time frame, *showed no chrome*. Appx2146-2152; *see* Appx6381. That refuted his assumption that mixed-color cullet—which typically includes green, Appx5704; Appx1409; pp. 41-42, *supra*—was actually used. Appx2146-2147; *see also* Appx6381. Particularly given the contrary evidence, pp. 47-50, *supra*, the jury was not required to find that Ardagh used the claimed process before the priority date.

Ardagh did not merely fail to meet its burden; its own witnesses disproved its prior-use defense. When a witness is not credible, a jury may infer “not only that the witness’ testimony is not true, but that the truth is the opposite.” *Dyer v. MacDougall*, 201 F.2d 265, 269 (2d Cir. 1952); *see NLRB v. Walton Mfg. Co.*, 369 U.S. 404, 408 (1962). Here, Ardagh’s witnesses so lacked credibility that its counsel apologized for “these terrible witnesses.” Appx2332-2333. For example, while Ardagh’s expert relied on Heidi Root for Ardagh’s pre-priority-date cullet use, she denied in her deposition—played at trial—even knowing what “mixed color cullet” means. Appx1590-1591. As explained elsewhere (pp. 73-75, *infra*; *see* pp. 13-14, *supra*), Root’s colleagues were similarly evasive. Testifying about

the importance of mixed-color cullet to Ardagh, one Ardagh employee tried to explain away damaging admissions, in a document he authored, by saying “word choice, you know . . . I think I used one word, then another word.” Appx1685. Another (the cullet procurement manager) answered “I don’t know” 47 times in her deposition. She also denied, in a declaration, that Ardagh or any manufacturer used mixed-color cullet, but later recanted, professing not to know what “mixed color cullet” is. Appx1293-1297. The jury thus was entitled to “assume the truth of what [Ardagh] denie[d].” *Dyer*, 201 F.2d at 269.

2. *Ardagh’s Claimed Public Use*

“[I]n order to invalidate a patent based on prior knowledge or use, that knowledge or use must have been available to the public.” *Woodland Tr. v. Flowertree Nursery, Inc.*, 148 F.3d 1368, 1370-71 (Fed. Cir. 1998); *see Carella*, 804 F.2d at 139. The district court correctly recognized that the jury could have found that Ardagh failed to prove its pre-1995 process, whatever it was, was reasonably accessible to the public. Appx21; Appx2254-2255 (jury instruction).

Multiple witnesses testified that Ardagh’s processes were not just confidential, but trade secrets. Ardagh’s Batch and Furnace Manager, Robert Waldron, stated that batch formulas are “not shared with anybody outside the company”; “[y]ou would get fired” if you did. Appx1883-1884. Heidi Root, Ardagh’s manager of glass technology, stated: “Anything related to the glass-

making process we keep to ourselves.” Appx1590. Ardagh’s expert, Dr. Carty, admitted that “batch records are confidential,” and he “can’t demonstrate” “that any of these batch records . . . were ever shared with anyone.” Appx2127. Ardagh’s glass consultant testified that he kept Ardagh’s batch records secret for over 20 years. Appx1927. Green Mountain’s expert explained that Ardagh’s batch records are “very, very confidential and not shared with anyone,” Appx1392-1394, and that “[w]hat Ardagh was doing in 1994” “would not have been” publicly known, Appx1571-1572. Ardagh’s assertion (at 46) that the only evidence of secrecy was that it “stamped as ‘confidential’ documents showing where Ardagh bought its ingredients, and how much it paid,” is mistaken.

Ardagh’s assertion that the public could tour Ardagh’s plants and see constituent materials, Br. 47 (citing Appx1833-1834), does not prove Ardagh’s *process* was public, much less require the jury to so find. Ardagh cites no testimony showing the public saw it using the materials as claimed in the invention. That Ardagh kept its batch records—its glassmaking “recipe,” Appx1403—secret proves otherwise.

Ardagh’s assertion (at 47-48) that it sold bottles made with the patented process fails. The on-sale bar invalidates patents for sales by the *patentee* more than a year before the filing date. 35 U.S.C. § 102(b) (Pre-AIA). But that rule does not extend to prior sales by others. A “sale prior to the critical date is a bar *if*

engaged in by the patentee or patent applicant, but not if engaged in by another.”

In re Caveney, 761 F.2d 671, 675 (Fed. Cir. 1985) (emphasis added). If Ardagh “offered and sold anything, it was” bottles, “not whatever process was used in producing” them. *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983). Ardagh’s assertion (at 48) that its bottles could be “reverse engineered” falls short. Ardagh’s glass consultant testified that a bottle by itself could not be reverse engineered to determine the process that made it. “Additional information,” he said, “would be required.” Appx1929; Appx2148-2149. A jury could agree.

B. The Jury’s Non-Obviousness Finding Should Be Affirmed

Ardagh argues “that combination of [its] process with Duckett renders the asserted claims obvious.” Ardagh Br. 48. But Ardagh raised *no* obviousness claim before verdict under Rule 50(a). *See* Appx6384-6401. After verdict, Ardagh’s Rule 50(b) motion never asserted obviousness based on Ardagh’s prior process combined with Duckett—or based on Ardagh’s process at all. It asserted the different combination of Duckett and “the Ross Batch Calculation” in light of the knowledge of skilled artisans. Appx6427-6429.

“[F]ailure to comply with Rule 50(b) forecloses . . . challenge[s] to the sufficiency of the evidence.” *Unitherm Food Sys., Inc. v. Swift-Eckrich, Inc.*, 546 U.S. 394, 404 (2006); *cf. i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 845

(Fed. Cir. 2010) (failure to file “pre-verdict JMOL motion on all theories, and with respect to all prior art references” waives them). Ardagh gave the district court no opportunity to measure the factual underpinnings necessary to evaluate its new combination—*e.g.*, what each “reference teaches and whether a skilled artisan would have been motivated to combine,” *Apple*, 839 F.3d at 1050—against the trial record. It cannot do so for the first time on appeal.

On the merits, Ardagh’s reliance on its prior processes as part of its new combination dooms its position. This Court presumes that “the jury resolved underlying factual disputes in [the prevailing party’s] favor.” *Apple*, 839 F.3d at 1047. Consequently, the jury here must be presumed to have found that Ardagh concealed its process; that it was insufficiently available to qualify as “prior art”; or that Ardagh failed to meet its clear-and-convincing burden on those questions. *See pp. 52-54, supra; Apotex USA, Inc. v. Merck & Co.*, 254 F.3d 1031, 1036 (Fed. Cir. 2001); Appx2259. Any one such finding—each supported by the record—forecloses the obviousness combination Ardagh newly asserts. *OddzOn Prods., Inc. v. Just Toys, Inc.*, 122 F.3d 1396, 1401-02 (Fed. Cir. 1997).

Ardagh’s cursory trial testimony on Duckett also falls short. Dr. Carty testified on Duckett for three minutes and discussed just one claim (18). *See Appx2090-2094.* He never mentioned claim 20—which the jury found infringed and which supports the whole damages base. Appx1630.

Carty's entire testimony regarding the dependent claims, moreover, was that "[a]ll the claims are met by Duckett. He doesn't miss anything." Carty's "limitation-by-limitation" analysis of independent claim 18 consisted of the following: For the first step, he testified that Duckett "says initially recovered by municipal waste blah-blah-blah." Appx2093. He was then asked, "[i]f we march through the rest of the limitations for Claim 18, do you find any . . . limitation that has not been disclosed in Duckett for Claim 18?" He responded, "No, I do not." *Id.* Such testimony is insufficient as a matter of law to prove obviousness by clear-and-convincing evidence. *See NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1325 (Fed. Cir. 2005) (rejecting "conclusory" testimony). Such testimony, moreover, glosses over key elements. *Apple*, 839 F.3d at 1062. Duckett nowhere suggests selectively decolorizing a color of cullet, much less decolorizing *and* colorizing a remaining color, as claims 21 and 22 require. Appx143, 9:19-10:5; *see* p. 11, *supra* and p. 57 n.9, *infra*. The jury could easily conclude Ardagh's pre-1995 process did not use mixed-color cullet with decolorizers at all. *See* pp. 47-52, *supra*.

Ardagh, moreover, presented no testimony showing skilled artisans would have been motivated to combine Duckett with other prior art. Ardagh now says (at 49) the motivation is within Duckett itself. But that was not argued below (in briefing or at trial). *See* Appx6428; Appx6610-6611; p. 21, *supra*. It is waived.

Sage Prods., Inc. v. Devon Indus., Inc., 126 F.3d 1420, 1426 (Fed. Cir. 1997). And Duckett provides no such motivation. It teaches away from decolorizers. “Because chrome, rather than iron, is the limiting factor in the use of recovered cullet,” Duckett concludes, “decolorizing additives do not appear to solve the problem.” Appx3456. There was ample basis for the jury to resolve that factual question against Ardagh. *Apple*, 839 F.3d at 1052.⁹

Ardagh insists that expert testimony “is not required.” Ardagh Br. 49 (citing *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1242 (Fed. Cir. 2010)). But “expert testimony regarding matters beyond the comprehension of laypersons is sometimes essential.” *Wyers*, 616 F.3d at 1240 n.5. Here, the art and specific reference were not simple, mechanical matters. A person of ordinary skill here would have “a

⁹ Ardagh argues (at 50) that Duckett does not teach away, because the failure of decolorizers it identified was specific to making flint bottles. That Duckett was directed at the different problem known as the “flint tinge problem,” Appx2149-2150, does not help Ardagh. The flint-tinge problem was disclosed and distinguished by the ’737 patent. Appx140, 3:20-29. To the extent Duckett teaches a solution to that separate problem, it provides no motivation to arrive at the invention in the ’737 patent. Regardless, Duckett’s discussion about the difficulty of removing green (chrome) is not limited to flint glass. Appx3456. The article says only that the difficulty is “especially” problematic for “flint glass.” Appx3457. Nor does “Duckett show[] that any amount of mixed color cullet could be used to make amber and green.” Ardagh Br. 50. Duckett warns that “increased variability of [waste] cullet colorant levels,” *i.e.*, variable amounts of coloring chemicals in mixed cullet, “would tend to reduce the use of recovered glass by manufacturers.” Appx3455. Duckett’s solution to variable waste-cullet-colorant levels was to sort-and-mix the cullet, closely monitor color content, or to encourage consumers to accept off-color glass. Appx3455-3458. It did not suggest selective decolorization, combined with selective colorization of a remaining color, as the patent claims.

bachelor's degree in materials science and engineering . . . and at least one or two years of full-time, technical design experience in the commercial glass industry.” Appx2254. Duckett discusses the chemistry and materials-science of glass manufacturing. “Expert testimony was required not only to explain what the prior-art reference disclosed, but also to show that a person skilled in the art would have been motivated to combine them.” *Alexsam, Inc. v. IDT Corp.*, 715 F.3d 1336, 1348 (Fed. Cir. 2013).

Finally, “the so-called ‘secondary considerations’ must always when present be considered.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Here, the jury heard unrebutted, objective indicia of nonobviousness. *See Apple*, 839 F.3d at 1052-53. Ardagh *copied* the invention, as the jury implicitly—and the district court expressly—found. Appx29-30; Appx34-35; p. 20, *supra*. Green Mountain’s advance received industry praise from Ardagh’s own scientists, *see* Appx4479 (would “impress [me]!”), and Dr. Lehman, Appx1172 (“surprised, even stunned”). The invention enjoyed commercial success, including Ardagh’s use with millions of tons of cullet. Appx1615-1617. And it fulfilled a long-felt but unsatisfied need to make mixed-color cullet usable. Appx6372-6377; pp. 4-8, *supra*.

This Court “presume[s] the jury found that the evidence was sufficient to establish each [secondary consideration] by a preponderance of the evidence.”

Apple, 839 F.3d at 1053. These secondary considerations—which Ardagh does not address—at least “tip the scales of patentability.” *Id.* at 1058.

IV. THE JURY’S DAMAGES AWARD IS SUPPORTED BY SUBSTANTIAL EVIDENCE

Ardagh challenges damages on the sufficiency of the evidence alone. This Court’s review is thus “‘exceedingly narrow.’” *Semper v. Santos*, 845 F.2d 1233, 1236 (3d Cir. 1988). The jury’s “award of damages ‘must be upheld unless the amount is grossly excessive or monstrous, clearly not supported by the evidence, or based only on speculation or guesswork.’” *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1310 (Fed. Cir. 2009).

A. Ardagh’s Apportionment Argument Does Not Deprive the Royalty Base of Evidentiary Support

Damages are typically calculated by determining a “royalty rate” for the invention and applying it to a “royalty base”—the number of units subject to the royalty. *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1226 (Fed. Cir. 2014). The “ultimate combination of royalty base and royalty rate” should “reflect the value attributable to the infringing features of the product, and no more.” *Id.* In this case, Green Mountain’s expert calculated a \$25-per-ton royalty rate, and applied that to a royalty base of 4,192,815 tons of cullet. Appx27. The jury’s verdict “equated to an effective royalty rate of approximately \$12 per ton.” *Id.*

1. Ardagh urges that Green Mountain “never apportioned the use of *additional* mixed color cullet from the *mixed color cullet already being used* by

Ardagh prior to the date of invention.” Br. 52 (emphasis added). The argument appears to challenge the royalty base (the quantity of mixed-color cullet subject to a royalty). Ardagh can raise no such objection. At trial, Ardagh proposed a royalty base of 4,192,817 tons. Appx18; Appx2192. That was two tons *more* than Green Mountain’s base of 4,192,815 tons. Appx2188. Ardagh cannot complain about a supposed failure to exclude pre-existing cullet usage from the royalty base when Ardagh *agreed* on the quantity subject to a royalty. The law—whether through “estoppel,” “waiver,” or “invited error”—“prohibit[s] a party from asserting as ‘error’ a position that it had advocated at the trial.” *Key Pharms.*, 161 F.3d at 715.

Ardagh insists that it used some mixed-color cullet “prior to the date of invention.” Ardagh Br. 52-53. But the royalty base represents the number of units to which the infringing process was applied. *Whitserve, LLC v. Comput. Packages, Inc.*, 694 F.3d 10, 28 (Fed. Cir. 2012) (number of “infringing transactions”); see Appx1609-1610. Ardagh used the infringing process on 4,192,817 tons of mixed cullet; that is a proper royalty base. Ardagh may be urging the invention provided lesser cost-savings because an existing, non-infringing alternative allowed it to use some mixed-color cullet anyway. That argument could influence the royalty rate (discussed below). But Ardagh’s assertion that it used some quantity of mixed-

color cullet before, without the infringing process, does not mean it can infringe the patent on that same quantity royalty-free.

Besides, Ardagh cites no evidence of what that prior method was or its comparative cost. The evidence showed Ardagh began using mixed-color cullet after the priority date, after meeting with Green Mountain. And Ardagh's corporate representative testified that the only alternative to using mixed-color cullet in the manner prescribed by the '737 patent was making glass from raw materials alone—that is, with no mixed-color cullet at all. Appx1670-1672. The jury was not required to accept Ardagh's current argument that contradicts its own corporate witness.

2. Ardagh complains (at 53) that Green Mountain witnesses testified about the “value of ‘cullet,’” as well as a Cullet Value Added Model (CVAM), that purportedly estimated savings from “cullet usage” generally, “whether or not the cullet was of ‘mixed’ colors.” Ardagh does not challenge the document's admissibility, and misunderstands it. The CVAM was a marketing tool Green Mountain created and showed Ardagh; it is evidence of the value of using mixed-color cullet. Appx1222; Appx2196. The CVAM has nothing to do with the royalty base. Green Mountain's expert mentioned the CVAM *not* to prove the *quantity* of cullet (the royalty base). Instead, he mentioned the CVAM's savings

estimate of \$100/ton to confirm “the conservative nature of [his] royalty—of not less than \$25 per ton” of mixed-color cullet, Appx1622.

Contradicting its witness, Ardagh now posits (at 53-54) that “primary color cullet” is a non-infringing alternative and that “60% of the cullet” Ardagh used “is of the primary color.” By “primary color cullet,” Ardagh seems to mean cullet that is approximately 60% one color, 40% others. Ardagh cites no evidence for that definition; for its 60% figure; or for how often it supposedly used such cullet.¹⁰ Regardless, under Ardagh’s definition, using “primary color cullet” is infringing: It is still “mixed-color cullet” under the claims, and it still requires the ’737 patent’s method to make bottles—which is why the parties agreed on the royalty base. *See* p. 60, *supra*. A reasonable juror surely could reject Ardagh’s unsupported “primary color cullet” theory.

B. The Royalty Rate Has Robust Evidentiary Support

Ardagh’s challenge to the royalty rate also fails. The jury’s damages award reflects a royalty rate of \$12 per ton (assuming it accepted the royalty base both experts supported). Appx27. There was more than substantial evidence to justify that royalty.

¹⁰ The only record evidence that Ardagh cites about primary color cullet refers to internal single-color cullet. Br. 53 (citing Appx1218). But internal, single-color cullet was excluded from the royalty base, Appx1610; Appx1625, and the cost-savings calculation, Appx1610.

Green Mountain’s expert, Michael Lasinski, applied a “hypothetical-negotiation approach” to calculating reasonable-royalty damages. *Prism Techs. LLC v. Sprint Spectrum L.P.*, 849 F.3d 1360, 1375-76 (Fed. Cir. 2017); *see* Appx1607-1628. In such a hypothetical negotiation, “[r]eliance upon estimated cost savings from use of the infringing product is a well settled method.” *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1080-81 (Fed. Cir. 1983); *see also Prism Techs.*, 849 F.3d at 1376 (same). The benefits of using mixed-color cullet were enormous: Mixed-color cullet is cheaper than raw materials; requires less energy to use; reduces furnace wear; reduces environmental emissions; and allows the manufacturer to “[m]ake more glass with less raw materials.” Appx1394-1398. Ardagh’s documents showed material and energy cost-savings *alone* ranged from \$20-\$40.32 per ton. Appx1615-1619 (discussing Appx6281, Appx5745, Appx5875, Appx5883, Appx6179, Appx6427, Appx4703); *see also* Appx2013. Mr. Lasinski estimated that, given the invention’s “cost savings”—*i.e.*, “the benefit of the patents versus the next best alternative”—arms-length negotiations would produce a royalty of at least \$25 per ton. *See, e.g.*, Appx1622-1623; *see pp.* 60-61 (testimony that only alternative was raw materials).

Ardagh does not challenge that testimony’s admissibility. It argues (at 54) that Mr. Lasinski “assigned nearly 100% of the estimated cost savings” to Green Mountain. Mr. Lasinski did no such thing: After assessing the strength of the

parties' negotiating positions, he "gave the benefit to Ardagh" as having the stronger position. Appx1626-1628; Appx1633. He thus opined that the parties would "*shar[e] a portion* of the energy and material cost savings," but that Ardagh would keep "the other financial benefits . . . [e.g.,] furnace life, the pull through, benefits from emissions and marketing." Appx1628-1629 (emphasis added). Mr. Lasinski's \$25/ton rate was a fraction of total cost-savings; his numbers were "at the lower end of [his] negotiating range." Appx1625; Appx1629.

The record supported far higher numbers. Ardagh estimated that, in Milford, "we save ~\$70/ton using cullet and that doesn't even include energy benefit." Appx5714. Another internal report suggested \$186 million in savings—over *4 times* the jury's verdict. Appx2218-2219.¹¹ A 1995 license, which *Ardagh* introduced into evidence, provided a \$15 royalty "for each ton of three-mix cullet processed by a Manufacturer." Appx4237. The jury awarded \$12/ton—closer to Ardagh's proposed rate than Green Mountain's and \$3 *less* than the license agreement. Neither Mr. Lasinski nor the jury awarded "all of the cost savings" to Green Mountain.

Ardagh's argument that the '737 patent would not by itself "produce commercially viable bottles," Br. 55, is unpersuasive. The royalty is not on

¹¹ That report states "[t]he Green Mountain activity is compelling and with potential value proposition of ~1.4M/year savings for a 500tpd furnace." Appx6005. \$1.4M per furnace, times Ardagh's 19 infringing furnaces, times 7 years of infringement, yields more than \$186 million.

bottles. It is on the cullet employed in infringement. It reflects a small portion of the resulting cost savings. Green Mountain is entitled to compensation based on the value the invention added. The evidence was amply sufficient. *See Monsanto Co. v. McFarling*, 488 F.3d 973, 980-81 (Fed. Cir. 2007) (\$40 per bag royalty reasonable where evidence showed “savings of \$31 to \$61 per bag of seed” from two of many cost savings).

CONCLUSION

The judgment should be affirmed.¹²

¹² In the event of a remand, the district court will need to address Green Mountain’s conditional motion for new trial in connection with the ’521 patent. That motion was deemed “moot” given the court’s decision upholding the verdict on the ’737 patent. Appx28 & n.13.

CROSS-APPEAL

JURISDICTIONAL STATEMENT

The district court had jurisdiction under 28 U.S.C. §§1331 and 1338(a). Appx100-105. The jury rendered its verdict on April 21, 2017, Appx3-9; final judgment was entered April 26, 2017, Appx1-2. The court ruled on post-trial motions on March 8, 2018. Appx10-38. Defendants filed a notice of appeal on March 23, 2018, Appx204-206; Green Mountain filed this cross-appeal on April 4, 2018, Appx207-208. This Court has jurisdiction under 28 U.S.C. § 1295(a)(1).

INTRODUCTION

The Patent Act authorizes enhanced damages to “punish” infringement that is “wanton or malicious”—in contrast to infringement committed “in ignorance or good faith.” *Seymour v. McCormick*, 57 U.S. (16 How.) 480, 488-89 (1854). Under a “heightened” willfulness instruction, Appx19, the jury found Ardagh engaged in “the most egregious behavior”—“wanton, malicious, consciously wrongful, or . . . bad faith” infringement that is “especially worthy of punishment.” Appx75-76. The district court accepted and itself invoked that “finding of egregious conduct above willful infringement[.]” Appx26.

The district court refused to enhance damages nonetheless. It did not dispute bad faith. Appx19. Instead, it tallied *Read* factors and declared that the final score, 4-3, disfavors enhancement. Appx30-35. That analysis cannot be reconciled with *Halo Electronics, Inc. v. Pulse Electronics, Inc.*, 136 S. Ct. 1923

(2016), which focuses the enhanced-damages inquiry on the defendant’s “culpability” at the time of the infringement. *Id.* at 1933. It also contradicts this Court’s admonition that the *Read* factors are used to evaluate egregiousness, not as a substitute. And the district court’s *Read* analysis was plagued by clearly erroneous findings.

STATEMENT OF THE ISSUE

Whether the district court’s refusal to enhance damages, despite the finding Ardagh had engaged in the “most egregious behavior,” “especially worthy of punishment,” rested on legal error, clear factual error, or an abuse of discretion.

SUMMARY OF ARGUMENT

The jury found that Ardagh engaged in “the most egregious behavior”—wanton, malicious, consciously wrongful, or done in bad faith—that was “especially worthy of punishment.” The district court did not disagree. But rather than evaluate the egregiousness of Ardagh’s misconduct, the court engaged in a rote counting of *Read* factors. That contravenes *Halo* and *Read*. Factor-counting cannot substitute for the evaluation of culpability the law requires.

The district court’s evaluation of the *Read* factors was erroneous. The court found Ardagh committed no litigation misconduct. But it never addressed myriad instances of such conduct. The court found that “remedial measures” weighed against enhancement. But it identified no remedial measures. And the court

inverted the test for motivation to harm, finding the absence of customer pressure on Ardagh mitigated culpability. Under *Read*, it is an aggravator.

ARGUMENT

I. THE DISTRICT COURT’S DECISION DEPARTS FROM PRECEDENT

In *Halo*, the Supreme Court reaffirmed that §284 enhanced damages serve “as a ‘punitive’ or ‘vindictive’ sanction for egregious infringement behavior.” 136 S. Ct. at 1929. Enhancing damages is proper where a defendant’s infringement is “willful, wanton, malicious, bad-faith, deliberate, consciously wrongful, flagrant, or . . . characteristic of a pirate.” *Id.* at 1932. *Halo* focused the §284 inquiry squarely on the defendant’s “culpability”—bad-faith infringement—“at the time of the challenged conduct.” *Id.*

Standard of Review. This Court reviews enhanced-damages rulings for abuse of discretion. *Halo*, 136 S. Ct. at 1934. “‘Failure to exercise discretion is not exercising discretion; it is making a legal mistake.’” *In re Nintendo Co.*, 544 F. App’x 934, 940 (Fed. Cir. 2013). Misapplying the law is *per se* an abuse of discretion. *Highmark Inc. v. Allcare Health Mgmt. Sys., Inc.*, 134 S. Ct. 1744, 1748 n.2 (2014).

A. The Jury and District Court Both Found Ardagh’s Conduct “Especially Worthy of Punishment”

The jury found that Ardagh engaged in precisely the egregious misconduct that warrants enhanced damages. The “heightened” willfulness instruction, given

at Ardagh's request, Appx1997-2007, went beyond willfulness. It required egregiously culpable conduct:

Willfulness requires that . . . the infringement by Ardagh was *especially worthy of punishment*. . . . [W]illful infringement is reserved *only* for the *most egregious behavior*, such as where the infringement is *wanton, malicious, consciously wrongful, or done in bad faith*.

Appx75 (emphasis added). The jury found that standard met, finding "Ardagh 'acted willfully' and 'was especially worthy of punishment.'" Appx19.

The evidence showed that Ardagh learned about the technology from Green Mountain; secretly practiced it while engaging in negotiations; and declined to get a license because it was already employing the technology. *See* pp. 8-11, *supra*. After Green Mountain discussed its technology with Ardagh in July 1995, Appx4479; Appx1374, Ardagh's then-Senior Vice President of Technical Services, Roger Erb, declared that it "would impress" him if the invention "could take 50% Green Glass and 50% Amber Glass and successfully make Amber Glass," Appx4479.

As the district court found, Ardagh then "drafted a secret dossier" with 19 questions regarding the then-patent-pending technology. Appx19; Appx5683. Ardagh asked its scientists to test whether it could increase mixed-color cullet usage by employing copper oxide as a decolorizer—a key aspect of Green Mountain's patented process. Appx4481. Ardagh first began using copper oxide as a decolorizer on mixed-color cullet after 1995, Appx1796, after learning of the

patent. Appx1372-1374; pp. 9-10, *supra*. And Ardagh took no action to “investigate the patent or form a good faith belief that it was invalid or not infringed.” Appx19.

When Green Mountain renewed licensing efforts, Ardagh “attempt[ed] to conceal its infringement” by (among other things) “denying it used mixed color cullet.” Appx19; pp. 10-11, *supra*. As late as 2005, Ardagh misrepresented that it had “no intention of using the technology found in the patents.” Appx1325-1326. Internally, Ardagh admitted otherwise: It would “not seek to license any color control technology (‘CulChrome,’ which uses copper oxide to mask high levels of green cullet) because *we are already doing it.*” Appx6016 (emphasis added); *see* Appx4291.

The district court upheld the jury’s finding as amply supported. Appx18-19. Indeed, the court itself invoked Ardagh’s “egregious misconduct above willfulness” when foreclosing an equitable defense, Appx26—a ruling Ardagh does not appeal.

B. The District Court Failed To Exercise Discretion Under *Read*

District courts must exercise “discretion” in light of the “circumstances of each case.” *Halo*, 136 S. Ct. at 1932-33. But the focus of that exercise must be whether the actions constituted “egregious” and “culpable behavior.” *Id.* at 1932. Here, the district court did not examine that issue. Instead, it tallied factors into

three categories: favors enhancement, disfavors enhancement, and neutral. Appx35. Because “[o]nly three factors favor[] enhancement,” the court declined to enhance damages. *Id.*

That was error. The *Read* factors are not points to be counted. They are proxies to assist in the ultimate inquiry—whether a “sanction” is warranted “for egregious infringement behavior.” *Halo*, 136 S. Ct. at 1932. *Halo* requires consideration of “the particular circumstances of the case to determine whether it is egregious.” *Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 875 F.3d 1369, 1383 (Fed. Cir. 2017). The optional *Read* factors are potentially helpful considerations, not a substitute. *Cf. Top Tobacco, L.P. v. N. Atl. Operating Co.*, 509 F.3d 380, 383 (7th Cir. 2007) (“A list of factors designed as *proxies* . . . can’t supersede” the “inquiry” itself).

Read recognizes as much: “The paramount determination in deciding to grant enhancement and the amount thereof is the egregiousness of the defendant’s conduct” *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 826 (Fed. Cir. 1992). The jury found Ardagh’s conduct to be “the most egregious behavior” and “especially worthy of punishment”—a determination the district court upheld and reiterated. Displacing reasoned discretion with point-tallying misapplies the law and is an abuse of discretion.

II. THE DISTRICT COURT’S *READ* ANALYSIS MISCONSTRUES THE FACTORS AND COMMITS CLEAR ERROR

Even within *Read*, the district court’s findings are often foreclosed, internally contradictory, or clearly erroneous. The court conceded that three factors favored enhancement. “[D]eliberate copying” was amply supported. Appx31-32. Whether the defendant investigated the patent’s scope and validity favored enhancement: There was no evidence of any investigation, and “the record shows that [Ardagh] did not have a ‘good faith belief’ that the ’737 patent was invalid or not infringed.” Appx32. The defendant’s “concealment . . . of its misconduct” favored enhancement as well. Appx34-35. Deliberately copying an invention, practicing it with no good-faith belief of invalidity or non-infringement, and then concealing it certainly amount to “pirate-like” conduct that warrants punishment. Indeed, under *Halo*, “‘subjective bad faith’ alone” can warrant enhancement. 136 S. Ct. at 1933. Here, all the factors, properly understood, favored enhancement.

A. The District Court Misconstrued the Relevance of—and Failed Even To Address Most—Litigation Misconduct

In district court, Green Mountain pointed to eight types of litigation misconduct. For example, Ardagh failed to issue a document-preservation notice until six months after litigation started; when it did so, notice was sent to just eight employees of 5,500. Appx6482-6486; Appx6468; *see* Appx6523-6524. None was

sent to 6 of 14 Ardagh employees Green Mountain identified in its initial disclosures. None was sent to infringing plants or to half of Ardagh's trial witnesses. Appx6483-6486; Appx6468. Consequently, Ardagh produced no pre-suit emails from its servers; it provided only emails that employees happened to have saved on personal workstations. *See* Appx6482-6486; Appx6523-6524.

Ardagh witnesses obfuscated facts and feigned ignorance. A manager of cullet procurement answered that she "did not know" or "did not remember" 47 times, including to basic questions about her job, such as whether cullet was essential to Ardagh's business. Appx1285-1302. She purported to not know what "mixed color cullet" is, even though she was the corporate representative for a company that uses the term regularly. Appx1299-1300. Other witnesses gave similarly inexplicable testimony. Appx1590-1591; Appx1675-1686; *see also, e.g.,* Appx1678 ("I'm not saying yes or I'm not saying no to this, I'm not saying its not true."). Indeed, counsel for Ardagh apologized to the jury during closing for these "terrible witnesses." Appx2332-2333.

Extreme conduct abounded. Ardagh failed to provide Green Mountain with notice for a deposition, *see* Fed. R. Civ. P. 30(b)(1), and attempted to proceed with the deposition without Green Mountain's counsel. Appx1747. Ardagh refused to stop the deposition until the special master intervened, Appx1746-1748, and then sought to admit at trial the testimony taken without opposing counsel's presence,

Appx1749-1751. Ardagh raised 37 invalidity references for the '737 patent, but only used two at trial. *Contrast Appx81-82 with Appx6472; see Appx6529-6530.* Ardagh offered financial compensation to fact witnesses. Appx1792; Appx6490-6497. It failed to destroy clawed-back documents. Appx6499.

Ardagh submitted a false declaration by employee Katie Flight. The declaration asserted that “Ardagh does *not* use ‘mixed color cullet’ (as that term is described in U.S. Patent Nos. 5,718,737 and 6,230,521) to make recycled glass products,” that “Ardagh does *not* purchase ‘mixed color cullet’ (as that term is described in [the '737 patent]),” and that “*no* glass manufacturers use ‘mixed color cullet’ (as that term is described in [the patent]) for the manufacture of recycled glass products.” Appx5986-5987. At her deposition, however, Ms. Flight could not recall ever having read the patents, admitted she had not written the declaration, and professed that she would not sign that same declaration again. Appx1294-1296.

The district court’s opinion addressed only the recanted declaration. The proper exercise of discretion does not extend to ignoring myriad instances of misconduct. *Nintendo*, 544 F. App’x at 940. With respect to Ms. Flight, the court acknowledged her admission that today she could not sign the declaration today—it would have to “say something completely different than what th[e] declaration said’ when she signed it.” Appx32-33 (quoting Appx1294-1295). Without

explanation, however, the court summarily asserted that the “litigation conduct factor does not favor enhancement.” Appx32-33.

The district court’s reliance on a supposed absence of litigation misconduct as weighing *against* enhancement, moreover, departs from *Halo*. *Halo* directs courts to focus on culpability “at the time” of infringement. 136 S. Ct. at 1933. A litigation cover-up might be aggravating. But its absence does not make egregious infringement less egregious.

B. Duration of Misconduct and Remedial Measures

The district court held that “the duration of [Ardagh’s] misconduct and remedial actions . . . do not favor enhancement.” Appx33. But the court identified no “remedial actions taken.” To the contrary, in sustaining willfulness, it invoked Ardagh’s “fail[ure] to take remedial action” and “continued post-suit infringement.” Appx19; see *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1370-71 (Fed. Cir. 2004). That inconsistency requires remand.

On duration, the court observed that, after failed negotiations in 1999, Green Mountain “did not make another infringement assertion” before “filing suit in 2014.” Appx33-34. But the question is the “[d]uration of defendant’s misconduct,” *Read*, 970 F.2d at 827—not Green Mountain’s actions. Ardagh infringed throughout 15 years without a good-faith belief of non-infringement. Appx19; Appx32. It concealed infringement, Appx19; pp. 8-11, *supra*, which is

why Green Mountain “did not seek redress earlier,” Appx35. That Ardagh got away with infringement for so many years weighs in favor of—not against—enhancement. *See Pac. Furniture Mfg. Co. v. Preview Furniture Corp.*, 800 F.2d 1111, 1114-15 (Fed. Cir. 1986).

C. The District Court Inverted Motivation To Harm

The district court ruled that absence of motivation to harm “disfavor[ed] enhancement” because Ardagh faced no customer pressure to use the infringing process. Appx34. But the presence of “economic pressure in the form of customer dissatisfaction” *mitigates* the inference of “pernicious” intent. *Read*, 970 F.2d at 827. Its absence is *aggravating*.

The cases the court invoked, moreover, hold only that bad faith cannot be inferred solely from the infringer’s “financial motive.” *Sprint Commc’ns L.P. v. Time Warner Cable, Inc.*, No. 11-2686, 2017 WL 978107, at *14 (D. Kan. Mar. 14, 2017). They do not hold that a financial motive is mitigating. “[P]iracy” is financially motivated, but it is deserving of punishment. *Halo*, 136 S. Ct. at 1929. The jury properly found “egregious” infringement “especially deserving of punishment,” financial motive notwithstanding.

D. “Closeness” Favors Enhancement

Finally, the district court deemed the “closeness of the case” to be neutral. Appx33. That is impossible to square with its finding that Ardagh “did not have a

‘good faith belief’ that the ’737 Patent was invalid or not infringed.” Appx32. *Halo*, moreover, rejects the idea that enhanced-damages analysis “should look to facts that the defendant neither knew nor had any reason to know at the time he acted.” 136 S. Ct. at 1933. The existence of reasonable defenses at trial—“closeness” at trial—is irrelevant if the defendant “did not act on the basis of the defense or was even aware of it.” *Id.*

Ardagh identified only one basis for a contemporaneous good-faith belief—its “prior-use invalidity position.” Appx6514. That defense was not close. The district court never suggested it was. Precisely the opposite: The court declared that Ardagh “did not, and cannot, prove anticipation” based on its “pre-1995 glassmaking process” for “six distinct reasons.” *See* Appx20-21. The closeness factor, and the culpability it reflects, supports enhanced damages.

CONCLUSION

Enhanced damages were warranted. A remand for proper consideration of relevant factors is appropriate.

October 12, 2018

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CERTIFICATE OF SERVICE

I certify that today, February 4, 2019, I electronically filed the foregoing Second Corrected Response and Opening Cross-Appeal Brief for Plaintiffs - Cross-Appellants Green Mountain Glass, LLC and CulChrome, LLC with the Clerk of the Court for the U.S. Court of Appeals for the Federal Circuit using the appellate CM/ECF system. All participants in the case are registered CM/ECF users and will be served by the appellate CM/ECF system.

February 4, 2019

/s/ Jeffrey A. Lamken

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