

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SCOUT ENERGY MANAGEMENT, LLC, and
CHEVRON U.S.A. INC.

Petitioners

v.

PILOT INTELLECTUAL PROPERTY, LLC,

Patent Owner.

PETITIONER'S REPLY TO PATENT OWNER RESPONSE

Case No. IPR2024-00385

Patent 8,505,332

Mail Stop Patent Board
Patent Trial and Appeal Board
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TABLE OF CONTENTS

I.	Introduction.....	1
II.	A POSITA would have been motivated to combine Aycaguer with each other Asserted reference	1
III.	Pilot’s focus on the presence of ethane is a red herring	5
IV.	Neither Aycaguer nor Soldati disclose either cryogenic conditions or carbon dioxide recovery solvents	6
	A. Cryogenic conditions.....	6
	B. Carbon Dioxide Recovery Solvents	8
V.	Soldati teaches sweet and sour NGL streams with the compositions described in Claims 4 and 7.....	15
	A. Soldati’s Stream 28 is a sweet NGL rich stream as recited by Claim 4	15
	B. Soldati’s Stream 12 is a sour NGL rich stream as recited by Claim 7	18
VI.	Patent Owner’s evidence of secondary considerations of non-obviousness lacks nexus with the Challenged Claims.....	19
	A. Pilot is not entitled to a rebuttable presumption of nexus because the critical features of CO2Flex are not claimed.	19
	B. Each of Pilot’s secondary consideration arguments fail	21
VII.	Conclusion	29

EXHIBIT LIST

Exhibit	Description
1001	U.S. Patent No. 8,505,332 (the “’332 Patent”)
1002	Declaration of Dr. David Rockstraw
1003	Prosecution History of the ’332 Patent
1004	U.S. Pat. No. 4,474,591 (“Arand”)
1005	Reducing Carbon Dioxide Emissions with Enhanced Oil Recovery Projects: A Life Cycle Assessment Approach (“Aycaguer”)
1006	U.S. Pat. No. 4,976,849 (“Soldati”)
1007	Treating Acid & Sour Gas: CO ₂ Recovery by the Ryan/Holmes Process (“Ryan”)
1008	Declaration of Dr. Sylvia Hall-Ellis
1009	Original Complaint, 4:23-cv-02505, DI. 1 (complaint and exhibits) (“Complaint”)
1010	Pilot Tests Prove Ryan/Holmes Cryogenic Acid Gas/Hydrocarbon Separations (“Holmes”)
1011	Plaintiffs’ Response in Opposition to Defendants’ Motion to Dismiss For Failure to State a Claim Under FRCP 12(B)(6) (“Opposition”)
1012	Separation Process Engineering (“Wankat”)
1013	Scheduling Order, 4:23-cv-02505, D.I. 27 (“Scheduling Order”)
1014	Comparison of Districts (“Comparison”)
1015	Curriculum Vitae of Dr. David Rockstraw
1016	U.S. Pat. No. 4,563,202 (“Yao”)

Exhibit	Description
1017	https://trc.nist.gov/cryogenics/aboutCryogenics.html (“About Cryonics”)
1018	Encyclopedia of Chemical Technology, Volume 18 (“Kirk”)
1019	Organic Chemistry, Fourth Edition (“Morrison”)
1020	Perry’s Chemical Engineers’ Handbook, Seventh Edition (“Perry”)
1021	Applied Thermodynamics (“DePriester”)
1022	U.S. Pat. No. 4,070,165 (“Colton”)
1023	Schlumberger Energy Glossary Entry for “Natural Gas Liquids”
1024	Sizing of Throttling Device for Gas/Liquid Two-Phase Flow Part 1: Safety Valves (“Diener”)
1025	Deposition of Mr. Bors (“Bors”)
1026	Deposition of Mr. Prim (“Prim”)

I. INTRODUCTION

The Patent Owner Response (“POR”) largely rehashes arguments from the Patent Owner Preliminary Response that were previously rejected by the Board. As discussed below, these arguments have no basis and should be rejected.

II. A POSITA WOULD HAVE BEEN MOTIVATED TO COMBINE AYCAGUER WITH EACH OTHER ASSERTED REFERENCE

In its institution decision, the Board agreed with the Petitioners that a POSITA would have had a motivation to combine each of the Asserted References. The Board credited not only the text of the Asserted References—which explicitly suggested the combination—but also the testimony of Dr. Rockstraw.

With regards to Grounds 1 and 2, Petitioners do not make any modification to Aycaguer, and thus do not need to show some “reason” to modify it. Instead, Dr. Rockstraw merely explains how a POSITA would interpret the teachings of the reference. *See, e.g.*, Pet. at 19-20. In Ground 2—as recognized by the Board—Petitioners used Arand merely “for expressly teaching the basic components of hydrocarbons,” and thus no additional motivation to combine is required. Paper 11 at 37. Pilot’s challenge to the sufficiency of Petitioner’s “motivation to combine” for Grounds 1 and 2 thus fails.

With regards to Grounds 3-6, Pilot baldly alleges that Petitioner provided only a “general motivation to combine two references.” POR at 64, 68, & 70. Pilot’s characterization of the Petition is grossly inaccurate—as recognized by the

Board, the Petition explained why a POSITA would be motivated to combine each of the references put forward in Grounds 3-6. Paper 11 at 40, 44-45.

Pilot ignores the Petition's analysis and instead argues against a motivation to combine based on a faulty "teaching away" theory. *See* POR at § VII. Teaching away doctrine inquires whether the proposed prior art combination "undermine[s] the very reason being proffered as to why a person of ordinary skill would have combined the known elements." *Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009). A prior art reference teaches away from a combination when it suggests the combination will not function as intended. *See In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1382 (Fed. Cir. 2007).

Pilot does not argue that the combination of references in any Ground would not work as described in the Petition. For example, Pilot does not contest that a POSITA would have understood that NGLs include at least C₃-C₈ (the only reason for the use of obviousness, instead of anticipation, in Grounds 1-2) or that a POSITA would have used the Soldati method to process NGLs in Aycaguer's system (the proposed combination in Grounds 3-6). Instead, Pilot argues the Asserted References "teach[] away" from the Challenged Claims and cannot be combined with any other Asserted Reference to read on the Challenged Claims because (i) the '322 Patent teaches that ethane and methane should be disregarded; and (ii) the Asserted References teach that ethane should be recovered. *See* POR at

29-31. But disregarding methane and ethane is not a limitation of the Challenged Claims and is therefore irrelevant to the teaching away analysis. Teaching away doctrine is based on whether the prior art “criticize[s], discredit[s], or otherwise discourage[s] the solution claimed.” *In re Brandt*, 886 F.3d 1171, 1178 (Fed. Cir. 2018) (emphasis added).

Pilot’s characterization of the ’332 Patent’s unclaimed teachings is also incorrect. The ’332 Patent provides several embodiments that recover ethane. For example, the ’332 Patent provides for an embodiment where the “purified carbon dioxide stream” is “substantially free of C₂₊”—*i.e.*, substantially all the ethane is recovered instead of being left with the carbon dioxide. EX1001 at 5:49-52.

Similarly, the ’332 Patent’s methods also recover ethane:

TABLE 2B

Stream Compositions			
Name	Purified CO ₂ Recycle Stream 164	Sour NGL Rich Stream 264	Cooled Sour NGL Rich Stream 266
Comp Mole Frac (H ₂ S)	0.0327	0.0000	0.0421
Comp Mole Frac (Nitrogen)	0.0058	0.0000	0.0000
Comp Mole Frac (CO ₂)	0.8359	0.0500	0.0500
Comp Mole Frac (Methane)	0.0558	0.0000	0.0000
Comp Mole Frac (Ethane)	0.0348	0.0281	0.0281
Comp Mole Frac (Propane)	0.0513	0.1728	0.1728
Comp Mole Frac (i-Butane)	0.0022	0.0789	0.0789
Comp Mole Frac (n-Butane)	0.0015	0.2388	0.2388
Comp Mole Frac (i-Pentane)	0.0000	0.0887	0.0887
Comp Mole Frac (n-Pentane)	0.0000	0.0866	0.0866
Comp Mole Frac (n-Hexane)	0.0000	0.1063	0.1063

EX1001 at Table 2B (annotated).

TABLE 5B

Stream Compositions

Name	Purified CO ₂ Recycle Stream 1	Sour NGL Rich Stream m	Cooled Sour NGL Rich Stream 266
	Disregarded	Recovered	
Comp Mole Frac (H ₂ S)	0.0004	0.0008	0.0008
Comp Mole Frac (Nitrogen)	0.0162	0.0000	0.0000
Comp Mole Frac (CO ₂)	0.6975	0.0250	0.0250
Comp Mole Frac (Methane)	0.1922	0.0000	0.0000
Comp Mole Frac (Ethane)	0.0620	0.0613	0.0613
Comp Mole Frac (Propane)	0.0275	0.2670	0.2670
Comp Mole Frac (i-Butane)	0.0017	0.0836	0.0836
Comp Mole Frac (n-Butane)	0.0024	0.2751	0.2751
Comp Mole Frac (i-Pentane)	0.0000	0.0697	0.0697

EX1001 at Table 5B (annotated); EX2028 at 68 (describing the recovery of 5.3% ethane). Pilot’s assertion that the ’332 Patent’s process “leaves all (or almost all) of the methane and ethane in the carbon dioxide recycle streams” thus directly contradicts the explicit teachings of the ’332 Patent and cannot serve to “teach away” from the Asserted References, even if the Board considered Pilot’s incorrect teaching-away theory.

Finally, the Board already (correctly) rejected this exact same argument. Pilot’s teaching away analysis is nearly word-for-word identical to the one in its POPR. The Board “disagreed” with Pilot’s arguments and held that “[f]or purposes of institution, Petitioner has made a sufficient showing that a skilled artisan would have combined the teachings of Aycaguer with Soldati to arrive at the invention

recited in claim 1.” Paper 11 at 40. Post-institution, Pilot added no new rationale or evidence supporting this argument. The Board should come to the same result again.

III. PILOT’S FOCUS ON THE PRESENCE OF ETHANE IS A RED HERRING

Petitioner is compelled to address Pilot’s allegations that both the Petitioner and Dr. Rockstraw “erroneous[ly]” stated that “Natural Gas Liquids includes only C3-C8 hydrocarbons.” POR at 58. Neither Petitioner nor Dr. Rockstraw ever said that, and Pilot thus unsurprisingly provides no support for this allegation. In fact, throughout Dr. Rockstraw’s declaration, he frequently explains that ethane is present in many of the NGL streams disclosed in the prior art. *See, e.g.*, EX1002, ¶¶ 82 (explaining that “all intermediate breakdown products (C₂-C₈) are also present in the formation”); 143 (explaining that stream 12 contains “ethane and higher hydrocarbons”); 212 (explaining that the exit stream in *Aycaguer* contains “some methane and C₂”). The foundation of Pilot’s position is thus faulty.

Furthermore, even accepting Pilot’s faulty premise that the Petitioners and Dr. Rockstraw failed to account for the presence of ethane in some of the prior art streams, Pilot fails to explain how it is relevant. As discussed above, the Challenged Claims do not require “disregarding” the recovery of ethane, and many embodiments of the ’332 Patent do indeed recover ethane. The streams in each of Challenged Claims 1-3 and 6 are claimed using the term “comprising”—*i.e.*, they

are open ended. The additional presence of ethane in the sour or sweet NGL rich streams has no impact on the obviousness analysis. *See* EX1001 claim 1; *see also*, *e.g.*, EX1025 at 52:16-54:2 (“Claim 1 does not discuss recovery percentages [of ethane or other hydrocarbons].”). And, in Challenged Claims 4 and 7, the exact compositions of the prior art streams are discussed in detail in both Dr.

Rockstraw’s declaration and the prior art references themselves, and indisputably satisfy the ethane composition requirements of those two claims. Finally, as discussed above, to the extent that Pilot is arguing that the presence of ethane would somehow affect the motivation to combine, Pilot’s arguments are legally and factually incorrect. *Supra*, § II.

IV. NEITHER AYCAGUER NOR SOLDATI DISCLOSE EITHER CRYOGENIC CONDITIONS OR CARBON DIOXIDE RECOVERY SOLVENTS

As with its motivation to combine argument, Pilot’s cryogenic conditions and carbon dioxide recovery solvents arguments are re-hashes of its rejected POPR positions.

A. Cryogenic conditions

While Pilot conclusorily states that Aycaguer “subjects the carbon dioxide recycle stream to cryogenic conditions,” as noted by the Board, Aycaguer does not disclose using cryogenic conditions. *See* Paper 11 at 35. Even assuming that a POSITA reading Aycaguer must use the Ryan/Holmes process to perform

Aycaguer's separations and that Petitioner "incorporated" one or more Ryan/Holmes articles into Grounds 1 and 2—both of which are incorrect assumptions—Pilot's own citations show that the Ryan/Holmes process can be performed under non-cryogenic conditions (which is why Pilot must also incorrectly construe "carbon dioxide recovery solvent").

First, Pilot argues that Aycaguer uses a "three-column" Ryan/Holmes process and then suggests that the three-column Ryan/Holmes process is cryogenic. POR at 61. But Pilot admits that the Ryan/Holmes exhibits in evidence "described [the] configurations to operate at non-cryogenic conditions," so this argument is unavailing. POR at 13; *see also* EX1007 at 3 ("Increased flow of additive can result in a demethanizer column where the coldest temperature is -35 °F").

Pilot's second argument is that EX1007 "teaches away" from the three-column embodiment because it explains that the four-column process "lower[s] the energy consumption and capital cost," and is therefore what a POSITA would prefer. POR at 13-14. Pilot's argument fails both factually and legally. Factually it fails because the first column in the four-column embodiment operates at an even higher temperature, so substitution for the four-column system does not resolve Pilot's problem. EX1007 at 5 ("In the four-column process, the coldest conditions in the first column are -10 to +40°F."). Legally it fails because the teaching away

inquiry does not depend on whether one embodiment is favored over another. *See, e.g., Bayer Pharma AG v. Watson Labs., Inc.*, 874 F.3d 1316, 1327 (Fed. Cir. 2017). Nothing in EX1007 suggests that the three-column system would not work for its intended purpose, and therefore it does not teach away.

Aycaguer thus discloses non-cryogenic conditions. And with respect to Grounds 3-6, Pilot does not even contest that the Soldati process uses non-cryogenic conditions.

B. Carbon Dioxide Recovery Solvents

Pilot argues—just as it did in its POPR—that every one of Petitioner’s prior art references discloses the use of a forbidden carbon dioxide recovery solvent. *Compare* POPR at 60 *with* POR at 65-66. However, Pilot’s argument fails for at least three reasons: (i) Pilot’s proposed definition of “carbon dioxide recovery solvent” contradicts the prosecution history; (ii) the embodiments found in the ’332 Patent use the same alleged carbon dioxide solvents as the Asserted References; and (iii) the Asserted References do not use carbon dioxide recovery solvents even under Pilot’s proposed definition.

1. The prosecution history contradicts Pilot’s proposed definition.

The term “carbon dioxide recovery solvent” does not appear in the ’332 Patent’s description. Instead, the first mention of carbon dioxide recovery solvents appeared when Pilot distinguished over Goddin in response to the Examiner’s

rejection. EX1003 at 257. The definition proposed in Pilot’s Office Action Response conflicts with the definition Pilot proposes here, and thus Pilot’s new definition should be rejected.

Goddin removes CO₂ from a hydrocarbon stream by “separating CO₂ from the first stream in a first CO₂ removal zone by absorption in a first solution effective for CO₂ removal to produce a hydrocarbon enriched second stream.” EX2003 at 2:25-32. In its additional CO₂ removal step, the solvent absorbs CO₂ with its high affinity for CO₂. EX2003 at 6:20-23.

During prosecution, Pilot explained that “Goddin subjects its streams to...*CO2 solution absorption (i.e., carbon dioxide recovery solvents)*.” EX1003 at 257 (emphasis added). Thus, Pilot used “CO₂ solution absorption” to define a carbon dioxide recovery solvent and then excluded such solvents from the Challenged Claims to distinguish over Goddin. Pilot’s current position that the carbon dioxide recovery solvent term excludes the presence of any material that affects CO₂ recovery is an attempt to rewrite the prosecution history over a decade after it had been written.

2. The embodiments found in the ’332 Patent use the same alleged carbon dioxide recovery solvents as the Asserted References.

Second, Pilot’s improper expansion of the meaning of “carbon dioxide recovery solvent”—manufactured in hindsight to attack the Asserted References—

should be rejected because it excludes all embodiments of the invention described in the '332 Patent's specification. Specifically, Pilot asserts that the C₄₊ in the distillation columns described in Soldati, which is separated from the hydrocarbons coming from underground and being processed in the plant,¹ “amounts to the use of carbon dioxide recovery solvents.” POR at 10-11. Since C₄₊ is present and recirculated during the separations of both Aycaguer and Soldati, Pilot argues that those Asserted References fall outside the Challenged Claims. POR at 10-11.

However, the presence of NGLs—which definitionally include C₄₊²—is foundational to the method described by the '332 Patent. *See, e.g.*, EX1001 at 2:22-24 (describing the invention as an “NGL recovery process”). The C₄₊ that Pilot argues is forbidden is an integral part of the '332 Patent's hydrocarbon feed stream, carbon dioxide recycle stream, sour NGL rich stream, and sweet NGL rich stream. Construing “carbon dioxide recovery solvents” as proposed by Pilot would result in claims with no § 112 support. Further, the '332 Patent describes the

¹ Some of the Ryan/Holmes references refer to these separated and recirculated NGLs as “additives,” but they are the same NGLs that have been produced from the underground reservoir and processed in the NGL recovery plant. *See, e.g.*, EX2028, ¶ 115.

² EX1001 at 3:5–6.

recirculation of C_{4+} back into the distillation column, thus using the C_{4+} in “recirculation” like in Soldati:

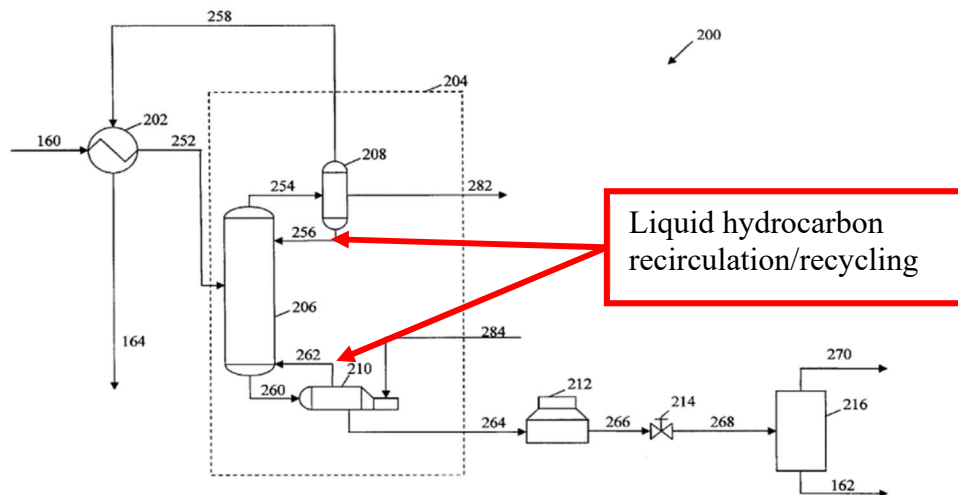


FIG. 2

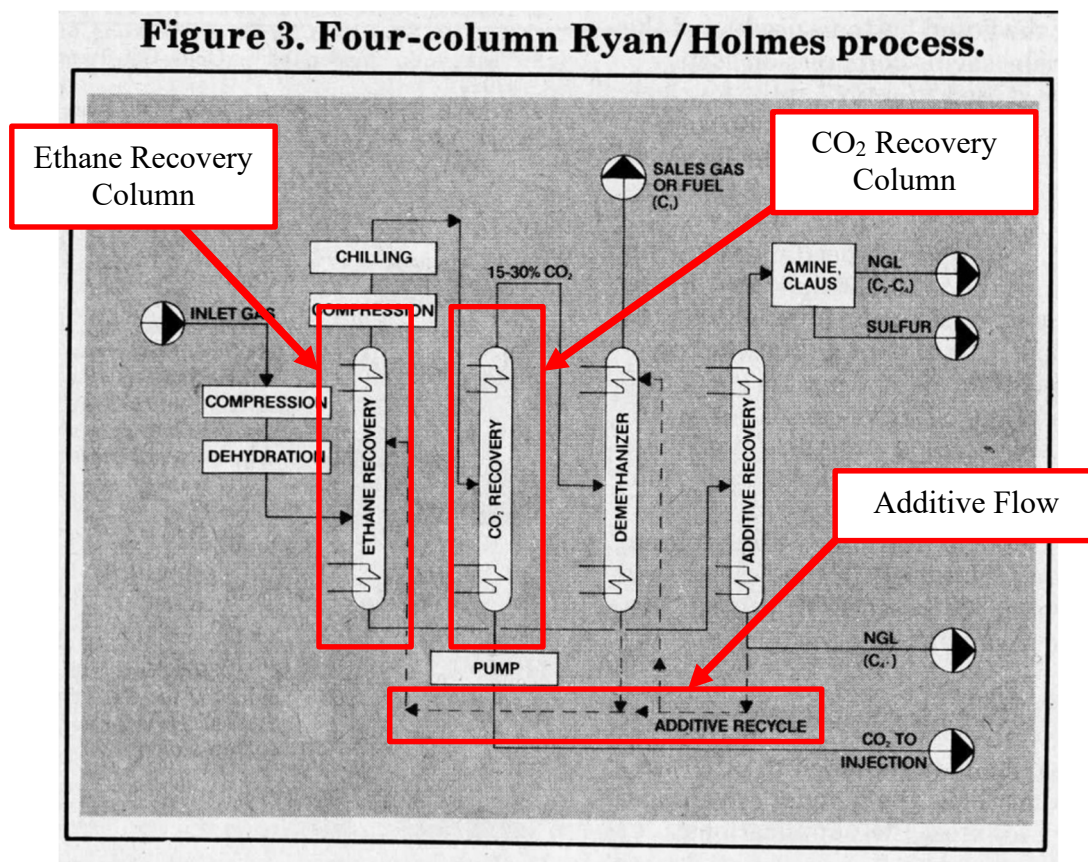
EX1001 at Figure 2 (Petitioner’s annotations in red); *see also* EX1001 at 7:9-11; *see also* EX1025 at 27:25-28:10. These recirculations appear in all embodiments of the ’332 patent, and thus Pilot’s proposed construction would exclude all embodiments of the ’332 Patent from Claim 1. *See id.* These recirculating hydrocarbons also solvate ethane, and thus perform the same chemical function in the ’332 Patent that they do in Soldati. EX1025 at 17:18-18:25 (explaining that ethane is soluble in the hydrocarbon additives because lighter hydrocarbons are soluble in heavier hydrocarbons); *see also* EX1001 at Table 2B (showing ethane in stream 264). Pilot’s proposed definition is contradicted by the ’332 Patent itself and should be denied.

3. Pilot's proposed definition would not exclude Aycaguer or Soldati.

Even assuming, *arguendo*, Pilot's definition of "carbon dioxide recovery solvents" as any solvent "used for recovery of carbon dioxide," the solvents Pilot points to in the Asserted References (the recirculated hydrocarbons) are not carbon dioxide recovery solvents because they are used to recover ethane, not CO₂.

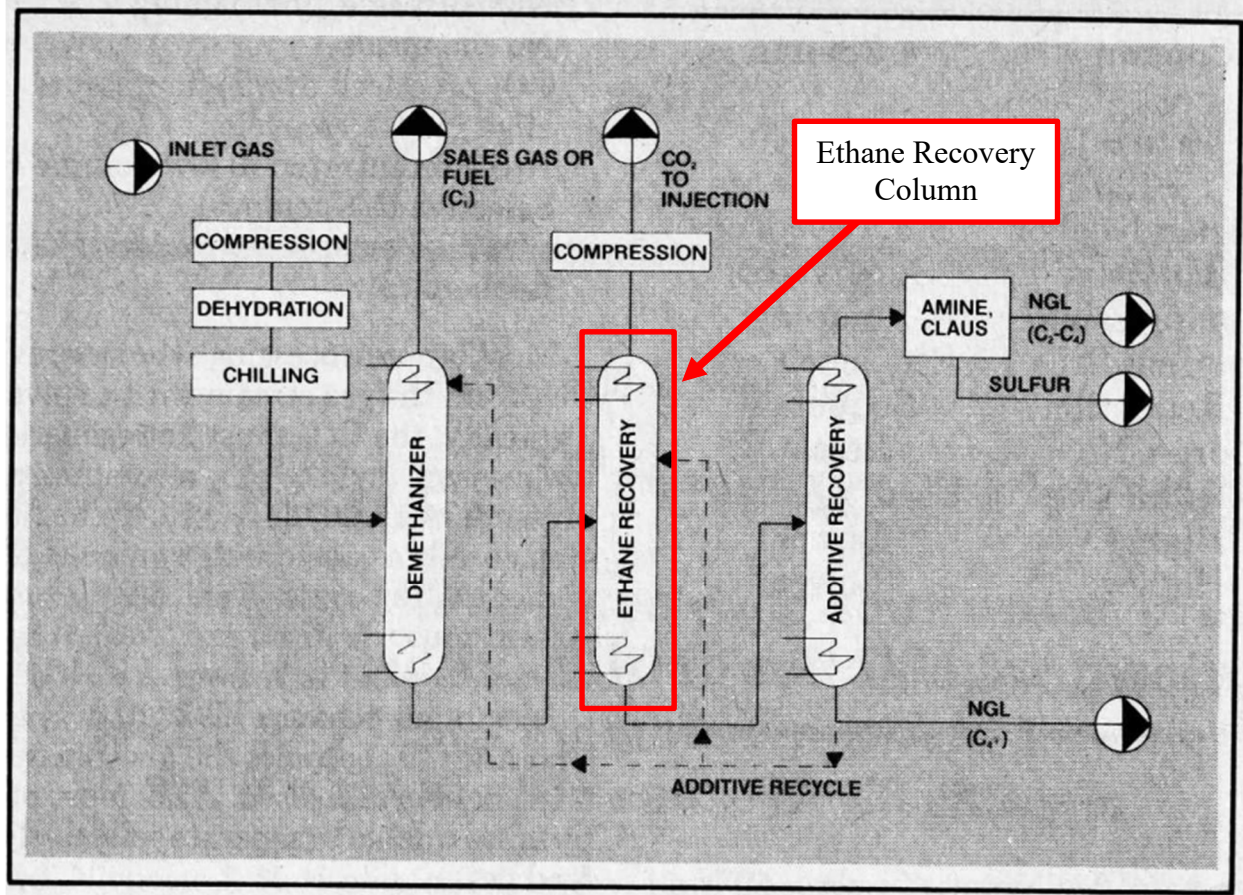
The "additives" in the Ryan/Holmes process are—as discussed above—C₄₊ hydrocarbons derived from the original hydrocarbon stream. POR at 21 ("The C₄₊ heavier hydrocarbons are produced as a bottom product for recycling as the 'liquid hydrocarbon stream' (aka 'additives')"). These additives solvate ethane, causing it to exit out the bottom of the separatory column away from the CO₂. EX2028 at ¶ 71 (Pilot's expert explaining that the role of the "additive" is to "remove the ethane by solubility").

The "additives" are therefore not carbon dioxide recovery solvents—they are instead ethane recovery solvents. The columns for recovering CO₂ do not have an additive. EX1007 at 4 ("No additive is used in the CO₂ recovery column."); EX1025 at 20:8-11 ("The CO₂ recovery column in a Four-Column Ryan/Holmes process does not receive any additive, correct? A: That is correct."). Instead, the additive flows into the ethane recovery column:



EX1007 at Fig 3 (annotations in red). Soldati—which Pilot admits is a detailed description of a four-column Ryan/Holmes process (Pilot Response at 17)—also explains that CO₂ recovery occurs in column 39, after the separation that occurs in column 8. EX1006 at Fig. 4; *see also* EX1006 at 1:33-37 (explaining that the methane/CO₂ separation is performed in the second column). This is true for the three-column Ryan/Holmes process too; it uses NGL additives added to an “ethane recovery” column, not a CO₂ recovery column:

Figure 2. Three-column Ryan/Holmes process.



EX1007 at Fig. 2 (annotations in red).

As admitted by Pilot's own expert, CO₂ is not considered "recovered" when it is left in the injection stream. EX1025 40:2-11 (explaining recovery is "something that is removed from the inlet stream and disposed of other than in the injection stream."); EX1025 at 40:21-41:7 (explaining that the '332 Patent's method only recovers the acid gas and NGL rich streams, not things "that aren't taken out or just put back into the reservoir").

Because carbon dioxide is not recovered in any of the Ryan/Holmes separation columns that Petitioners rely on in their obviousness grounds, nothing in those columns can be a “carbon dioxide recovery solvent” as defined by Pilot.

V. SOLDATI TEACHES SWEET AND SOUR NGL STREAMS WITH THE COMPOSITIONS DESCRIBED IN CLAIMS 4 AND 7.

Pilot alleges that Soldati does not disclose the sweet and sour streams described by Claim 4 and 7, respectively. POR at 66-68. However, Pilot’s argument is directly contradicted by the express teachings of Soldati.

A. Soldati’s Stream 28 is a sweet NGL rich stream as recited by Claim 4

Pilot does not (and cannot) contest that Soldati’s stream 28 satisfies the compositional requirement of a “sweet NGL rich stream” as recited in Claim 1, which is the inclusion of “C₃-C₈ hydrocarbons.” EX1001 at Claim 1. Stream 28 contains C₃-C₈ and is “sweet” (*i.e.*, contains no hydrogen sulfide). POR at 22; EX1002, ¶ 31. It is therefore a sweet NGL rich stream as defined in Claim 1. *Id.* Claim 4 then further requires that the “sweet NGL rich stream comprises no more than 1 molar percent methane, no more than 1 molar percent ethane, and no more than 1 molar percent acid gases.” Stream 28 satisfies these requirements:

COMPONENT THROUGHPUT KMOLS/H	STREAM		
	28	10	95
NITROGEN	—	—	—
HYDROGEN SULPHIDE	—	—	—
CARBON DIOXIDE	—	46.64	—
METHANE	—	7.03	—
ETHANE	—	10.54	—
PROPANE	12.11	11.97	12.00
N-BUTANE	1092.03	1081.98	1082.60
N-PENTANE	81.06	80.26	80.25
THROUGHPUT KMOLS/H	1513.37	1563.53	1500.00
PHASE	L	L	L
TEMPERATURE °C.	122.0	16.0	48.0
PRESSURE ATA	19.2	39.6	44.0

EX1006 at Table III (annotations in red).

Confronted with these indisputable composition facts about stream 28, Pilot instead baldly asserts that stream 28 is not a sweet NGL rich stream. POR at 22 (asserting that Dr. Rockstraw “intentionally mischaracteriz[ed]” stream 28 as a sweet NGL rich stream). However, Pilot’s two arguments as to why lack any support.

First, Pilot seems to suggest that there can be only one “sweet NGL rich stream” in an NGL processing plant and stream 28 isn’t it because stream 27 is the better example of a sweet NGL rich stream. *See, e.g.*, POR at 22-23. Nothing in the claims, however, states there can only be one “sweet NGL rich stream” and Pilot offers no support for its implied restriction.

Such an interpretation would also contradict the teachings of the ’332 Patent. For example, Claim 9 recites separating a “recycle stream” (equivalent to the

carbon dioxide recovery stream of claim 1) into a “sour natural gas liquid NGL rich stream” and a “purified recycle stream.” EX1001, claim 9. But the sour NGL rich stream explicitly has less NGL and less acid gas than the purified recycle stream. *Id.* (reciting the sour NGL rich stream has “some” C₃₊ and “some” acid gas, whereas the purified recycle stream has “most” of the C₃₊ and “most” of the acid gas). Under Pilot’s proposed interpretation, Claim 9 would make no sense, as the “purified recycle stream” would have more NGLs and more acid gas, and thus be a “better” example of a sour NGL rich stream.

Second, Pilot argues that stream 28 isn’t a sweet NGL rich stream because part of it is recirculated (*i.e.*, split into streams 10 and 31) instead of being sold in its entirety. POR at 22. Again, Pilot fails to explain why recycling of the claimed “sweet NGL rich stream” is forbidden by Claims 1 or 4.³ Because stream 28 meets all the requirements of a “sweet NGL rich stream” as recited by Claims 1 and 4, Soldati expressly discloses the limitations of Claim 4.

³ Even if a recycled stream were for some reason excluded from the definition of “sweet NGL stream,” Stream 31 would still satisfy every requirement of Claim 4. *See* EX1006 at Table III.

B. Soldati's Stream 12 is a sour NGL rich stream as recited by Claim 7

Similar to steam 28 and Claim 4, Pilot does not (and cannot) contest that Soldati's stream 12 satisfies the compositional requirements "sour NGL rich stream" as recited in Claims 1 and 7. EX1006 at Table III. Instead, Pilot disputes that stream 12 is a "sour NGL rich stream." POR at 23. However, Pilot never explains why.

Stream 12 is sour (*i.e.*, it includes hydrogen sulfide). EX1006 at Table III. Stream 12 contains NGLs. *Id.* Stream 12 is therefore a sour NGL rich stream as defined by Claim 1. EX1002, ¶ 190.

Pilot presents the same two arguments against stream 12 being a sour NGL rich stream that it presented against stream 28 being a sweet NGL rich stream. POR at 23-24. First, Pilot suggests that there can only be one sour NGL rich stream, and stream 12 isn't it. POR at 22-23 (arguing stream 27 is the "sour NGL rich stream," and therefore stream 12 is not). Pilot does not, however, support its assertion that there can be only one sour NGL rich stream. Second, Pilot argues stream 12 is not a sour NGL rich stream because it is "subsequently fed into the 'additive recovery' column 21." POR at 23. Again, Pilot proffers no reason why subsequent processing disqualifies stream 12 from being the claimed "sour NGL rich stream."

Soldati's stream 12 is therefore a "sour NGL rich stream" as recited by Claims 1 and 7, and Soldati expressly discloses this element.

VI. PATENT OWNER'S EVIDENCE OF SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS LACKS NEXUS WITH THE CHALLENGED CLAIMS

A. Pilot is not entitled to a rebuttable presumption of nexus because the critical features of CO2Flex are not claimed.

When a patentee describes "unclaimed features" of a product as "critical to the product's ability" to function, there can be no presumption of nexus between the product and the claims. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1374-75 (Fed. Cir. 2019). For example, with respect to commercial success, the key question is whether "the commercial success of a product is limited to the features of the claimed invention." *SightSound Techs., LLC v. Apple Inc.*, 809 F.3d 1307, 1319 (Fed. Cir. 2015). If the product's success "is due to an unclaimed feature of the device, the commercial success is irrelevant." *Ormco Corp. c. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006).

Here, the various indicia of the non-obviousness of CO2Flex argued by Pilot, even if true, are due to features unclaimed by the Challenged Claims. Pilot argues that CO2Flex improves on the Ryan/Holmes prior art by "leav[ing] all (or almost all) of the methane and ethane in the carbon dioxide recycle streams, to produce NGLs, having little to no methane and ethane, while using significantly less process equipment and energy, and thereby recover[ing] NGLs with

significantly less costs.” POR at 31. Pilot asserts that CO2Flex does not even recover most of the propane, let alone methane or ethane. POR at 39. According to Pilot, by disregarding most of the C₁₋₃, CO2Flex “unexpected[ly]” improved the economics of NGL separation. POR at 39.

The Challenged Claims, by comparison, do not limit the amount of methane, ethane, or propane recovered from the carbon dioxide recycle stream. The Challenged Claims are thus not limited to the critical features that Pilot argues drive the various indicia of non-obviousness, which is exactly why these claims are obvious in light of the Ryan/Holmes prior art presented in the Petition (i.e., they cover *both* the CO2Flex process *and* the Ryan/Holmes prior art). The allegedly-critical features instead appear to be recited in Claim 5, which is ***not*** challenged in this proceeding.

While Pilot shows certain CO2Flex plants might fall within the scope of at least some of the Challenged Claims, this showing is insufficient as a matter of law. The Federal Circuit has explicitly “rejected attempts ‘to reduce the coextensiveness requirement to an inquiry into whether the patent claims broadly cover the product that is the subject of the secondary considerations.’” *Teva Pharms. Int’l GmbH v. Eli Lilly and Co.*, 8 F.4th 1349, 1361-62 (Fed. Cir. 2021). But that is the only argument Pilot has offered.

B. Each of Pilot's secondary consideration arguments fail

Pilot's secondary consideration arguments fail at the outset because Pilot has presented no evidence showing nexus with the Challenged Claims. As discussed above, Pilot's evidence shows the opposite: each of the secondary considerations allegedly associated with CO2Flex is unrelated to the features of the Challenged Claims. Pilot's secondary considerations arguments further fail on the merits for the reasons below.

1. Long Felt but Unmet Need

Pilot characterizes the long-felt but unmet need as the need for a "more economical alternative to the Ryan/Holmes and Mechanical Refrigeration Unit technologies." POR at 33. As an initial matter, Pilot fails to establish this as a long-felt but unmet need. Additionally, Pilot does not explain how the "'332 Patent CO2Flex® process" solves this alleged long-felt but unmet need. POR at 33-36. The POR suggests Pilot might present one of two different arguments.

First, Pilot might argue that CO2Flex addressed this need by "recover[ing] NGLs with significantly less costs," and Pilot has explained that this result was brought about by "leav[ing] all (or almost all) of the methane and ethane in the carbon dioxide recycle streams." POR at 31. As explained above, this feature is not recited by the Challenged Claims; instead, that innovation is at best captured by a different—and unchallenged—claim of the '332 Patent.

Second, Pilot might argue that CO2Flex addresses this need by recovering “an economical amount of C3 Propane.” POR at 35. However, Pilot makes no attempt to link the recovery of “economical” amounts of propane to any element of the Challenged Claims, which is necessary to show nexus. Recovery of propane was also well understood in the prior art. *See, e.g., Soldati* at Table III, stream 27.

2. Failure of Others

With respect to this secondary consideration, the POR does not explain what, exactly, Chevron failed to achieve.

Pilot first argues that Chevron failed because it did not pay maintenance fees on U.S. Pat. No. 4,753,666 (“Pastor”). POR at 36. Pilot insinuates that Chevron did not pay maintenance fees because the invention described in Pastor did not work, but Pilot’s own evidence shows otherwise. Pilot submitted EX2050, a PowerPoint presentation that shows Chevron’s Rangely plant based on the Pastor process has been operating for over 20 years. *See* EX2050 (describing the history of the Rangely Gas Plant); EX2029, ¶ 88 (explaining that the Rangely plant uses the Pastor process). Pilot fails to reconcile its argument that Pastor “failed” with the fact that Chevron had continuously operated the Rangely plant for over 20 years. Pilot’s “failure” arguments should be rejected for this reason alone.

Pilot then argues that Chevron failed based on an alleged decade-old hearsay statement submitted by Mr. Prim. EX2029, ¶ 47. Mr. Prim has overwhelming

personal interest in this case as the purported inventor on the '332 Patent and president of Pilot. His recollection of a vague, off-hand statement supposedly made to him at a conference over 10 years ago should be given minimal, if any, weight. Furthermore, nowhere does this statement address the relative economics (cost vs. revenue) of the two methods, which is the aspect Pilot alleges to have improved over the prior art. *See, e.g.*, POR at 39.

Furthermore, the recoveries disclosed during the 2012 presentation that the Chevron employee was reacting to were substantially greater than is typical in a CO2Flex plant. *Compare* EX2049 at 15 (showing a 45% propane recovery) *with* EX2029, ¶ 48 (“The '332 patent process typically recovers about 25% of the propane.”).

Thus, even looking past Pilot’s failure to prove nexus, Pilot’s failure to compare the relevant metrics for the Rangely plant and the '332 Patent’s process makes it impossible for Pilot to carry its burden of showing that Chevron “failed” to develop a similarly economic process.

3. Skepticism of Experts

Pilot next argues that Exxon was skeptical that the methods of the '332 Patent would work, but it presents no evidence in support. Pilot argues that it submitted proposals to Exxon to build a proof-of-concept plant at an Exxon facility. POR at 37-38. While Pilot alleges that Exxon rejected the proposals due to

skepticism of CO2Flex, Pilot's allegations are purely speculative. Exxon's refusal to contract Pilot for a costly NGL separation facility could be credited to a host of reasons, from strategic economic decisions based on the expected future cost of hydrocarbons to Pilot overcharging for its services. *See, e.g.*, EX1026 35:2-12 (explaining that one reason Exxon might not have adopted CO2Flex technology is "probably some reservoir reasons"). Without more information, Exxon's rejection cannot support Pilot's allegation that Exxon was skeptical of CO2Flex.

4. Unexpected Results

Pilot argues that CO2Flex achieved unexpected economic efficiencies when there was a "low (25%) propane recovery." POR at 39. However, low propane recovery is not described in any of the Challenged Claims. It is instead arguably captured by Claim 5, which explains that only 20-40% of the C₃₊ should be recovered from the system, and the rest should be disregarded. EX1001 at Claim 5. Additionally, this argument conflicts with Pilot's arguments both for "failure of others" and "industry acclaim/praise" that are based on hearsay statements in reaction to Pilot's touted recoveries of 45% propane, which would even be outside of claim 5. *See* EX2049 at 15. This secondary consideration therefore shares no nexus with the Challenged Claims.

5. Industry Acclaim/Praise

Pilot's sole evidence for industry acclaim is a hearsay statement proffered by its president and inventor, Mr. Prim. POR at 41. As explained above, this hearsay statement should be accorded minimal, if any, weight. *See supra*, § VI.B.2. Even if the Board considers Pilot's hearsay, Pilot fails to show a nexus between the allegedly praised "recoveries" of CO2Flex and the Challenged Claims, as noted above.

6. Commercial Success

As explained above, Pilot has argued the alleged commercial success of CO2Flex is due to "leav[ing] all (or almost all) of the methane and ethane in the carbon dioxide recycle streams, to produce NGLs, having little to no methane and ethane" and in doing so "using significantly less process equipment and energy, and thereby recover[ing] NGLs with significantly less costs." POR at 30-31. This feature does not appear in any of the Challenged Claims, and thus there is no nexus.

Additionally, Pilot does not explain what revenue or profit would have been expected by using any of the Ryan/Holmes, machine refrigeration, Pastor, or other prior art methods. Without such a comparison, it is impossible to judge the extent to which any of the CO2Flex plants can be considered commercially successful compared to the alternative methods.

7. Copying

Finally, Pilot asserts that Chevron copied CO2Flex when it designed the Mabee NGL plant.⁴ POR at 45. However, Mr. Prim—Pilot’s witness to the alleged copying—admits that Pilot was “speculating on how [Mabee] works” and “we don’t know for sure [how it works].” EX1026 55:16-25. Furthermore, the evidence cited in the POR contradicts Pilot’s allegations.

Pilot asserts that Pastor does not recover propane, but CO2Flex and Mabee do, therefore Mabee must be a copy of CO2Flex. POR at 53. Pilot cites to no evidence that Pastor teaches propane should not be captured—that is because Pastor contains no such teaching. It instead states “recovery of C₃/C₄ can be monitored to...optimize the economical operation of the plant.” EX2016 at 3:8-11. Thus, Mabee’s recovery of some propane is directly in line with the teachings of Pastor.

The POR then compares the propane recovery of Chevron’s Mabee plant, a Pastor process simulation, and a CO2Flex plant, and asserts that Mabee and

⁴ Pilot essentially argues that, if Mabee is not based on Chevron’s prior-art Pastor technology, it must be a copy of CO2Flex. POR at 52–54. Pilot proffers no evidence to support this false dichotomy other than the say-so of Mr. Prim. EX2029, ¶ 88.

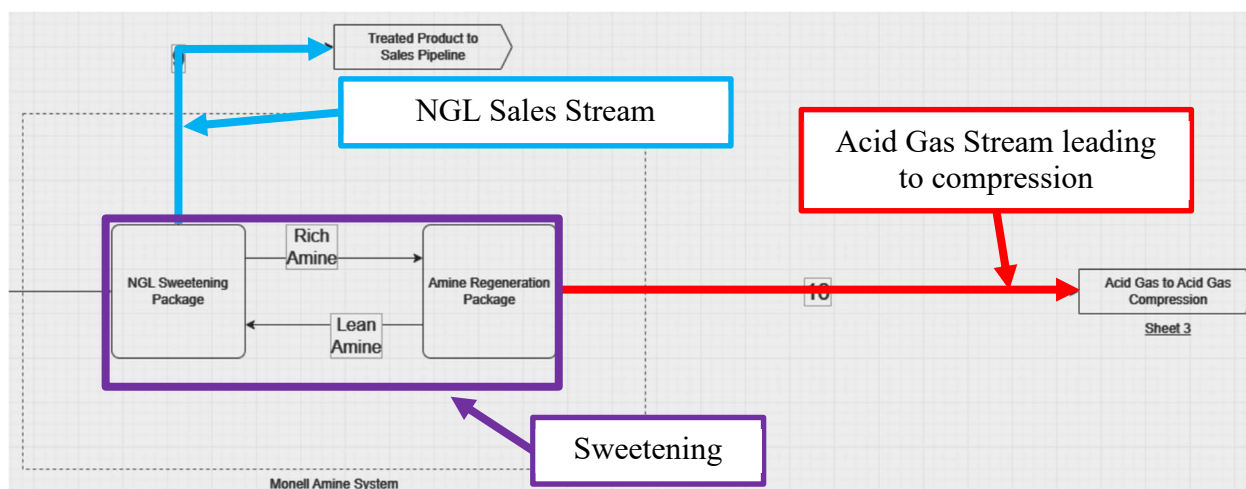
CO2Flex are the same and Pastor is different. POR at 54-56. But each of these three processes have substantially different percentages of propane. *Id.* (showing 5.48% for Mabee, 29.68% for CO2Flex, and 0.02% for the Pastor simulation). Pilot does not explain how Chevron’s Mabee plant could be a “copy” of CO2Flex when its propane recovery is closer to Pastor than CO2Flex. And again, Mr. Prim even admitted that he did not know how the Mabee plant worked based on these data, and conceded he was “speculat[ing] what’s in the Mabee Plant based on” the available information. EX1026 at 51:11-52:16.

Pilot next argues that the presence of a sweetener means that Mabee copied the ’332 Patent. POR at 53. This argument fails for at least two reasons. First, sweeteners were well-known in the prior art, and copying such known features is “not relevant to prove nonobviousness.” *Apple Inc. v. Samsung Elecs. Co.*, 816 F.3d 788, 810 (Fed. Cir. 2016) *vacated in part on reh’g en banc*, 839 F.3d 1034 (Fed. Cir. 2016); EX1003 at 270 (explaining sweetening was “well-known”). Second, Pilot admits that the Mabee plant’s use of a sweetener is consistent with Petitioner’s prior-art Rangely plant design.⁵ EX2029, ¶ 47 (arguing that the Rangely plant embodies Pastor); EX1026 at 76:23-78:3 (admitting that “there’s all

⁵ Pilot does not contest that Rangely “has each of the five main components of the CO2Flex® process,” and thus also sweetens its NGL output. POR at 52.

kinds of reasons why [Rangely] would need [a sweetener]...even if Rangely actually built the '666 patent"). Petitioner's use of its own designs cannot be evidence of copying Pilot.

Additionally—as noted by the Board in denying Pilot's request for additional discovery—Pilot fails to present evidence demonstrating that Mabee included the claimed “acid gas stream” found in the CO2Flex plant. Paper 18 at 6. The POR did not remedy this problem. POR at 52-57. Comparing diagrams of a CO2Flex plant (first) and Chevron's Mabee plant (second) highlights the issue:



EX2055 at 1 (color annotations added).

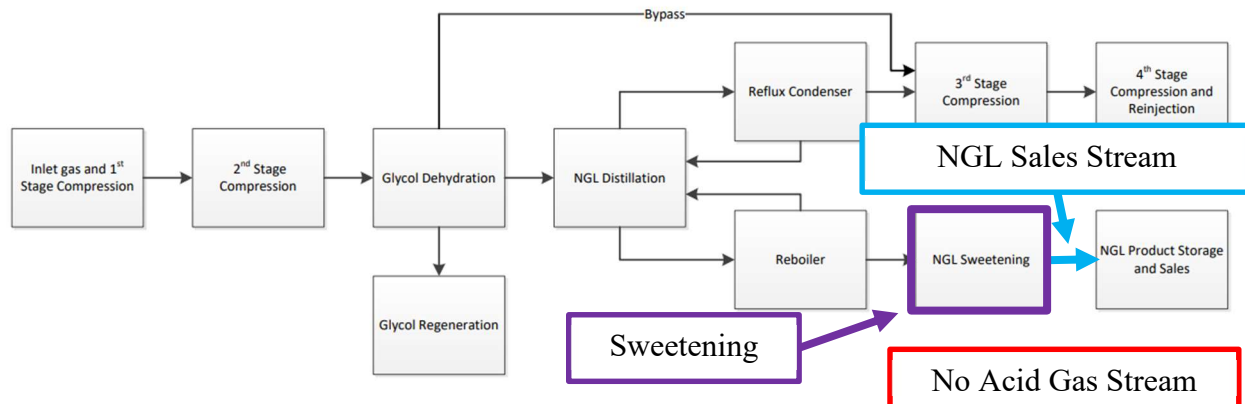


Figure 3: Mabee Gas Plant Block Flow Diagram

Ex. 2012 at Fig. 3 (color annotations added). As explained in EX2023, Mabee uses a “Sulfa-treat tower” which produces “solid waste sulfur cakes” through a chemical reaction between iron oxides and H_2S . *See* EX2023 at 15. That is why—as confirmed by the diagram above—no acid gas stream exits the Mabee plant sweetener. EX2012 at Fig. 3; *see also* EX1025 at 51:23-52:3 (“Q: The spent media inside the [sweetener] column is not a gas, is it? A: It is not.”). Because the Mabee plant does not include an acid gas stream required in the CO2Flex process and the ‘332 Patent, Pilot fails to demonstrate “copying” as a secondary consideration.

VII. CONCLUSION

Accordingly, Petitioners request the challenged claims be cancelled as unpatentable under 35 U.S.C. § 318(b).

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Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH WORD COUNT

Under the provisions of 37 C.F.R. §42.24(d), the undersigned hereby certifies that the word count for the foregoing PETITIONER'S REPLY TO PATENT OWNER RESPONSE totals 5,573 words, which is less than the 5,600 allowed under 37 C.F.R. §42.24(c)(1).

Date: February 21, 2025

/Brian W. Oaks/

Brian W. Oaks

CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on the 21st day of February, 2025, a complete and entire copy of the foregoing **PETITIONER'S REPLY TO PATENT OWNER RESPONSE** was served on Patent Owner via email to counsel of record for the Patent Owner at the following addresses:

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February 21, 2025

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