

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

UNION ELECTRIC COMPANY,  
Petitioner,

v.

BIRCHTECH CORPORATION,  
Patent Owner

---

Case: IPR2025-01118  
Patent 10,343,114

---

**PETITIONER'S UPDATED EXHIBIT LIST**

**UPDATED EXHIBIT LIST  
(Adding Exhibit 1086)**

Exhibit No.	Exhibit Description
1001	United States Patent No. 10,343,114 (“ <b>114 Patent</b> ”)
1002	Declaration of Dr. Radisav Vidic
1003	Curriculum Vitae of Dr. Radisav Vidic
1004	U.S. Patent Publication No. US 2008/0107579 (May 8, 2008) (“ <b>Downs</b> ”)
1005	U.S. Provisional Patent Application No. 60/555,353 (filed Mar. 22, 2004) (“ <b>Downs-Provisional</b> ”)
1006	Redline comparison between U.S. Patent Publication No. US 2008/0107579 (Downs, EX1004) and U.S. Provisional Patent Application No. 60/555,353 (Downs-Provisional, EX1005) using Downs-Provisional as the original version (“ <b>Downs-Redline</b> ”)
1007	U.S. Patent No. 5,827,352 (Oct. 27, 1998) (“ <b>Altman</b> ”)
1008	U.S. Patent Pub. No. 2004/0003716 to Nelson (published Jan. 8, 2004) (“ <b>Nelson</b> ”)
1009	U.S. Provisional Patent Application No. 60/377,790 (filed May 6, 2002) (“ <b>Nelson-Provisional</b> ”)
1010	Redline comparison between U.S. Patent Pub. No. 2004/0003716 (Nelson, EX1008) and U.S. Provisional Patent Application No. 60/377,790 (Nelson-Provisional, EX1009) using Nelson-Provisional as the original version (“ <b>Nelson-Redline</b> ”)
1011	US Patent Publication No. 2004/0013589 (Jan. 22, 2004) (“ <b>Vosteen</b> ”)
1012	Steve Blankinship, “A Variety of Hg Capture Solutions Are Available,” Power Engineering, Vol. 113, Issue 6, (Jan. 6, 2009) (“ <b>Blankinship</b> ”)

Exhibit No.	Exhibit Description
1013	U.S. Patent No. 8,652,235 (Feb. 18, 2014) ( <b>“Olson-235”</b> )
1014	S. Julien et al., “The Effect of Halides on Emissions from Circulating Fluidized Bed Combustion of Fossil Fuels,” Fuel, 75(14):1644–1663 (1996) ( <b>“Julien”</b> )
1015	Hawley’s Condensed Chemical Dictionary, (Van Nostrand Reinhold, 13 <sup>th</sup> Ed.), Definition of “Compound,” 291 (1997)
1016	Hawley’s Condensed Chemical Dictionary, (Van Nostrand Reinhold, 13 <sup>th</sup> Ed.), Definitions of “Alkaline-Earth Metals,” “Calcium Hydroxide” and “Lime, Hydrated,” 33, 196, 671-672 (1997)
1017	U.S. Provisional Application No. 60/605,640 as filed with U.S. Patent and Trademark Office (USPTO) ( <b>“the Provisional”</b> )
1018	U.S. Application No. 11/209,163 as filed with USPTO ( <b>“the ‘163 Application”</b> )
1019	U.S. Application No. 12/201,595 as filed with USPTO ( <b>“the ‘595 Application”</b> )
1020	U.S. Application No. 12/429,058 as filed with USPTO ( <b>“the ‘058 Application”</b> )
1021	U.S. Application No. 14/102,896 as filed with USPTO ( <b>“the ‘896 Application”</b> )
1022	U.S. Application No. 15/295,594 as filed with USPTO ( <b>“the ‘594 Application”</b> )
1023	File History for United States Patent No. 10,343,114 (U.S. Application No. 15/978,760)( <b>“the ‘760 CIP”</b> ) – but NOT including prior art references therein
1024	Reserved

<b>Exhibit No.</b>	<b>Exhibit Description</b>
1025	Reserved
1026	Reserved
1027	Reserved
1028	Redline comparison between U.S. Application No. 11/209,163 and 12/201,595
1029	Redline comparison between U.S. Application No. 12/201,595 and 12/429,058
1030	Redline comparison between U.S. Application No. 12/429,058 and 14/102,896
1031	Redline comparison between U.S. Application No. 14/102,896 and 15/295,594
1032	Redline comparison between U.S. Application No. 15/295,594 and 15/978,760
1033	Reserved
1034	Reserved
1035	Reserved
1036	Reserved
1037	US Patent Publication No. US 2018/0280870A1 ( <b>“Olson-870”</b> )
1038	Institution Decision, IPR2020–00832, Patent 10,343,114 ( <b>“832 DI”</b> )
1039	Institution Decision, IPR2020–00834, Patent 10,343,114 ( <b>“834 DI”</b> )
1040	Oxtoby et al., PRINCIPLES OF MODERN CHEMISTRY, 4 <sup>th</sup> ed (Saunders College Publishing: 1999) ( <b>“Oxtoby”</b> )

Exhibit No.	Exhibit Description
1041	Evan J. Granite et al., “Sorbents for Mercury Removal from Flue Gas,” DOE/FETC/TR-98-01, U.S. Department of Energy (Jan. 1998) ( <b>“Granite”</b> )
1042	Babcock & Wilcox, STEAM: ITS GENERATION AND USE, 40th ed. (The Babcock & Wilcox Company: 1992) ( <b>“B&amp;W: Steam”</b> )
1043	U.S. EPA, AP-42: External Combustion Sources, Chapter 1: Fifth Edition, Volume I (Sep. 1998), available at <a href="https://www3.epa.gov/ttn/chief/ap42/ch01/index.html">https://www3.epa.gov/ttn/chief/ap42/ch01/index.html</a> (last visited Apr 10, 2020) ( <b>“Chapter 1 of AP-42”</b> )
1044	Thomas J. Feeley, et al., “A Review of DOE/NETL’s Mercury Control Technology R&D Program for Coal-Fired Power Plants,” <i>DOE/NETL &amp; R&amp;D Program Review</i> (April 2003) ( <b>“Feeley”</b> )
1045	Clean Air Mercury Rule: Basic Information, available at <a href="https://web.archive.org/web/20050920005951/http://www.epa.gov/mercuryrule/basic.htm">https://web.archive.org/web/20050920005951/http://www.epa.gov/mercuryrule/basic.htm</a> ( <b>“Clean Air Mercury Rule”</b> )
1046	EPA, “Mercury Study Report to Congress Volume VIII: An Evaluation of Mercury Control Technologies and Costs,” EPA Report No. EPA-452/R-97-010 (Dec. 1997), available at <a href="https://www3.epa.gov/airtoxics/112nmerc/volume8.pdf">https://www3.epa.gov/airtoxics/112nmerc/volume8.pdf</a> ( <b>“EPA 1997 Mercury Study Report Vol. VIII”</b> )
1047	Deposition Transcript of Edwin Olson (Aug. 26, 2022) (excerpted), taken in <i>Midwest Energy Emissions Corp., et al. v. Arthur J. Gallagher &amp; Co., et al.</i> , No. 1:19-cv-01334-CJB.
1048	Deposition Transcript of Michael Holmes (Aug. 24, 2022) (excerpted), taken in <i>Midwest Energy Emissions Corp., et al. v. Arthur J. Gallagher &amp; Co., et al.</i> , No. 1:19-cv-01334-CJB.
1049	U.S. Patent No. 1,984,164 to Stock et al. (issued Dec. 11, 1934) ( <b>“Stock”</b> )

Exhibit No.	Exhibit Description
1050	B.R. Puri, <i>Surface Complexes on Carbons</i> , in CHEMISTRY AND PHYSICS OF CARBON 191 (Philip L. Walker, ed.) (Marcel Dekker: 1970) (“ <b>Puri</b> ”)
1051	Roop Chand Bansal, et al., ACTIVE CARBON (Marcel Dekker:1988) 482 pages (“ <b>Bansal</b> ”)
1052	Frank E. Huggins et al., “XAFS Examination of Mercury Sorption on Three Activated Carbons,” <i>Energy &amp; Fuels</i> 1999(13), p. 114–121 (1999) (“ <b>XAFS</b> ”)
1053	Charlene R. Crocker et al., “Mercury Control with the Advanced Hybrid Particulate Collector Technical Progress Report,” U.S. DOE–NETL (Nov. 2003) (“ <b>Crocker</b> ”)
1054	C. Eckberg et al., “Mercury Control Evaluation of Halogen Injection into a Texas Lignite-Fired Boiler,” Track A, Session A3 (Mercury – Control), Presentation A3c, EUEC: 8TH ELECTRIC UTILITIES ENVIRONMENTAL CONFERENCE (Tucson, Arizona: January 25, 2005) (“ <b>Eckberg</b> ”)
1055	US Patent Publication No. 2006/0048646 (Mar. 9, 2006) (“ <b>Olson-646</b> ”)
1056	Vosteen, B. W. et al.: Mercury-Related Chemistry in Waste Incineration and Thermal Process Flue Gases. Poster, Air Quality IV Conference. September 22nd – 24th, 2003, Arlington VA. (“ <b>Vosteen poster</b> ”)
1057	“Mercury Reduction Technology Shows Promise for Texas Lignite,” <i>Power Engineering</i> , Vol. 109, Issue 3, (Mar. 1, 2005)
1058	J. Bustard, S. Sjostrom, et al., “Full Scale Evaluation of Sorbent Injection for Mercury Control on Coal-Fired Power Plants,” International Conference on Air Quality III, Paper No. A5–4 (Sept. 9–12, 2002: Arlington, VA) (“ <b>Bustard</b> ”)

Exhibit No.	Exhibit Description
1059	Sharon Sjostrom et al., “Field Studies of Mercury Control Using Injected Sorbents,” AWMA ANNUAL MEETING, Session Ae-1b (2002) ( <b>“Sjostrom-III”</b> )
1060	Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 69 Fed. Reg. 4652–4752 [Volume 69, No. 20] (Jan. 30, 2004) ( <b>“EPA-Proposal”</b> )
1061	Vosteen et al., “Energy Process Engineering and Environmental Protection,” Study commissioned by the State Environmental Agency of North Rhine-Westphalia (April 22, 2004)
1062	S. Sjostrom et al., “Full Scale Evaluation of Mercury Control by Injecting Activated Carbon Upstream of a Spray Dryer and Fabric Filter,” POWER GEN CONFERENCE (Orlando, Florida: Nov. 29 – Dec. 2, 2004) ( <b>“Sjostrom-I”</b> )
1063	Sjostrom, S., “Evaluation of Sorbent Injection for Mercury Control,” Report No. 41986R04 (Oct. 29, 2004)
1064	Sjostrom, S., “Evaluation of Sorbent Injection for Mercury Control,” Report No. 41986R05 (Feb. 2, 2005)
1065	Mercury Information Clearinghouse, “Quarter 6 – Mercury Control Field Demonstrations” (Apr. 2005)
1066	Sharon Sjostrom, “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) ( <b>“Sjostrom-II”</b> )
1067	Sharon Sjostrom, “Evaluation of Sorbent Injection for Mercury Control,” Report No. 41986R08 (Aug. 2, 2005)

Exhibit No.	Exhibit Description
1068	Chu, P. and Porcella, D. B. "Mercury stack emissions from U.S. electric utility power plants," <i>Water, Air, Soil Pollution</i> , 80, 135-144, 1995.
1069	Meij, R. "The fate of mercury in coal-fired power plants and the influence of wet flue-gas desulfurization," <i>Water, Air, Soil Pollution</i> , 56, 21, 1991.
1070	Galbreath, K.C. and Zygarlicke, C.J. "Mercury transformations in coal combustion flue gas," <i>Fuel Processing Technology</i> , 65–66, 289–310, 2000.
1071	Institution Decision, IPR2020–00928, Patent 8,168,147 ("928 DI")
1072	Senior, C.L., Sarofim, A.F., Zeng, T., Helble, J.J., and Mamani-Paco, R. "Gas-phase transformations of mercury in coal-fired power plants," <i>Fuel Processing Technology</i> , 63, 197–213, 2000.
1073	Sliger, R.M., Kramlich, J.C., Marinov, N.M. "Towards the development of a chemical kinetic model for the homogeneous oxidation of mercury by chlorine species," <i>Fuel Processing Technology</i> , 65–66, 423–438, 2000.
1074	Chang, R. and Offen, G., "Mercury Emission Control Technologies: An EPRI Synopsis," <i>Power Engineering</i> , Vol. 99, No. 11, pp. 51-57, 1995.
1075	Liu, W., Vidic, R.D., Brown, T.D. "Optimization of high temperature sulfur impregnation in activated carbon for permanent sequestration of mercury," <i>Environmental Science Technology</i> , 34, 483-488, 2000.
1076	Liu, W., Vidic, R.D., Brown, T.D. "Impact of flue gas conditions on mercury uptake by sulfur-impregnated activated carbon," <i>Environmental Science Technology</i> , 34, 154-159, 2000.
1077	Brief in Support of Plaintiff's Motion for Transfer of Actions to the Southern District of Iowa, filed in <i>In re Midwest Energy Emissions Corp. Patent Litigation</i> , No. 4:24-md-1332 (S.D. Iowa).

<b>Exhibit No.</b>	<b>Exhibit Description</b>
1078	Granite, E.J., Pennline, H.W. and Hargis, R.A. “Novel sorbents for mercury removal from flue gas,” Industrial Engineering Chemistry Research, 39, 1020-1029, 2000.
1079	Lee, S.J., Seoa, Y-C., Jurng, J., Lee, T.J. “Removal of gas-phase elemental mercury by iodine- and chlorine-impregnated activated carbons,” Atmospheric Environment, 38, 4887–4893, 2004.
1080	U.S. Patent No. 5,435,980 (“Felsvang”)
1081	U.S. Patent No. 6,878,358 to Vosteen
1082	Declaration of Tracey J. Olanyk (6/2/2025), authenticating various exhibits including Blankinship EX1012
1083	Expert Report of Philip J. O’Keefe, PE Regarding Infringement (Oct. 25, 2022) (excerpted), submitted by Patent Owner in Midwest Energy Emissions Corp., et al. v. Arthur J. Gallagher & Co., et al., No. 1:19-cv-01334-CJB
1084	Buschmann, J, et al., “The KNX™ Coal Additive Technology A Simple Solution for Mercury Emissions Control,” POWER GEN CONFERENCE (Las Vegas, Nevada: Dec. 6 – Dec. 8, 2005)
1085	Vassileva, S.V., et al., “Contents, modes of occurrence and origin of chlorine and bromine in coal,” Fuel 79 (2000) 903–921.
1086	Petitioner’s Stipulation Regarding District Court Proceedings

Dated: July 23, 2025

Respectfully submitted,

By: /s/ Robert M. Evans, Jr.

Robert M. Evans, Jr., Reg. No. 36,794

Kathleen Markowski Petrillo, Reg. No. 35,076

Michael J. Hartley, Reg. No. 67,230

LEWIS RICE LLC

600 Washington Avenue, Suite 2500

St. Louis, MO 63101

T: 314-444-7784; F: 314-612-7784

Email: [revans@lewisrice.com](mailto:revans@lewisrice.com)

[kpetrillo@lewisrice.com](mailto:kpetrillo@lewisrice.com)

[mhartley@lewisrice.com](mailto:mhartley@lewisrice.com)

*Counsel for Petitioner*

## CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, the undersigned certifies that on July 23, 2025, a copy of the PETITIONERS' UPDATED EXHIBIT LIST and EXHIBIT 1086 was electronically served on the following counsel of record for Patent Owner:

Hamad M. Hamad, Reg. No. 64,641  
[hhamad@caldwellcc.com](mailto:hhamad@caldwellcc.com)

Justin T. Nemunaitis (Pro Hac Vice pending)  
[jnemunaitis@caldwellcc.com](mailto:jnemunaitis@caldwellcc.com)

Richard Cochrane (Pro Hac Vice pending)  
[rcochrane@caldwellcc.com](mailto:rcochrane@caldwellcc.com)

[midwest@caldwellcc.com](mailto:midwest@caldwellcc.com)

By: /s/ Robert M. Evans, Jr.  
Robert M. Evans, Jr., Reg. No. 36,794  
LEWIS RICE LLC  
600 Washington Avenue, Suite 2500  
St. Louis, MO 63101  
T: 314-444-7784; F: 314-612-7784  
Email: [revans@lewisrice.com](mailto:revans@lewisrice.com)

*Lead Counsel for Petitioner*