

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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PACIFICORP,  
Petitioner,

v.

BIRCHTECH CORP.,  
Patent Owner.

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IPR2025-00687  
Patent 10,933,370 B2

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Before KRISTINA M. KALAN, ZHENYU YANG, and  
DAVID COTTA, *Administrative Patent Judges*.

KALAN, *Administrative Patent Judge*.

DECISION

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

## I. INTRODUCTION

PacifiCorp (“PacifiCorp”), Interstate Power & Light Company (“IPL”), MidAmerican Energy Company (“MidAmerican”), WEC Energy Group, Inc. (“WEC”), and Wisconsin Power & Light Company (“WPL”) (collectively, “Petitioner”)<sup>1</sup> filed a Petition (Paper 1, “Pet.”), seeking *inter partes* review of claims 1–8 and 10–18 of U.S. Patent No. 10,933,370 B2 (Ex. 1001, “the ’370 patent”). Birchtech Corp. (“Patent Owner”), formerly known as Midwest Energy Emissions Corp. (“ME2C”) (Paper 8, 2), filed a Preliminary Response. Paper 17 (“Prelim. Resp.”). Petitioner also filed a petition for *inter partes* review in IPR2025-00688, challenging the same claims of U.S. Patent 10,933,370 challenged in this proceeding. IPR2025-00688, Paper 1. Pursuant to the Memorandum on Interim Processes for PTAB Workload Management (March 26, 2025), *available at* <https://uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf>, Patent Owner requested that the Petition be discretionarily denied (along with the petition in IPR2025-00688). Paper 14. Petitioner opposed. Paper 15. The Acting Director determined that discretionary denial was not appropriate and referred each case (IPR2025–00687 and IPR2025-00688) to the panel. Paper 18 (“Referral Decision”).

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<sup>1</sup> IPL and WPL subsequently settled their dispute with Patent Owner and have been terminated from this proceeding. Paper 25. WEC and MidAmerican also settled their disputes with Patent Owner and have been terminated from this proceeding. Papers 27, 42. Accordingly, “Petitioner” as used herein refers only to the remaining Petitioner, namely, PacifiCorp.

After the Referral Decision, and with our authorization (Ex. 3001), Petitioner filed a Reply to the Preliminary Response (Paper 19, “Pet. Reply”), and Patent Owner filed a Sur-reply to Petitioner’s Reply (Paper 20, “Sur-reply”). We instituted *inter partes* review in this proceeding (Paper 29) and in IPR2025-00688 because, on the merits, we determined that Petitioner had shown a reasonable likelihood of prevailing in all its challenges.

Patent Owner sought Director Review of the Referral Decision. Paper 34, 1 (requesting “Director Review of the Director’s August 22, 2025 Decision Referring the Petition to the Board (‘Referral Decision’)”). Patent Owner argued that institution of IPR2025-00687 and IPR2025-00688 “should be discretionarily denied.” *Id.* at 5. Petitioner opposed. Paper 37. The Director granted review and found that “granting institution of two petitions that each challenge the same claims of the ’370 patent and ’218 patent<sup>2</sup>” was an “abuse[] of discretion.” Paper 40, 1. The Director remanded the cases “to the Board panel to determine which of the two petitions challenging each of the ’370 and ’218 patents to institute.” *Id.* at 3.

Pursuant to the Director’s instruction that we choose only one of the two petitions challenging the ’370 patent to institute, and for the reasons set forth below, we choose to institute review of the ’370 patent in this Petition, and not in IPR2025-00688.

*A. Real Parties in Interest*

Petitioner identify PacifiCorp, IPL, MidAmerican, WEC, and WPL, as well as Alliant Energy Corporation, Alliant Energy Corporate Services, Inc., Berkshire Hathaway Energy Company, Inc., MidAmerican Funding,

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<sup>2</sup> Patent 10,926,218 B2, challenged in IPR2025-00717 and IPR2025-00718.

LLC; MHC Inc., PPW Holdings LLC, and Madison Gas and Electric Company as real parties-in-interest and Wisconsin Public Service Corporation as a potential real party-in-interest. Pet. 1–2.

Patent Owner identifies “MES, Inc.” as the real party in interest. Paper 8, 2.

*B. Related Matters*

Petitioner filed a concurrent petition (IPR2025-00688), seeking *inter partes* review of the same claims challenged in this proceeding.<sup>3</sup> Pet. 3. Petitioner also identifies IPR2025-00422 and IPR2025-00423 (challenging claims of US Patent No. 10,668,430) and IPR2025-00424 and IPR2025-00245 (challenging claims of US Patent No. 10,589,225), as previously filed petitions that are “counterpart patents with substantially similar claims.” *Id.* at 3–4.

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”);

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<sup>3</sup> Petitioner filed an explanation regarding the necessity of multiple petitions. Paper 2. In its briefing before the panel, Patent Owner did not challenge that multiple petitions are necessary. *See generally* Prelim. Resp. This is consistent with the Director’s determination that the decision 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), <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); and

*Birchtech Corp. f/k/a Midwest Energy Emissions Corp. v. Evergy, Inc. et al.*, Case No. 4-25-cv-00050 (W.D. Mo.).

*Birchtech Corp. f/k/a Midwest Energy Emissions Corp. v. Evergy Metro, Inc. et al.*, Case No. 5-25-cv-04033 pending in the United States District Court for the District of Kansas.

*Midwest Energy Emissions Corp. v. Evergy Inc. et al.*, No. 4:25-cv-00046 (S.D. Iowa) (filed Feb. 6, 2025).

Pet. 5–6; Paper 8, 1–2.

Petitioner previously filed other petitions for *inter partes* review, challenging two other patents owned by Patent Owner. Pet. 3. The Board instituted trial in those proceedings.

Petitioner also bring 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 '225 patent. Pet. 3–5. According to Petitioner, the Board granted institution but terminated those proceedings because the parties settled. *Id.*

C. *The '370 patent*

The '370 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, 1:40–43.

The '370 patent states:

The 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 1:49–54.

The '370 patent acknowledges: “Several 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 2:5–8. According to the '370 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 2:26–32. Thus, “there remains a

need for more economical and effective mercury removal technology.” *Id.* at 2:38–39.

The ’370 patent describes a halogen/halide promoted activated carbon sorbent that is highly effective for the removal of mercury from flue gas streams. *Id.* at 2:51–53. According to the ’370 patent, the “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 2:53–56.

The ’370 patent states: “Optional 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 2:56–58, 3:34–37.

The ’370 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 2:65–3:1. In one embodiment, “the promoter is selected from the group consisting of Br<sub>2</sub>, a Group V bromide, a Group VI bromide, and combinations thereof.” *Id.* at 4:5–7.

The ’370 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 2:38–43.

#### *D. Illustrative Claim*

Independent claim 1 is illustrative of the claimed subject matter and is reproduced below.

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

[1(a)] combusting a mixture of coal and an additive in a combustion chamber, to form the mercury-containing gas, wherein the additive is chosen from halides, halogens, salts thereof, and combinations thereof

[1(b)] adding a particulate sorbent material comprising activated carbon into the mercury-containing gas,

[1(c)] wherein a weight ratio of the additive added to the coal, added to the combustion chamber, or a combination thereof, to an amount of the sorbent material added to the mercury-containing gas is from about 1:100 to about 30:100;

[1(d)] contacting mercury in the mercury-containing gas with the sorbent material, to form a mercury-sorbent; and

[1(e)] separating the mercury-sorbent from the mercury-containing gas.

Ex. 1001, 35:49–65 (Petitioner’s bracketed designations).

*E. Asserted Challenges to Patentability*

Petitioner asserts the following challenges to patentability:

| <b>Claims Challenged</b> | <b>35 U.S.C.<br/>§</b> | <b>Reference</b>                             |
|--------------------------|------------------------|----------------------------------------------|
| 1–8, 10–18               | 103(a)                 | Vosteen589, <sup>4</sup> Starns <sup>5</sup> |

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<sup>4</sup> US 2004/0013589 A1, published Jan. 22, 2004. Ex. 1005 (“Vosteen589”).

<sup>5</sup> Starns, Travis, et al., *Full-Scale Test of Mercury Control with Sorbent Injection and an ESP at Wisconsin Electric’s Pleasant Prairie Power Plant*, Session AE1-C, Paper No. 43249, AIR & WASTE MANAGEMENT’S ASSOCIATION’S 95<sup>TH</sup> ANNUAL CONFERENCE, June 23–27, 2002. Ex. 1008 (“Starns”).

| Claims Challenged      | 35 U.S.C.<br>§ | Reference                         |
|------------------------|----------------|-----------------------------------|
| 1–8, 10–18             | 103(a)         | Vosteen589, Mass-EPA <sup>6</sup> |
| 1–6, 8, 11             | 102(e)         | Downs-Boiler, <sup>7</sup> Starns |
| 1–6, 8, 11, 12, 14–16  | 103(a)         | Downs-Boiler, Mass-EPA            |
| 1, 5, 6, 11            | 103(a)         | Lissianski, <sup>8</sup> Starns   |
| 1, 5, 6, 11, 12, 14–16 | 103(a)         | Lissianski, Mass-EPA              |

Pet. 10. In support of the unpatentability challenges, Petitioner relies on the Declaration of Stephen Niksa, Ph.D. (Ex. 1002).

## II. WHETHER THE PETITION IS TIME-BARRED

“An inter partes review may not be instituted if the petition requesting the proceeding is filed more than 1 year after the date on which the petitioner, real party in interest, or privy of the petitioner is served with a complaint alleging infringement of the patent.” 35 U.S.C. § 315(b).

Petitioner bears the burden of demonstrating compliance with 35 U.S.C. § 312(a)(2) and § 315(b). *See, e.g., Ventex Co., Ltd. v. Columbia Sportswear N. Am., Inc.*, IPR2017-00651, Paper 152 (PTAB Jan. 24, 2019)

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<sup>6</sup> Massachusetts Dep. of Environmental Protection, Bureau of Waste Prevention, *Evaluation of the Technological and Economic Feasibility of Controlling and Eliminating Mercury Emissions from the Combustion of Solid Fossil Fuel*, Dec. 2002, available at <https://web.archive.org/web/20030411074158/http://www.state.ma.us/dep/bwp/daqc/files/mercfeas.pdf> and at <https://www.mass.gov/doc/evaluation-of-technologicaleconomic-feasibility-of-controlling-eliminating-mercuryemissions/download>. Ex. 1009 (“Mass-EPA”).

<sup>7</sup> US 2008/0107579 A1, published May 8, 2008. Ex. 1006 (“Downs-Boiler”).

<sup>8</sup> Lissianski et al., US 7,514,052 B2, issued April 7, 2009. Ex. 1014 (“Lissianski”).

(precedential). In addition, under 35 U.S.C. § 312(a)(2), we consider a petition only if it identifies all real parties in interest.

Whether an unnamed party is a real party in interest or a privy of the instant petitioner is highly fact dependent and “demands a flexible approach that takes into account both equitable and practical considerations.”

*See Applications in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336, 1351, 1360 (Fed. Cir. 2018) (“AIT”); *Ventex Co., Ltd. v. Columbia Sportswear N. Am., Inc.*, IPR2017-00651, Paper 152 at 4–5 (PTAB Jan. 24, 2019) (precedential) (citing *Worlds Inc. v. Bungie, Inc.*, 903 F.3d 1237, 1242 (Fed. Cir. 2018)); Consolidated Trial Practice Guide (“CTPG”) 13 (2019), available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

“Courts invoke the terms ‘real party-in-interest’ and ‘privy’ to describe relationships and considerations sufficient to justify applying conventional principles of estoppel and preclusion.” CTPG 13. These requirements are designed to “protect patent owners from harassment via successive petitions by the same or related parties, to prevent parties from having a ‘second bite at the apple,’ and to protect the integrity of both the USPTO and federal courts by assuring that all issues are promptly raised and vetted.” *Id.* at 12–13. Factors to consider in determining whether a sufficient relationship exists include

(1) an agreement to be bound; (2) pre-existing substantive legal relationships between the person to be bound and a party to the judgment (e.g., “preceding and succeeding owners of property”); (3) adequate representation by someone with the same interests who was a party (e.g., “class actions” and “suits brought by trustees, guardians, and other fiduciaries”); (4) assumption of control over the litigation in which the judgment was rendered; (5) where the nonparty to an earlier litigation acts as a proxy for the named party to relitigate the

same issues; and (6) a special statutory scheme expressly foreclosing successive litigation by nonlitigants.

*WesternGeco LLC v. ION Geophysical Corp.*, 889 F.3d 1308, 1319 (Fed. Cir. 2018); *Taylor v. Sturgell*, 553 U.S. 880, 894–95 (2008); *AIT*, 897 F.3d at 1351.

The mere existence of some relationship between a petitioner and another entity, however, is not sufficient to place that petitioner in privity with that entity. *Google LLC v. DDC Technology, LLC*, IPR2023-00707, Paper 27 at 37 (PTAB Oct. 25, 2023). Instead, that relationship must be related to an earlier lawsuit and be “sufficiently close that it can be fairly said the petitioner had a full and fair opportunity to litigate the validity of the patent in that lawsuit” or the evidence must show “that petitioner is simply serving as a proxy to allow another party to litigate the patent validity question that the other party raised in an earlier filed litigation.”

*WesternGeco LLC v. ION Geophysics Corp.*, 889 F.3d 1308, 1319 (Fed. Cir. 2018).

Patent Owner argues “the Petition is time-barred based on a 2019 patent infringement case that ME2C filed against real-parties-in-interest of Petitioners.” Prelim. Resp. 1. According to Patent Owner, “[a]ll of the Petitioners or their privies own power plants that were accused of infringement in a prior patent infringement case that ME2C filed in Delaware in 2019.” *Id.* Patent Owner notes that “[w]hile Petitioners were not named in that lawsuit, their co-owners and/or suppliers were named in that lawsuit, defended that lawsuit, and settled the case.” *Id.* at 1–2.

Petitioner asserts that Patent Owner provides no support for its contentions that the Petition is time-barred and further that it cannot

“because ***PO never asserted the ’370 Patent against anyone in Delaware.***”

Pet. Reply 1–2 (citing Ex. 2023 (first amended complaint)). Petitioner argues that “[t]he first time [Patent Owner] sued anyone on the ’370 Patent was the complaint filed in Iowa on July 18, 2024” and “[t]he two petitions challenging the ’370 Patent (IPR2025-00687 and IPR2025-00688) were filed March 24, 2025, which is less than one year before the date on which anyone was ever ‘served with a complaint alleging infringement of the patent.’” *Id.* at 2. Petitioner further contends that Patent Owner “has not identified any persons who are alleged to be [real parties-in-interest] or privies with respect to these IPR proceedings and Petitioners, nor does [Patent Owner] explain the basis for be [real party-in-interest] or privity.” *Id.*

Based on the current record, we determine that the Petition is not time-barred. The ’370 patent was not part of the 2019 Delaware lawsuit that forms the basis of Patent Owner’s time-bar allegations. And, as Petitioner explains, when the ’370 patent was asserted in July 2024, Petitioner filed this request for *inter partes* review about seven months later, i.e., within the one-year period. Furthermore, Patent Owner does not allege which unnamed entity is in privity with Petitioner or provide any details of the relationship that establishes privity. Nor does Patent Owner direct our attention to record evidence that would support its allegations. Therefore, without more, we determine that the Petition is not time-barred.

### III. CHOICE OF PETITIONS

As discussed above, Petitioner filed two petitions challenging the ’370 patent, and the Director instructed us to “determine which of the two petitions challenging . . . the ’370 patent . . . to institute.” Paper 40, 4. For

the reasons discussed below, we find that the Petition in this case meets the threshold for institution. For this reason, and because Petitioner ranks this petition above the petition in IPR2025-00688 (Paper 2, 3), we institute on this petition and do not institute in IPR2025-00688.

#### IV. 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). 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 (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 person of ordinary skill in the art because it is consistent with the skill level reflected in the disclosure of the ’370 patent and prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (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).

Petitioner “[does] not, at this time, contend that any term requires construction,” and instead, states that “[a]ll terms have been accorded their plain and ordinary meaning.” Pet. 11 (citing Ex. 1002 ¶¶ 212–215).

Patent Owner asserts that it “does not presently propose any constructions,” but discusses the Board’s claim construction in IPR2020-00834, Paper 18, 7–8. Prelim. Resp. 7.

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. Alleged Obviousness over Vosteen589 and Starns or Mass-EPA*

Petitioner asserts that claims 1–8 and 10–18 would have been obvious over Vosteen589 and Starns (Ground 1), and over Vosteen589 and Mass-EPA (Ground 2). Pet. 10, 18–54. Based on this record, and for at least the following reasons, we determine Petitioner has established a reasonable likelihood that it would prevail in these assertions.

1. Asserted Prior Art

a. *Vosteen589 (Exhibit 1005)*

Vosteen589 “relates to a process for removing mercury from flue gases of high-temperature plants, in particular power stations and waste incineration plants.” Ex. 1005 ¶ 1. Specifically, Vosteen589 states:

The invention relates to a process for removing mercury from flue gases of high-temperature plants, in particular from power stations and waste incineration plants, in which bromine and/or a bromine compound and/or a mixture of various bromine compounds is fed to the if appropriate multistage furnace and/or to the flue gas in a plant section downstream of the furnace, the temperature during the contact of the bromine compound with the flue gas being at least 500° C., preferably at least 800° C., the combustion taking place in the presence of a sulphur compound, in particular sulphur dioxide, with or without the addition of sulphur and/or a sulphur compound and/or of a mixture of various sulphur compounds, and then the flue gas being subjected to an if appropriate multistage cleanup for removing mercury from the flue gas, which cleanup comprises a wet scrubber and/or a dry cleanup.

*Id.* ¶ 6.

Vosteen589 discloses that the bromine compound may be sodium bromide and can be in the form of a salt that can be added to waste mixture, coal, or the like to be burnt. *Id.* ¶ 13. Vosteen589 describes a flue gas emission control system including a dry emission control system that may use, for example, “cloth filters which are impinged with a blown-in finely pulverulent slaked lime/activated carbon or slaked lime/lignite coal coke mixture.” *Id.* ¶ 19. Vosteen589 further describes continuously measuring the mercury content of the flue gas and controlling the amount and/or mixture of bromine and/or bromine compound fed by Vosteen589’s emission control system. *Id.* ¶ 22.

*b. Starns (Exhibit 1008)*

Starns describes a project that “determine[s] the capabilities of injecting activated carbon ahead of particle control devices (PCD) to remove mercury” and “determine[s] the cost and impacts of this technology.” Ex. 1008, 2.

Starns discloses that the “most mature, retrofit technology available today is the injection of sorbents such as powdered activated carbon (PAC) into the flue gas upstream of the particle control equipment” in which “[t]he gas-phase mercury in the flue gas contacts the sorbent and attaches to its surface.” *Id.* A PLC (programmable logic controller) system “is used to control system operation and adjust injection rates” of the sorbent. *Id.* at 7. Primary variables of the optimum operating conditions include “injection concentration” and “carbon type.” *Id.* at 10. Accordingly, Starns provides a “full-scale evaluation of mercury control using activated carbon injection upstream of an ESP” (electrostatic precipitator, a particle control equipment). *Id.* at 3, 20.

*c. Mass-EPA (Exhibit 1008)*

Mass-EPA provides a report relative to “Massachusetts’ regulation 310 CMR 7.29” that “establishes emissions standards for sulfur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>) and carbon dioxide (CO<sub>2</sub>) from the six affected power plants and caps emissions of CO<sub>2</sub> from the facilities.” Ex. 1009, 1.

Mass-EPA notes that “[m]ass transfer refers to the ability of the sorbent particles to contact the Hg in the flue gas.” *Id.* at 21, n.25. Mass-EPA explains that “[m]ercury can be captured and removed from gas by injection of a sorbent into the exhaust system and subsequent collection of

the particulates” thereby providing a “low-cost and efficient sorbents and effective particulate collection” methodology. *Id.* at 32. Activated carbon is used as a “sorbent for mercury adsorption.” *Id.* Mass-EPA states that “[r]esearch in understanding and improving mercury adsorption efficiency of activated carbons has been ongoing with the goal of improving carbon to mercury injection rates and reducing control costs.” *Id.* at 35.

## 2. Analysis

Petitioner provides detailed analysis to support its argument that the combination of Vosteen589 and Starns (Ground 1) or the combination of Vosteen589 and Mass-EPA (Ground 2) teaches each limitation of claim 1. *Id.* at 18–43. We focus our analysis on independent claim 1.

Petitioner argues that Vosteen589 discloses all of the limitations of claim 1 except for 1(b), “adding a particulate sorbent material comprising activated carbon into the mercury-containing gas,” and 1(c) “wherein the weight ratio of the additive added to the coal, added to the combustion chamber or a combination thereof, to an amount of sorbent material added to the mercury containing gas is from about 1:100 to about 30:100,” which Petitioner alleges is taught by Vosteen589 with Starns and with Mass-EPA. *Id.* at 31–43.

Patent Owner does not dispute Petitioner’s mapping of claim 1’s limitations to the asserted prior art. *See generally* Prelim. Resp. On this record, we find Petitioner’s analysis persuasive. *See* Pet. 31–43. Thus, there is a reasonable likelihood that the combination of Vosteen589 and Starns, or the combination of Vosteen589 and Mass-EPA, teaches each limitation of claim 1.

This, however, does not end our obviousness inquiry. A patent claim “composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). We still “must further consider the factual questions of whether a person of ordinary skill in the art would be motivated to combine those references, and whether in making that combination, a person of ordinary skill would have had a reasonable expectation of success.” *Dome Patent L.P. v. Lee*, 799 F.3d 1372, 1380 (Fed. Cir. 2015).

Patent Owner argues that Petitioner’s proffered reason to combine the teachings of Vosteen589 with Starns or Mass-EPA is insufficient and record evidence establishes that a person of ordinary skill in the art would not have combined the references in the manner suggested by Petitioner. Prelim. Resp. 8–19. Based on the current record, and for purposes of this Decision, we find Petitioner has shown sufficiently that “a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *See In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) ) (quoting *Intelligent Bio-Sys., Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016)). We address the parties’ arguments below.

Petitioner argues that “[a] POSITA would have been motivated to use activated-carbon injection (as in Starns and Mass-EPA) with Vosteen589, with reasonable expectation of success, because activated-carbon injection was well-known, as admitted by the ’370 Patent.” *Id.* at 27 (Ex. 1001, 2:8–15, 7:41–48, 28:11–24). Petitioner asserts: “Each combination represents

combining prior art elements (activated-carbon sorbent) according to known methods (injection into flue gas) to yield predictable results (mercury removal). *Id.* at 28–29 (citing Ex. 1002 ¶ 296).

Patent Owner asserts that “Petitioners fail to provide evidence of a motivation to combine and instead just rely on the fact that various mercury control techniques were known in the art.” Prelim. Resp. 9. Patent Owner contends that “Petitioners offer no evidence to support their conclusion other than the fact that the references qualify as prior art.” *Id.* at 11. According to Patent Owner, “Petitioners identify no problem to be solved in Vosteen or other reason why a POSITA would be motivated to modify Vosteen.” *Id.* at 12.

Patent Owner also argues that the testimony of Dr. Niksa, Petitioner’s declarant, “does not fill this gap.” *Id.* According to Patent Owner, Dr. Niksa’s testimony should be afforded little weight because it is inconsistent with his testimony in IPR2020-00834. *Id.* at 12–13. Lastly, Patent Owner asserts that during prosecution of the related ’114 patent, the examiner found that a person of ordinary skill in the art would not have modified the prior art in the manner suggested by Petitioner. *Id.* at 13–14.

On this record, we find Petitioner has sufficiently shown that a person of ordinary skill in the art would have had a reason to modify the teachings of Vosteen589 with either of Starns or Mass-EPA.

With respect to the combination of Vosteen589 and Starns, Petitioner relies on Starns for teaching hardware and control processes for “injecting activated carbon ahead of particle control devices (PCD) to remove mercury.” *Id.* at 34 (citing Ex. 1008, 2). Specifically, Starns teaches that through “injection of sorbents such as powdered activated carbon (PAC) into

the flue gas upstream of the particle control equipment,” the “gas-phase mercury in the flue gas contacts the sorbent and attaches to its surface.” *Id.* at 35 (quoting Ex. 1008, 2; citing Ex. 1002 ¶¶ 322–323).

Petitioner asserts that activated-carbon injection was well-known in the art. *Id.* at 27 (citing Ex. 1001, 2:8–15, 7:41–48, 28:11–24; Ex. 1095, 114:21–25; Ex. 1096, 41:5–9; Ex. 1097, 210:4–18). Petitioner points to Starns for disclosing that the “most mature, retrofit technology available today is the injection of sorbents such as powdered activated carbon (PAC) into the flue gas upstream of the particle control equipment.” *Id.* at 29 (citing Ex. 1008, 2).

According to Petitioner, a person of ordinary skill in the art would have modified Vosteen589’s system to include Starns’s activated-carbon injection because activated-carbon injection is “a ‘mature’ technology [and] the combination of Vosteen589 and Starns represents [nothing more than] combining prior art elements according to known methods to yield predictable results of removing mercury.” *Id.* at 28–31 (citing Ex. 1002 ¶¶ 298–301). Petitioner further explains that this combination results in “improved mercury removal (as compared to bare activated carbon) with lowered sorbent costs.” *Id.* at 28 (citing Ex. 1002 ¶ 296).

Similarly, Petitioner asserts that “the combination of Vosteen589 and Mass-EPA represents [nothing more than] combining prior-art elements according to known methods to yield predictable results of removing mercury,” because activated-carbon injection “was ready for commercialization by 2002, years before the ’370 Patent’s earliest possible priority date.” *Id.* at 30–31 (citing Ex. 1002 ¶¶ 302–306). As support, Petitioner points to Mass-EPA’s teaching that activated carbon, as “the most

extensively studied sorbent for mercury adsorption,” was “the most likely candidate to reach commercialization for mercury removal in the near future.” *Id.* at 30 (citing Ex. 1009, 32); *see also* Ex. 1009, 32 (“Increased removal of mercury from gas has been demonstrated by co-injection of activated carbon and calcium-based sorbents in spray dryer adsorber systems in full-scale coal-fired power plants.”).

Petitioner also alleges that Mass-EPA provides an express motivation to combine the teachings of these references, that is, to “improv[e] adsorption efficiency of activated carbons . . . with the goal of improving carbon to mercury injection rates and reducing control costs.” Pet. 31 (citing Ex. 1009, 39); *see also id.* at 30 (“Availability of low-cost and efficient sorbents and effective particulate collection are key in implementation of this type of mercury control.”) (quoting Ex. 1009, 32); *id.* (“[E]stimated costs for powdered activated carbon injection-based technology, which most likely will reach commercialization for mercury control before other technologies, is within the current control costs for NO<sub>x</sub>’ (another type of pollutant).”) (quoting Ex. 1009, 58). Petitioner contends that using Mass-EPA’s activated carbon injection in Vosteen589’s method would result in “improved mercury-adsorption efficiency, achieving the Mass-EPA’s stated goal of ‘reducing control costs.’” *Id.* at 31 (citing Ex. 1002 ¶ 307).

The current record supports that Petitioner’s combination of Vosteen589 with Starns and with Mass-EPA would have been “the mere application of a known technique to a piece of prior art ready for the improvement.” *KSR*, 550 U.S. at 401. Indeed, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the

technique is obvious unless its actual application is beyond that person's skill." *Id.* Patent Owner does not allege that the combination was beyond the skill level of a person of ordinary skill in the art at the time of the alleged invention. *See generally* Prelim. Resp. Thus, Petitioner has provided sufficient reasoning with rational underpinnings to explain why a skilled artisan would have modified the teachings of the applied references. *See KSR*, 550 U.S. at 418.

We acknowledge, but disagree with, Patent Owner's arguments to the contrary. The Supreme Court has explained that "the [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.* at 418. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 416. "If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *Id.* at 417. Here, as detailed above, it appears that activated-carbon injection is a known substitute that may be implemented as an alternative to activated carbon in a fixed form, *i.e.*, coated on a fabric filter.

To the extent that any portions of Dr. Niksa's testimony may be contradictory, Patent Owner will have the opportunity to test the veracity of Dr. Niksa's opinions over the course of trial. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595 (1993) ("Vigorous cross examination [and] presentation of contrary evidence . . . are the traditional and appropriate means of attacking shaky but admissible evidence.").

We also find unpersuasive Patent Owner’s argument that the Examiner ultimately allowed the claims of the related ’114 patent after initially rejecting the claims on a similar basis. Prelim. Resp. 13–14. That issue is best raised and resolved through the process involving a bifurcated procedure for considering discretionary issues, such as 35 U.S.C. § 325. *See* USPTO Memorandum, Interim Process for PTAB Workload Management (March 26, 2025), <https://uspto.gov/sites/default/files/documents/InterimProcesses-PTABWorkloadMgmt-20250326.pdf>.

In sum, based on the current record and for purposes of institution, we find Petitioner has shown sufficiently that the combination of Vosteen589 with either of Starns or Mass-EPA teaches the limitations of claim 1. We also find Petitioner has shown adequately a motivation to combine the teachings of Vosteen589 with those of Starns or Mass-EPA with a reasonable expectation of success in doing so. In other words, Petitioner has established a reasonable likelihood of prevailing on its assertion that the combination of Vosteen589 with either of Starns or Mass-EPA renders claim 1 obvious. We, thus, institute trial to review the challenged claims of the ’370 patent.

Petitioner also asserts that the combination of Vosteen589 with either of Starns or Mass-EPA renders claims 2–8 and 10–18 obvious. Pet. 43–54. Patent Owner does not argue these claims separately. *See* Prelim. Resp. 8–19. In any event, we institute an *inter partes* review as to all challenges raised in the Petition. *See SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018); *see also* 37 C.F.R. § 42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to

proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

*D. Alleged Obviousness Based on Downs-Boiler Starns or Mass-EPA*

Petitioner asserts that claims 1–6, 8, and 11 would have been obvious over Downs-Boiler and Starns (Ground 3), and that claims 1–6, 8, 11, 12, and 14–16 would have been obvious over Downs-Boiler and Mass-EPA (Ground 4). Pet. 10, 55–73. Based on this record, and for at least the following reasons, we determine Petitioner has established a reasonable likelihood that it would prevail in these assertions.

1. Downs-Boiler (Exhibit 1006)

Downs-Boiler discloses that “[b]romine-containing compounds, added to the coal, or to the boiler combustion furnace, are used to enhance the oxidation of mercury, thereby enhancing the overall removal of mercury in downstream pollution control devices.” Ex. 1006, code (57).

Downs-Boiler’s Figure 2 is reproduced below:

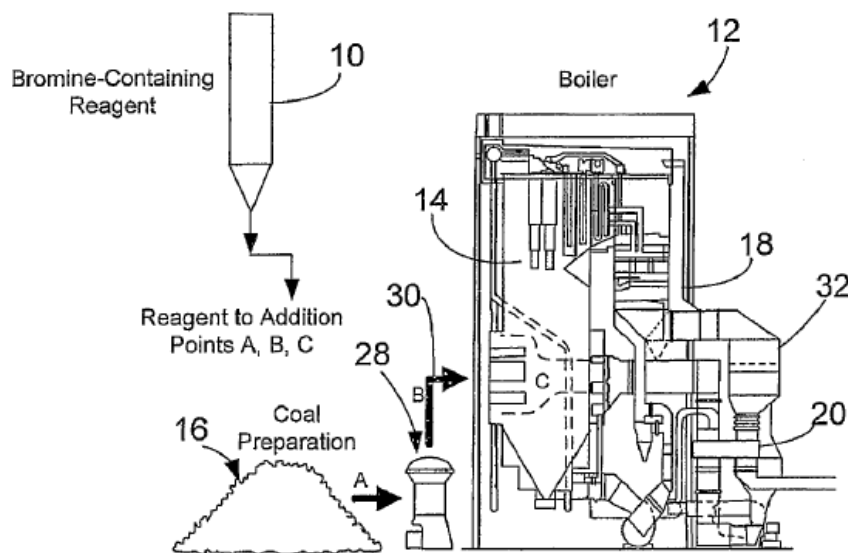


FIG. 2

Figure 2 shows adding bromine to improve mercury removal from flue gases. *Id.* ¶ 10.

Downs-Boiler discloses that, in Figure 2, bromine-containing reagent 10 is added to boiler 12 of combustion furnace 14 “either directly or by premixing with the incoming coal 16.” *Id.* ¶ 15. It describes the use of an aqueous solution of calcium bromide for injection into the combustion chamber 14, and the use of HBr or Br<sub>2</sub> as the bromine-containing reagent 10. *Id.* ¶¶ 18, 21. Downs-Boiler also discloses “powdered activated carbon (PAC)” as a sorbent, and describes “downstream pollution control systems such as wet 22 and SDA 24 FGD systems, and PAC injection systems.” *Id.* ¶¶ 15, 25. It states that “experimental results indicate that bromine addition also results in an increased fraction of particulate-bound mercury.” *Id.* ¶ 15.

## 2. Analysis

Petitioner provides detailed analysis to support their argument that the combination of Downs-Boiler and Starns (Ground 3) or the combination of Downs-Boiler and Mass-EPA (Ground 4) teaches each limitation of claim 1. Pet. 58–66. We focus our analysis on independent claim 1.

At this preliminary stage, Patent Owner does not dispute that the combination of Downs-Boiler with Starns or Mass-EPS discloses each of the limitations of these claims. *See* Prelim. Resp. 19–52. On this record, and for purposes of institution, we find Petitioner’s analysis persuasive. Thus, there is a reasonable likelihood that the combination of Downs-Boiler and Starns, or the combination of Downs-Boiler and Mass-EPA, teaches each limitation of claim 1. The parties, however, dispute Downs-Boiler’s prior-art status. *See* Prelim. Resp. 19–54; Pet. Reply 2–7. We address the parties’ arguments below.

Petitioner asserts that Downs-Boiler “qualifies as prior art, with a priority date of March 22, 2004, when [Provisional Patent Application No.] 60/555,353” (“the Downs-Boiler Provisional”) was filed. Pet. 55 (bolding removed); *see also id.* at 17 (listing Downs-Boiler as prior art under pre-AIA 35 U.S.C. § 102(e)). Petitioner provides a redline comparison between Downs-Boiler and the Downs-Boiler Provisional as evidence that the “disclosure of Downs-Boiler is supported by Downs-Boiler-Provisional.” *Id.* at 55 (citing Ex. 1032). Petitioner also identifies where in the Downs-Boiler Provisional it asserts the limitations of claim 1 of Downs-Boiler can be found. *Id.* at 55–56 (citing Ex. 1007 ¶¶ 2–6, 18, 19, 21, 27, Fig. 2). Petitioner points out that the Board “previously found that Downs-Boiler qualifies as prior art as of March 22, 2004.” *Id.* at 55 (citing Ex. 1026, 84–85, 96).

Patent Owner argues that Petitioner has failed to meet their burden to show Downs-Boiler qualifies as prior art. Prelim. Resp. 19. To remove Downs-Boiler, a U.S. patent application publication, as a prior art reference, Patent Owner must establish “reduction to practice prior to the effective date of the reference, or conception of the invention prior to the effective date of the reference coupled with due diligence from prior to said date to a subsequent reduction to practice or to the filing of the application.”<sup>9</sup> *In re Steed*, 802 F.3d 1311, 1316 (Fed. Cir. 2015); 37 C.F.R. § 1.131(b).

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<sup>9</sup> The parties dispute whether Patent Owner has provided sufficient evidence relating to conception and diligence. *See* Prelim. Resp. 21–23; Reply 12–13; Sur-reply 12. We do not analyze the sufficiency of Patent Owner’s purported evidence of diligence because Patent Owner does not appear to assert conception coupled with diligence to an actual or constructive

Patent Owner argues that the inventors “have testified that they conceived of the invention at least by August 2002, and . . . reduced the challenged claims to practice at least as early as September 2003.” Prelim. Resp. 21 (citing Ex. 2018). According to Patent Owner, “[t]hese dates are corroborated by contemporaneous meeting presentations, testing logbooks, and post-testing reports.” *Id.* (citing Exs. 2013–2015, 2017, 2024–2033).

Specifically, Patent Owner asserts that “[d]uring tests conducted in September 2003, December 2003, and February 2004, the inventors reduced the claims of the ’370 patent to practice by performing tests using sodium bromide as the pre-combustion chamber additive and activated carbon as a post-combustion sorbent.” *Id.* at 24 (citing Ex. 2018, Claim chart exhibit). According to Patent Owner, “[t]hese tests were described in reports provided to the DOE.” *Id.* at 24–25 (citing Ex. 2012, 10–11; Exs. 2013, 2014; Ex. 2018 ¶¶ 41–42). Patent Owner contends that “[t]hese tests were also recorded in logbooks maintained by the EERC.” *Id.* at 25–27 (citing Ex. 2017; Ex. 2018 ¶¶ 31–39; Ex. 2012; Ex. 2004, 292:9–293:22). Patent Owner also argues that “[i]nventor John Pavlish has described similar documentation for the December 2003 and February 2004 tests” (*id.* at 28 (citing Ex. 2018 ¶¶ 31–49)) and “explained the results at trial” (*id.* at 28–29 (citing Ex. 2004, 260:5–20)).

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reduction to practice *after* Downs-Boiler’s priority date. Instead, the latest date on which Patent Owner asserts a reduction to practice predates the date Petitioner identifies as Downs-Boiler’s priority date. *See* Prelim. Resp. 24 (“During tests conducted in September 2003, December 2003, and February 2004, the inventors reduced the claims of the ’225 patent to practice.”), 30; Pet. 55 (identifying March 22, 2004 as Downs-Boiler’s priority date).

Patent Owner contends that “reduction to practice is confirmed by testimony from all three inventors (Exs. 2003, 2018) and corroborated by non-inventor testimony (Ex. 2017), logbook entries (Ex. 2017), and DOE reports (Exs. 2012–2014).” *Id.* at 29. Patent Owner provides “a summary of evidence on an element-by-element basis” for claims 1–3, 5, 7, and 11–18. *Id.* at 30–51 (citing Ex. 2012–2014).

Petitioner counters that Patent Owner “has not produced evidence that the ’370 patent is entitled to a pre-AIA filing date, such that that a ‘swear behind’ is available.” Pet. Reply 4 (citing Ex. 1004; Pet. 12). Petitioner contends that even if Patent Owner could attempt to swear behind Downs-Boiler, it has failed to do so. *Id.*

Petitioner argues there is no evidence of early actual reduction to practice. *Id.* at 5. According to Petitioner, although Patent Owner asserts that “reduction to practice is confirmed by testimony from all three inventors” (Prelim. Resp. 29), Patent Owner “submits an inventor declaration only from Mr. Pavlish (Ex. 2018), who does not even discuss the ’370 patent.” *Id.* In addition, Patent Owner’s assertions are “based on unwitnessed laboratory notebooks,” which is insufficient to support a claim of reduction to practice. *Id.* at 5–6 (citing *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006)).

Petitioner further argues that there is “no evidence of an actual reduction to practice ‘that met all the limitations of the claim.’” Pet. Reply 6 (quoting *In re Steed*, 802 F.3d at 1318). Specifically, Petitioner argues:

There is no corroborating evidence for limitations from the independent claims, such as: (i) “combusting ... coal and an additive in a combustion chamber ..., wherein the additive is chosen from halides, halogens, salts thereof, and combinations

thereof...the additive added to the coal, added to the combustion chamber, or a combination thereof” (Claims 1 and 17); and (ii) “the additive comprises a and b, b and c, a and c, or a, b: a) I- and/or I<sub>2</sub>, b) Br- and/or Br<sub>2</sub> c) Cl- and/or Cl<sub>2</sub>” (Claim 17). PO in its POPR does not address applying any iodine-containing additives to the coal (e.g., the I- and I<sub>2</sub> in independent Claim 17). *See* POPR at 31-37, 49. Nor does PO address applying additives in combination (e.g., “a and b” or “b and c” in Claim 17). PO does not demonstrate possession of the invention for the broad categories of all “halides, halogens, salts thereof.”

*Id.* Petitioner further asserts that Patent Owner fails to carry its burden because it “ignores the vast majority of the ’370 patent claims.” *Id.* at 7.

Finally, Petitioner asserts that the inquiry on dates of conception and actual reduction to practice “is best left for trial after full development of the record,” considering that Petitioner has “had no opportunity to depose the declarants to probe their declarations.” *Id.*

To establish an actual reduction to practice, a party must establish that: (1) the inventor constructed an embodiment or performed a process that satisfies every element of the claim at issue; and (2) the inventor determined that the invention would work for its intended purpose. *E.I. du Pont De Nemours & Co. v. Unifrax I LLC*, 921 F.3d 1060, 1075 (Fed. Cir. 2019). We analyze evidence supporting the reduction to practice under the rule of reason. *Id.* at 1076.

Petitioner bears the burden of persuasion that the challenged claims are unpatentable, which includes the burden of establishing that any reference upon which it relies constitutes prior art under 35 U.S.C. § 102. *See* 35 U.S.C. § 316(e); *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576 (Fed. Cir. 1996) (holding that a patent challenger “bore the burden of

persuasion . . . on all issues relating to the status of [the asserted reference] as prior art”).

Here, because Petitioner initially shows that Downs-Boiler qualifies as prior art on its face, Patent Owner bears the subsequent procedural burden to produce evidence antedating the reference. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378–80 (Fed. Cir. 2015); *Magnum Oil*, 829 F.3d at 1375. Although the burden of production can be a shifting burden, the burden of persuasion is on Petitioner to ultimately prove “unpatentability by a preponderance of the evidence,” and that this burden never shifts to Patent Owner. *Dynamic Drinkware*, 800 F.3d at 1378.

Patent Owner has come forward with evidence and arguments that Downs-Boiler does not qualify as prior art, due to the asserted prior reduction to practice. *See* Prelim. Resp. 24–51; Sur-reply 3–6. At this stage in the proceeding, Patent Owner does not persuade us that its evidence and arguments merit denial of institution.

As an initial matter, we agree with Petitioner that the issue of whether Patent Owner reduced the claimed method to practice is best reserved for trial because Petitioner has had no opportunity to depose Patent Owner’s declarants. Reply 7. Moreover, at this preliminary stage, Patent Owner does not sufficiently explain how disclosure of sodium bromide (NaBr) in its antedating documents supports the full scope of what is claimed, i.e., “halides, halogens, salts thereof.” Patent Owner argues that the inventors “clearly appreciated that other species of halogens/halides ‘would behave similarly’ to NaBr,” pointing to testimony and a discussion in the ’370 patent on how the claimed method works. Sur-reply 5 (citing Ex. 2018, 9–

11, 15–16;<sup>10</sup> Ex. 2004, 246:13–259:12; Ex. 1001, 8:4–13). But the evidence Patent Owner identifies does not directly address the issue of why the species “NaBr” supports the broadly claimed “halides, halogens, salts thereof” genus.

Finally, we note that Patent Owner’s attempt to antedate Downs-Boiler presupposes that pre-AIA 35 U.S.C. § 102 applies. Because we have already determined that Petitioner has presented sufficient evidence that Downs-Boiler is prior art for purposes of institution, we need not determine whether pre- or post- AIA 35 U.S.C. § 102 applies. Nonetheless, the parties have devoted briefing to this issue, and to guide the parties going forward, we provide our views on Petitioner’s argument that pre-AIA 35 U.S.C. § 102 does not apply. Pet. Reply 4–5.

As Patent Owner points out, and Petitioner does not dispute: “The ’370 Patent claims priority back to the provisional application through a chain of continuations and a divisional application. There are no continuation-in-part applications in the chain connecting the ’370 patent to the provisional application.” Sur-reply 2–3 (citations omitted) (citing Ex. 1004). Accordingly, absent evidence, not present in the record at this time, that the continuation or divisional applications in the ’370 patent priority chain do not support the challenged claims, the ’370 patent appears to be a pre-AIA patent.

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<sup>10</sup> Patent Owner’s citation to Exhibit 2018 uses the pagination added by Patent Owner. The panel prefers the parties cite to declaration evidence by paragraph number.

Emphasizing that the Petition “assumes *arguendo* that the Challenged Claims of the ’370 patent have priority to August 30, 2004, . . . and that the pre-AIA statute applies,” Patent Owner argues that Petitioner has forfeited the issue of whether pre-AIA § 102 applies. Sur-reply 2 (quoting Pet. 2–3) (emphasis removed). This argument is not persuasive because we do not interpret the Petition’s initial reliance on the filing date of the provisional application as a waiver of the right to challenge that filing date in the event that, as here, Patent Owner attempts to antedate the prior art relied upon in the Petition. This is particularly true given that the Petition expressly states that if Patent Owner attempts to swear behind any asserted references, Petitioner “may rebut such arguments at that time,” including by asserting “that the ’370 patent cannot claim priority to any pre-AIA parent application, so cannot swear behind references.” Pet. 18.

In sum, based on the current record and for purposes of institution, we find Petitioner has shown sufficiently that Downs-Boiler qualifies as prior art. We also find Petitioner has shown adequately that the combination of Downs-Boiler with Starns or Mass-EPA discloses each of the limitations of the claims challenged under this ground. In other words, Petitioner has established a reasonable likelihood of prevailing on their assertion that the combination of Downs-Boiler with either of Starns or Mass-EPS would have rendered claims 1–6, 8, 11, 12, and 14–16 of the ’370 patent obvious.

*E. Alleged Obviousness over Lissianski and Starns or Mass-EPA*

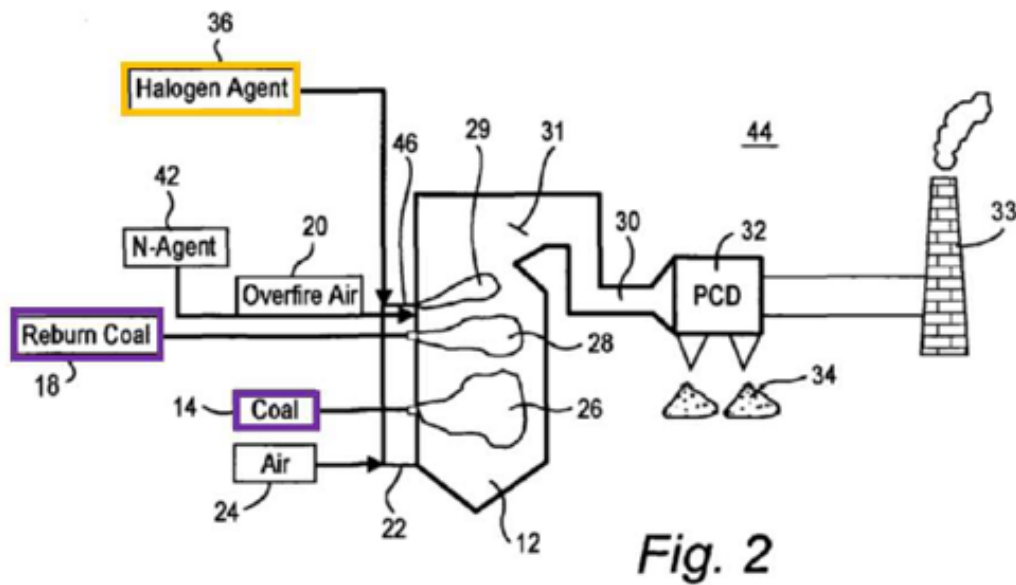
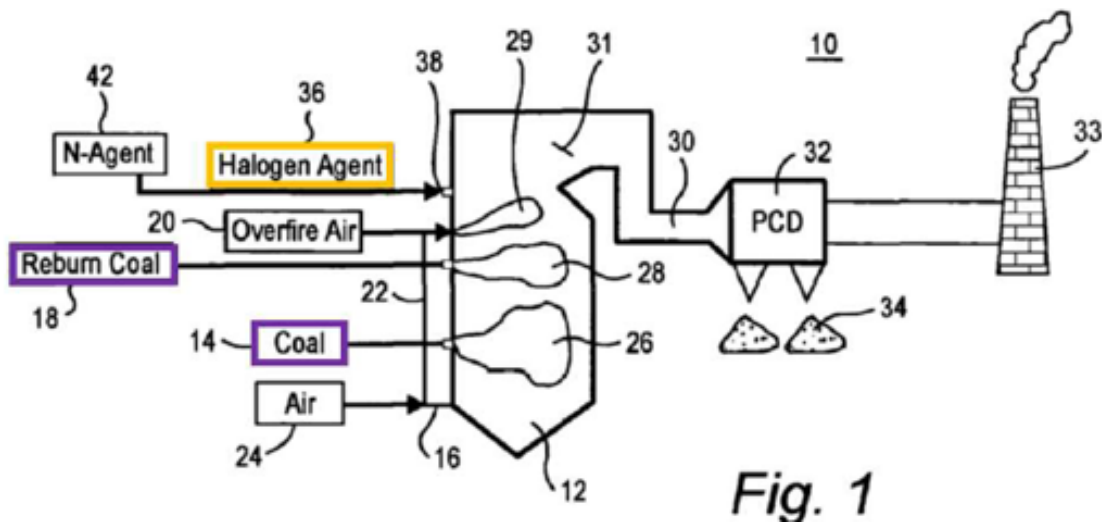
Petitioner asserts that claims 1, 5, 6, and 11 would have been obvious over Lissianski and Starns (Ground 5), and claims 1, 5, 6, 11, 12, and 14–16 would have been obvious over Lissianski and Mass-EPA (Ground 6). Pet. 10, 74–89. Based on this record, and for at least the following reasons,

we determine Petitioner has established a reasonable likelihood that they would prevail in these assertions.

1. Lissianski (Exhibit 1014)

Lissianski relates to a method for removing mercury emissions from coal combustion flue gas by injecting  $\text{NH}_4\text{Br}$  into the flue gas; oxidizing elemental mercury with a halogen from the injected additive; absorbing the oxidized mercury with an adsorbent in the flue gas; and collecting the adsorbent in a combustion waste treatment system. Ex. 1014, 2:3–13. Lissianski discloses that “[t]he hot flue gas causes the additive to thermally decompose to form  $\text{HCl}$ ,  $\text{HBr}$  or  $\text{HI}$  which results in more significant mercury oxidation. The increase in mercury oxidation allows for improved efficiency of mercury removal by activated carbon (AC) injection.” *Id.* at 3:45–49. Lissianski discloses that “[t]he halogen additive can be co-injected with air, recycled flue gas, nitrogen or another carrier gas to increase the penetration of the additive aqueous solution across the flue gas path and to improve mixing of the additive aqueous solution and flue gas.” *Id.* at 4:20–23.

Lissianski illustrates the method for removing mercury emissions in a coal plant with a halogen containing additive in Annotated Figures 1 and 2 (as annotated by Petitioner), reproduced below.



Annotated Figures 1 and 2 of Lissianski are “schematic diagram[s] of coal fired power plant . . . where the additive injection system downstream of the primary combustion zone” and where “additive injection is performed in cooperation with an overfire air (OFA) system,” respectively. *Id.* at 2:53–60. Annotated Figure 1 illustrates halogen containing additive 36 (annotated in yellow) injected via nozzles 38 into the flue gas and downstream of combustion zone 26. *Id.* at 4:14–19. Annotated Figure 2 shows the halogen

containing additive 36 (annotated in yellow) injected through nozzles 46 into the boiler with overfire air and into the burnout zone 29. *Id.* at 4:30–36.

Lissianski discloses that “[m]odeling predicts that injection of chlorine or bromine in the amount of 3 ppm results in mercury oxidation at higher temperatures. Modeling also predicts that bromine is a more effective oxidizing agent than is chlorine.” *Id.* at 6:53–65, Fig. 9.

## 2. Analysis

Petitioner provides detailed analysis to support its argument that the combination of Lissianski and Starns (Ground 5) or the combination of Lissianski and Mass-EPA (Ground 6) teaches each limitation of claim 1. *Id.* at 74–89. At this preliminary stage, Patent Owner does not dispute that Lissianski in combination with Starns or Mass-EPA discloses all of the limitations of these claims. *See* Prelim. Resp. 19–52. Thus, there is a reasonable likelihood that the combination of Lissianski and Starns, or the combination of Lissianski and Mass-EPA, teaches each limitation of claims 1, 5, 6, and 11 or claims 1, 5, 6, 11, 12, and 14–16, respectively.

Instead, Patent Owner focuses its argument on challenging Lissianski’s prior-art status relying on the same arguments advanced for its assertion that Downs-Boiler is not prior art. We determine Petitioner has shown a reasonable likelihood that Lissianski is prior art for the same reasons discussed above with respect to Downs-Boiler. *See supra* Section III.D.2.

Thus, based on this record, we determine Petitioner has established a reasonable likelihood that it would prevail in showing obviousness of claims 1, 5, 6, and 11 over Lissianski and Starns (Ground 5), and claims 1, 5, 6, 11, 12, and 14–16 over Lissianski and Mass-EPA (Ground 6).

## V. 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, 862–864 (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).

## VI. 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 '370 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.

IPR2025-00687  
Patent 10,933,370 B2

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