IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

NOVOZYMES A/S,	)	
	)	
Plaintiff,	)	
	)	
v.	)	Civil Action No. 05-160-KAJ
	)	
GENENCOR INTERNATIONAL, INC. and ENZYME DEVELOPMENT CORPORATION,	)	
	)	
Defendants.	)	

POST-TRIAL FINDINGS OF FACT AND CONCLUSIONS OF LAW

Josy W. Ingersoll, Esq., Rolin P. Bissell, Esq., Karen E. Keller, Esq., Andrew A. Lundgren, Esq., Young Conaway Stargatt & Taylor, LLP, 1000 West Street, 17th Floor, Wilmington, Delaware 19801; Counsel for Plaintiff.

Of Counsel: Joseph R. Robinson, Esq., Robert C. Sullivan, Jr., Esq., David Tellekson, Esq., Steven E. Lipman, Esq., Robert Schaffer, Esq., George C. Hykal, Esq., Darby & Darby PC, 805 Third Avenue, New York, New York 10022-7513.

Donald E. Reid, Esq., Jason A. Cincilla, Esq., Morris, Nichols, Arsht & Tunnell, 1201 North Market Street, 18th Floor, Wilmington, Delaware 19899; Counsel for Defendants.

Of Counsel: Kenneth R. Adamo, Esq., Tharan Gregory Lanier, Esq., Jane L. Froyd, Esq., Jones Day, 2882 Sand Hill Road, Suite 240, Menlo Park, California 94025;

Thomas E. Friebel, Esq., Jones Day, 222 East 41st Street, New York, New York 10017-6702.

February 16, 2007
Wilmington, Delaware

JORDAN, Circuit Judge[1]

I. INTRODUCTION

Novozymes A/S ("Novozymes") has sued Genencor International, Inc. ("Genencor") and Enzyme Development Corporation ("EDC") (collectively "Defendants"), alleging infringement of U.S. Patent No. 6,867,031 (issued Mar. 15, 2005) (the "'031 patent"). Briefly, the technology at issue relates to alpha-amylase enzymes that are used in the production of fuel ethanol. Trial of this matter was bifurcated. The first bench trial focused on patent infringement, invalidity, and unenforceability. In my post-trial Findings of Fact and Conclusions of Law issued on August 24, 2006, I concluded that Defendants infringed claims 1, 3, and 5 of the '031 patent, that those claims are valid, and that the '031 patent is enforceable. *Novozymes A/S v. Genencor Int'l, Inc.*, 446 F. Supp. 2d 297, 333-34 (D. Del. 2006). The second bench trial, focusing on willfulness and damages, was held from October 10 to October 12, 2006. The following, issued pursuant to Federal Rule of Civil Procedure 52(a), are my findings of fact and conclusions of law as to the issues in that second trial.

For the reasons set forth, I conclude that:

(1) Novozymes's subsidiary, Novozymes of North America, Inc. ("NZNA"), does not have standing to join this lawsuit as a party plaintiff;[2]

---

[1]Sitting by designation.

[2]On July 25, 2006, almost five months after the end of the bench trial on liability, Novozymes moved to modify the scheduling order to allow it to join NZNA as a party plaintiff pursuant to Federal Rules of Civil Procedure 15 and 21. (Docket Item ["D.I."] 144.) After hearing the parties' arguments, I denied Novozymes's motion without prejudice and allowed additional discovery regarding the relationship between Novozymes and NZNA. (D.I. 178; D.I. 182 at 23:2-17.) The parties presented evidence on the issue during the second bench trial in October 2006, and Novozymes renewed its motion at trial (Trial Transcript, D.I. 213, A15000-A15557 ["Tr."] at A15361:21-25). I

(2) Novozymes is not entitled to lost profits damages;

(3) Defendants must pay reasonable royalty damages;

(4) Genencor willfully infringed the '031 patent;

(5) Novozymes is entitled to double damages and reasonable attorneys' fees; and

(6) Defendants will be permanently enjoined from infringing the '031 patent.[3]

II. FINDINGS OF FACT[4]

A. *The Parties*

1. Novozymes is a Danish corporation with a place of business in Bagsvaerd, Denmark. (Uncontroverted Facts, Docket Item ["D.I."] 101 at ¶ III.A.) Novozymes is the sole assignee of the '031 patent, titled "Amylase Variants." ('031 patent.)

2. Genencor is a Delaware corporation having a principal place of business in Palo Alto, California. (Uncontroverted Facts, D.I. 101 at ¶ III.B.) Genencor sold an alpha-amylase product under the brand name Spezyme® Ethyl. (*Id.* at ¶ III.V.)

---

incorporate my decision on that motion into these Findings of Fact and Conclusions of Law. (*See infra* Section III.A.)

[3]Novozymes filed its Motion for a Permanent Injunction (D.I. 169) on September 1, 2006.

[4]Throughout these Findings of Fact and Conclusions of Law, I may have adopted without attribution language suggested by one side or the other in this dispute. In all such instances, the finding or conclusion in question has become my own, based upon my review of the evidence and the law. To the extent that any of my findings of fact may be considered conclusions of law or vice versa, they are to be considered as such.

Spezyme Ethyl infringes claims 1, 3, and 5 of the '031 patent. *Novozymes*, 446 F. Supp. 2d at 321-22.

3. EDC is a Delaware corporation having a principal place of business in New York, New York. (Uncontroverted Facts, D.I. 101 at ¶ III.C.) EDC was a United States distributor of Spezyme Ethyl. (*Id.* at ¶ III.W.)

B. *The Relationship Between Novozymes and NZNA*

4. NZNA is an indirect wholly owned United States subsidiary of Novozymes. (Uncontroverted Facts, D.I. 213 at A14503, ¶ III.E.) NZNA manufactures and distributes industrial enzymes. (Olofson,[5] Trial Transcript, D.I. 213, A15000-A15557 ["Tr."] at A15162:4-6.)

5. NZNA's board of directors has five members: four executives from the parent company, Novozymes, and one officer from NZNA. (*Id.* at A15163:1-6; Meyer,[6] Tr. at A15014:12-A15015:18.)

6. Day to day operations at NZNA are controlled by NZNA employees, but strategic decisions, including those regarding marketing and tax strategies, are made by the parent, Novozymes. (Olofson, Tr. at A15163:7-20.) Novozymes is organized into industry strategy groups that are responsible for different businesses on a worldwide basis. (Meyer, Tr. at A15010:7-A15011:2.) The Novozymes industry strategy group for biofuel starch, for example, is responsible for portfolio planning, product introduction,

---

[5]Richard Olofson is a finance manager at NZNA. (Tr. at A15159:17-25.)

[6]Henrik Meyer is Novozymes's Vice President of Marketing. (Tr. at A15007:4-5.)

licensing, and intellectual property strategy for the biofuel starch business. (*Id.* at A15012:4-18.)

7. Novozymes sets the financial policies for its subsidiaries, including NZNA. (Loft,[7] Tr. at A15055:4-14.) To comply with certain regulatory requirements, Novozymes consolidates the financial information from its subsidiaries into an overall financial report that is available to the public and filed with securities regulators in Denmark and the United States. (*Id.* at A15055:23-A15056:11, A15060:5-13; Olofson, Tr. at A15164:19-A15165:6; Trial Exhibit ["TX"] 456A, D.I. 214 at A16550-A16591.)

8. Novozymes owns the technology developed by itself and its subsidiaries. (Meyer, Tr. at A15018:7-14.) That technology includes the '031 patent (*supra* Finding of Fact ["FF"] ¶ 1; Meyer, Tr. at A15017:14-16) and another patent related to alpha-amylases, U.S. Patent No. 6,297,038 (issued Oct. 2, 2001) (the "'038 patent") (Meyer, Tr. at A15020:8-23). Novozymes is the sole assignee of both of those patents.

9. According to agreements made with Novozymes, its subsidiaries have the right to use Novozymes's technology. (Meyer, Tr. at A15018:1-2, A15018:15-22.) Of particular relevance here, on January 1, 1996, the predecessors in interest to Novozymes and NZNA entered into a Technology Licence Agreement ("TLA") granting NZNA a "non-exclusive non-transferable right and license, without right to sublicense, to use the Technology in the process of producing enzymes, including finished products and concentrates, and to make and use apparatus and machinery of implementing and maintaining that process." (TX 240, D.I. 214 at A16028, ¶ 1.b.) That agreement

---

[7]Benny Dalgaard Loft is Novozymes's Vice President of Finance. (Tr. at A15051:13-22.)

remains in effect and gives NZNA blanket rights to use Novozymes's technology (Meyer, Tr. at A15022:19-22, A15023:8-11, A15024:14-18, A15025:23-A15026:7), including the '031 and '038 patents (*id.* at A15027:6-13). According to the TLA, Novozymes also covenants not to sue NZNA "under any patent that may issue in the United States to [Novozymes] and which claims all or any part of the Technology." (TX 240, D.I. 214 at A16028, ¶ 1.c.)

10. In return for the use of Novozymes's technology, NZNA pays royalties at the rate of 40% of net sales. (Loft, Tr. at A15063:4-23; TX 240, D.I. 214 at A16029-A16030, ¶ 5.a, A16033 (amendment to ¶ 5.a).) That royalty rate was negotiated by Novozymes, NZNA, and tax authorities from Denmark and the United States to provide NZNA with the income level of similar companies in the United States. (Loft, Tr. at A15074:17-A15075:8, A15076:8-19, A15077:24-A15078:12.)

11. Novozymes maintains control over licensing and litigation regarding its technology. (Meyer, Tr. at A15048:19-25.) NZNA has "no authority" to license the technology or sue for patent infringement. (*Id.*)

12. Novozymes has a general policy of not licensing what it considers "core technology" outside of its corporate family. (*Id.* at A15015:19-A15016:21.) Core technology relates to business interests in which Novozymes has a strong market position and, often, a strong patent position. (*Id.* at A15016:12-21.) Novozymes considers both the '031 and '038 patents to cover core technology in the area of fuel ethanol production. (*Id.* at A15017:2-7, A15017:14-22, A15019:15-18.)

13. Even with that general policy, Novozymes has licensed its core technology "when it really is worth it." (*Id.* at A15045:17-25.) For example, Novozymes has licensed core technology in the context of joint development agreements and in settlement of litigation. (*Id.* at A15046:1-A15048:7.)

C. *The Competition Between NZNA and Genencor in the U.S. Fuel Ethanol Market*

1. *The Use of Alpha-Amylases in Fuel Ethanol Production*

14. The '031 patent relates to alpha-amylase enzymes. ('031 patent, 1:21-22.) Alpha-amylases break down starch molecules and "convert complex starch into smaller, simpler groups of glucose molecules." *Novozymes*, 446 F. Supp. 2d at 303. One commercial application of the enzymes is "the fuel ethanol industry, where ethanol fuel is produced from starch-rich crops such as corn, barley, and wheat." *Id.* at 304. "Alpha-amylases are used in the fuel ethanol industry to liquefy and reduce the viscosity of starch feedstocks so that they are easier to process in the manufacturing plant." *Id.*

15. Alpha-amylases used in fuel ethanol production are typically subjected to high temperatures, so "the thermostability of the enzyme, its capacity to withstand high temperatures, is important to its effectiveness in industrial applications." *Id.*

16. "One way to improve the thermostability of alpha-amylases is to add high levels of calcium to the starch slurry." *Id.* But that leads to an additional step in starch processing "that is inconvenient and increases costs." *Id.*

17. The starch mixture can be acidic, so acid tolerance is also important for alpha-amylase effectiveness. (Faller,[8] Tr. at A15088:20-24.)

2. *NZNA's Introduction of Liquozyme Alpha-Amylases in 1999*

18. "In the U.S. Ethanol Market, alpha-amylase products are currently essentially supplied almost exclusively by two competitors, NZNA and Genencor." (Uncontroverted Facts, D.I. 213 at A14504, ¶ III.L.)

19. NZNA manufactures and sells a group of alpha-amylase products under the brand name Liquozyme®. (*Id.* at A14503, ¶ III.E.) "NZNA is presently the only manufacturer and distributor of the Liquozyme Products in the United States." (*Id.* at A14503, ¶ III.F.) NZNA began selling Liquozyme in 1999. (Faller, Tr. at A15093:9-23.)

20. "None of the Liquozyme Products practice the '031 Patent." (Uncontroverted Facts, D.I. 213 at A14503, ¶ III.H.)

21. Prior to the introduction of Liquozyme, the market for alpha-amylases in dry mill[9] fuel ethanol production was dominated by Defendants. (Faller, Tr. at A15089:1-6, A15093:19-23.) Genencor sold an alpha-amylase under the brand name Spezyme Fred that was produced from a *Bacillus licheniformis* gene. (*Id.* at A15090:19-23; Crabb,[10] Tr. at A15366:15-20.) Also, wild type *Bacillus*

---

[8]Jeffrey Lyndon Faller is the Industry Sales Manager for the Ethanol Group at NZNA. (Tr. at A15085:16-21.)

[9]In the dry mill process, the entire kernel of corn is ground without being soaked, leaving many other components in the starch mixture that affect the performance of the alpha-amylases. (Faller, Tr. at A15108:24-A15109:3.)

[10]Dr. William Douglas Crabb is Genencor's Vice President of Applications. (Tr. at A15201:24-A15202:6, A15362:22-A15363:24.)

stearothermophilus alpha-amylases, G995 and G997, were marketed through EDC. (Faller, Tr. at A15090:23-24, A15091:22-24.)

22. Compared to those alpha-amylases, Liquozyme was more thermostable, did not require added calcium, and was more acid tolerant. (*Id.* at A15089:14-A15090:12.) No alpha-amylase available from Genencor in 1999 had that combination of properties. (Beto,[11] Tr. at A15180:24-A15181:7, A15181:20-A15182:16; Crabb, Tr. at A15203:3-10.) Liquozyme eventually accounted for more than 80% of the dry mill fuel ethanol market, based at least in part on customer demand for its improved properties. (Faller, Tr. at A15093:24-A15094:21, A15101:12-A15102:1; Beto, Tr. at A15182:17-22.) Using Liquozyme, customers could produce more ethanol without having to expand their production facilities. (Faller, Tr. at A15097:7-A15098:25.)

3. *Genencor's Introduction of Spezyme Ethyl Alpha-Amylases in 2004*

23. In early 2002, Genencor acquired Enzyme BioSystems Limited ("EBS"). (Crabb, Tr. at A15371:10-20.) At that time, EBS had developed three alpha-amylases, including one named EBS1 that was the subject of litigation between Novozymes and EBS. (*Id.* at A15371:21-23, A15377:15-23, A15378:5-10; TX 228, D.I. 214 ["Crabb Declaration"] at A16005-06, ¶ 13.) Novozymes alleged that EBS1 alpha-amylase infringed the '038 patent. (Crabb Declaration at A16005-06, ¶ 13.) To settle the litigation, the parties agreed that EBS1 would be pulled from the market. (Meyer, Tr. at A15021:7-24; Crabb, Tr. at A15378:5-10.)

---

[11]Maurice Beto is Genencor's Senior Director of Technical Sales with the Grain Processing Group for the Americas. (Tr. at A15179:13-23.)

24. Another EBS alpha-amylase named EBS2 was developed and, beginning in 2004, was sold by Genencor under the brand name Spezyme Ethyl. (Beto, Tr. at A15185:2-5; Crabb, Tr. at A15384:15-20.) Spezyme Ethyl had "the same desirable properties" as Liquozyme: improved thermostability without the need for added calcium and improved acid tolerance. (Faller, Tr. at A15102:5-13; Crabb Declaration at A16005-06, ¶ 13.) Throughout 2004 and early 2005, Genencor sold Spezyme Ethyl at a lower price than Liquozyme (Davis,[12] Tr. at A15295:9-17; TX 492A, D.I. 214 at A16646), and the availability of similar benefits at a lower price led many customers to switch products (Faller, Tr. at A15102:5-13). Liquozymes's market share fell from more than 80% to approximately 50%. (*Id.* at A15103:4-10.)

4. *Genencor's Reaction to the '031 Patent*

25. On September 21, 2004, the U.S. Patent and Trademark Office issued a notice of allowance of the claims that eventually issued as Novozymes's '031 patent. *Novozymes*, 446 F. Supp. 2d at 312. "On September 29, 2004, Novozymes sent a letter to Genencor providing a copy of the allowed claims . . . ." (Uncontroverted Facts, D.I. 213 at A14502, ¶ III.A.) That letter expressed Novozymes's belief that the allowed claims covered Spezyme Ethyl. (TX 320, D.I. 214 at A16074.) The '031 patent issued on March 15, 2005 ('031 patent), and Novozymes sued Defendants for patent infringement on that same day (D.I. 1).

[12]Julie L. Davis presented expert testimony on damages for Novozymes. (Tr. at A15228:1-A15229:18; TX 247, D.I. 214 at A16042-55.)

26. Genencor continued to sell Spezyme Ethyl until at least September 2006. (TX 277A, D.I. 214 at A16062; *see also* Beto, Tr. at A15421:12-20 (agreeing that product had been shipped after Aug. 24, 2006).)

27. Genencor takes the position that, when it received notice of Novozymes's allowed claims, it believed in good faith that those claims were invalid for obviousness in light of a 1989 publication authored by Suzuki et al. (the "Suzuki reference"). (D.I. 209 at 30-32.)

28. Specifically, claims 1, 3, and 5 of the '031 patent cover engineered *Bacillus stearothermophilus* alpha-amylases that have a particular deletion of two amino acids. *Novozymes*, 446 F. Supp. 2d at 305-06. The parties do not to dispute that Spezyme Ethyl has that deletion. *See id.* at 313, 321-22 (noting that "the parties agree on the amino acid sequence of Spezyme Ethyl" and concluding that that sequence has the deletion). That same deletion in alpha-amylases from another organism, *Bacillus amyloliquefaciens*, was disclosed in the Suzuki reference. *Id.* at 308. According to Dr. Crabb, Genencor believed that Novozymes's claims were obvious in light of the Suzuki reference because "from a scientific standpoint, anyone that has read that paper would choose to make those deletions if they wanted to try and improve the thermostability of [*Bacillus*] *stearothermohilus* [alpha-amylase]." (Crabb, Liability Phase Trial Transcript, D.I. 213 at A5041:4-7.) Dr. Crabb further testified that, at the time Genencor decided to commercialize EBS2 (as Spezyme Ethyl), "Genencor believed that the specific deletion of EBS2 had been taught by Suzuki et al. in a 1989 publication." (Crabb Declaration at A16005-06, ¶ 13.)

29. Genencor asserts that its belief was supported by an opinion of counsel regarding the '038 patent. (D.I. 209 at 31.) The '038 patent issued from Application No. 09/354,191 ('038 patent, cover page), a parent of Application No. 10/025,648 that issued as the '031 patent ('031 patent, cover page). According to that opinion, Spezyme Ethyl "did not infringe any claim of the '038 patent." (Crabb Declaration at A16005, ¶ 13; *see also* Crabb, Tr. at A15218:19-25, A15385:21-25.) Furthermore:

> Genencor was aware that [during the prosecution of the '038 patent] Novozymes had attempted to claim *B. stearothermophilus* α-amylases with a deletion corresponding to the deletion in EBS2, but the U.S. Patent Office had rejected those claims as obvious over Suzuki et al. Therefore, Genencor concluded that Novozymes would not be able to obtain claims that encompass *B. stearothermophilus* α-amylases with the EBS2 deletion.

(Crabb Declaration at A16006, ¶ 13; *see also* Crabb, Tr. at A15212:4-13, A15386:1-23.)

30. Finally, Genencor asserts (D.I. 209 at 32 & n.23; D.I. 210 at 17) that its belief in the obviousness of Novozymes's claims was supported by later developments in this case, specifically the discovery of another publication, by Machius et al.,[13] and my denial, on October 24, 2005, of Novozymes's motion for a preliminary injunction because of substantial questions as to invalidity (D.I. 68 at 4-6). (Crabb, Tr. at A15392:19-A15393:7.)

31. In stark contrast to its arguments about obviousness, however, Genencor filed on April 8, 2005 a telling patent application in the U.S. Patent and Trademark

---

[13]The Machius reference, which was discussed at length in the liability phase of trial, disclosed the location of the Suzuki deletion in the three-dimensional structure of a particular alpha-amylase. *Novozymes*, 446 F. Supp. 2d at 312-13. Defendants asserted that the '031 patent claims were obvious in light of that reference as well as the Suzuki reference. *Id.* at 323-24, 328-29.

Office. (Publication No. US 2006/0014265, published Jan. 19, 2006 and titled "Mutant Alpha-Amylases", TX 202, D.I. 213 at A8532.1-A8532.46.) That application claimed a *Bacillus stearothermophilus* alpha-amylase containing the deletion disclosed by the Suzuki reference (*id.* at A8532.44, claim 1) and cited the Suzuki reference (*id.* at A8532.14-A8532.15, ¶ 0013).

5. *Sales of Spezyme Ethyl Between March 2005 and September 2006*

32. Novozymes's damages expert, Ms. Davis, testified that if a 25% royalty were paid on Spezyme Ethyl sales in the U.S. fuel ethanol market and an 8% royalty on other Spezyme Ethyl sales, then the royalties would total $5,040,621 and $56,087 respectively. (Davis, Tr. at A15346:4-15.) To calculate those royalties, Ms. Davis took sales figures for the period between March 15, 2005, when the '031 patent issued, and September 30, 2006, based on Genencor records (TX 483, D.I. 214 at A16610-27), made one adjustment to those sales, and then applied the two royalty rates. (Davis, Tr. at A15347:16-A15348:20.)

33. The adjustment was for the sales by Genencor to its distributor EDC that were made at a discount from the price paid by the end customer. (*Id.* at A15348:1-12.) Ms. Davis took out that discount so that the royalty base reflected the sales price paid by Genencor's and EDC's customers rather than the price paid by EDC to Genencor. (*Id.*)

34. Working back from Ms. Davis's final royalty figures and her royalty rates, Spezyme Ethyl sales for the period between March 2005 and September 2006 were $20,162,484 for the U.S. fuel ethanol market and $701,088 for other Spezyme Ethyl sales.

6. *The Fuel Ethanol Market After August 2006*

35. On August 24, 2006, I issued Findings of Fact and Conclusions of Law in which I concluded that Defendants infringed claims 1, 3, and 5 of the '031 patent, that those claims are valid, and that the '031 patent is enforceable. *Novozymes*, 446 F. Supp. 2d at 333-34.

36. Genencor stopped manufacturing Spezyme Ethyl on August 24, 2006. (Beto, Tr. at A15420:20-24.) However, some sales continued into September. (FF ¶ 26.)

37. Of the 29 Spezyme Ethyl customers that Genencor had in August 2006, 22 of them either switched or agreed to switch to other Genencor products, including Spezyme Fred and another Genencor product introduced in June 2006 named Spezyme Xtra. (Beto, Tr. at A15423:4-A15424:21, A15194:12-15.) Of the seven remaining customers, three switched to Liquozyme and four were testing products from sources other than Genencor. (*Id.* at A15424:22-A15425:8.) While nine of the Spezyme Ethyl customers have switched to Spezyme Xtra (*id.* at A15423:11-13), that product must be used at a higher dose than Spezyme Ethyl to get equivalent results (Crabb, Tr. at A15203:20-A15204:2).

D. *Licensing Activity*

38. In 1995, Genencor licensed a group of patents to Novozymes's predecessor in interest, Novo Nordisk A/S. Those patents related to the expression of polypeptides in filamentous fungi. (TX 339, D.I. 214 at A16120-33; Davis, Tr. at A15279:3-9.) The license was the result of a negotiated settlement of litigation. (Davis, Tr. at A15280:5-12.) For polypeptides used for "therapeutical purposes," the royalty

rate was between 5% and 8% "depending on the normal royalty rate typically paid for comparable products in comparable markets." (TX 339, D.I. 214 at A16121, ¶ 1.6, A16125, ¶ 3.1; Davis, Tr. at A15280:15-A15281:1.)

39. During the dispute over EBS1 alpha-amylase (*see* FF ¶ 23), Novozymes refused to license the '038 patent to Genencor "because this was core technology." (Meyer, Tr. at A15021:7-20.)

40. According to Defendants' damages expert, Dr. Teece,[14] other licenses produced in this case had royalty rates between 0% and 4%. (Teece, Tr. at A15485:25-A15486:8.) Ms. Davis testified that "nearly all" of the licenses produced were cross-licenses or part of settlement agreements. (Davis, Tr. at A15278:20-A15279:2.)

41. To support his opinion on a reasonable royalty, Dr. Teece also relied on deposition testimony of a Novozymes employee stating that the highest royalty rate for a Novozymes license with a party outside the Novozymes group of companies was 8%. (Teece, Tr. at A15486:9-16.)

42. Finally, Dr. Teece relied on studies of royalty rates in various industries. First, a study by Lemley and Shapiro reported an average royalty of 9.6% for the biotechnology industry and 11.98% for the chemical industry. (*Id.* at A15486:17-A15487:6.) In that study, some royalties in pharmaceuticals and biotechnology ranged as high as 50%. (*Id.* at A15515:14-19, A15516:21-A15517:5.) Second, data from the Licensing Economic Review reported royalty averages of 4.7% for the chemical

[14]Dr. David John Teece presented expert testimony on damages for Defendants. (Tr. at A15432:4-A15433:3; TX 694, D.I. 214 at A16674-99.)

industry, 4.0% for the food industry, 7.3% for pharmaceuticals and biotechnology, and 5.0% for energy and environment. (*Id.* at A15489:5-22, A15490:8-13.) Third, a search by Dr. Teece and his staff of a licensing database showed royalties of 1% to 8% for catalyst-related technology in the chemical industry. (*Id.* at A15490:15-25; TX 771, D.I. 214 at A16870.)

III. CONCLUSIONS OF LAW

1. Jurisdiction over the subject matter of this action is proper under 28 U.S.C. §§ 1331 and 1338.

A. *NZNA Does Not Have Standing to Join This Lawsuit*

2. Novozymes has renewed its motion to join NZNA as a co-plaintiff. (*See supra* note 2.) Because NZNA does not have standing to sue for infringement of the '031 patent, I will deny Novozymes's motion.

3. According to statute, "[a] patentee shall have remedy by civil action for infringement of his patent." 35 U.S.C. § 281. The term "patentee" includes "not only the patentee to whom the patent was issued but also the successors in title to the patentee." 35 U.S.C. § 100(d). That limitation means that, "[g]enerally, one seeking money damages for patent infringement must have held legal title to the patent at the time of the infringement." *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1551 (Fed. Cir. 1995) (citing *Crown Die & Tool Co. v. Nye Tool & Mach. Works*, 261 U.S. 24, 40-41 (1923)).

4. "Under certain circumstances, [however,] a licensee may possess sufficient interest in the patent to have standing to sue as a co-plaintiff with the

patentee." *Id.* at 1552. That "does not mean that every licensee under a patent has a rightful place in an infringement suit." *Ortho Pharm. Corp. v. Genetics Inst., Inc.*, 52 F.3d 1026, 1031 (Fed. Cir. 1995). To join as a co-plaintiff, a licensee must usually have an exclusive license, meaning that the licensee has "received, not only the right to practice the invention within a given territory, but also the patentee's express or implied promise that others shall be excluded from practicing the invention within that territory as well." *Rite-Hite*, 56 F.3d at 1552. A nonexclusive license, on the other hand, "may amount to no more than a covenant by the patentee not to sue the licensee . . . [with] the patentee reserving the right to grant others the same right." *Ortho*, 52 F.3d at 1031. "A holder of such a nonexclusive license suffers no legal injury from infringement and, thus, has no standing to bring suit or even join in a suit with the patentee." *Id.*

5. "Determining whether a licensee is an exclusive licensee . . . is a question of ascertaining the intent of the parties to the license as manifested by the terms of their agreement and examining the substance of the grant." *Textile Prods., Inc. v. Mead Corp.*, 134 F.3d 1481, 1484 (Fed. Cir. 1998). The surrounding circumstances may be relevant to that determination. For example, in *Kalman v. Berlyn Corp.*, 914 F.2d 1473 (Fed. Cir. 1990), the United States Court of Appeals for the Federal Circuit determined that a close corporation had standing to sue for patent infringement, where the patentee was one of the two shareholders and directors of the corporation and the corporation was the sole licensee of the patent. *Id.* at 1475-76, 1482. In that case, "when the nexus between the sole licensee and the patentee is so clearly defined . . . the sole licensee must be recognized as the real party in interest." *Id.* at 1482.

6. In another case, the United States District Court for the District of New Hampshire concluded that the wholly owned subsidiary of the patentee had standing to sue. *Ricoh Co. v. Nashua Corp.*, 947 F. Supp. 21, 24 (D.N.H. 1996). There, "[a]lthough plaintiffs presented no direct evidence of the strictly exclusive nature of the license, all of the evidence presented at trial, taken together, strongly supports the inference that [the subsidiary] held an exclusive right to manufacture [the patented device], including the right to exclude others from doing so." *Id.* That conclusion was supported by the relationship between the corporations and the fact that the subsidiary was the sole licensee in the United States. *Id.*

7. Novozymes argues that the circumstances here demonstrate that NZNA had an exclusive license to the '031, including the right to exclude others that is necessary to confer standing. (D.I. 207 at 26-30; D.I. 212 at 3-5.) First, NZNA is a wholly owned subsidiary of Novozymes. (FF ¶ 4.) Second, Novozymes sets the strategy for NZNA through the industry strategy groups and its control of NZNA's board of directors. (FF ¶ 6.) Third, Novozymes consolidates NZNA financial information into its financial reports. (FF ¶ 7.) Fourth, NZNA is the sole licensee of the '031 patent in the United States. (FF ¶ 8.) And fifth, Novozymes has a corporate policy of not licensing core technology outside of its family of companies. (FF ¶ 12.) According to Novozymes, those circumstances demonstrate that NZNA's license to use the '031 patent was effectively exclusive. (D.I. 209 at 28.)

8. The written agreement between Novozymes and NZNA, however, expressly grants a "non-exclusive" license of Novozymes's patents, including the '031 patent, to NZNA. (FF ¶ 9.) According to the agreement, Novozymes also covenanted

not to sue NZNA for patent infringement. (*Id.*) Those terms indicate that the parties intended NZNA to have nonexclusive rights, with no right to exclude others under the patents. The written agreement is consistent with Novozymes's apparent intent to maintain complete control over licensing and litigation decisions regarding its patents. (FF ¶ 11.) Indeed, when "it really is worth it," Novozymes has licensed core technology to other entities in the United States. (FF ¶ 13.)

9. I conclude that Novozymes and NZNA intended for the license of Novozymes's technology to be nonexclusive. Although NZNA is a wholly owned subsidiary of Novozymes, the TLA is structured to approximate an arms length negotiation, with NZNA getting a license to Novozymes's technology in exchange for a royalty. The corporations established that relationship for their own purposes. (FF ¶¶ 9-10.) Importantly, Novozymes retained the right to license its technology to others, and it has done so. (FF ¶¶ 11, 13.) Thus, unlike the corporation in *Kalman*, the facts here do not show that the licensee, NZNA, is the "real party in interest," with a right to exclude under the '031 patent. Indeed, the terms of the TLA are expressly to the contrary. The presence of a written nonexclusive license here also distinguishes this case from *Ricoh*, where all the evidence supported the presence of an exclusive license. Here, the clearest indication of Novozymes's and NZNA's intent is their written agreement providing for a nonexclusive license.[15]

---

[15]Novozymes also relies on *WMS Gaming Inc. v. International Game Technology*, 184 F.3d 1339, 1360-61 (Fed. Cir. 1999), as an example of a case where a corporation properly recovered the lost profits of its subsidiary. In that case, however, the defendant "stipulated in a pretrial order that [the parent corporation] does manufacture [the product]." *Id.* at 1361. The Federal Circuit held that the district court did not abuse its discretion in denying the defendant's motion, made late in the case, to

10. I conclude that NZNA is a nonexclusive licensee of the '031 patent. As such, NZNA has no right to exclude others from practicing the '031 patent, and thus has no standing to sue Defendants for infringing that patent. I will therefore deny Novozymes's motion to add NZNA as a co-plaintiff.

B. *Novozymes May Not Recover NZNA's Lost Profits*

11. Novozymes argues that even if NZNA is not a party in this case, Novozymes is still entitled to recover damages for the profits that NZNA allegedly lost because of Defendants' infringement. (D.I. 207 at 24-26; D.I. 212 at 2-3.) According to Novozymes, "[m]ultinational corporate patentees . . . are not required to arrange their internal structures specifically to be eligible for full compensation [for patent infringement]." (D.I. 207 at 24.) Thus, the argument goes, this court should treat Novozymes and NZNA as a single economic unit, so that damage to NZNA may be recovered by Novozymes. (*Id.* at 25-26.)

12. I will not ignore the organizational structure of Novozymes and its subsidiaries, and, therefore, Novozymes may not recover NZNA's alleged lost profits.

13. The Federal Circuit has addressed whether a corporation that owns a patent, but does not sell any product on which it could claim lost profits, can recover the lost profits of a sister corporation that was a nonexclusive licensee of the patent. *Poly-America, L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310-12 (Fed. Cir. 2004). In

---

withdraw the stipulation. *Id.* The Federal Circuit also noted that, even if the district court had allowed the stipulation to be withdrawn, "it would have been obligated to give [the plaintiff] the opportunity to join the subsidiary." *Id.* (citing *Kalman*, 914 F.2d at 1480.) That statement does not imply that joinder is appropriate under circumstances different from those in *Kalman*.

that case, even though the sister corporations collaborated to manufacture and sell products, "that relationship by itself [was] not sufficient to permit [the patentee] to claim [the other entity's] lost profits . . . ." *Id.* at 1311. The corporations were "not simply divisions of a single corporation, but [were] separate corporate entities." *Id.* The Court concluded:

> Their parent has arranged their corporate identities and functions to suit its own goals and purposes, but it must take the benefits with the burdens. While we do not speculate concerning the benefits that the two companies reap from dividing their operations and separating the owner of the patent from the seller of the patented product, [they] may not enjoy the advantages of their separate corporate structure and, at the same time, avoid the consequential limitations of that structure–in this case, the inability of the patent holder to claim the lost profits of its non-exclusive licensee.

Id.

14. Novozymes tries to distinguish that precedent by arguing that, unlike the patentee in *Poly-America*, Novozymes is a Danish rather than American company and that Novozymes is attempting to recover its own profits rather than those of another corporation. (D.I. 212 at 3.) Novozymes fails to present any reason, and I can discern none, why the *Poly-America* decision should not apply when one of the companies is Danish. Novozymes's second argument, that it is trying to recover its own profits, simply begs the question of whether Novozymes can claim NZNA's profits as its own.[16]

---

[16]Novozymes also argues that *WMS Gaming*, 184 F.3d at 1360-61, supports its position that a parent corporation may recover a subsidiary's lost profits even if the subsidiary is not joined as a plaintiff. (Hearing Transcript, January 30, 2007, at 5:1-6:10.) Again, in that case, lost profits were awarded pursuant to a defense stipulation. (*See supra* note 15.) The case, therefore, does not stand for the general proposition that parents may recover the lost profits of their subsidiaries. Such a proposition would be directly contrary to the Federal Circuit's reasoning in *Poly-America*.

15. Like the corporations in *Poly-America*, Novozymes has structured itself and its subsidiaries for its own goals and purposes. (*See* FF ¶ 10.) Novozymes must take the burdens of that structure along with the benefits. Novozymes may not blur the legal distinction between itself and NZNA to recover damages that Novozymes has not directly suffered.

16. Therefore, Novozymes may not recover NZNA's alleged lost profits. Because Novozymes has presented no other evidence of lost profits, no lost profits damages will be awarded.

C. *Defendants Must Pay a Reasonable Royalty on Sales of Spezyme Ethyl*

17. As an alternative to lost profits, Novozymes argues that it is entitled to a royalty of 25% of Spezyme Ethyl sales in the U.S. fuel ethanol market and 8% for sales in other markets. (D.I. 207 at 22-24.) For the reasons that follow, I conclude that a reasonable royalty is 20% for the U.S. fuel ethanol market and 8% for other markets.

18. "A patentee is entitled to no less than a reasonable royalty on an infringer's sales for which the patentee has not established entitlement to lost profits." *Rite-Hite*, 56 F.3d at 1554 (citing 35 U.S.C. § 284). "The royalty may be based upon an established royalty, if there is one, or if not, upon the supposed result of hypothetical negotiations . . . [taking place] as the result of a supposed meeting between the patentee and the infringer at the time infringement began." *Id.* "Factors relevant in a reasonable royalty determination using this method include those set out in *Georgia-Pacific*." *Micro Chem., Inc. v. Lextron, Inc.*, 317 F.3d 1387, 1393 (Fed. Cir. 2003)

(referring to *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970)).[17]

---

[17]The *Georgia-Pacific* factors are:

> 1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
> 2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.
> 3. The nature and scope of the license . . . .
> 4. The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention . . . .
> 5. The commercial relationship between the licensor and licensee, such as, whether they are competitors . . . .
> 6. The effect of selling the patented specialty in promoting sales of other products of the licensee . . . .
> 7. The duration of the patent and the term of the license.
> 8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
> 9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.
> 10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
> 11. The extent to which the infringer has made use of the invention . . . .
> 12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
> 13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements . . . .
> 14. The opinion testimony of qualified experts.
> 15. The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount which a prudent licensee . . . would have been willing to pay as a royalty and yet be able to make a reasonable profit and which amount would have been acceptable by a prudent patentee who was willing to grant a license.

318 F. Supp. at 1120.

1. *Novozymes's Proposed Royalty Rate*

19. Novozymes's damages expert, Ms. Davis, testified that she considered the fifteen *Georgia-Pacific* factors and found three to be the most relevant. First, Genencor and Novozymes's subsidiary NZNA are direct competitors in the U.S. fuel ethanol market. (Davis, Tr. at A15282:14-A15283:1.) Second, Spezyme Ethyl and NZNA's competing product, Liquozyme are highly profitable, with profit margins of 71% and 74% respectively. (*Id.* at A15283:25-A15284:23.) The third *Georgia-Pacific* factor that Ms. Davis heavily relied on was the result of a hypothetical negotiation between Genencor and Novozymes in March 2005, when the '031 patent issued. That factor, to some extent, incorporates the other *Georgia-Pacific* factors. (*Id.* at A15286:25-A15287:16.)

20. Ms. Davis approached the hypothetical negotiation through two different analyses. First, she applied a method that she called the "rule of thumb". (*Id.* at A15289:22-A15291:14.) According to that method, the parties would expect to split the expected profit margin of the infringing product, with the patentee taking one quarter to one third of that margin as a royalty. (*Id.* at A15290:5-8.) While there is no particular analytical justification for that approach (Teece, Tr. at A15473:8-20), it has been used to estimate royalties (*id.* at A15473:23-25). Applying the rule of thumb to the expected 71% profit margin on Spezyme Ethyl, Ms. Davis calculated a reasonable royalty of 18% to 24%. (Davis, Tr. at A15291:12-14.)

21. Second, Ms. Davis applied a method that she called the "analytical method." (*Id.* at A15291:15-A15292:19.) *See TWM Mfg. Co. v. Dura Corp.*, 789 F.2d

895, 899-900 (Fed. Cir. 1986) (discussing use of the analytical method in determining a reasonable royalty). According to that method, the parties would compare the expected profit margin of the infringing product to the typical profit margin for the relevant business. (*Id.* at A15291:18-22.) The difference in those margins would be used to estimate an appropriate royalty. (*Id.*) Here, Ms. Davis compared the 71% margin on Spezyme Ethyl to the 44% margin on Spezyme Fred, which was taken to be a typical margin for alpha-amylases in the fuel ethanol industry. (*Id.* at A15292:4-19.) The difference between those margins is 27%. (*Id.* at A15292:17-19.)

22. Taking the results of the rule of thumb and analytical methods, and considering Genencor's and NZNA's direct competition in a highly profitable business, Ms. Davis concluded that Novozymes was entitled to a reasonable royalty of 25% on Spezyme Ethyl sales in the U.S. fuel ethanol market. (*Id.* at A15292:20-A15293:2.)

23. For other markets, Ms. Davis used as a starting point the 5% to 8% royalty rate from the Genencor/Novo Nordisk license regarding filamentous fungi (FF ¶ 38). (Davis, Tr. at A15281:2-12, A15287:22-A15288:11.) She concluded that the high end of that range, 8%, would be a reasonable royalty for sales outside of the fuel ethanol market. (*Id.* at A15288:8-11.)

2. *Defendants' Criticisms*

24. Defendants' argument (D.I. 210 at 40-45) and the testimony of their expert, Dr. Teece, focus on several criticisms of Ms. Davis's conclusions.

25. First, Dr. Teece testified that there is no analytical justification for the rule of thumb, and that it tends to be used only when there is no relevant transactional data

to support a royalty rate. (Teece, Tr. at A15473:8-20.) Furthermore, when it is used, the relevant number for the parties to split will not be the total profit margin for the infringing product, but instead the incremental profit, i.e. the difference between the margin for the infringing product and the margin for non-infringing alternatives. (*Id.* at A15474:1-9.) According to Dr. Teece, Spezyme Xtra was a non-infrigning alternative that Genencor would have considered in a hypothetical negotiation in March 2005. (*Id.* at A15475:17-A15476:18; TX 769, D.I. 214 at A16866.) Depending on Genencor's expectations for Spezyme Xtra availability, Dr. Teece estimated the expected profits from sales of Xtra and subtracted those profits from the expected profits of Spezyme Ethyl to get an expected incremental profit. (TX 769, D.I. 214 at A16866.) Taking one fourth to one third of that incremental profit, rather than the total profit margin, according to the rule of thumb, yields a reasonable royalty of 5.7% to 7.5% if Xtra were available immediately in March 2005 and 8.3% to 11.0% if Xtra were not available until six months later. (*Id.*)

26. Second, Dr. Teece criticized the use of the analytical method because of its dependence on the benchmark for "normal" profit margins and its dependence on the time period over which margins are measured. (Teece, Tr. at A15482:23-A15483:1; TX 770, D.I. 214 at A16868.) Regarding the benchmark, Dr. Teece again argued that Spezyme Xtra would be an available alternative to Ethyl, and using the 58% margin for Xtra, instead of the 44% margin for Fred, leads to an estimated royalty of 13%. (TX 770, D.I. 214 at A16868.)

27. Dr. Teece also argued that the analytical method is overly sensitive to the time period over which profit margins are calculated. (Teece, Tr. at A15482:2-12.) Ms.

Davis did not include sales of Spezyme Ethyl between its launch in April 2004 and October 2004 in her calculation of Ethyl profit margins, because she believed that initial period included start-up costs that would lower the actual margin from the long term margin that the parties would expect Ethyl to achieve. (Davis, Tr. at A15291:4-11.) Indeed, when Dr. Teece included those sales, his profit margin for Ethyl was 65% instead of 71%. (TX 770, D.I. 214 at A16868.) Comparing that 65% margin for Ethyl to the 44% margin for Fred leads to an estimated 13% royalty by the analytical method. (*Id.*; Teece, Tr. at A15482:5-12.) Comparing that 65% margin to the 58% margin for Xtra leads to an even lower estimated royalty of 7%. (TX 770, D.I. 214 at A16868; Teece, Tr. at A15482:20-A15483:1.)

28. Based on those criticisms, Dr. Teece testified that a reasonable royalty for both the fuel ethanol market and other markets would be 8%. That 8% royalty is within the 5.7% to 11% range taken from Dr. Teece's "corrected" rule of thumb analysis and the 7% to 13% range taken from his "corrected" analytical method analysis. Also, the royalty rate for the filamentous fungi license agreed to by Genencor and Novo Nordisk was between 5% and 8%. (FF ¶ 38.) Dr. Teece also relied on testimony that the highest royalty rate for a Novozymes license to an entity outside its group of companies was 8%. (FF ¶ 41.) Finally, Dr. Teece relied on reported royalty rates for the biotechnology and chemical industries, ranging from 1% to almost 12%. (FF ¶ 42.)

3. *Reasonable Royalty*

29. I conclude, based on all the evidence, that a reasonable royalty rate is 20% for sales in the fuel ethanol market and 8% for sales in other markets.

30. First, I agree with Dr. Teece that the parties in a hypothetical negotiation would consider available, or soon to be available, alternatives to the infringing product. Thus, it would be a mistake to ignore the potential market entry of Spezyme Xtra. The fact that nine out of twenty-nine customers who purchased the infringing product, Spezyme Ethyl, in August 2006 switched to Xtra indicates that, even in March 2005, Genencor would have reasonably considered Xtra as a factor in the negotiation over royalties for Ethyl. I conclude that Novozymes's proposed 25% royalty rate, based in part on an analysis that discounted any effect from Xtra, is too high.

31. On the other hand, the fact remains that Xtra was not introduced until June 2006. (FF ¶ 37.) So while Genencor would consider the possibility of marketing Xtra, the timing of market entry would have been uncertain in March 2005, when the hypothetical negotiation would have taken place. Also, Xtra is not a perfect substitute for Ethyl for all customers, as shown by the fact that only about one third of Genencor's Ethyl customers switched to Xtra in August 2006. Xtra is technically inferior to Ethyl, requiring a higher dose of enzyme to achieve comparable results. (*Id.*) Therefore, while Xtra would be a factor in negotiations, the parties would not reasonably expect all Ethyl customers to switch to Xtra, either immediately in March 2005 or six months later, as proposed by Dr. Teece. Accordingly, I conclude that Defendants' range of 5.7% to 13% is too low.

32. As for Dr. Teece's criticism about the sensitivity of the analytical method to the time period chosen for calculating profit margins, I conclude that Ms. Davis presented a reasonable basis for choosing to exclude Spezyme Ethyl sales from the first six months after its introduction. (Davis, Tr. at A15291:4-11.) The parties'

expectation of long term profit margins would account for the effect of start-up costs on the initial profit margins. Therefore, the expected profit margin for Spezyme Ethyl would reasonably be 71% rather than 65%.

33. A royalty rate of 20% for the fuel ethanol market adequately accounts for the possibility of Genencor's noninfringing substitutes, while also accounting for the uncertainty as to when substitutes would be available and the likelihood that some customers would reject those substitutes.

34. While a 20% royalty rate is higher than the rates in other licenses offered by the parties and the average rates reported for the relevant industries, several of the *Georgia-Pacific* factors support a higher rate in this case. First, the parties are direct competitors in a highly profitable business, with profit margins of more than 70% for the parties' Spezyme Ethyl and Liquozyme products. (Conclusion of Law ["CL"] ¶ 19.) Second, Novozymes has a general policy of refusing to license core technology to entities outside its family of companies. (FF ¶ 12.) Indeed, Novozymes refused to license the '038 patent to Genencor during the settlement of the EBS1 litigation. (FF ¶ 39.) Third, the '031 patent term does not end until 2016. ('031 patent.) Fourth, the patented technology works better than many other available products, with improved thermostability and acid tolerance. (FF ¶ 24.) Fifth, Genencor made extensive use of the patented technology, as evidenced by its sales of more than seven million kilograms of Spezyme Ethyl between March 2005 and September 2006. (Davis, Tr. at A15285:13-A15286:3.) Considering all of the evidence, a 20% rate is reasonable for the U.S. fuel ethanol industry.

35. I agree with both experts that an 8% royalty rate is reasonable for sales outside of the fuel ethanol market. That rate is consistent with the average rates for the relevant industries (FF ¶ 42), the rate for the filamentous fungi license (FF ¶ 38), and the opinions of both experts.

36. I conclude that Ms. Davis's determination of the royalty base was appropriate. In particular, the parties to the hypothetical negotiation would reasonably correct for the discount on sales from Genencor through EDC so that the sales numbers represented the amount paid by the customer in the market. The corrected royalty base for the damages period is $20,162,484 for the U.S. fuel ethanol market and $701,088 for other markets.

37. Applying the 20% royalty rate to the fuel ethanol market sales gives a royalty of $4,032,497. Applying the 8% royalty rate to the other sales gives a royalty of $56,087. Reasonable royalty damages thus total $4,088,584.

4. *Prejudgment Interest*

38. I also conclude that Novozymes should be awarded prejudgment interest on the damages award. "An award of prejudgment interest serves to make the patentee whole because the patentee also lost the use of its money due to infringement." *Crystal Semiconductor Corp. v. TriTech Microelecs. Int'l, Inc.*, 246 F.3d 1336, 1361 (Fed. Cir. 2001). "[T]he discretion of the district court in denying prejudgment interest is limited to specific circumstances." *Id.* at 1346. Those circumstances include delay in filing suit and use of litigation tactics to delay the resolution of the lawsuit. *Id.* at 1361-62. There appear to be no such circumstances here, as Defendants apparently recognize, since they make no argument in response to

Novozymes's position (D.I. 207 at 30). Thus, Novozymes will be awarded prejudgment interest.

D. *Genencor Willfully Infringed the '031 Patent*

39. Novozymes argues that Genencor willfully infringed the '031 patent. (D.I. 207 at 31-37; D.I. 212 at 15-19.) For the following reasons, I agree.

40. "The tort of willful infringement arises upon deliberate disregard for the property rights of the patentee." *Vulcan Eng'g Co. v. Fata Aluminum, Inc.*, 278 F.3d 1366, 1378 (Fed. Cir. 2002). A party has "an affirmative duty of due care to avoid infringement of the known patent rights of others." *Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1345 (Fed. Cir. 2004). "The extent to which the infringer disregarded the property rights of the patentee, the deliberateness of the tortious acts, or other manifestations of unethical or injurious commercial conduct, may provide grounds for a finding of willful infringement . . . ." *Hoescht Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1583 (Fed. Cir. 1996).

41. "Determination of willfulness is made on consideration of the totality of the circumstances . . . ." *Knorr-Bremse*, 383 F.3d at 1342. "The patentee bears the burden of persuasion and must prove willful infringement by clear and convincing evidence." *Golden Blount, Inc. v. Robert H. Peterson Co.*, 438 F.3d 1354, 1368 (Fed. Cir. 2006). "The patentee must present threshold evidence of culpable behavior before the burden of production shifts to the accused to put on evidence that it acted with due care." *Id.* (internal quotation marks omitted).

42. In September 2004, Novozymes sent a letter to Genencor with a copy of the allowed '031 patent claims, stating Novozymes's position that those claims covered Spezyme Ethyl. (FF ¶ 25.) Novozymes sued Genencor for patent infringement on March 15, 2005, the same day the allowed claims issued. (*Id.*) After receiving notice of Novozymes's claims, not only did Genencor continue to manufacture and sell Spezyme Ethyl, it also applied for its own patent claiming what appears to be, in essence, the same technology. (FF ¶¶ 26, 31.) Taken together, Genencor's behavior suggests that it deliberately continued to infringe Novozymes's claims on technology that Genencor itself believed was patentable.

43. In response, Genencor argues that it had a good faith belief that Novozymes's claims were invalid for obviousness in light of the Suzuki reference. (D.I. 209 at 30-32.) Dr. Crabb testified that, in his scientific opinion, "anyone that has read that paper would choose to make the deletions" claimed in the '031 patent. (FF ¶ 28.) According to Dr. Crabb, Genencor also relied on an opinion of counsel regarding Novozymes's related '038 patent. (FF ¶ 29.)

44. Genencor's arguments, however, are flatly contradicted by its representation to the Patent Office that its own claims were patentable. Genencor's application cited the Suzuki reference and claimed *Bacillus stearothermophilus* alpha-amylases with the Suzuki deletion. (FF ¶ 31.) Thus, when it filed its application, Genencor apparently did not believe that the Suzuki reference invalidated a patent claim on an alpha-amylase with the deletions described in the '031 patent. Genencor has not tried to distinguish its application from the '031 patent, instead arguing only that the application is just one piece of the totality of the evidence. (D.I. 209 at 33 n.24.)

Given that that piece is a sworn statement to the U.S. government, it has practically dispositive weight, within the circumstances of this case.

45. I also conclude that Genencor's opinion of counsel regarding the '038 patent does not demonstrate a good faith belief in the '031 patent's invalidity. That opinion stated that the '038 patent, as issued, had no claims that covered Spezyme Ethyl and that during prosecution Novozymes had tried and failed to get such claims. (FF ¶ 29.) That opinion, however, fails to address the fact that Genencor knew that those claims were, in fact, allowed by the Patent Office during the later '031 patent prosecution. Therefore, that opinion, now incomplete in light of the Patent Office's later decision, does not support a reasonable belief in invalidity.

46. Genencor also argues that its belief that the '031 patent was invalid is supported by later developments in this case, particularly my decision to deny Novozymes's motion for a preliminary injunction. (FF ¶ 30.) Because Novozymes had to carry a high burden to get preliminary relief and because the decision issued over a year after Genencor first received notice of Novozymes's claims, my decision provides little support for Genencor's position. Similarly, the later assertion of the Machius reference as support for invalidity does not establish good faith at the time Genencor received notice of the allowed claims.

47. In sum, the totality of the evidence shows that, on receiving notice of Novozymes's claims, Genencor failed to exercise due care when it chose to continue making and selling the accused product until the end of the liability phase of this trial. Genencor's current assertion that it believed in good faith that Novozymes's claims were invalid is contrary to its own actions before the Patent Office. Therefore, I

conclude that Novozymes has shown by clear and convincing evidence that Genencor's infringement was willful.

E. *Novozymes is Entitled to Enhanced Damages and Attorneys' Fees*

48. Because Genencor willfully infringed the '031 patent, I conclude that this is an exceptional case, that Novozymes's damages award should be doubled, and that Novozymes should recover its reasonable attorneys' fees.

1. *Enhanced Damages*

49. In exceptional cases of patent infringement, a court "may increase the damages up to three times." 35 U.S.C. § 284. Because Genencor has willfully infringed the '031 patent, I conclude that this is an exceptional case. *See Epcon Gas Sys., Inc. v. Bauer Compressors, Inc.*, 279 F.3d 1022, 1034 (Fed Cir. 2002).

50. Enhanced damages are appropriate if the "infringer is guilty of conduct upon which increased damages may be based," and if the "totality of the circumstances" supports an enhanced award. *Jurgens v. CBK, Ltd.*, 80 F.3d 1566, 1570 (Fed. Cir. 1996) (citing *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 826-27 (Fed. Cir. 1992)). "In exercising [its] discretion [to award enhanced damages], the trial court considers the weight of the evidence of the infringer's culpability, in light of the factors

included in *Read*."[18] *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1365 (Fed. Cir. 1998) (internal citations omitted).

51. I conclude that the most relevant *Read* factor here is the question of "whether the infringer, when he knew of the other's patent protection, investigated the scope of the patent and formed a good-faith belief that it was invalid or that it was not infringed." *Read*, 970 F.2d at 827. Genencor's decision to continue infringing without a good faith belief in the '031 patent's invalidity is the basis for my finding of willful infringement, and it supports an award of enhanced damages. That Defendants failed to take remedial action and continued to infringe until after the liability trial also supports an enhanced award. *See id.* (setting forth the voluntary withdrawal of the accused product during litigation as a mitigating factor in determining enhanced damages).

52. While the patent statute allows damages in exceptional cases to be trebled, I conclude that other factors weigh in favor of a smaller award. First, Genencor's behavior as a party to the litigation was not objectionable. *See Read*, 970

---

[18]The *Read* factors are:

> (1) whether the infringer deliberately copied the ideas or design of another;
> (2) whether the infringer, when he knew of the other's patent protection, investigated the scope of the patent and formed a good-faith belief that it was invalid or that it was not infringed; . . .
> (3) the infringer's behavior as a party to the litigation[;] . . .
> (4) [d]efendant's size and financial condition[;] . . .
> (5) [c]loseness of the case[;] . . .
> (6) [d]uration of defendant's misconduct[;] . . .
> (7) [r]emedial action by the defendant[;] . . .
> (8) [d]efendant's motivation for harm[;] . . . [and]
> (9) [w]hether defendant attempted to conceal its misconduct.

970 F.2d at 827.

F.2d at 827. Second, contrary to Novozymes's assertions (D.I. 207 at 37), there is no evidence that Genencor copied Novozymes's ideas or design. *See Read*, 970 F.2d at 827. Indeed, the evidence is to the contrary. Genencor acquired EBS, the company that developed the enzyme that was sold as Spezyme Ethyl, in 2002, and it began selling Spezyme Ethyl in 2004. (FF ¶¶ 23-24.) Novozymes's '031 patent did not issue until 2005. Novozymes did not, and still does not, sell an alpha-amylase covered by the '031 patent. Thus, while Spezyme Ethyl infringes Novozymes's patent, Genencor and EBS apparently developed the enzyme on their own.

53. Therefore, the totality of the circumstances here justifies an award of double damages to Novozymes, but not more than that.

2. *Attorneys' Fees*

54. In exceptional cases, a court may also "award reasonable attorney fees to the prevailing party." 35 U.S.C. § 285. "[T]he Court may consider the factors relevant to an enhanced damages award in determining whether attorneys' fees should be granted." *nCUBE Corp. v. SeaChange Int'l, Inc.*, 313 F. Supp. 2d 361, 391 (D. Del. 2004).

55. Here, the evidence that supports an award of double damages also supports an award of reasonable fees and costs.

56. I note that Novozymes is only entitled to a reasonable award. At several points during this litigation, extra time and effort was spent because of Novozymes's own decisions. For example, during the litigation phase of trial, an issue arose as to the provenance of a protein sample whose amino acid sequence was part of Novozymes's case for infringement. *Novozymes*, 446 F. Supp. 2d at 314. The expense associated

with obtaining and analyzing a new sample should not be shifted to Defendants. As another example, Novozymes moved to join NZNA months after the liability phase of trial. (*Supra* note 2.) Again, the expense associated with that motion should not be shifted. Therefore, in its application for attorneys' fees, I will require Novozymes to justify its request by generally identifying the issues on which its attorneys spent their time, so inappropriate cost shifting is avoided.

F. *Defendants will be Permanently Enjoined from Infringing the '031 Patent*

57. Courts "may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable." 35 U.S.C. § 283. "According to well-established principles of equity, a plaintiff seeking a permanent injunction must satisfy a four-factor test before a court may grant such relief." *eBay Inc. v. MercExchange, L.L.C.*, 126 S. Ct. 1837, 1839 (2006).

> A plaintiff must demonstrate: (1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction.

Id. In *eBay*, the Supreme Court rejected the position that a patentee's "statutory right to exclude alone justifies [a] general rule in favor of permanent injunctive relief." *Id.* at 1840. The Court also rejected a categorical rule that a patentee's willingness to license its patent is enough to establish that the patentee would not suffer irreparable harm in the absence of an injunction. *Id.* "[T]raditional equitable principles do not permit such broad classifications." *Id.*

58. I conclude that Novozymes has suffered irreparable harm because of Genencor's infringement of Novozymes's right to exclude others from practicing its patent. Contrary to Genencor's argument (D.I. 209 at 37, 39), the Supreme Court in *eBay* did not state that loss of the right to exclude could not be irreparable harm. Rather, the Court simply rejected the proposition that the patentee's right to exclude should always lead to injunctive relief for patent infringement. *eBay*, 126 S. Ct. at 1840. Here, Novozymes owns two related patents for alpha-amylases. It licenses both patents to its U.S. subsidiary, not only in exchange for a 40% royalty, but also with the expectation that the value of its subsidiary will increase with the successful marketing of the licensed technology. The subsidiary markets one of the two alpha-amylases, and Novozymes expects its patents to exclude competitors from marketing either of them. In those circumstances, even though Novozymes does not market the alpha-amylases itself, it has suffered harm beyond the reasonable royalty that it can recover from Defendants. And Novozymes will continue to suffer such irreparable harm if Defendants are not enjoined from infringing on Novozymes's right to exclude.

59. Legal remedies are not adequate to compensate Novozymes for the infringement of its patent. Because Novozymes markets its technology by licensing it to a subsidiary, the legal remedy of lost profits damages is not available. Even if it were, the statutory right to exclude represents a benefit that, under these circumstances, cannot be equated by an award of cash. These are head-to-head competitors, and Novozymes has a right, granted by Congress, not to assist its rival with the use of proprietary technology.

60. The balance of hardships tips in favor of Novozymes. While Novozymes would suffer irreparable harm from future infringement, Defendants, who have apparently pulled the infringing product from the market, will not be harmed by a permanent injunction.

61. Finally, there is no evidence that a permanent injunction would harm the public. While the fuel ethanol industry has growing importance in a time of rising energy prices, Novozymes has a competing product, and Genencor has products that do not infringe the '031 patent.

62. In conclusion, after weighing the factors set forth in *eBay*, I conclude that Defendants should be enjoined from infringing the '031 patent.

IV. SUMMARY OF CONCLUSIONS

For the reasons set forth herein, Novozymes's motion to join NZNA as a party plaintiff will be denied. Novozymes's motion for a permanent injunction will be granted. An appropriate order will issue.

Furthermore, Defendants must pay reasonable royalty damages in the amount of $4,088,584 plus prejudgment interest. Genencor has willfully infringed the '031 patent, so the damages award will be doubled. Novozymes is entitled to reasonable attorneys' fees and costs. The parties shall confer and, within ten days, submit a form of judgment order giving effect to the foregoing conclusions, as well as the conclusions set forth in my decision following the liability trial in this case. *See Novozymes*, 446 F. Supp. 2d at 333-34.

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

NOVOZYMES A/S,	)	
	)	
Plaintiff,	)	
	)	
v.	)	Civil Action No. 05-160-KAJ
	)	
GENENCOR INTERNATIONAL, INC. and ENZYME DEVELOPMENT CORPORATION,	)	
	)	
Defendants.	)	

ORDER

For the reasons set forth in the Post-Trial Findings of Fact and Conclusions of Law issued in this matter today,

IT IS HEREBY ORDERED that Plaintiff's Motion to join Novozymes of North America, Inc. as a party plaintiff in this case is DENIED.

IT IS FURTHER ORDERED that Plaintiff's Motion for a Permanent Injunction (D.I. 169) is GRANTED.

IT IS FURTHER ORDERED that the parties shall confer and, within ten days, submit a form of judgment order giving effect to the conclusions set forth in both the accompanying Findings of Fact and Conclusions of Law and the Findings of Fact and Conclusions of Law issued following the liability trial in this case.

UNITED STATES CIRCUIT JUDGE

February 16, 2007
Wilmington, Delaware