

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PACIFICORP,
Petitioner,

v.

BIRCHTECH CORP.,
Patent Owner.

IPR2025-00718
Patent 10,926,218 B2

Before KRISTINA M. KALAN, ZHENYU YANG, and
AVELYN M. ROSS, *Administrative Patent Judges*.

YANG, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

PacifiCorp, Interstate Power & Light Company (“IPL”), MidAmerican Energy Company (“MidAmerican”), WEC Energy Group, Inc. (“WEC”), and Wisconsin Power & Light Company (“WPL”) filed a Petition (Paper 1, “Pet.”), seeking *inter partes* review of claims 1–4 and 6–26 of U.S. Patent No. 10, 926,218 B2 (Ex. 1001, “the ’218 patent”). IPL, WPL, WEC, and MidAmerican subsequently settled their dispute with Birchtech Corp. (“Patent Owner”),¹ and have been terminated from this proceeding. Papers 25, 30, 33. Accordingly, “Petitioner” as used herein refers only to the remaining Petitioner, namely, PacifiCorp.

Patent Owner filed a Preliminary Response. Paper 16 (“Prelim. Resp.”).² With our authorization (Ex. 3001), Petitioner filed a Reply to the Preliminary Response (Paper 24, “Reply”), and Patent Owner filed a Sur-reply to Petitioner’s Reply (Paper 26, “Sur-reply”).

We have authority under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

For the reasons provided below, we determine Petitioner has satisfied the threshold requirement set forth in 35 U.S.C. § 314(a). We institute *inter*

¹ Birchtech Corp. was formerly known as Midwest Energy Emissions Corp. (“ME2C”) (Paper 9, 2),

² The parties also filed briefs, arguing for and against discretionary denial. Papers 15, 17. The Acting Director determined that discretionary denial was not appropriate and referred the Petition to the Board. Paper 23.

partes review of all challenged claims based on all the grounds raised in the Petition.

A. Real Parties in Interest

The Petition identifies Berkshire, IPL, MidAmerican, PacifiCorp, WEC, and WPL, as well as Alliant Energy Corporation, Alliant Energy Corporate Services, Inc., MidAmerican Funding, LLC, MHC Inc., PPW Holdings LLC, Madison Gas and Electric Company, and Wisconsin Public Service Corporation as real parties in interest. Pet. 1–2.

Patent Owner identifies “MES, Inc.” as the real party in interest. Paper 9, 2.

B. Related Matters

Petitioner filed a concurrent petition (IPR2025-00717), seeking *inter partes* review of the same claims challenged in this proceeding.³ Pet. 2–3.

The parties identify the following matters as related to this proceeding:

Midwest Energy Emissions Corp. et al. v. Arthur J. Gallagher & Co. et al., No. 1:19-cv-01334 (D. Del.) (“the Delaware Action”);

³ Petitioner filed an explanation regarding the necessity of multiple petitions. Paper 2. Patent Owner does not challenge that multiple petitions are necessary. *See generally* Prelim. Resp. In any event, whether to deny institution because a petitioner filed multiple petitions is best raised and resolved through the process involving a bifurcated procedure for considering discretionary issues. *See* USPTO Memorandum, Interim Process for PTAB Workload Management (March 26, 2025), *available at* <https://uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf>.

Midwest Energy Emissions Corp. v. Tucson Electric Power Co. et al., No. 3:24-cv-08145 (D. Ariz.);
Midwest Energy Emissions Corp. v. Berkshire Hathaway Energy Co. et al., No. 4:24-cv-00248 (S.D. Iowa);
Midwest Energy Emissions Corp. v. Ameren Corporation et al., No. 4:24-cv-00980 (E.D. Mo.);
In re Midwest Energy Emissions Corp. Patent Litigation, No. 4:24-md-3132 (S.D. Iowa) (consolidating the Iowa, Arizona, and Missouri cases);
Midwest Energy Emissions Corp. v. Berkshire Hathaway Energy Company et al., No. 2:25-cv-00015 (D. Wy.);
Midwest Energy Emissions Corp. v. Wisconsin Power and Light Company, No. 3:25-cv-00026 (W.D. Wis.);
Midwest Energy Emissions Corp. v. MidAmerican Energy Company et al., Case No. 4:24-cv-00243 (S.D. Iowa);
Birchtech Corp. f/k/a Midwest Energy Emissions Corp. v. Evergy, Inc. et al., Case No. 4:25-cv-00050 (W.D. Mo.);
Midwest Energy Emissions Corp. v. Evergy, Inc. et al., Case No. 4:25-cv-00046 (S.D. Iowa); and
Birchtech Corp. f/k/a Midwest Energy Emissions Corp. v. Evergy, Inc. et al., Case No. 5:25-cv-04033 (D. Kan.).

Pet. 5–6; Paper 9, 2–3.

Petitioner previously filed other petitions for *inter partes* review, challenging two other patents owned by Patent Owner. Pet. 3–4. Those petitions are: IPR2025-00274 and IPR2025-00278, challenging claims of U.S. Patent No. 10,343,114 (“the ’114 patent”); and IPR2025-00280 and IPR2025-00281, challenging claims of U.S. Patent No. 10,596,517;

IPR2025-00422 and IPR2025-00423, challenging claims of U.S. Patent No. 10,668,430; IPR2025-00424 and IPR2025-00425, challenging claims of U.S. Patent No. 10,589,225; and IPR2025-00687 and IPR2025-00688, challenging claims of U.S. Patent No. 10,933,370. *Id.* The Board instituted trial in those proceedings.

Petitioner also brings to our attention several *inter partes* review proceedings, with petitions filed by other entities, including IPR2020-00832 and IPR2020-00834, challenging claims of the '114 patent; and IPR2020-00926 and IPR2020-00928, challenging claims of a parent patent of the '218 patent. Pet. 4–5. According to Petitioner, the Board granted institution but terminated those proceedings because the parties settled. *Id.*

C. The '218 Patent

The '218 patent “relates to methods and materials for the removal of pollutants from flue gas or product gas from a gasification system. In particular, mercury is removed from gas streams generated during the burning or gasification of fossil fuels by highly reactive regenerable sorbents.” Ex. 1001, 1:46–50.

The '218 patent states that

[t]he combustion and gasification of fossil fuel such as coal generates flue gas that contains mercury and other trace elements that originate from the fuel. The release of the mercury (and other pollutants) to the environment must be controlled by use of sorbents, scrubbers, filters, precipitators, and other removal technologies.

Id. at 1:54–59.

The '218 patent acknowledges that “[s]everal types of mercury control methods for flue gas have been investigated, including injection of fine sorbent particles into a flue gas duct and passing the flue gas through a

sorbent bed.” *Id.* at 2:10–13. According to the ’218 patent, however, because sorbents in the existing carbon injection systems are initially unreactive, they “must be used in large amounts, at high sorbent-to-mercury ratios, to effectively capture the mercury.” *Id.* at 2:31–37. Thus, “there remains a need for more economical and effective mercury removal technology.” *Id.* at 2:43–44.

The ’218 patent describes a halogen/halide promoted activated carbon sorbent that is highly effective for the removal of mercury from flue gas streams. *Id.* at 2:56–58. According to the ’218 patent, “[t]he sorbent comprises a new halide-modified carbon form containing a reactive compound produced by the reaction of bromine (or halide or other halogen) with the carbon.” *Id.* at 2:58–61.

The ’218 patent states that “[o]ptional secondary components and alkali may be added to further increase reactivity and mercury capacity,” and discloses that “the optional secondary component is selected from the group consisting of Group V halides, Group VI halides, HI, HBr, HCl, and combinations thereof.” *Id.* at 2:61–63, 3:40–43.

The ’218 patent provides a promoted carbon sorbent “comprising a base activated carbon that has reacted with a promoter selected from the group consisting of halides, halogens, and combinations thereof.” *Id.* at 3:3–6.

The ’218 patent states that its invention “provides for cost-effective removal of pollutants including mercury, using sorbent enhancement additives and/or highly reactive sorbents, with contact times of seconds (or less), and that may be regenerated and reused.” *Id.* at 2:44–48.

D. Illustrative Claim

Independent claim 1 is illustrative of the claimed subject matter and is reproduced below, with Petitioner's designations of the limitations in brackets.

1. [1(Pre)] A method of separating mercury from a mercury-containing gas, the method comprising:

[1(a)] combusting coal in a combustion chamber, to provide the mercury-containing gas, wherein

[1(b)] the coal comprises added HI, an iodide salt, or a combination thereof, added to the coal before the coal enters the combustion chamber, or
the combustion chamber comprises added HI, an iodide salt, or a combination thereof, or
a combination thereof;

[1(c)] injecting a sorbent comprising activated carbon into the mercury-containing gas downstream of the combustion chamber,

[1(d)] wherein a weight ratio of the HI, iodide salt, or the combination thereof added to the coal, added to the combustion chamber, or a combination thereof, to an amount of the sorbent injected into the mercury-containing gas is from about 1:100 to about 30:100;

[1(e)] contacting mercury in the mercury-containing gas with the sorbent; and

[1(f)] separating the sorbent contacted with the mercury from the mercury-containing gas.

Ex. 1001, 35:61–36:14.

E. Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Claims Challenged	35 U.S.C. §	Reference
1–4, 6–9, 13–17, 20–25	102	Baldrey ⁴
1–4, 6–26	103	Baldrey, Olson-235 ⁵
1–4, 6–26	103	Baldrey, Olson-646 ⁶
1–4, 6–26	103	Sjostrom, ⁷ Olson-235
1–4, 6–26	103	Sjostrom, Olson-646
1–4, 6–26	103	Sjostrom, Olson-235, Olson-279 ⁸
1–4, 6–26	103	Sjostrom, Olson-646, Olson-279

In support of the unpatentability challenges, Petitioner relies on the Declaration of Stephen Niksa, Ph.D. (Ex. 1002).

II. ANALYSIS OF ASSERTED GROUNDS

A. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

⁴ US 2011/0030592 A1, published Feb. 10, 2011, Ex. 1015 (“Baldrey”).

⁵ US 8,652,235 B2, issued Feb. 18, 2014, Ex. 1018 (“Olson-235”).

⁶ US 2006/0048646 A1, published Mar. 9, 2006, Ex. 1012 (“Olson-646”).

⁷ Sjostrom, Sharon, *Full Scale Evaluations of Mercury Control Technologies with PRB Coals*, Track A, Session A3 (Mercury – Control), Presentation A3b, EUEC: 8TH ELECTRIC UTILITIES ENVIRONMENTAL CONFERENCE (Tucson, Arizona: January 25, 2005), Ex. 1010 (“Sjostrom”).

⁸ US 2014/0255279 A1, published Sept. 11, 2014, Ex. 1016 (“Olson-279”).

Furthermore, the prior art itself can reflect the appropriate level of ordinary skill in the art. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Petitioner asserts that “[a] person of ordinary skill in the art (‘POSITA’) would have at least a bachelor’s degree in chemical engineering, mechanical engineering, or a related field of study with at least two years of experience implementing pollution control in power generation plants for natural gas, coal, and/or industrial waste incineration.” Pet. 11–12 (citing Ex. 1002 ¶¶ 48–51). Patent Owner does not dispute the level of ordinary skill in the art. *See generally* Prelim Resp.

For purposes of this Decision, we adopt Petitioner’s proposed definition of a POSITA because it is consistent with the skill level reflected in the disclosures of the ’218 patent and prior art. *See Okajima*, 261 F.3d at 1355 (the prior art may reflect an appropriate level of skill in the art).

B. Claim Construction

In an *inter partes* review, we construe a claim term “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b). Under that standard, the words of a claim “are generally given their ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

Claim terms need only be construed to the extent necessary to resolve the controversy. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). On this record and for purposes of this Decision, we see no need to construe any claim term expressly.

C. Priority Analysis

The '218 patent issued from Application No. 16/509,071 (“the '071 Application”), filed July 11, 2019. Ex. 1001, codes (21), (22). Each of the references asserted in this proceeding (Sjostrom (2005), Olson-646 (2006), Baldrey (2011), Olson-235 (2014), and Olson-279 (2014)) predates the filing date of the '071 Application.

The '071 Application, however, claims priority, through several earlier non-provisional applications, to Application No. 60/605,640 (“the Provisional Application”), filed August 30, 2004 (Ex. 1001, code (60)), which predates all the asserted references. Thus, if the challenged claims of the '218 patent were entitled to the priority date of the Provisional Application, none of the asserted references would qualify as prior art.

In addition, if the challenged claims of the '218 patent were entitled to the priority date of some of the non-provisional applications, which were filed in 2005, 2008, 2009, 2012, and 2013, certain asserted references would not qualify as prior art either.

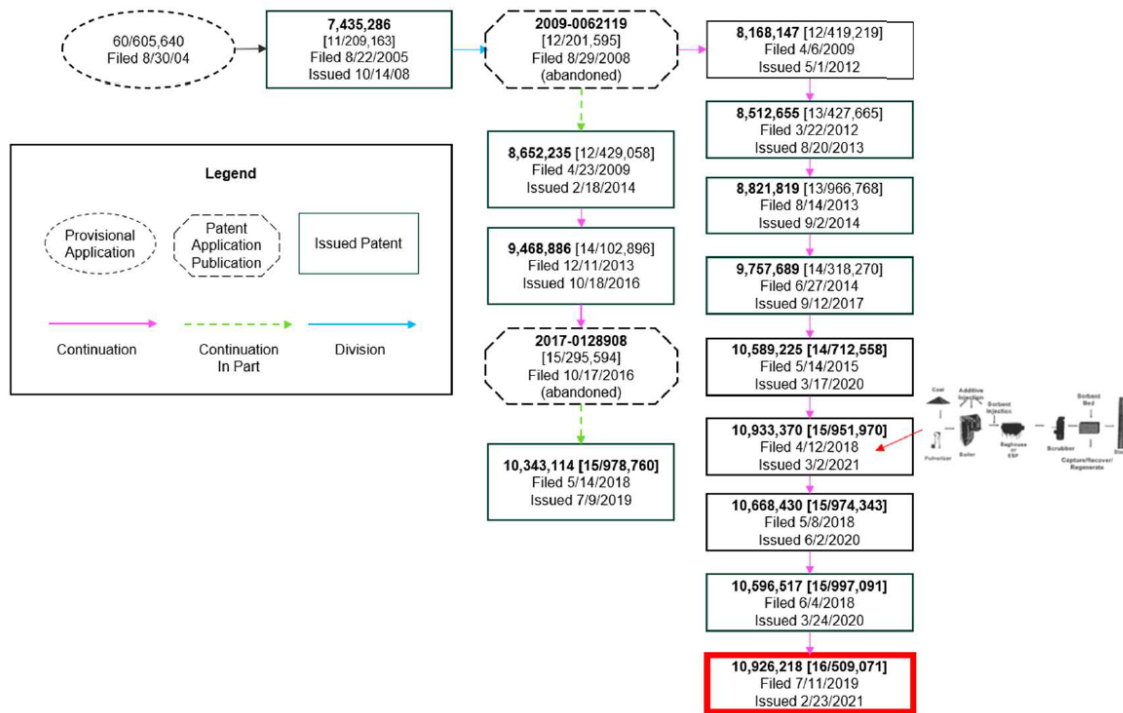
A patent's claims, however, “are not entitled to an earlier priority date merely because the patentee claims priority. Rather, for a patent's claims to be entitled to an earlier priority date, the patentee must demonstrate that the claims meet the requirements of 35 U.S.C. § 120.” *In re NTP, Inc.*, 654 F.3d 1268, 1276 (Fed. Cir. 2011) (citations omitted). Under § 120, a claim is entitled to the priority to a prior application's filing date only if the prior application discloses the claimed invention “in the manner provided by [§] 112(a) (other than the requirement to disclose the best mode).” Section 112(a) in turn requires the specification to, among other things, contain a written description of the claimed invention.

The test for sufficiency of a written description under 35 U.S.C. § 112(a) is whether the earlier application’s disclosure “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). That test “requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Id.*

In an *inter partes* review, although the petitioner has the ultimate burden of persuasion to prove unpatentability, the patent owner must demonstrate entitlement to a priority date when the patent owner relies on that priority date to overcome an anticipation or obviousness argument. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1379–80 (Fed. Cir. 2015).

On the current record, and for purposes of this Decision, we find record evidence does not show that the challenged claims of the ’218 patent are entitled to a priority date before 2018.

Petitioner provides the following family tree of the '218 patent:



Pet. 20.

The parties group these applications into three categories: the Provisional Application; the applications filed before April 12, 2018 (“Pre-2018 Applications”), and the applications filed on or after April 12, 2018 (“Post-2018 Applications”). *See, e.g.*, Prelim. Resp. 9.

This grouping reflects Petitioner’s assertion that Application No. 15/951,970 (“the ’970 application”), filed in April 2018, made “extensive” changes to the specification. Pet. 20 (citing Ex. 1064 (comparison of the ’970 application to the immediately prior application)). According to Petitioner, limitations “directed to what halide compounds are added and where they are added,” which Petitioner terms “Newly-Introduced Limitations,” do not have written-description support in applications before the ’970 applications. *Id.* at 21. Petitioner argues that before April 2018, when the ’970 application was filed, a POSITA “would

not have concluded Applicants were in possession of the subject matter of the issued claims of the '218 Patent.” *Id.* Thus, Petitioner contends that Patent Owner is not entitled to a priority date before April 2018. *Id.* at 22.

Patent Owner disagrees with Petitioner. Prelim. Resp. 7–26. The parties dispute (1) whether the Pre-2018 Applications provide express support for Newly-Introduced Limitations; and (2) whether the Provisional Application provides sufficient written-description support for the Newly-Introduced Limitations. Pet. 23–25, 33–36; Prelim. Resp. 9–13, 16. On this record, we find Petitioner’s arguments more persuasive.⁹ We address these arguments in turn.

1. Pre-2018 Applications

Each of independent claims 1 and 26 recites

the coal comprises added HI, an iodide salt, or a combination thereof, added to the coal before the coal enters the combustion chamber, or

the combustion chamber comprises added HI, an iodide salt, or a combination thereof, or

a combination thereof.

Ex. 1001, 35:65–36:3, 38:12–17. Similarly, independent claim 25 recites “the coal comprising an additive comprising added HI, an iodide salt, or a combination thereof. . . the HI, iodide salt, or the combination thereof added

⁹ The parties also dispute whether the Provisional Application was incorporated by reference into the Pre-2018 Applications. Pet. 26–33; Prelim. Resp. 14–15. We do not need to resolve this issue because as explained below, even if all the disclosures of Provisional Application were considered, they would not provide written-description support for the challenged claims. *See infra* Section II.C.2.

to the coal, added to the combustion chamber, or a combination thereof.” *Id.* at 37:39–41, 38:3–5.

Petitioner contends that

[t]he Pre-2018 Applications do not support adding any halides to the coal or combustion chamber, let alone the HI, iodide salt, or combination thereof claimed in the ’218 Patent. Rather, the Pre-2018 Applications are directed to preparing brominated-activated carbon . . . outside mercury-containing flue gas . . . , and then injecting the pre-brominated sorbent into mercury-containing flue gas . . . downstream from the combustion chamber.

Pet. 23–24.

Patent Owner argues that paragraph 56 of the Pre-2018 Applications¹⁰ discloses adding bromine to the coal in the combustion chamber by disclosing “the practice of adding the promotor and sorbent at one or multiple locations.” Prelim. Resp. 16.

The Board previously addressed this issue in IPR2020-00832:

Paragraph 56 explains that “single injection points 116 or 119 are shown in Figure 3, although one skilled in the art will understand that multiple injection points are within the scope of the present invention.” Ex. 1022, 11, ¶ 56. However, this refers to injection points in flue gas stream 15 described in paragraph 55 of the ’595 application, not multiple injection points at different points in the process (e.g., in the flue gas stream, in the combustion chamber, or with coal). *Id.* at 10–11, ¶ 55. Further, to the extent Patent Owner argues there is written description support in the [Pre-2018 Applications] for adding the promoter to the coal or to the combustion chamber . . . because this would have been an obvious variation of the ’595

¹⁰ Patent Owner states that the “Pre-2018 Applications contain substantively identical disclosures” and cites to the Application No. 12/201,595 (“the ’595 Application,” Ex. 1022) as representative. Prelim. Resp. 14. For convenience, we do the same.

application's disclosure, rendering an invention obvious does not satisfy the written description requirement.

IPR2020-00832, Paper 17, 28–29.

On the current record, and for purposes of institution, we agree with the Board's previous determination and adopt it as our own.

Patent Owner acknowledges that the Pre-2018 Applications do “not contain provisional figure 2,” but argues that they do “provide a similar disclosure of bromine species being added to coal.” Prelim. Resp. 16. Specifically, Patent Owner points to the Pre-2018 Applications for disclosing an example, in which “the halogen/halide promoted carbon sorbent was injected into the flue gas after the boiler. In general, however, the inventive sorbent can be injected where desired (e.g., before, after, or within the boiler).” *Id.* (citing Ex. 1022 ¶ 107).

Patent Owner argues that “[b]ecause a halogen/halide promoted sorbent necessarily includes a halogen/halide such as HI and iodide salts, a POSITA would recognize that adding this material before the boiler necessarily results in the limitations at issue in the '218 Patent.” *Id.* The Board addressed this issue in IPR2020-00832 too:

For this example [described in ¶ 107], the '595 application discloses “the halogen/halide promoted carbon sorbent was injected into the flue gas after the boiler.” *Id.* Thus, this passage describes a combination of promoter and sorbent material being added at one single point: “into the flue gas after the boiler.” The '595 application continues the description of this example by stating “[i]n general however, the inventive sorbent can be injected where desired (e.g., before, after, or within the boiler).” *Id.* Although this describes other injection points (“e.g., before, after, or within the boiler”), this disclosure regards the promoted sorbent material. As a result, it describes the addition of both the promoter and the sorbent material at a single point, not (1) the addition of the promoter with the coal or the

combustion chamber and (2) the injection of the sorbent material into mercury-containing gas downstream of the combustion chamber. . . . As a result, we do not agree with Patent Owner’s arguments regarding paragraph 107 of the ’595 application.

IPR2020-00832, Paper 17 at 28.

On the current record, and for purposes of institution, we agree with the Board’s previous analysis and adopt it as our own.

Furthermore, as Petitioner points out, in the Pre-2018 Applications, “[t]he only mention of halide salts (of which iodide salts are a subset) is of criticism.” Pet. 24. Indeed, the Pre-2018 Applications disclose that “[h]alides are considered reduced forms that do not, alone, oxidize other compounds. In the conventional view therefore, a halide-salt-treated activated carbon will not effectively oxidize elemental mercury and capture elemental mercury.” Ex. 1022, 269. This evidence tends to support Petitioner’s argument that the Pre-2018 Applications do not provide support for adding iodide salt, or a combination of HI and iodide salt, to the coal or combustion chamber. Pet. 24.

In sum, the current record supports that the Pre-2018 Applications, at least, do not expressly disclose adding iodide salts or a combination of HI and iodide salt to the coal in the combustion chamber. Thus, Patent Owner has not shown that the Pre-2018 Applications provide sufficient written-description support for the challenged claims.

2. Provisional Application

Petitioner argues that the Provisional Application does not support two aspects of the challenged claims: (1) the claimed genus of “HI, an iodide salt, or a combination thereof;” and (2) adding the claimed genus to the coal “before the coal enters the combustion chamber.” Pet. 33–36.

a. The Claimed Genus

As support for the claimed genus of “HI, an iodide salt, or a combination thereof,” Patent Owner points to the following disclosure in the Provisional Application as explaining “the scientific basis for the invention:”

We now teach that the formation of the new bromide compound with carbon increases the reactivity of the carbon forms toward mercury and other pollutants. The resulting bromide compound is uniquely suited to facilitate oxidation of the mercury. ***The effectiveness of the oxidation results from the promotion effect of the halide*** exerted on the developing positive charge on the mercury during the oxidation, known in the chemical art as a specific catalytic effect. ***Thus, as the mercury electrons are drawn toward the positive carbon, the halide anion electrons are pushing in from the other side, which stabilizes the positive charge developing on the mercury and lowers the energy requirement for the oxidation process.*** Bromide is especially reactive, owing to the highly polarizable electrons in the outer 4p orbitals of the ion. Thus, adding HBr or Br₂ to the carbon forms a similar carbon bromide, in which the positive carbon oxidizes the mercury with the assistance of the bromide ion.

Prelim. Resp. 9–10 (citing Ex. 1020, 7–8¹¹).

From this disclosure, Patent Owner contends that “the benefits of the claimed promoted sorbent are obtained by forming a carbon halide (for example, a bromide) out of activated carbon and a negative halogen ion, *i.e.*, Br-.” *Id.* at 10. In addition, “this bromine Br- ion may be supplied by adding HBr or Br₂ (both of which contain Br-) to the carbon.” *Id.* According to Patent Owner, the Provisional Application thus teaches that “[w]hen these components are mixed into mercury-containing gas, the mercury (Hg) is

¹¹ We cite the native page number of the Provisional Application, not the page number of the Exhibit provided by Petitioner.

drawn toward the carbon, and the Bromine ion is drawn toward the mercury, creating a stable bond.” *Id.* at 11. We are not persuaded by Patent Owner’s argument.

On the current record, it is unclear to what extent, if at all, the alleged “scientific basis for the invention” describes adding bromine to coal. Written description requires more than that the disclosure renders the claimed subject matter obvious. *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571–72 (Fed. Cir. 1997) (“The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification. Rather, a prior application itself must describe an invention.”); *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008) (“Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed.”).

Patent Owner points to the following disclosure of using an optional second component as providing support for the claimed genus:

It has been demonstrated that addition of an optional second component, in addition to the bromine, results in improved reactivity and capacity for the sorbent, exceeding that of both the untreated carbon and the brominated carbon. The second compound comprises either a second halogen or a compound from a second halogen, such as HBr.

Prelim. Resp. 11–12 (quoting Ex. 1020, 10¹²).

Patent Owner also points to provisional example 1E as disclosing “additional substance is a compound comprised of a Group V or VI element or combination of Group V or VI with Group VII element, such as SCl₂,

¹² Patent Owner’s Preliminary Response cites page 12 of the Exhibit 1020. The cited passage appears at page 10. We deem this harmless error.

1-10 wt% of bromine.” Prelim. Resp. 19. Because “a group VII element includes iodine,” Patent Owner interprets example 1E as disclosing “the use of various halogen-containing compounds.” *Id.* at 11, 19; Sur-reply 6–7.

Patent Owner points to the Provisional Application as stating “[t]he sorbent that contains bromine is expected to be more reactive than the corresponding sorbent containing chlorine and much less expensive than the sorbent containing iodine.” Prelim. Resp. 13 (citing Ex. 1020, 13). Based on this disclosure, Patent Owner contends that “the inventors were plainly aware that the additive injection could include iodine as the halogen in use.” *Id.* We are not persuaded by Patent Owner’s argument.

“It is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to the modifications that the inventor might have envisioned, but failed to disclose.” *Lockwood*, 107 F.3d at 1572. Thus, what the inventors were aware of, but the specification does not disclose, does not constitute objective evidence to show written-description support.

Patent Owner has not identified any disclosure in the Provisional Application of adding an iodide salt. In fact, the Provisional Application discloses that “[t]he halide is considered a reduced form and cannot therefore oxidize anything by itself. It is for this reason that it is not obvious that a halide-halogen treated activated carbon would be effective at oxidizing elemental mercury and provide effective capture of elemental mercury.” Ex. 1020, 7. This disclosure tends to support Petitioner’s argument that “the patentee taught not to use the category of halide salts.”

Reply 8 (citing Ex. 1002 ¶ 178; Ex. 1020, 7¹³); *see also* Ex. 1002 ¶ 178 (Dr. Niksa’s testifying that “the Provisional suggests that the inventors had determined not to use halide salts (such as iodide salts)”).

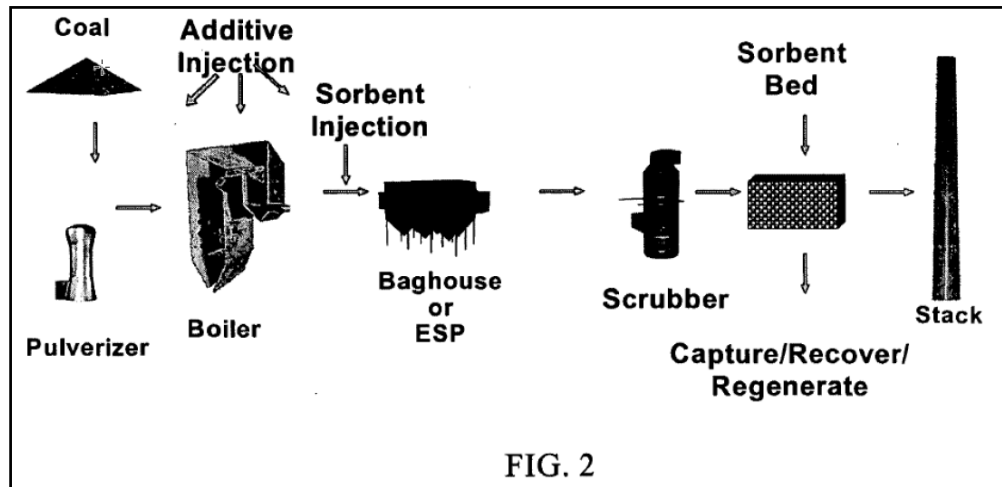
In addition, even though Example 1E of the Provisional Application discloses the claimed HI, that single species is insufficient to provide the written-description support for the claimed genus “HI, an iodide salt, or a combination thereof.” That is because the record shows that HI and an iodide salt have different properties. *See, e.g.*, Ex. 1026 ¶¶ 11, 29 (co-inventor Mr. Pavlish testifying during prosecution of the ’114 patent that HBr and HI “are gases that dissolve in water to give acids which are commonly known as hydrohalic acids,” whereas salt is “an ionic compound that can be formed by the neutralization reaction of an acid and a base”). Because the difference between HI and an iodide salt is such that the person skilled in the art would not readily discern that an iodide salt would perform similarly HI, “disclosure of more species is necessary to adequately show possession of the entire genus.” *Bilstad v. Wakalopulos*, 386 F.3d 1116, 1125 (Fed. Cir. 2004).

In sum, on this record, and for purposes of institution, Patent Owner has not sufficiently shown that the Provisional Application supports the full scope of the claimed genus.

¹³ Page 8 of the Reply cites Exhibit 1010. The correct citation appears to be Exhibit 1020. In addition, the quoted language allegedly from the Provisional Application is in fact from the Pre-2018 Applications. *See* Reply 8. Because the Provisional Application includes similar, although not identical, language (*compare* Ex. 1020, 7, *with* Ex. 1022, 269), we deem this harmless error. For future filings, we encourage the parties to provide accurate citations to the record.

b. Adding the Genus to Coal Before It Enters the Combustion Chamber

As support for adding the claimed genus to the coal, Patent Owner points to Figure 2 of the Provisional Application and its accompanying description. Prelim. Resp. 12. Figure 2 is reproduced below.



Ex. 1020, Fig. 2. As described in the Provisional Application:

FIG. 2 is a block diagram illustrating the use of the invention in a coal fueled facility. . . . FIG. 2 shows a boiler for burning pulverized coal. The facility utilizes various devices to clean the exhaust of the boiler. In this example, a baghouse or ESP is used to collect particulates in the exhaust. A scrubber and sorbent bed are also used to remove undesired constituents from the flue gas stream, before being fed to the stack. In the example shown, the sorbent is injected into the flue gas after the boiler. The additive can be injected where desired (e.g., before, after, or within the boiler).

Id. at 12.

Petitioner argues that the “before the boiler” language in the Provisional Application does not “expressly or inherently disclose any halides (let alone iodide halide or HI) supplied ‘to the coal,’ as opposed to elsewhere upstream of the boiler.” Pet. 35. Petitioner contends that “[t]here are numerous systems in coal plants ‘before . . . the boiler’ that could deliver halides, but do not necessarily interface with the coal.” *Id.* at 35–36 (citing

Ex. 1027, 13-3 to 13-5). For example, an additive could be fed directly to the combustion chamber as part of a separate stream of “Secondary Air.” *Id.* at 36 (citing Ex. 1002 ¶ 181).

Patent Owner argues that

a POSITA would understand that . . . claim [1] refers to the two ways that halogen could be added to the combustion chamber: either it is added to the coal and then passed through the coal entry ports, or it is added through secondary air ports into the combustion chamber. This is consistent with the provisional application which describes adding the halogen “before” or “within” the boiler.

Prelim. Resp. 23–24.

We are not persuaded by this argument. The Federal Circuit has instructed that

[e]ntitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed. It extends only to that which is disclosed. While the meaning of terms, phrases, or diagrams in a disclosure is to be explained or interpreted from the vantage point of one skilled in the art, all the limitations must appear in the specification. The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification. Rather, a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.

Lockwood, 107 F.3d at 1571–72. Here, what “a POSITA would understand,” without disclosure in the specification, is insufficient to show written-description support.

Thus, on this record, and for purposes of institution, Patent Owner has not shown that the Provisional Application provides sufficient support for adding the claimed genus to the coal.

3. Summary

In sum, the current record does not show that either the Provisional Application or the Pre-2018 Applications provide sufficient written-description support for the challenged claims. As a result, we determine that the '218 patent cannot claim priority to the Provisional Application. Thus, all asserted references qualify as prior art.

D. Challenges Based on Baldrey

Petitioner asserts that (1) Baldrey anticipates claims 1–4, 6–9, 13–17, and 20–25; (2) the combination of Baldrey and Olson-235 renders claims 1–4 and 6–26 obvious; and (3) the combination of Baldrey and Olson-646 renders claims 1–4 and 6–26 obvious. Pet. 41–77. Based on this record, we determine Petitioner has established a reasonable likelihood that it would prevail in these assertions.

1. Asserted Prior Art

a. Baldrey

Baldrey “relates generally to additives for coal-fired power plants and particularly to additives for mercury removal.” Ex. 1015 ¶ 2. It describes using an additive that includes a halogen-containing compound. *Id.* ¶¶ 11–14. Figure 2 (reproduced below) shows that the additive can be introduced in multiple locations.

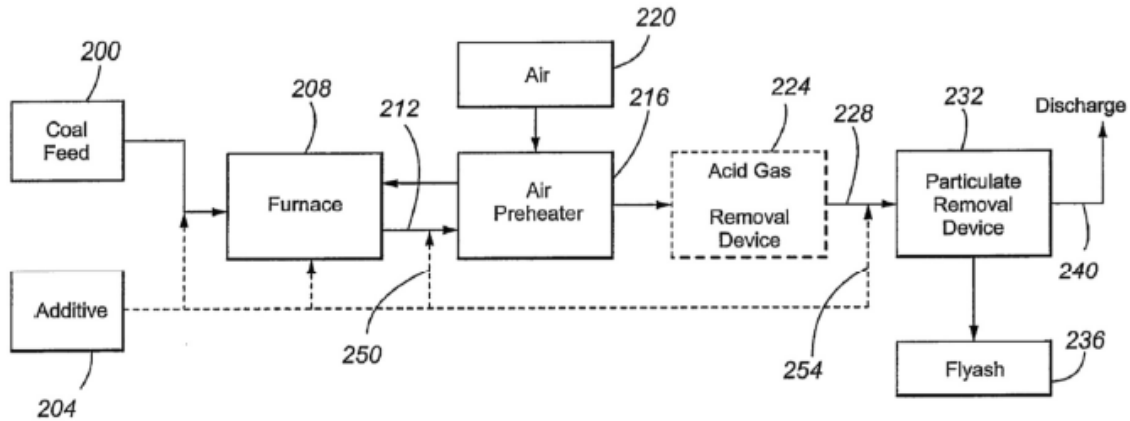


FIG. 2

Figure 2 “is a block diagram of a coal combustion waste gas treatment assembly.” *Id.* ¶ 52. It shows that additive 204, which includes halogen-containing compounds, may be introduced into multiple locations such as coal feed 200, furnace 208, after the furnace at location 250, and/or at location 254 upstream of particulate removal device 232. Baldrey explains that “[t]he additive of the present invention is believed to promote elemental mercury oxidation by means of metal mercury oxidation catalysts.” *Id.* ¶ 60.

b. Olson-646

Olson-646 is a patent publication of Application No. 11/209,163 (“the ’163 application”). Ex. 1012, code (21). It “relates to methods and materials for the removal of pollutants from flue gas or product gas from a gasification system. In particular, mercury is removed from gas streams generated during the burning or gasification of fossil fuels by highly reactive regenerable sorbents.” *Id.* ¶ 4.

Olson-646 proposes a model for the oxidation of mercury in Figure 2, which is reproduced below.

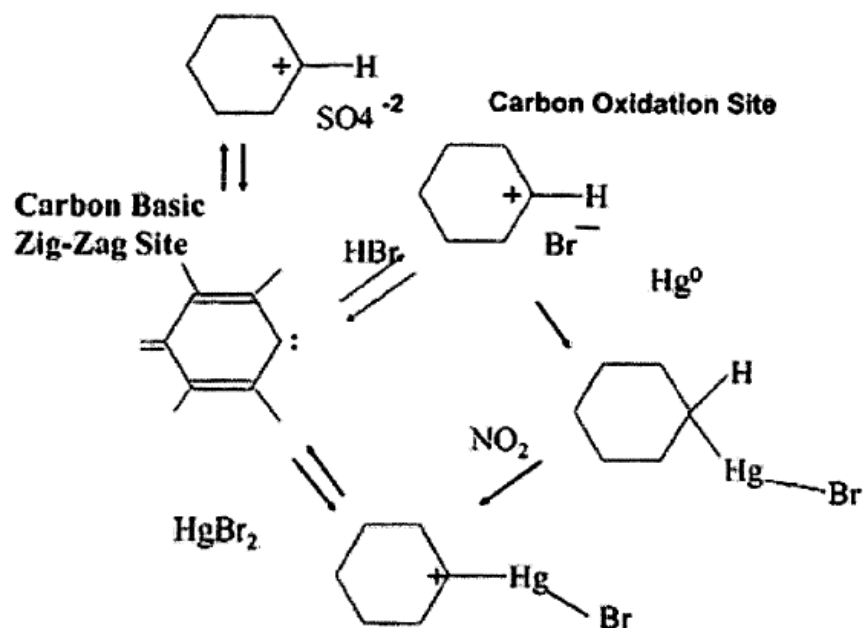


FIG. 2

Figure 2 is a proposed mechanistic model of the chemical reactions in the oxidation and capture of mercury. *Id.* ¶ 33.

Olson-646 explains that “as illustrated in FIG. 2, hydrogen bromide reacts with the unsaturated structure of the activated carbon” and this “may be, by way of illustration only, a carbene species on the edge of the graphene sheet structures of the carbon.” *Id.* ¶ 54. According to Olson-646, “[m]olecular bromine or a bromine compound reacts to form a similar structure, with a positive carbon that is active for oxidizing the mercury with subsequent capture by the sorbent.” *Id.*

Olson-646’s Figure 3 is reproduced below.

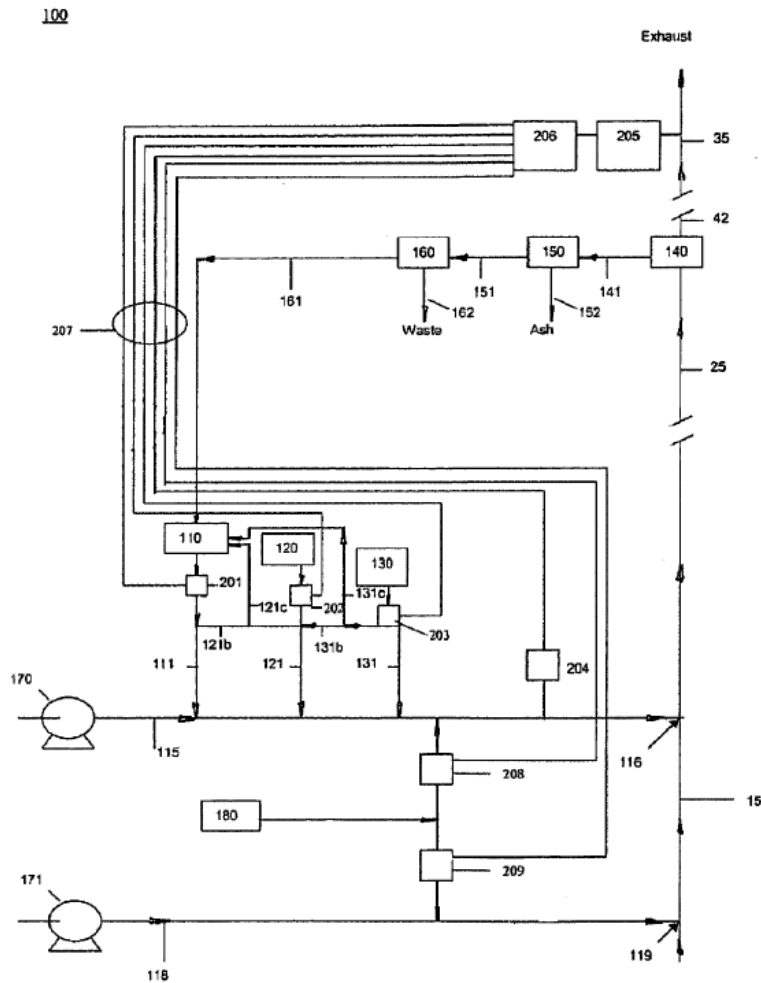


FIG. 3

Figure 3 is schematic for the preparation of promoted carbon sorbents and processes for flue gas mercury reduction in flue gases. Ex. 1012 ¶ 34.

Figure 3 depicts a schematic flow diagram of a “mercury control system 100 comprising preparation of promoted carbon sorbents” that includes a “base activated carbon reservoir 110, an optional halogen/halide promoter reservoir 120, an optional secondary component reservoir 130, and an optional alkali component reservoir 180, each of which with corresponding flow control device(s) 201, 202, 203, and 208/209, respectively.” *Id.* ¶ 56. Olson-646 further explains that in “operation,

promoted carbon sorbent and/or an optional alkali component is injected into contaminated flue gas stream 15.” *Id.* ¶ 61.

c. Olson-235

Olson-235 is a patent issued from an application that is a continuation-in-part of a divisional of the ’163 application (which published as Olson-646). Ex. 1018, code (60); Ex. 1012, code (21). As such, Olson-235 includes disclosures that are substantially similar to those discussed above in Olson-646 (*supra* Section II.D.1.b). *See, e.g.*, Ex. 1018, 1:20–24, 8:63–9:4, 14:30–32, 16:60–17:2, Fig. 2, Fig. 3.

Olson-235 further discloses “monitoring the mercury content of the cleaned gas” in which “the carbon base sorbent and the promoter are introduced into the mercury-containing gas at the same location or at separate locations.” *Id.* at 6:55–59. According to Olson-235, “[w]here possible and desirable, the mercury control technology of the present invention may preferably utilize continuous measurement of mercury emissions as feedback to assist in control of the sorbent injection rate.” *Id.* at 20:1–5.

2. Analysis

Petitioner asserts that Baldrey anticipates, and the combination of Baldrey and Olson-235 or Olson-646 renders obvious, the challenged claims. Pet. 41–77. Patent Owner asserts that because the challenged claims are entitled to priority to earlier filed applications, Baldrey, Olson-235, and Olson-646 do not qualify as prior art. Prelim. Resp. 1–3, 6–26. Patent Owner does not otherwise substantively address Petitioner’s patentability challenges based on Baldrey. *See generally* Prelim. Resp.

As explained above (*supra* Section II.C), the current record does not show that earlier filed applications provide sufficient written-description

support for the challenged claims. As a result, all asserted references qualify as prior art.

After reviewing the Petition and accompanying evidence, we determine Petitioner has established a reasonable likelihood that Baldrey anticipates claims 1–4, 6–9, 13–17, and 20–25, and the combination of Baldrey and Olson-235 or Olson-646 would have rendered claims 1–4 and 6–26 obvious.

E. Challenges Based on Sjostrom

Petitioner asserts that claims 1–4 and 6–26 would have been obvious over (1) Sjostrom and Olson-235; (2) Sjostrom and Olson-646; (3) Sjostrom, Olson-235, and Olson-279; and (4) Sjostrom, Olson-646, and Olson-279. Pet. 77–111. Based on this record, we determine Petitioner has established a reasonable likelihood that it would prevail in these assertions.

1. Prior-Art Status of Sjostrom

Petitioner asserts Sjostrom qualify as printed publications. Pet. 37–39. According to Petitioner, Sjostrom is available as prior art under 35 U.S.C. §§102(a) and (b) (pre-AIA) or §102(a)(1) (post-AIA). *Id.* at 37.

According to Petitioner, “Sjostrom was presented January 25, 2005, at the Electric Utilities Environment Conference (‘2025 EUEC’) in Arizona, and mailed to conference attendees (including Dr. Niksa) by February 2005.” *Id.* at 38. Petitioner argues that Sjostrom meet the standard for public accessibility set forth in *GoPro, Inc. v. Contour IP Holding LLC*, 908 F.3d 690, 693 (Fed. Cir. 2018). *Id.*

The standard for public accessibility is one of “reasonable diligence,” *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1348 (Fed. Cir. 2016), to locate the information by “interested members of the relevant public.” *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1569 (Fed. Cir.

1988). Accordingly, “[a] reference will be considered publicly accessible if it was ‘disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it.’” *Blue Calypso*, 815 F.3d at 1348 (quoting *Kyocera Wireless Corp. v. Int’l Trade Comm’n*, 545 F.3d 1340, 1350 (Fed. Cir. 2008)).

Patent Owner argues that “Petitioners rely on their paid technical expert’s largely uncorroborated fact testimony regarding a conference that took place twenty years ago.” Prelim. Resp. 27. Patent Owner asserts that “Petitioners have not corroborated the number of people in attendance at this track during the relevant time, nor whether those people were skilled in the art.” *Id.* Thus, Patent Owner concludes that “Petitioners have not provided sufficient evidence that Sjostrom was disseminated or otherwise made available to . . . persons interested and ordinarily skilled in the subject matter or art.” *Id.* (quotation marks omitted). We are not persuaded by Patent Owner’s argument.

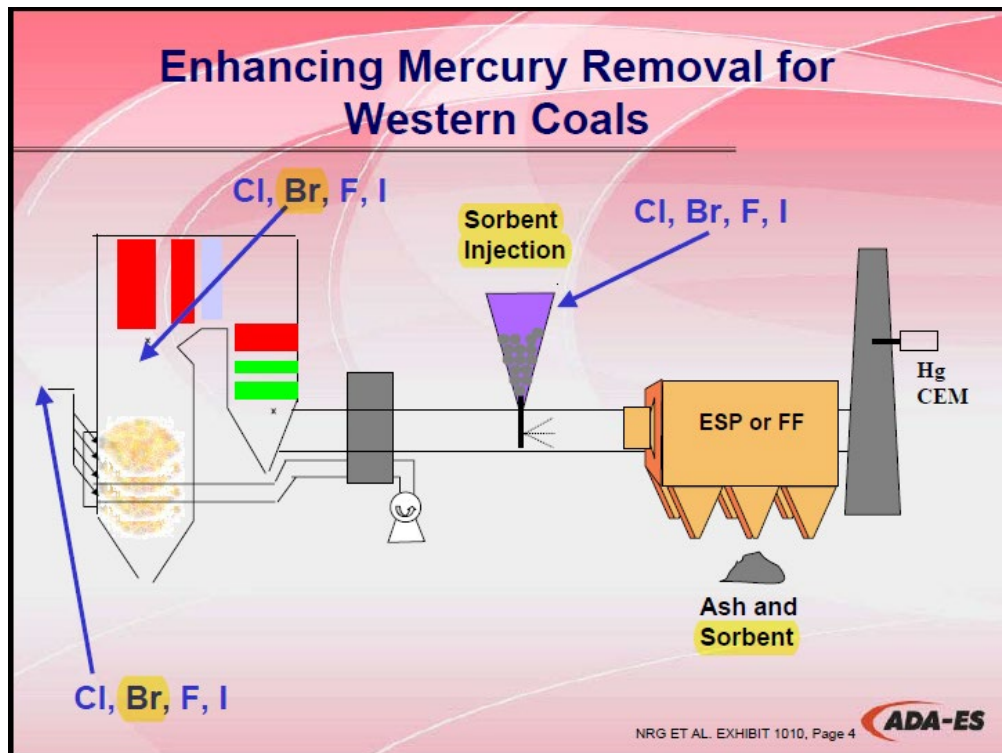
Petitioner relies on the testimony of Dr. Niksa, who attended and delivered a presentation at the 2005 EUEC. Ex. 1002 ¶¶ 125, 242–251; Ex. 1030, 3, 7, 23, 32, 106–118; Ex. 1031. Dr. Niksa testifies that there were over 800 attendees. Ex. 1002 ¶ 250. Other evidence corroborates Dr. Niksa’s testimony. Ex. 1030, 103–118 (list of attendees); Ex. 1031. Petitioner’s evidence does not indicate that attendance of the 2005 EUEC was restricted, and the evidence indicates that the CD appears to have been disseminated without any apparent restriction or expectation of confidentiality. Ex. 1002 ¶¶ 243, 244, 248; Ex. 1010; Ex. 1030, 103–118; Ex. 1031; *GoPro*, 908 F.3d at 694–95.

Therefore, on this record, Petitioner has sufficiently demonstrated a reasonable likelihood that Sjostrom was publicly available, and thus, qualifies as printed publications. *See Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 28 (PTAB Dec. 20, 2019) (Paper 29) (precedential).

2. Asserted Prior Art

a. Sjostrom

Sjostrom is entitled “Full Scale Evaluations of Mercury Control Technologies with PRB [Powder River Basin] Coals.” Ex. 1010, 1. Sjostrom identifies multiple power plants that used “activated carbon injection to improve mercury control” and identifies the ACI equipment used. *Id.* at 10–11. Sjostrom includes the following Process Diagram:

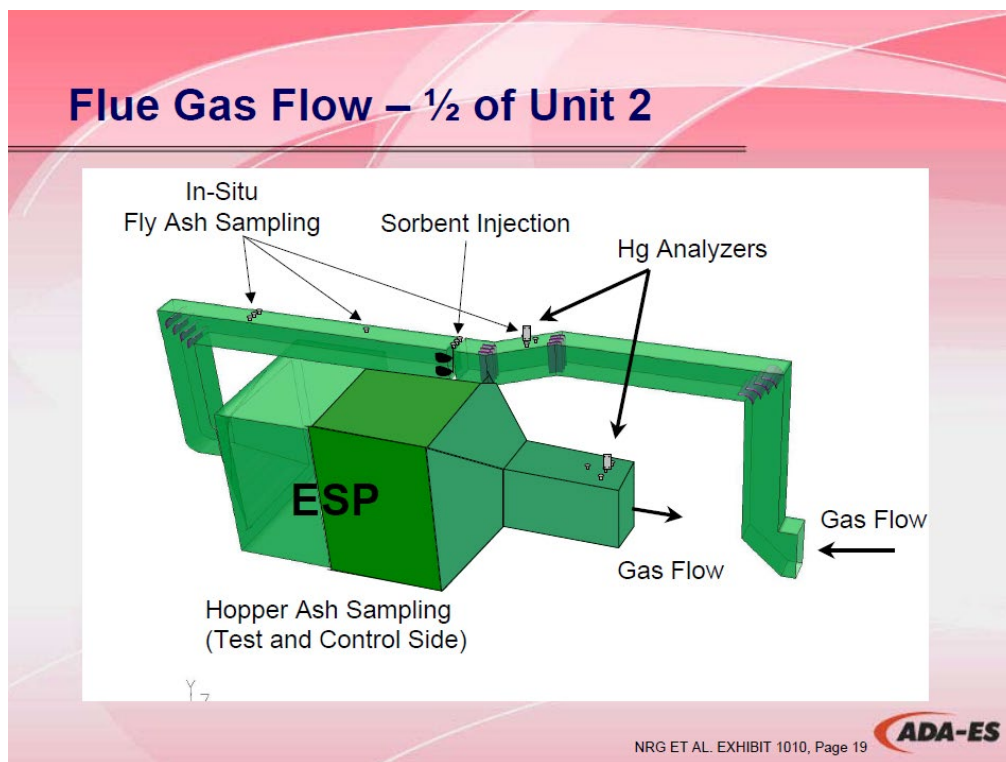


Ex. 1010, 4.

Sjostrom’s Process Diagram is captioned “Enhancing Mercury Removal for Western Coals.” *Id.* The figure includes a boiler (or combustion

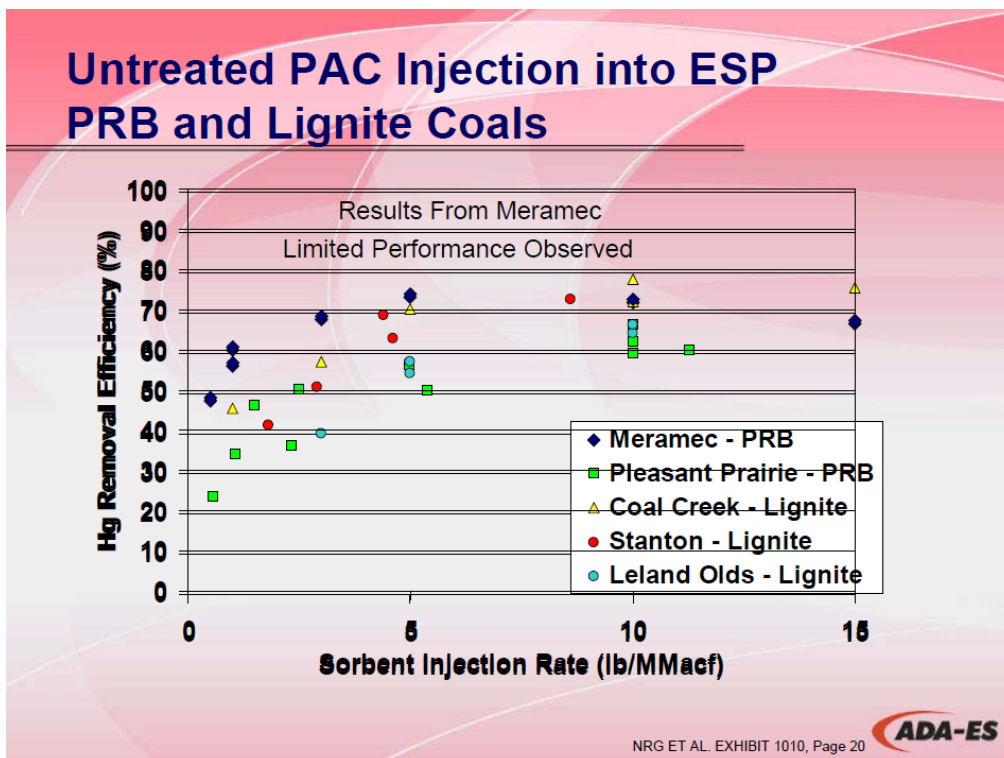
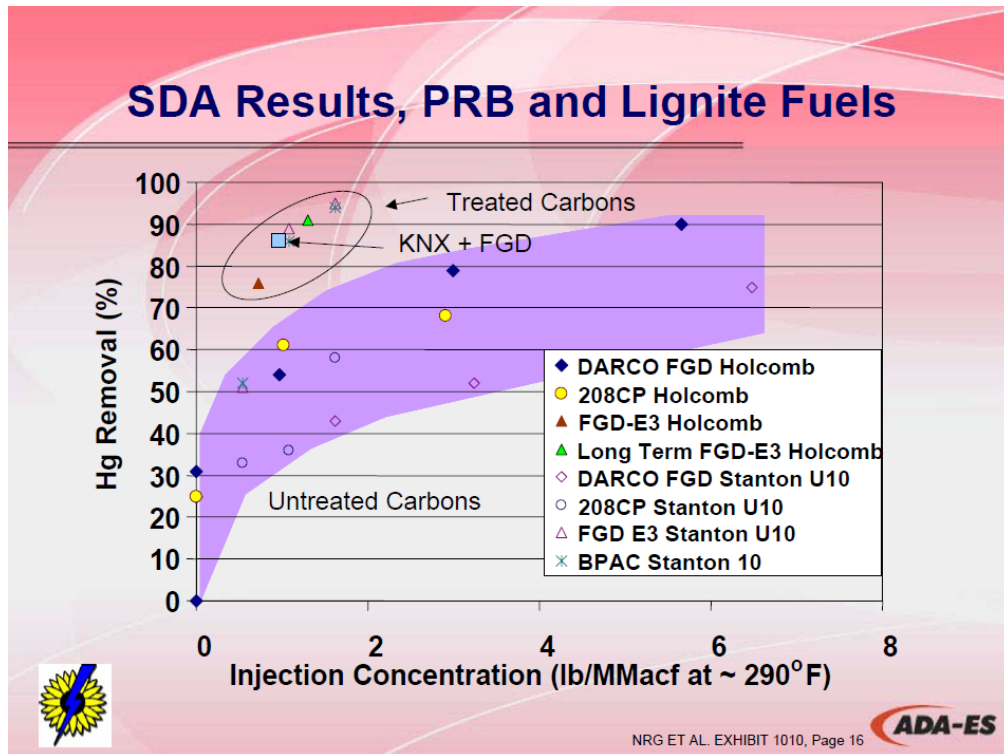
chamber) on the left and arrows pointing to what appears to be upstream of the boiler, into the boiler, and to a “Sorbent Injection” device, which appears to be located downstream of the boiler. *Id.* The arrows are labeled with chemical species, such as bromine. *Id.* An “ESP or FF” is located on the right side of the figure with “Ash and Sorbent” located below the “ESP or FF” device. *Id.* The far-right side also has a “Hg CEM” notation. *Id.*

Sjostrom provides the following drawing when discussing “Flue Gas Flow – ½ of Unit 2:”



Id. at 19. Sjostrom’s Flue Gas Flow drawing includes arrows indicating “Hg Analyzers.” *Id.*

Sjostrom also includes the following graphs:



Id. at 16, 20. The above graphs are scatter plots and are captioned “SDA Results, PRB and Lignite Fuels” and “Untreated PAC Injection into ESP PRB and Lignite Coals.” *Id.* at 16, 20.

b. Olson-279

Olson-279 is a patent publication of Application No. 14/195,360. Ex. 1016, code (21). It “provides a method of reducing the pollutant content in a pollutant-containing gas.” *Id.* ¶ 7. “The method includes contacting the mercury-containing gas with the activated carbon sorbent.” *Id.* ¶ 8.

Olson-279 discloses that the activated carbon sorbent includes a halogen- or halide-promoted activated carbon. *Id.* ¶ 6. According to Olson-279,

[t]he halogen or halide can be fluorine or fluoride, chlorine or chloride, bromine or bromide, or iodine or iodide. In some examples, the promotor can include at least one of a halogen, a Group V halide, a Group VI halide, a hydrogen halide, an ammonium halide, an alkali earth metal halide, and an alkaline earth metal halide.

Id. ¶ 69; *see also id.* (“The promotor can include at least one of HI, IBr, ICl[,], NH₄Br, NaBr, CaBr₂, HBr, NaCl, CaCl₂, and HCl.”).

Olson-279 discloses that “[t]he promoting of the sorbent material can occur before addition or injection into a gas stream, during addition or injection into a gas stream, after addition or injection into a gas stream, or a combination thereof.” *Id.* ¶ 70. Olson-279 discloses that a pre-added promoter can be an ammonium salt, such as ammonium iodide. *Id.*

3. Analysis

Petitioner contends that claims 1–4 and 6–26 would have been obvious over the combination of Sjostrom and several Olson references. Pet. 77–111. At this preliminary stage, Patent Owner does not substantively

address Petitioner's arguments regarding the combined teachings of the asserted references. *See generally* Prelim. Resp. Instead, Patent Owner focuses on challenging Sjostrom's prior-art status. Prelim. Resp. 26–28.

As explained above (*supra* Section II.E.1), on this record, Petitioner has sufficiently demonstrated a reasonable likelihood that Sjostrom was publicly available, and thus, qualifies as a printed publication.

After reviewing the Petition and accompanying evidence, we determine Petitioner has established a reasonable likelihood that claims 1–4 and 6–29 would have been obvious over (1) Sjostrom and Olson-235; (2) Sjostrom and Olson-646; (3) Sjostrom, Olson-235, and Olson-279; and (4) Sjostrom, Olson-646, and Olson-279.

III. CONCLUSION

Based on the current record, and for the reasons explained above, we find Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to at least one claim challenged in the Petition. We, therefore, institute an *inter partes* review of all challenged claims on all asserted grounds.

This Decision is not a final determination on the patentability of any challenged claim. Our view with regard to any conclusion reached in the foregoing could change upon further development of the record during trial. We remind the parties that any argument not raised in a Patent Owner Response to the Petition, or as permitted in another manner during trial, shall be deemed forfeited and/or waived even if asserted in the Preliminary Response. *In re Google Tech. Holdings LLC*, 980 F.3d 858, 862–64 (Fed. Cir. 2020) (holding an argument forfeited when not timely raised before the Board); *In re NuVasive, Inc.*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016)

(holding Patent Owner waived an argument addressed in the Preliminary Response by not raising the same argument in the Patent Owner Response).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), *inter partes* review is hereby instituted on all challenged claims of the '218 patent based on the asserted grounds set forth in the Petition; and

FURTHER ORDERED, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of a trial commencing on the entry date of this decision.

IPR2025-00718
Patent 10,926,218 B2

FOR PETITIONER:

David Tobin
Brian Oaks
Syed Fareed
Christian Tatum
MCDERMOTT WILL & SCHULTE LLP
dtobin@mwe.com
boaks@mwe.com
sfareed@mwe.com
ctatum@mwe.com

R. Scott Johnson
Thomas Patton
FREDRIKSON & BYRON, P.A.
rsjohnson@fredlaw.com
tpatton@fredlaw.com

Michelle Kemp
PERKINS COIE LLP
kemp-ptab@perkinscoie.com

Michael Piery
Lauren Bolcar
QUARLES & BRADY LLP
michael.piery@quarles.com
lauren.bolcar@quarles.com

FOR PATENT OWNER:

Hamad Hamad
CALDWELL, CASSADY & CURRY P.C.
hhamad@caldwellcc.com