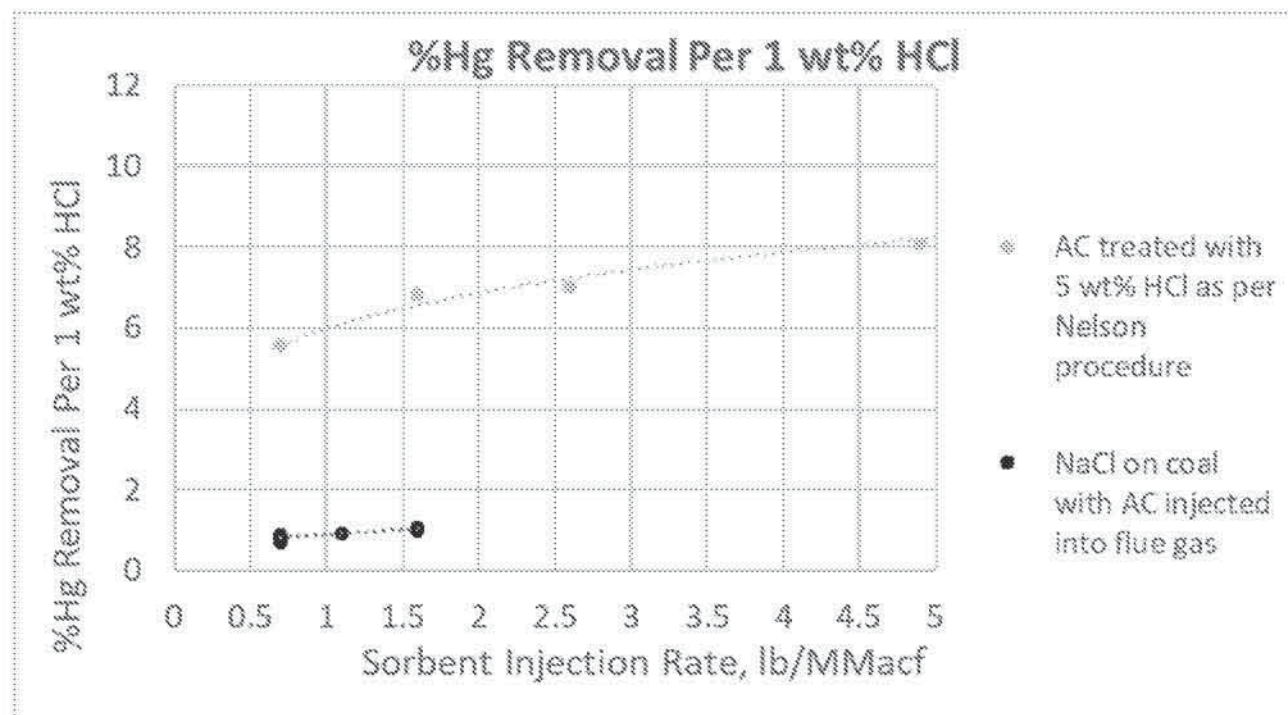
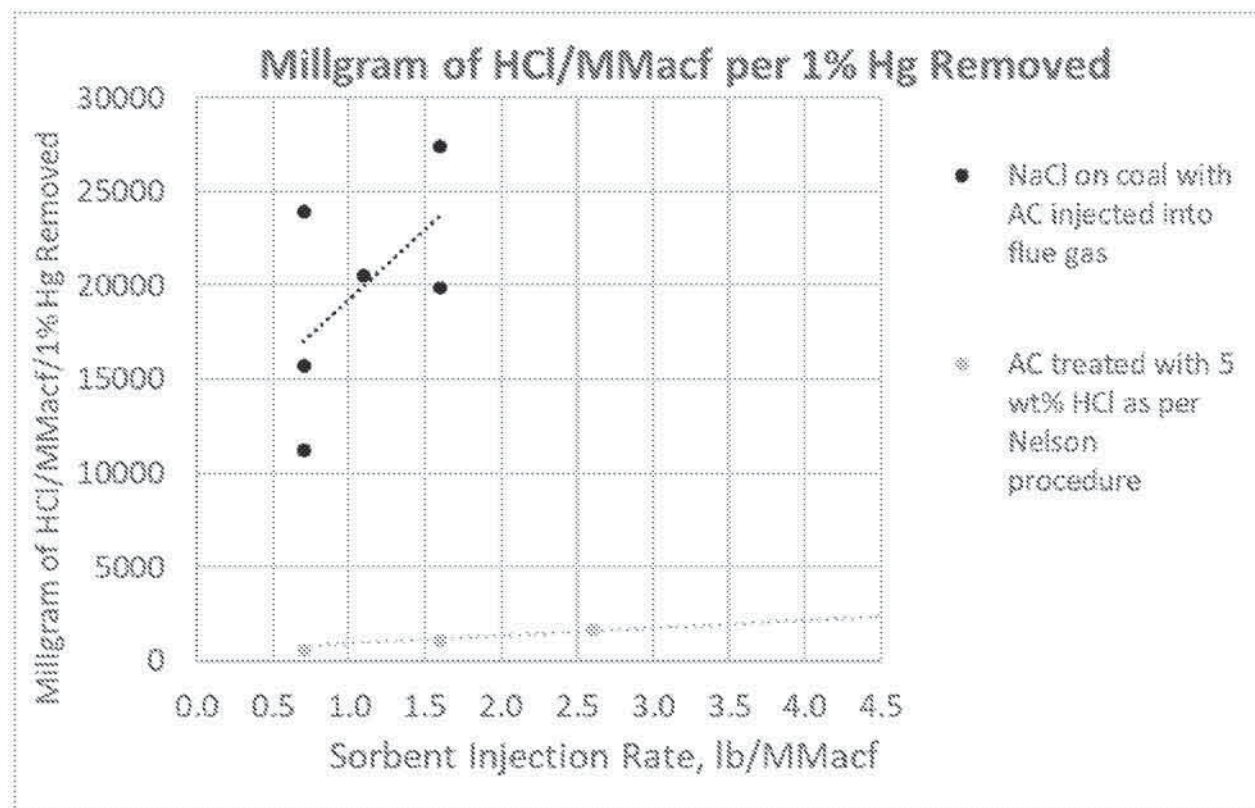


at item 7), and with NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. The same activated carbon was used for each sample. See, the first 132 Declaration at items 8-10. The first plot given in the first 132 Declaration at item 15 is reproduced below.



The data in the plot above from the item 15 of the first 132 Declaration show that activated carbon treated with HCl outside the flue gas as per the Nelson procedure provided a much higher percent of mercury removal per 1 wt% HCl at all tested sorbent injection rates as compared to NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas. See, first 132 Declaration at item 16.

The pilot-scale data was also plotted to show the milligrams of HCl/MMacf per 1% mercury removal versus the sorbent injection rate with NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas, and for the activated carbon treated with HCl outside the flue gas described herein at item 7 as per the Nelson procedure. The second plot given in the first 132 Declaration at item 15 is reproduced below.



The data in the second plot above from item 15 of the Declaration show that the milligrams of HCl/MMacf per 1% mercury removal versus the sorbent injection rate with NaCl added to coal prior to introduction to the furnace with injection of untreated activated carbon into the flue gas was significantly higher as compared to the activated carbon treated with HCl outside the flue gas described herein at item 7 as per the Nelson procedure, indicating more efficient use of HCl for mercury removal by treatment of activated carbon outside the flue gas than by promotion in-flight.

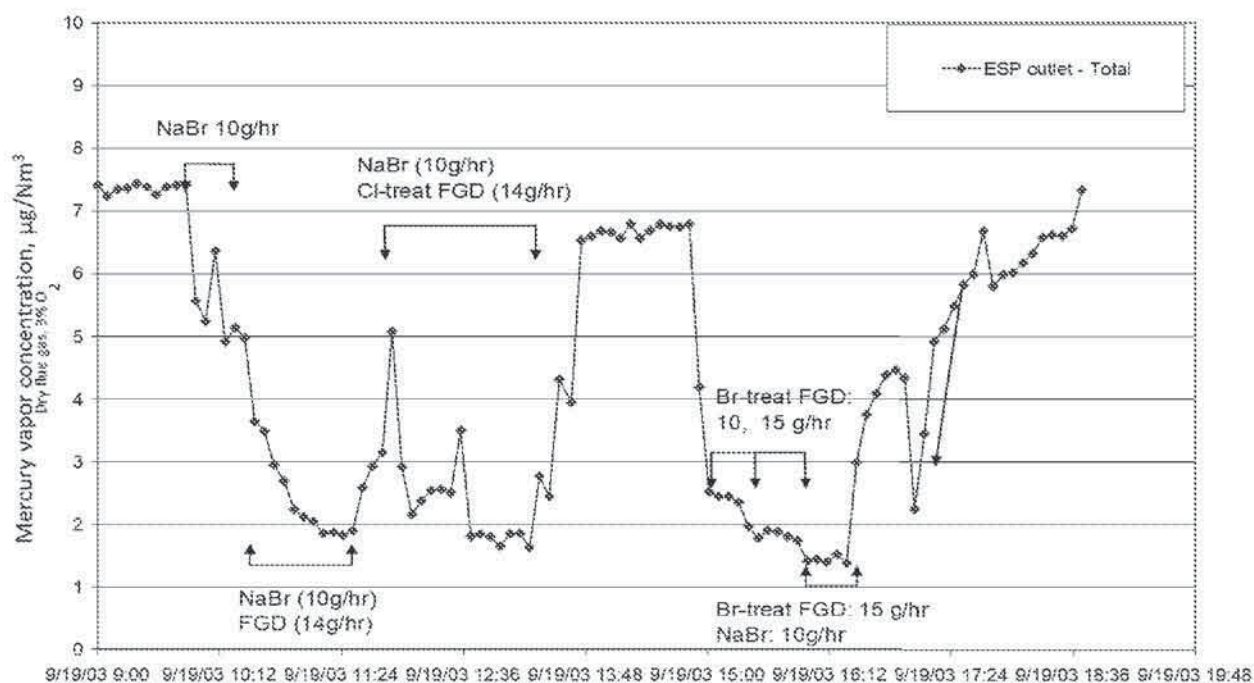
II(E)(1). Activated carbon treated with bromide additives outside the flue gas and subsequently injected into the flue gas containing bromide promoters for in-flight promotion results in greater mercury removal than using activated carbon only treated with bromide additives outside the flue gas or activated carbon only treated with bromide promoters in-flight in the flue gas.

As explained in the 37 CFR § 1.132 declaration by John Pavlish filed herewith ("second 132 Declaration"), the following data show trends that provide evidence that using activated carbon treated with bromide additives outside the flue gas and subsequently injected into the flue gas

containing bromide promoters for in-flight promotion results in greater mercury removal than using activated carbon only treated with bromide additives outside the flue gas or activated carbon only treated with bromide promoters in-flight in the flue gas. Although the additives used to treat injected activated carbon in this section are HCl or Br₂, the trends shown would be expected to occur also with bromide-treated activated carbon. See, second 132 Declaration at item 18.

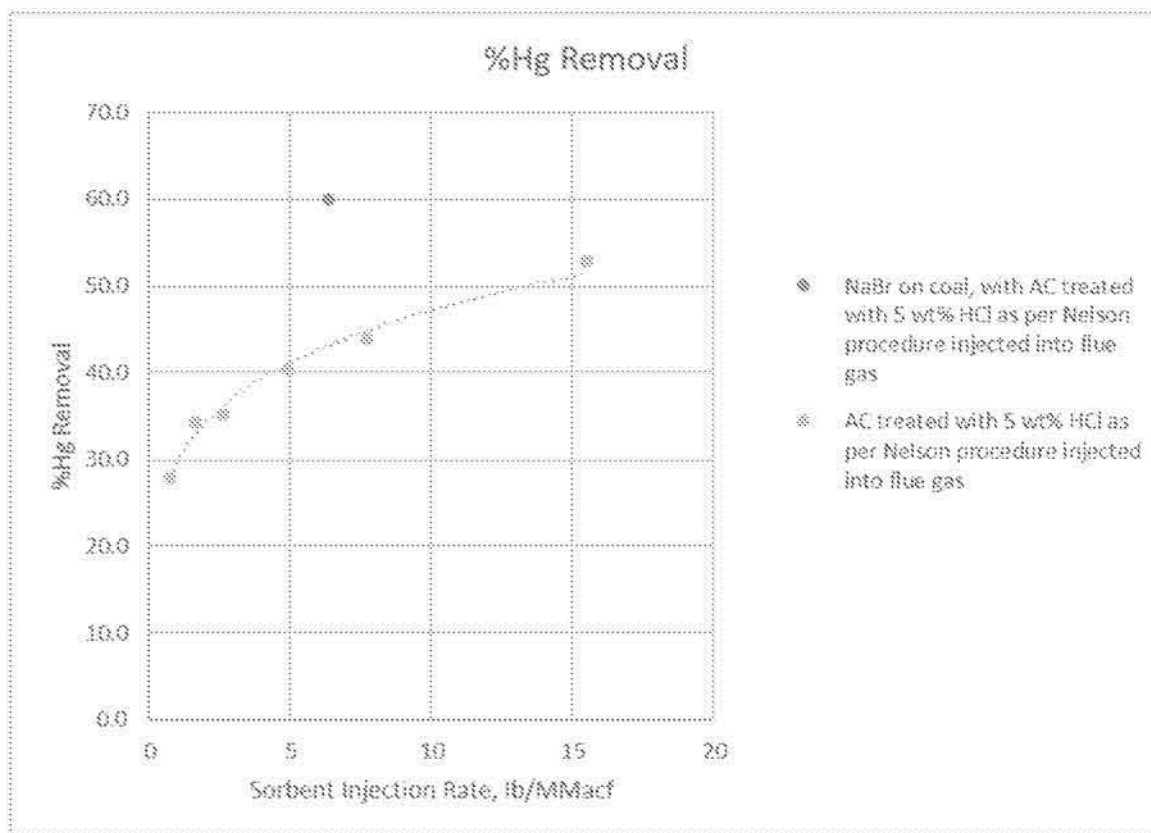
Pilot-scale testing was performed, using lignite coal and Norit DARCO® FGD, and the mercury content at the ESP outlet was measured with NaBr on coal, with NaBr on coal with injection of untreated activated carbon into the flue gas, with NaBr on coal with injection of 5 wt% HCl-treated activated carbon, with injection of 5 wt% Br₂-treated activated carbon without additives on the coal, and with NaBr on the coal with injection of 5 wt% Br₂-treated activated carbon. See, the second 132 Declaration at items 2-4. The plot given in the second 132 Declaration at item 5 is reproduced below.

Mercury Vapor Species at ESP Outlet (September 19, 2003)



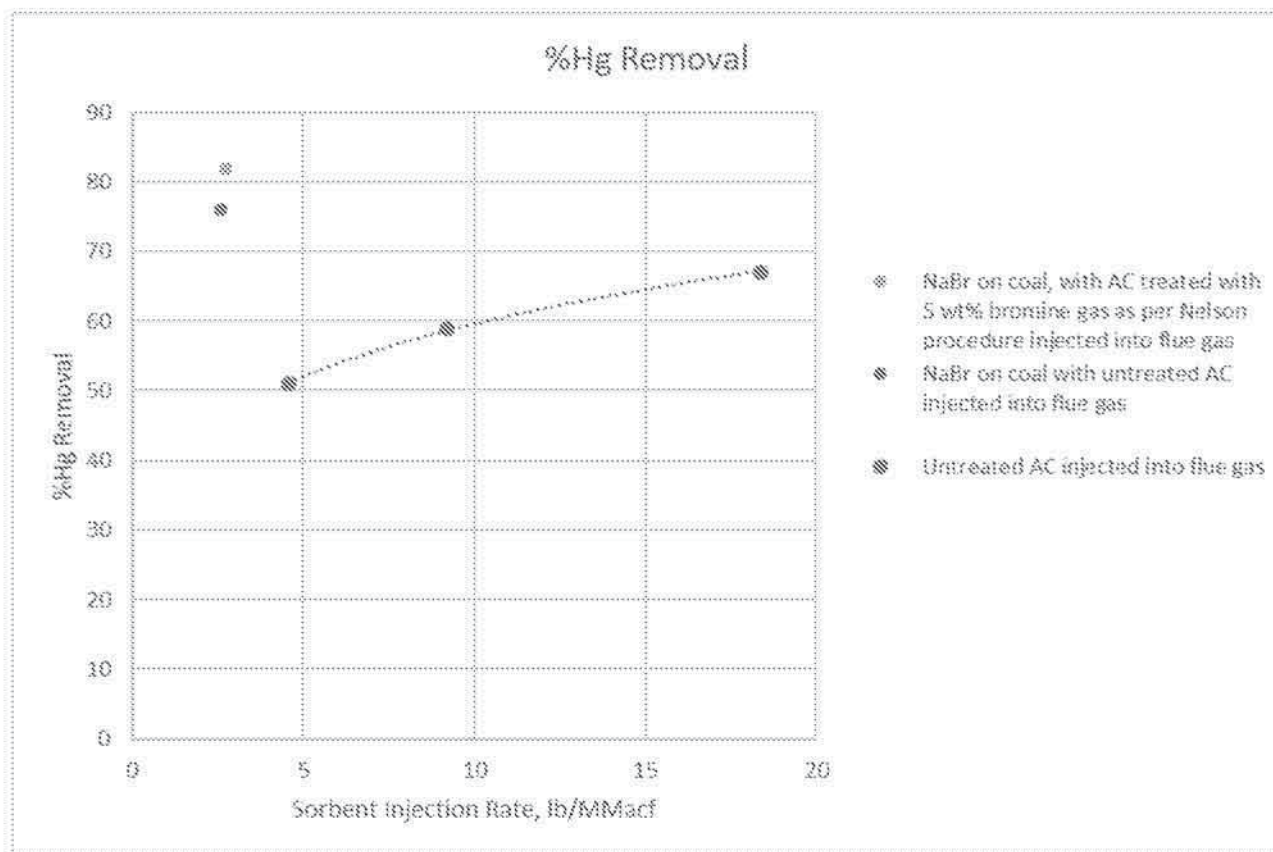
The data in the plot above from item 5 of the second 132 Declaration shows that, compared to placing NaBr on the coal and injecting untreated activated carbon into the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas provided greater mercury removal. The data in the plot above also shows that, compared to injecting activated carbon into the flue gas treated with 5 wt% Br₂ outside the flue gas, and compared to placing NaBr on the coal and injecting untreated activated carbon into the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% Br₂ outside the flue gas provided greater mercury removal. Therefore, in-flight promotion of activated carbon with bromide in the flue gas provides even greater mercury removal if the activated carbon has already been treated with Br₂ or HCl outside the flue gas prior to injection. In-flight bromide promotion in the flue gas of activated carbon treated with Br₂ outside the flue gas also provides greater mercury removal than injecting activated carbon treated with Br₂ outside the flue gas with no in-flight bromide promotion. See, second 132 Declaration at item 6.

The pilot-scale testing was repeated, using lignite coal and Norit DARCO[®] FGD, with NaBr on coal with injection of 5 wt% HCl-treated activated carbon, and with injection of 5 wt% HCl-treated activated carbon without NaBr on coal. See, second 132 Declaration at item 7. The plot given in the second 132 Declaration at item 8 is reproduced below.



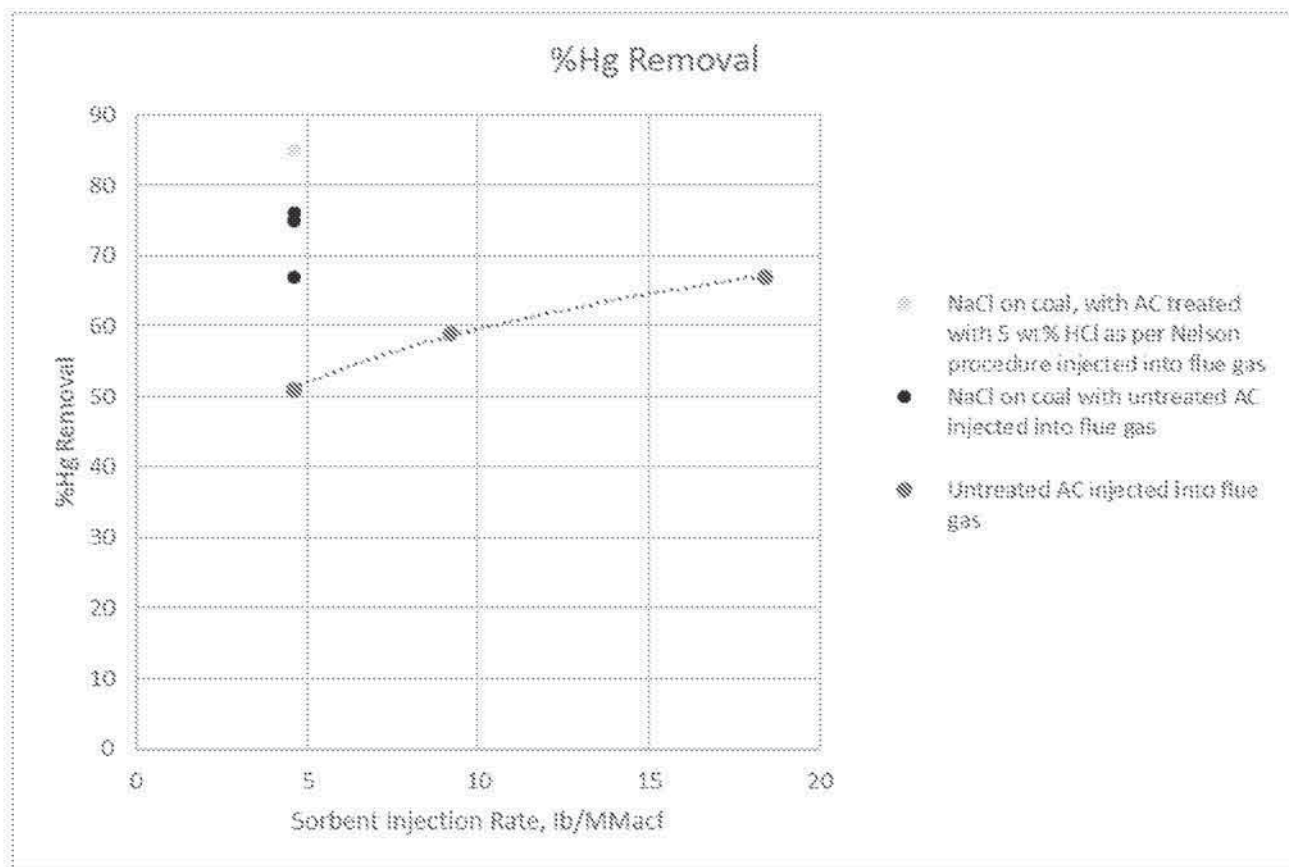
The data in the plot above from item 8 of the second 132 Declaration shows that, compared to injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas provided greater mercury removal. Therefore, in-flight bromide promotion in the flue gas of activated carbon treated with HCl outside the flue gas provides greater mercury removal than injecting activated carbon treated with HCl outside the flue gas with no in-flight bromide promotion. See, second 132 Declaration at item 9.

The pilot-scale testing was repeated, using subbituminous coal and Norit DARCO® Hg, with injection of untreated activated carbon into the flue gas, NaBr on coal with injection of untreated activated carbon into the flue gas, and with NaBr on coal with injection of 5 wt% Br₂-treated activated carbon into the flue gas. See, second 132 Declaration at items 10-12. The plot given in the second 132 Declaration at item 13 is reproduced below.



The data in the plot at item 13 shows that, compared to placing NaBr on the coal and injecting untreated activated carbon into the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% Br₂ outside the flue gas provided greater mercury removal. Therefore, in-flight promotion of activated carbon with bromide in the flue gas provides even greater mercury removal if the activated carbon has already been treated with Br₂ outside the flue gas prior to injection. See, second 132 Declaration at item 14.

The pilot-scale testing was repeated, using subbituminous coal and Norit DARCO® Hg, with injection of untreated activated carbon into the flue gas, NaCl on coal with injection of untreated activated carbon into the flue gas, and with NaCl on coal with injection of 5 wt% HCl-treated activated carbon into the flue gas. See, second 132 Declaration at item 15. The plot given in the second 132 Declaration at item 16 is given below.



The data in the plot above from item 16 of the second 132 Declaration shows that, compared to placing NaCl on the coal and injecting untreated activated carbon into the flue gas, placing NaCl on the coal and injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas provided greater mercury removal. Therefore, in-flight promotion of activated carbon with chloride in the flue gas provides even greater mercury removal if the activated carbon has already been treated with chloride outside the flue gas prior to injection. See, second 132 Declaration at item 17.

II(E)(2) There would be no way for a person of ordinary skill in the art to predict this advantage from the cited references.

Neither Felsvang nor Nelson describes or suggests that activated carbon treated with bromide additives outside the flue gas and subsequently injected into the flue gas containing bromide promoters for in-flight promotion results in greater mercury removal than using activated

carbon only treated with bromide additives outside the flue gas or activated carbon only treated with bromide promoters in-flight in the flue gas. The only way that a person of ordinary skill in the art could discover that that activated carbon treated with bromide additives outside the flue gas and subsequently injected into the flue gas containing bromide promoters for in-flight promotion results in greater mercury removal than using activated carbon only treated with bromide additives outside the flue gas or activated carbon only treated with bromide promoters in-flight in the flue gas would not be from the cited references alone; instead, the person of ordinary skill would need to actually modify Felsvang with Nelson as alleged, and would need to make a further modification of Felsvang that also includes injection of sorbents treated with bromide additives outside the flue gas.³ As explained herein at **II(A)**, there would be no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process in the first place; therefore, one of ordinary skill in the art would not use bromide compounds on the coal of Felsvang's process, let alone combine bromide compounds on coal with injection of activated carbon treated with bromide additives outside the flue gas. Even if the person of ordinary skill hypothetically placed Nelson's additives on Felsvang's coal, they would be surprised to find that in-flight promotion with bromide is more effective for mercury removal than bromide treatment of the sorbent outside the flue gas, as explained herein at **II(B)**; similarly, such a person of ordinary skill in the art carrying out the further modification of using Nelson's activated carbon treated with bromide outside the flue gas for injection into the flue gas formed from combustion of coal including Nelson's bromide additives would also be surprised that the further modification results in even greater mercury removal. The process giving rise to these surprising results was discovered by the inventors of the present application. Surprising results are a hallmark of patentability; only by having the present application in-hand could such results be predicted, and a need to resort to hindsight analysis to predict the advantages of the combination asserted by the Office Action is indicative that the presently claimed invention is not obvious over the cited references. Accordingly, independent claim 1 is patentable over Felsvang in view of Nelson for at least this additional reason.

³ In the event the Examiner intends to argue that such advantages are inherent in the cited art, Applicant notes that the claimed invention is not specifically disclosed in the prior art. The Examiner cannot reason inherency in a §103 context based on a mere proposed or hypothetical combination of features from cited references. Such reasoning would merely reflect the Examiner's reliance on impermissible hindsight. See, M.P.E.P. § 2112(IV).

Dependent claims 2-3, 5-8, 14, and 21-25 are dependent on independent claim 1. As such, these dependent claims incorporate all the features of claim 1. Accordingly, dependent claims 2-3, 5-8, 14, and 21-25 are patentable for at least the reasons given herein for patentability of independent claim 1.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claims 1-3, 5-8, 14, and 21-25 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson.

III. The Office Action rejected claim 4 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 (“Felsvang”) in view of U.S. patent publication no. 2004/0003716 (“Nelson”) and U.S. patent no. 6,848,374 (“Srinivasachar”).

This rejection is respectfully traversed.

Independent claim 1 is presently amended to recite “...a promoter that comprises [[Br₂, HBr, Br⁻, or a combination thereof...”

As explained herein at **II**, claim 1 is patentable over Felsvang and Nelson. Srinivasachar mentions treating activated carbon with halide salts or halogen acids prior to placing the activated carbon into flue gas. See, col. 6. lines 2-20. However, like Nelson, Srinivasachar fails to describe or suggest promotion of activated carbon in flue gas, and also fails to describe or suggest that HBr or Br⁻ have the same or greater effectiveness for mercury removal when used to treat activated carbons than chlorides. Accordingly, there would be no motivation for a person of ordinary skill in the art to use Srinivasachar’s bromide additives in Felsvang’s process. Further, there is no way to determine from Srinivasachar that in-flight promotion with bromide promoters is more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas (as explained herein at **III(B)(1)**), or that in-flight promotion with bromide promoters is more effective for mercury removal than in-flight promotion with chloride-promoters (as explained herein at **III(C)(1)**). Additionally, even if a person of ordinary skill in the art compared the mercury removal of Felsvang’s activated carbons promoted with chloride in the flue gas to activated carbons treated with HCl outside of the flue gas as used in Nelson and Srinivasachar, they would not determine that in-flight promotion provides the same or better mercury removal properties, as explained herein at **III(D)**. As such, Srinivasachar fails to remedy

the deficiencies of Felsvang and Nelson. Therefore, claim 1 is patentable over Felsvang in view of Nelson and Srinivasachar.

Claim 4 is dependent on independent claim 1. As such, claim 4 incorporates all the features of claim 1. Accordingly, dependent claim 4 is patentable for at least the reasons given herein for patentability of independent claim 1.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 4 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson and Srinivasachar.

IV. The Office Action rejected claim 9 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 (“Felsvang”) in view of U.S. patent publication no. 2004/0003716 (“Nelson”) and U.S. patent no. 6,848,374 (“Srinivasachar”).

This rejection is respectfully traversed.

Independent claim 1 is presently amended to recite “...a promoter that comprises $[[\text{Br}_2,$ $]]\text{HBr}, \text{Br}^-$, or a combination thereof...”

As explained herein at **II**, claim 1 is patentable over Felsvang and Nelson. As explained herein at **III**, Srinivasachar fails to remedy the deficiencies of Felsvang and Nelson. Therefore, claim 1 is patentable over Felsvang in view of Nelson and Srinivasachar.

Dependent claim 9 is dependent on independent claim 1. As such, claim 9 incorporates all the features of claim 1. Accordingly, dependent claim 9 is patentable for at least the reasons given herein for patentability of independent claim 1.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 9 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson and Srinivasachar.

V. The Office Action rejected claim 10 under 35 U.S.C. § 103(a) over U.S. patent no. 5,435,980 (“Felsvang”) in view of U.S. patent publication no. 2004/0003716 (“Nelson”) and U.S. patent no. 6,136,749 (“Gadkaree”).

This rejection is respectfully traversed.

Independent claim 1 is presently amended to recite “...a promoter that comprises $[[\text{Br}_2,$ $]]\text{HBr}, \text{Br}^-$, or a combination thereof...”

As explained herein at **II**, claim 1 is patentable over Felsvang and Nelson. Gadkaree mentions forming activated carbons in the presence of an alkali metal halide co-catalyst, see, claims 1 and 10. Gadkaree's Examples use KI or SnCl₂, and Gadkaree fails to describe or suggest relative mercury removal activities of activated carbons treated with bromide versus other halide additives. Gadkaree fails to describe or suggest promotion of activated carbon in flue gas, and does not even specifically mention bromide or bromine additives. Therefore, like Nelson, Gadkaree also fails to describe or suggest that HBr or Br⁻ have the same or greater effectiveness for mercury removal when used to treat activated carbons than chlorides. Accordingly, Gadkaree fails to remedy the deficiency of Nelson and Felsvang explained herein at **III(A)** that there would be no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process. Further, there is no way to determine from Gadkaree that in-flight promotion with bromide promoters is more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas (as explained herein at **III(B)(1)**), or that in-flight promotion with bromide promoters is more effective for mercury removal than in-flight promotion with chloride-promoters (as explained herein at **III(C)(1)**). Additionally, Gadkaree fails to remedy the deficiency of Nelson and Felsvang explained herein at **III(A)** that even if a person of ordinary skill in the art compared the mercury removal of Felsvang's activated carbons promoted with chloride in the flue gas to activated carbons treated with HCl outside of the flue gas as used in Nelson, they would not determine that in-flight promotion provides the same or better mercury removal properties. As such, Gadkaree fails to remedy the deficiencies of Felsvang and Nelson. Therefore, claim 1 is patentable over Felsvang in view of Nelson and Gadkaree.

Dependent claim 10 is dependent on independent claim 1. As such, claim 10 incorporates all the features of claim 1. Accordingly, dependent claim 1 is patentable for at least the reasons given herein for patentability of independent claim 1.

Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of claim 10 under 35 U.S.C. § 103(a) over Felsvang in view of Nelson and Gadkaree.

Double Patenting Rejection

VI(A). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-30 of U.S. patent no. 7,435,286 in view of U.S. patent no. 5,435,980 ("Felsvang") and U.S. patent publication no. 2004/0003716 ("Nelson").

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-30 of U.S. patent no. 7,435,286 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(B). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-25 of U.S. patent no. 8,168,147 in view of U.S. patent no. 5,435,980 ("Felsvang") and U.S. patent publication no. 2004/0003716 ("Nelson").

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-25 of U.S. patent no. 8,168,147 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(C). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-60 of U.S. patent no. 8,512,655 in view of U.S. patent no. 5,435,980 ("Felsvang") and U.S. patent publication no. 2004/0003716 ("Nelson").

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-60 of U.S. patent no. 8,512,655 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(D). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-60 of U.S. patent no. 8,821,819 in view of U.S. patent no. 5,435,980 (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-60 of U.S. patent no. 8,821,819 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(E). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-33 of U.S. patent no. 9,757,689 in view of U.S. patent no. 5,435,980 (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-33 of U.S. patent no. 9,757,689 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(F). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of U.S. patent no. 9,468,886 in view of U.S. patent no. 5,435,980 (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of U.S. patent no. 9,468,886 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(G). The Office Action rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-30 of U.S. patent no. 8,652,235 in view of U.S. patent no. 5,435,980 ("Felsvang") and U.S. patent publication no. 2004/0003716 ("Nelson").

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-30 of U.S. patent no. 8,652,235 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(H). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-16 of copending application no. 15/295,594 in view of ("Felsvang") and U.S. patent publication no. 2004/0003716 ("Nelson").

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-16 of copending application no. 15/295,594 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(I). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 8-20 of copending application no. 15/589,359.

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 8-20 of copending application no. 15/589,359.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(J). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/853,029 in view of (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of copending application no. 15/853,029 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(K). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 14/712,558.

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of copending application no. 14/712,558.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(L). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/951,970.

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of copending application no. 15/951,970.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(M). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/382,114 in view of (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of copending application no. 15/382,114 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(N). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/853,029 in view of (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of copending application no. 15/853,029 in view of Felsvang and Nelson. This rejection appears to be a duplicate of the rejection listed herein at **VI(J)**.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

VI(O). The Office Action provisionally rejected claims 1-10, 14, and 21-25 on the ground of nonstatutory double patenting over claims 1-20 of copending application no. 15/978,760 in view of (“Felsvang”) and U.S. patent publication no. 2004/0003716 (“Nelson”).

This rejection is respectfully traversed. Applicant does not admit that claims 1-10, 14, and 21-25 are obvious over claims 1-20 of copending application no. 15/978,760 in view of Felsvang and Nelson.

As the current pending claims stand rejected on other grounds and are still subject to amendment, Applicant takes note of these rejections but do not take further action at this time

inasmuch as no pending claim has yet to be allowed. Applicant will re-evaluate this rejection, upon an indication of allowable claims.

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 349-9580 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402-0938
(612) 373-6900

Date December 3, 2018

By Nicholas P. Lanzatella

Nicholas P. Lanzatella
Reg. No. 63,803

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Edwin S. Olson et al.	Examiner:	Amber Orlando
Serial No.:	15/974,343	Group Art Unit:	1776
Filed:	May 8, 2018	Docket:	4820.001US9
Customer No.:	21186	Confirmation No.:	1072
Title:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY		

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(c)(2), Applicant hereby authorizes the Commissioner to charge the fee of \$240.00 as set forth in 37 C.F.R. § 1.17(p), to Deposit Account No. 19-0743. Please charge any additional fees or deficiencies, or credit any overpayment to Deposit Account No. 19-0743.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

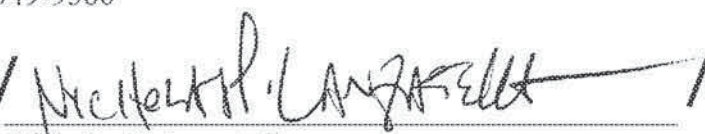
The Examiner is invited to contact the undersigned at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9580

Date December 3, 2018

By



Nicholas P. Lanzatella

Reg. No. 63,803

NPL:mlr1

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	15/974,343
	Filing Date	May 8, 2018
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1		Attorney Docket No: 4820.001US9

US PATENT DOCUMENTS			
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,130,930	11/20/2018	Olson, Edwin S
	US-20180229182A1	8/16/2018	Olson, Edwin S., et al.
	US-20180280870A1	10/4/2018	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS			
Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document
			T 1

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T 1
	"Application Serial No. 14/712,558, Non Final Office Action mailed 10-19-18", 26 pgs		
	"Application Serial No. 14/712,558, Non-Final Office Action mailed 10-19-18", 35 pgs		
	"Application Serial No. 14/712,558, Response filed 08-14-18 to Non Final Office Action mailed 07-02-18", 11 pgs		
	"Application Serial No. 15/295,594, Non Final Office Action mailed 10-23-18", 20 pgs		
	"Application Serial No. 15/382,114, Response filed 09-12-18 to Restriction Requirement mailed 08-28-18", 8 pgs.		
	"Application Serial No. 15/382,114, Restriction Requirement mailed 08-28-18", 9 pgs		
	"Application Serial No. 15/589,359, Final Office Action mailed 09-12-18", 14 pgs		
	"Application Serial No. 15/589,359, Non Final Office Action mailed 10-22-18", 12 pgs		
	"Application Serial No. 15/589,359, Response filed 09-14-18 to Final Office Action mailed 09-12-18", 18 pgs.		
	"Application Serial No. 15/978,760, Non Final Office Action mailed 10-10-18", 17 pgs		
	"Application Serial No. 15/997,091, Non Final Office Action mailed 11-02-18", 27 pgs		
	"Application Serial No. 15/997,091, Response filed 08-14-2018 to Non Final Office Action mailed 07-27-18", 10 pgs		
	PIETRZAK, et al., "Preparation of nitrogen-enriched activated carbons from brown coal", Energy and Fuels 20.3, (2006), 1275-1280		

EXAMINER

DATE CONSIDERED

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

A/N 15/974,343

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Examiner: AMBER ROSE ORLANDO

Application No.: 15/974,343

Group Art Unit: 1776

Filed: May 8, 2018

Docket No.: 4820.001US9

Confirmation No.: 1072

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, John Pavlish, declare and say as follows:

1. I have been the Chief Technology Officer and Senior Vice President of Midwest Energy Emissions Corporation since November 16, 2014. Prior to this, I served as an Executive Consultant Advisor to Midwest Energy Emissions Corporation. Prior to joining Midwest Energy Emissions Corporation, I was a Senior Research Advisor and the Director of the Center for Air Toxic Metals Program at the Energy & Environmental Research Center in Grand Forks, North Dakota. I have over 25 years of mercury-related experience and am regarded as an international expert on the topic of mercury. My primary areas of interest and expertise include research, technical consultation and development of mercury control technologies, in particular, for coal combustion and gasification systems. I am an inventor of a number of patented mercury control technologies and have years of experience in development and testing of these technologies for commercial applications. Over the last 15 years, I have spent much time evaluating the efficacy of a number of different mercury control technologies/approaches and their cost competitiveness in the commercial market. I also have years of power plant experience and have worked for an engineering/consulting company, Black & Veatch, where I served as Unit Leader/System Engineer. I am a professional engineer, a member of the American Society of Mechanical Engineers, and a member of the Air & Waste Management Association (A&WMA). I serve on numerous professional and technical committees and am a U.S. Representative on the Mercury Emissions from Coal International Experts Working Group on Reducing Emissions from Coal and a member

of the United Nations Environment Programme Global Mercury Partnership, Reduction of Mercury Releases from Coal Combustion. I have published over 200 papers, articles, and reports on various mercury-related topics and issues.

2. A bromine-treated activated carbon was prepared by exposing activated carbon (Norit DARCO® FGD) to gaseous bromine. A cement mixer was used to expose the activated carbon to the bromine gas. Tumbling vanes produced a dispersion of the activated carbon within the barrel. A cover was fit over the opening to keep the activated carbon dispersion inside the barrel. In the center of the lid, a small hole was drilled, and a tube extended to the center of the barrel. The tube was attached to a source of bromine vapor (Br_2) in dry nitrogen via a swivel so that the tube in the barrel would rotate and the tube to the source would be stationary. A charge of 1 to 5 kg of the activated carbon was weighed and transferred to the barrel. The weight of bromine transferred to the barrel was equal to 5 weight % of the amount of activated carbon.

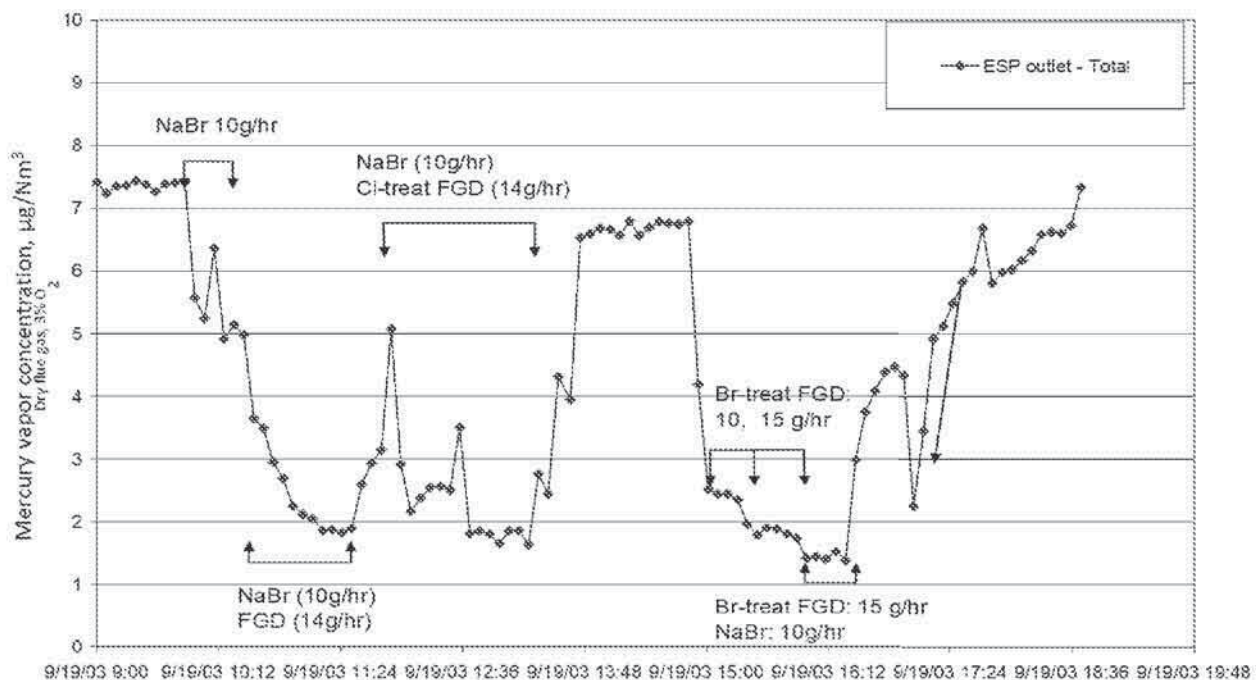
3. An HCl-treated activated carbon was prepared by exposing activated carbon (Norit DARCO® FGD) to gaseous HCl. The carbon was weighed and added to a flask which was attached to a rotary apparatus. A hard-plastic tube was inserted into the condenser end of the apparatus for introduction of the HCl/nitrogen gas mix. This extended to the center of the flask. HCl from a cylinder was run through a flow meter and mixed with a low flow of nitrogen in a T-tube attached to the inlet tube. The flow rate was set to provide 5 wt % HCl over 15 minutes exposure. The flask was slowly rotated in the apparatus at room temperature so that the carbon turned over but did not exit the flask. After the exposure period, the HCl flow was stopped and the HCl-treated activated carbon was removed.

4. A pilot-scale 550,000-Btu/hr pulverized coal (pc)-fired test unit was used to combust lignite coal and test mercury control using various sorbents. The coal combustion flue gas exiting the pilot unit was cooled down to a nominal temperature of 49°C (300°F) and then was introduced into a single wire tubular ESP unit. Activated

carbon sorbents were fed with a K-Tron dual-screw feeder upstream of the ESP. The feeder was calibrated prior to the start of each carbon injection test. Before Hg control testing began, a baseline condition was established with the pilot-scale unit, and flue gas mercury content was measured. The mercury content at the ESP outlet was measured with NaBr on coal, with NaBr on coal with injection of untreated activated carbon (Norit DARCO® FGD) into the flue gas, with NaBr on coal with injection of the HCl-treated activated carbon from the procedure at item 3, with injection of the Br₂-treated activated carbon from the procedure at item 2 without additives on the coal, and with NaBr on the coal with injection of the Br₂-treated activated carbon from the procedure at item 2.

5. A plot showing the amount of mercury in the ESP outlet versus time from the procedure described at item 4 is shown below.

Mercury Vapor Species at ESP Outlet (September 19, 2003)

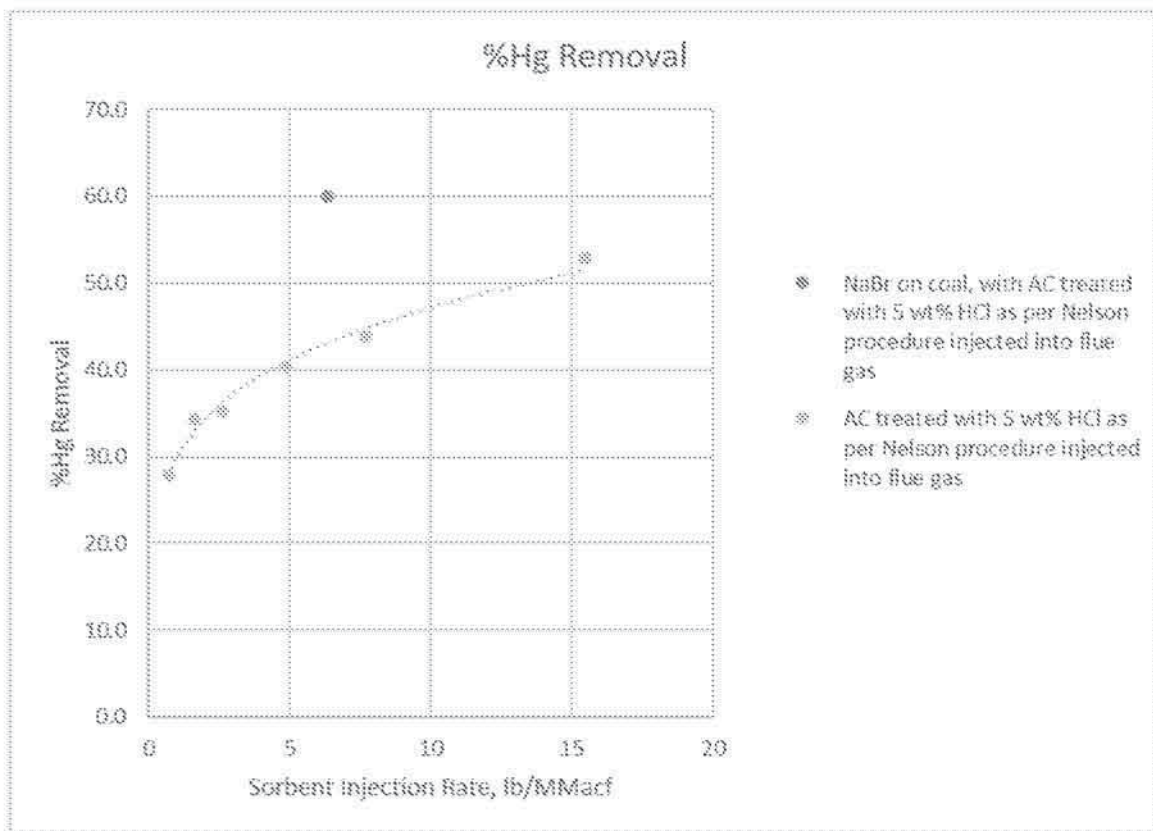


6. The data in the plot at item 5 shows that, compared to placing NaBr on the coal and injecting untreated activated carbon into the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas provided greater mercury removal. The data in the plot above also shows that, compared to injecting activated carbon into the flue gas treated with 5 wt% Br₂ outside the flue gas, and compared to placing NaBr on the coal and injecting untreated activated carbon into the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% Br₂ outside the flue gas provided greater mercury removal.

Therefore, in-flight promotion of activated carbon with bromide in the flue gas provides even greater mercury removal if the activated carbon has already been treated with Br₂ or HCl outside the flue gas prior to injection. In-flight bromide promotion in the flue gas of activated carbon treated with Br₂ outside the flue gas also provides greater mercury removal than injecting activated carbon treated with Br₂ outside the flue gas with no in-flight bromide promotion.

7. The procedure from item 4 was repeated, using NaBr on coal with injection of the HCl-treated activated carbon from the procedure at item 3, and with injection of the HCl-treated activated carbon from the procedure at item 3 without NaBr on coal.

8. A plot showing the percent mercury removal versus the sorbent injection rate from the procedure described at item 7 is shown below.



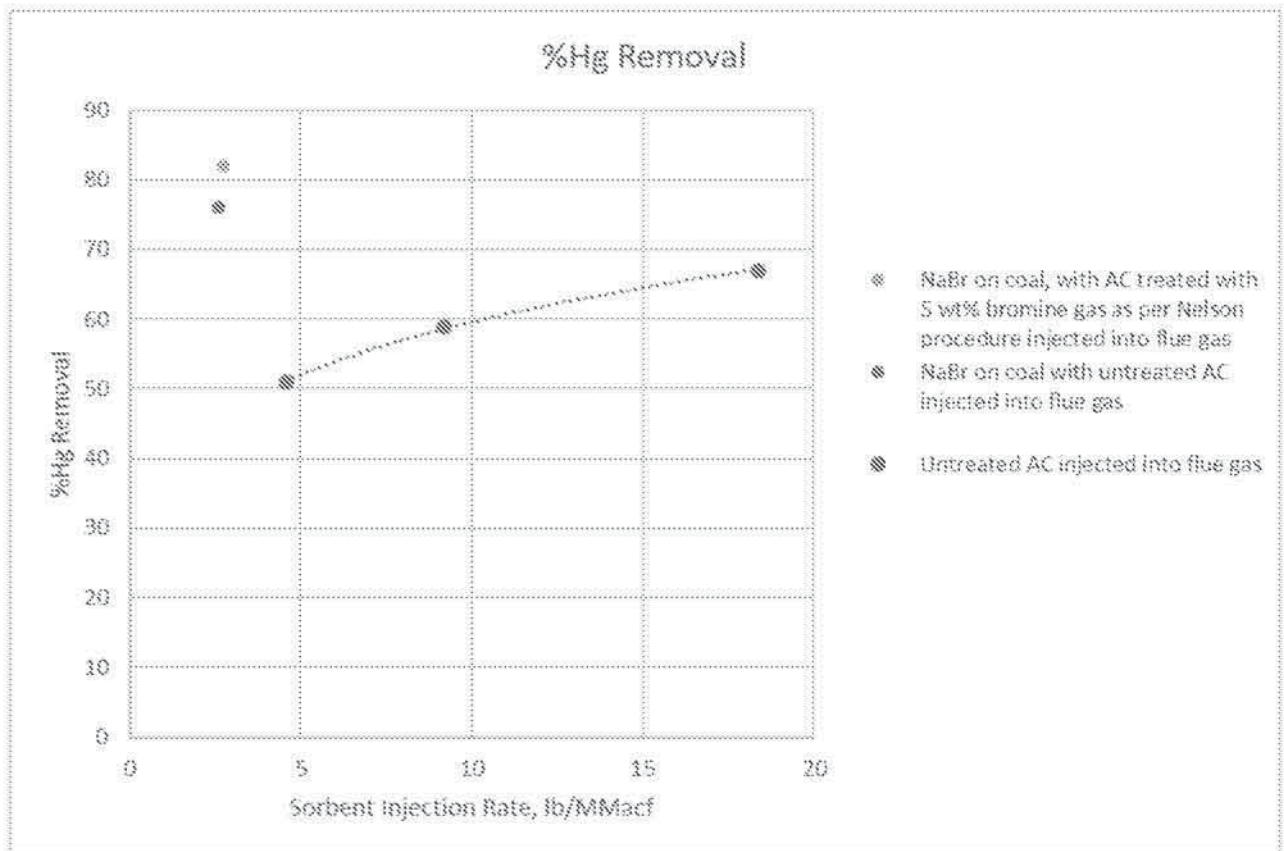
9. The data in the plot at item 8 shows that, compared to injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas, placing NaBr on the coal and injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas provided greater mercury removal. Therefore, in-flight bromide promotion in the flue gas of activated carbon treated with HCl outside the flue gas provides greater mercury removal than injecting activated carbon treated with HCl outside the flue gas with no in-flight bromide promotion.

10. A bromine-treated activated carbon was prepared by following the procedure described at item 2, but using Norit DARCO[®] Hg activated carbon in place of Norit DARCO[®] FGD. Norit DARCO[®] Hg is an activated carbon that a Norit Americas technical representative told me was rebranded for mercury control applications and was previously referred to as Norit DARCO[®] FGD.

11. An HCl-treated activated carbon was prepared by following the procedure described at item 3, but using exposing using Norit DARCO[®] Hg activated carbon in place of Norit DARCO[®] FGD.

12. The procedure from item 4 was repeated, using subbituminous coal. Testing was performed using injection of untreated activated carbon (Norit DARCO[®] Hg) into the flue gas, NaBr on coal with injection of untreated activated carbon (Norit DARCO[®] Hg) into the flue gas, and using NaBr on coal with injection of the Br₂-treated activated carbon from the procedure at item 10 into the flue gas.

13. A plot showing the percent mercury removal versus the sorbent injection rate from the procedure described at item 12 is shown below.

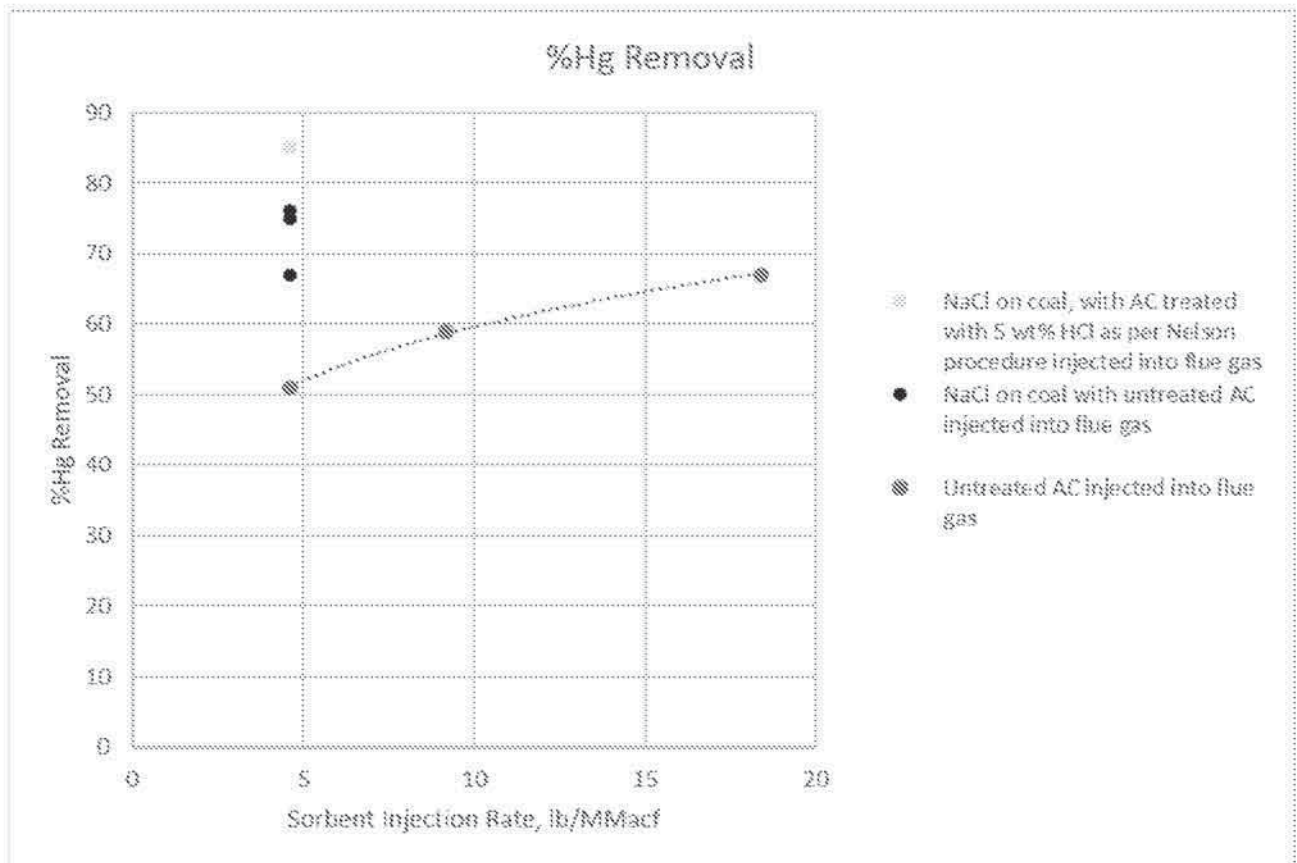


14. The data in the plot at item 13 shows that, compared to placing NaBr on the coal and injecting untreated activated carbon into the flue gas, placing NaBr on the coal and

injecting activated carbon into the flue gas treated with 5 wt% Br₂ outside the flue gas provided greater mercury removal. Therefore, in-flight promotion of activated carbon with bromide in the flue gas provides even greater mercury removal if the activated carbon has already been treated with Br₂ outside the flue gas prior to injection.

15. The procedure of item 12 was repeated, using injection of untreated activated carbon into the flue gas, NaCl on coal with injection of untreated activated carbon (Norit DARCO® Hg) into the flue gas, and using NaCl on coal with injection of the HCl-treated activated carbon from the procedure at item 11 into the flue gas.

16. A plot showing the percent mercury removal versus the sorbent injection rate for the procedure described at item 15 is shown below.



17. The data in the plot at item 16 shows that, compared to placing NaCl on the coal and injecting untreated activated carbon into the flue gas, placing NaCl on the coal and injecting activated carbon into the flue gas treated with 5 wt% HCl outside the flue gas provided greater mercury removal. Therefore, in-flight promotion of activated carbon with chloride in the flue gas provides even greater mercury removal if the activated carbon has already been treated with chloride outside the flue gas prior to injection.

18. The data herein show trends that provide evidence that using activated carbon treated with bromide additives outside the flue gas and subsequently injected into the flue gas containing bromide promoters for in-flight promotion results in greater mercury removal than using activated carbon only treated with bromide additives outside the flue gas or activated carbon only treated with bromide promoters in-flight in the flue gas. Although the additives used to treat injected activated carbon herein are HCl or Br₂, the trends shown would be expected to occur also with bromide-treated activated carbon.

19. I further declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by a fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application and/or any patent issued thereon.

Dated: December 3, 2018

By: 

John Pavlish

Electronic Patent Application Fee Transmittal

Application Number:	15974343			
Filing Date:	08-May-2018			
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY			
First Named Inventor/Applicant Name:	Edwin S. Olson			
Filer:	Steven M. Reid/Megan Reed			
Attorney Docket Number:	4820.001US9			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	240	240
Total in USD (\$)				240

Electronic Acknowledgement Receipt

EFS ID:	34470321
Application Number:	15974343
International Application Number:	
Confirmation Number:	1072
Title of Invention:	SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY
First Named Inventor/Applicant Name:	Edwin S. Olson
Customer Number:	21186
Filer:	Steven M. Reid/Megan Reed
Filer Authorized By:	Steven M. Reid
Attorney Docket Number:	4820.001US9
Receipt Date:	03-DEC-2018
Filing Date:	08-MAY-2018
Time Stamp:	17:45:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$240
RAM confirmation Number	120418INTEFSW00004943190743
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		SIGNED_4820_001US9_NFOAR espSIDS_Dec.pdf	1255739	yes	49
			b800353ecc9dcde8775306c5a397bb9a5ef828d0		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	1	
	Amendment/Req. Reconsideration-After Non-Final Reject		2	2	
	Claims		3	5	
	Applicant Arguments/Remarks Made in an Amendment		6	38	
	Transmittal Letter		39	40	
	Information Disclosure Statement (IDS) Form (SB08)		41	41	
	Affidavit-traversing rejectns or objectns rule 132		42	49	
Warnings:					
Information:					
2	Non Patent Literature	4820_001US7_aarn_08142018.pdf	145922	no	11
			4d970a5ffe9fef2a7444f0ddacf9bf5ae5b61138		
Warnings:					
Information:					
3	Non Patent Literature	4820_001US7_OARN_10192018.pdf	4575545	no	35
			c1d927fd854e316fbccdc097d60729d4b5f5cd8		
Warnings:					
Information:					

4	Non Patent Literature	4820001U10_OARNPE_11022018.pdf	2761437	no	27
			34c549c6cdc94728be5b6de758cfb298d81339a5		
Warnings:					
Information:					
5	Non Patent Literature	4820001U10_rsp_20180814.pdf	139078	no	10
			b885eace8cc9592c3beaceef426960d4b66d32c1		
Warnings:					
Information:					
6	Non Patent Literature	4820001US7_OARN_10192018.pdf	2852544	no	26
			4eeba85b888a3d31b679e1ee641d3bcd01ff776		
Warnings:					
Information:					
7	Non Patent Literature	4820003US2_AARF_091418.pdf	158598	no	14
			8e81e9d62c0e34c49c268ab4bbc2ec2e60a47797		
Warnings:					
Information:					
8	Non Patent Literature	4820003US2_FOAR_09122018.pdf	1184529	no	14
			2389c12c7182e9a25f5d417bb4a92ef6ab26f773		
Warnings:					
Information:					
9	Non Patent Literature	4820003US2_OARN_10222018.pdf	993980	no	12
			716b1e9eb168c280dbdf5217532fb1b556cd494d		
Warnings:					
Information:					
10	Non Patent Literature	4820004US1_RERR_08282018.pdf	853637	no	9
			428ed9cc415f2c09777548ae9bcffe524295a471		
Warnings:					
Information:					

11	Non Patent Literature	4820004US1_RRR1MO_091218.pdf	129340	no	8
			ddb08fabbb6d6f8a0f6c6b0ca33e8b4e63ec1683		
Warnings:					
Information:					
12	Non Patent Literature	4820007US3_OARN_10232018.pdf	2099174	no	20
			c497166d6706900dde2aafba6f1d521e03a7d45e		
Warnings:					
Information:					
13	Non Patent Literature	4820007US4_OARNPE_10102018.pdf	1857201	no	17
			90533c77a7653ec28595acaf94e17e1e124776f1		
Warnings:					
Information:					
14	Non Patent Literature	Pietrzak_PreparationofNitrogen.pdf	219945	no	6
			1e493934d8b8549b6da2d6bc71a5db44ff08e432		
Warnings:					
Information:					
15	Fee Worksheet (SB06)	fee-info.pdf	30342	no	2
			1afd28c07bbd2e3f76e93e39e1f16e14b15fd457		
Warnings:					
Information:					
Total Files Size (in bytes):			19257011		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Edwin S. Olson et al.

Title: SORBENTS FOR THE OXIDATION AND REMOVAL OF MERCURY

Docket No.: 4820.001US9
Filed: May 8, 2018
Examiner: Amber Orlando
Customer No.: 21186

Serial No.: 15/974,343
Due Date: January 29, 2018
Group Art Unit: 1776
Confirmation No.: 1072

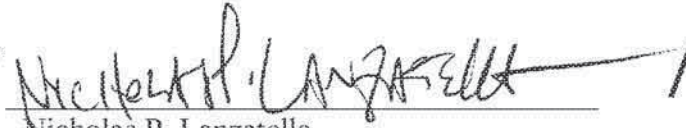
Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Amendment and Response under 37 C.F.R. § 1.111 (37 pgs.)
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.) Copies of Cited References (13).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$240.00 to cover the fee for consideration of Information Disclosure Statement under 37 C.F.R. § 1.97(c).
- ☒ Declaration Under 37 C.F.R. § 1.132 (8 pgs)

If not provided for in a separate paper filed herewith, please consider this a **PETITION FOR EXTENSION OF TIME** for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743. If applicable, any papers or fees supplied herewith are considered to be timely filed pursuant to 37 C.F.R. § 1.7(a), the response period falling on a Federal Holiday, Saturday or Sunday being extended to the next succeeding business day.

SCHWEGMAN LUNDBERG & WOESSNER, P.A.
Customer No.: 21186

B/ 
Nicholas P. Lanzatella
Reg. No. 63,803

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/974,343		Filing Date 05/08/2018		☐ To be Mailed			
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO											
APPLICATION AS FILED - PART I											
		(Column 1)	(Column 2)								
FOR		NUMBER FILED	NUMBER EXTRA	RATE (\$)		FEE (\$)					
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A	N/A							
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A	N/A	N/A							
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A	N/A							
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 = *		x \$100 =							
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *		x \$460 =							
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))											
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL							
APPLICATION AS AMENDED - PART II											
		(Column 1)	(Column 2)	(Column 3)							
AMENDMENT	12/03/2018	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)				
	Total (37 CFR 1.16(i))	* 17	Minus ** 20	= 0	x \$100 =		0				
	Independent (37 CFR 1.16(h))	* 1	Minus *** 3	= 0	x \$460 =		0				
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
						TOTAL ADD'L FEE		0			
		(Column 1)	(Column 2)	(Column 3)							
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)				
	Total (37 CFR 1.16(i))	*	Minus **	=	x \$0 =						
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x \$0 =						
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
						TOTAL ADD'L FEE					
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.						SLIE					
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".						/ALA H HUNTER/					
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".											
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.											

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/974,343	05/08/2018	Edwin S. Olson	4820.001US9	1072
21186	7590	01/14/2019		
SCHWEGMAN LUNDBERG & WOESSNER, P.A.			EXAMINER	
P.O. BOX 2938			ORLANDO, AMBER ROSE	
MINNEAPOLIS, MN 55402				
			ART UNIT	PAPER NUMBER
			1776	
			NOTIFICATION DATE	DELIVERY MODE
			01/14/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

SLW@blackhillsip.com
uspto@slwip.com

Office Action Summary**Application No.**

15/974,343

Applicant(s)

Olson et al.

Examiner

AMBER R ORLANDO

Art Unit

1776

AIA Status

No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/03/2018.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-10,14 and 21-26 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-10,14 and 21-26 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 4) ☐ Other: ____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the

contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

Claim 1-3 and 5-8, 14 and 21-26 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 in view of Nelson Jr. US 2004/0003716.

For claims 1 and 26, the Felsvang et al. reference discloses a method for separating mercury from a mercury-containing gas, the method comprising: combusting a mixture of coal and an additive that has been added to the coal to form the mercury-containing gas (column 5, lines 23-25, lines 60-65 and column 4, lines 42-45) wherein the combusting of the mixture is performed at a coal combustion facility site (column 4, lines 39-47), adding a particulate sorbent material comprising activated carbon into the mercury-containing gas (column 6, lines 11-14 and lines 24-26); promoting at least a portion of the particulate sorbent material by reacting the sorbent material with a promoter in-flight in a gas stream at the coal combustion facility site comprising contacting the particulate sorbent material dispersed in the gas stream with the promoter to form a promoted sorbent material; (column 4, lines 5-15 and column 4, lines 42-45 and the figure) capturing reacting mercury in the mercury-containing gas with the sorbent material, to form a mercury-sorbent (column 6, lines 24-28); and separating the mercury-sorbent from the mercury-containing gas (column 5, lines 57-65). The reference does not disclose the additive comprising a bromide compound, Br_2 , HBr and Br^- , promoting at least a portion of the sorbent material by chemically reacting the sorbent material with a promoter that comprises HBr , Br^- or a combination thereof, to form a promoted sorbent material.

The Nelson reference discloses the additive comprising a bromide compound, Br_2 , HBr and Br^- and promoters including HBr , Br^- or a combination thereof (Nelson paragraphs [0017] and [0041]).

It would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. reference to either replace the Cl promoter/additive with or include in addition to the Cl promoter/additive, with an additive comprising a bromide compound, Br_2 , HBr and Br^- and promoters including HBr, Br^- or a combination thereof (Nelson paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

The combination of references above would result in promoting at least a portion of the sorbent material by chemically reacting the sorbent material with a promoter (as shown in Felsvang et al. above) that comprises HBr, Br^- or a combination thereof (as shown in Nelson above), to form a promoted sorbent material promoting (as shown in Felsvang et al. above). The examiner also points to Felsvang et al. which discloses that the halogen and the activated carbon exhibit a synergistic effect enabling an extremely efficient Hg removal (column 6, lines 8-11).

For claim 2, the Felsvang reference discloses mixing the additive and the coal before combusting the coal (column 4, lines 42-45).

For claim 3, the Nelson reference discloses the additive mixed with the coal is in a liquid (paragraph [0064]).

For claims 5 and 6, and as detailed above, each of the claimed steps is disclosed by the combination of Felsvang and Nelson reference and therefore the result of performing the steps would inherently be the same and would result in the promoted sorbent material comprises active sites, wherein the active sites comprise halide anions bound to the activated carbon and the promoted sorbent material comprises active sites, wherein the active sites comprise carbocations bound to halide anions.

For claims 7 and 8, the promoted sorbent is disclosed by the combination of Felsvang and Nelson as disclosed above. Each of the steps as claimed are also disclosed by Felsvang and Nelson and would inherently have the same results when the method is performed i.e. chemically reacting the

sorbent material with the additive in the mercury-containing gas comprises chemically reacting carbene species edge sites in the activated carbon with the additive and carbocations in the activated carbon of the mercury-sorbent accept electrons from mercury atoms of the mercury-sorbent.

For claim 14, the Felsvang et al. reference discloses the activated carbon is chosen from powdered activated carbon, granular activated carbon, carbon black, carbon fiber, aerogel carbon, pyrolysis char, and combinations thereof (column 3, lines 5-23).

For claim 21, the Felsvang et al. reference discloses that the coal and the additive are mixed prior to the combustion step as well as the combustion furnace where combustion occurs (column 3 lines 43-47 and column 4, lines 23-26). The examiner asserts that this would include coal and the additive being mixed at a location upstream of a combustion furnace where combustion occurs. Further while the reference does not explicitly state "at a location upstream of the combustion furnace" it would be well within the level of ordinary skill in the art to modify the Felsvang et al. reference to include the coal and the additive being mixed at a location upstream of the combustion furnace as this does not fundamentally change the reaction step and is merely a rearrangement of parts/steps.

For claims 22 and 23, the Felsvang et al. reference discloses separating greater than 70 wt% of the mercury from the mercury-containing gas on the sorbent (examples 1, 3 and 4). Further the examiner asserts that these limitations are the result of the method. As the method is disclosed by Felsvang et al. and Nelson as shown above, the result of such a combination would occur i.e. separating greater than 70 wt% of the mercury from the mercury-containing gas on the sorbent.

For claim 24, the Felsvang et al. reference does not explicitly state the sorbent material has a composition comprising from about 1 to about 30 grams of additive per 100 grams of activated carbon. The reference does disclose optimizing the amount of Cl and activated carbon introduced (column 6, lines 42-46).

Further the Nelson reference also discloses optimizing of additive so as to obtain a desired mercury reactivity (paragraph [0054]).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang et al. reference to include state the sorbent material has a composition comprising from about 1 to about 30 grams of additive per 100 grams of activated carbon (Felsvang et al. column 6, lines 42-46 and Nelson paragraph [0054]) so as to adjust the amount of halogen introduced based on the Hg content and to ensure optimum reaction between the halogen and the activated carbon. Further the courts have held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

For claim 25, the Felsvang et al. reference discloses the method is a method for reducing mercury in the mercury-containing gas to a desired level, wherein separating the mercury-sorbent from the mercury-containing gas forms a cleaned gas (column 5, lines 45-50), the method further comprising: monitoring the mercury content of the cleaned gas; and controlling, in response to the monitored mercury content of the cleaned gas, an introduction rate (amount would include introduction rate) of the sorbent into the mercury-containing gas, the sorbent composition, or a combination thereof, so that, the mercury content of the cleaned gas is maintained at or below the desired level (column 6, lines 42-47).

The Felsvang et al. reference does not disclose injection as a means of introduction.

The Nelson reference discloses injection (abstract).

It would have been obvious to one having ordinary skill in the art to modified Felsvang et al. to have the means of introduction be injection (Nelson abstract) so as to allow for the components of the system to be entered into the system.

Claim 4 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716 as applied in claim 3 above and further in view of Srinivasachar et al. US 6,848,374.

For claim 4, the Felsvang and Nelson combination does not disclose the liquid is a hydrocarbon, a chlorinated hydrocarbon, supercritical carbon dioxide water, salt solution, or a combination thereof.

The Srinivasachar et al. reference discloses the liquid is a salt solution (column 6, lines 5-10).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang and Nelson combination to include the liquid is a salt solution (Srinivasachar et al. column 6, lines 5-10) so as to allow the halogen to be sprayed and therefore deposited on the sorbent particles.

Claim 9 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716 as applied in claim 1 above and further in view of Srinivasachar et al. US 6,848,374.

For claim 9, the Felsvang and Nelson combination does not disclose wherein the additive is substantially in vapor form in the mercury-containing gas.

The Srinivasachar et al. reference discloses wherein the additive is substantially in vapor form in the mercury-containing gas (column 6, lines 13-18).

It would have been obvious to one having ordinary skill in the art before the invention was made to have modified the Felsvang and Nelson combination to include wherein the additive is substantially in vapor form in the mercury-containing gas (Srinivasachar et al. column 6, lines 13-18) so as to allow the halogen to be deposited on the sorbent particles via condensing/adsorbing.

Claim 10 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716 as applied in claim 1 above and further in view of Gadkaree US 6,136,749.

The combination of Felsvang et al. and Nelson do not disclose the additive comprises Ca, Na, or a combination thereof.

The Gadkaree reference discloses the additive comprises Ca, Na, or a combination thereof (column 3, lines 58-65 and claim 10).

It would have been obvious to one having ordinary skill in the art to have modified the Felsvang et al. and Nelson combination to include the additive comprises Ca, Na, or a combination thereof (Gadkaree column 3, lines 58-65 and claim 10) so as to enhance the activity of the activated carbon catalyst.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file

provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(I)(1) - 706.02(I)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. US 7,435,286 ('286) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '286 except for combusting a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '286 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-25 of U.S. Patent No. US 8,168,147 ('147) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '147 except a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '147 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,512,655 ('655) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '655 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '655 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65

and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-60 of U.S. Patent No. US 8,821,819 ('819) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '819 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '819 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-33 of U.S. Patent No. US 9,757,689 ('689) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '689 except combusting a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '689 reference to include combusting a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. US 9,468,886 ('886) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '886 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '886 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of U.S. Patent No. 8,652,235 ('235) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '235 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '235 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-16 of copending Application No. 15/295594 ('594) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '594 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '594 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson

paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 8-20 of copending Application No. 15/589359 ('359).

Although the claims at issue are not identical, they are not patentably distinct from each other because while the current claim set includes different wording the limitations correspond to '359.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '029 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 14/712558 ('558). Although the claims at issue are not identical, they are not patentably distinct from each other because while the current claim set includes different wording the limitations correspond to '558.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of copending Application No. 15/951970 ('970). Although the claims at issue are not identical, they are not patentably distinct from each other because while the current claim set includes different wording, the limitations correspond to '970.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/382114 ('114) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '114 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '114 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/853029 ('029) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '029 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '029 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claims 1-10, 14 and 21-26 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over 1-20 of copending Application No. 15/978,760 ('760) in view of Felsvang et al. US 5,435,980 and Nelson Jr. US 2004/0003716.

The current claim set corresponds to '760 except for a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas.

Felsvang et al. and Nelson references disclose this limitation as shown above.

It would have been obvious to one having ordinary skill in the art to have modified the '760 reference to include a mixture of coal and an additive, the additive comprising a bromide compound that has been added to the coal, to form the mercury-containing gas (Felsvang et al. column 5, 60-65 and column 4, lines 42-45 and Nelson paragraphs [0017] and [0041]) so as to supplement the halogen content of the system so as to increase the mercury sorption capability.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Response to Arguments

Applicant's arguments filed 12/03/2018 have been fully considered but they are not persuasive.

I. The 112 rejection of claims 1, 7 and 23-25 has been overcome by the claim amendment.

II A. The applicant traverses the combination of Felsvang and Nelson combination stating that there is no motivation for a person of ordinary skill in the art to use Nelson's bromide additives in Felsvang's process. The applicant contends that one having ordinary skill in the art would not be motivated to replace Felsvang's chloride-treatment with treatment by another material as the prior art does not disclose the bromide additives performing the same or better mercury-removal efficiency.

The examiner disagrees. See Fig. 14 of Nelson which shows that about 3 times the amount of chlorine treated PAC was required to achieve the same degree of mercury removal as with bromine. (paragraph [0085]). Also see the absorption rate in the table on page 8. Further as the rejection above states. Both chlorine and bromine are known within the art to treat activated carbon and therefore it would be well within the capability of one having ordinary skill in the art to *either replace the Cl with or include in addition to* the halogen or halide promoter comprising HBr, Br⁻, or a combination thereof to promote activated carbon (Nelson paragraphs [0017] and [0041]) so as to provide an effective carbon sorbent for mercury.

The applicant contends that the Nelson reference does not disclose HBr and Br⁻ being more effective with activated carbons than chlorides.

The examiner disagrees. The Nelson reference discloses that HBr is used to provide bromide to the system. Example 5, paragraph [0083] states that the brominated PACs were treated with HBr or Br₂. Figures 14 and 15 disclose that HBr treated PAC performs better than chlorine treated PAC. Further one having ordinary skill in the art would expect PAC treated with HBr or Br₂ would result in a very similar modified PAC as they both include bromide (see paragraph [0092] which discloses that each of the brominated PACs performed similarly). The examiner also points to paragraph [0087] of Nelson which discloses that PAC adsorption of gaseous hydrogen bromide being ten times faster than it was for chlorine.

II(B)(1). The applicant contends that the bromide promoters are more effective for mercury removal than treating the sorbent with bromide or bromine additives outside the mercury-containing gas. The applicant further provides a graph to demonstrate these unexpected results.

These unexpected results are not commensurate with the scope of the claims. The applicant is claiming HBr and Br⁻ while the graph only demonstrates HBr. Further the comparisons between the prior art and that of the current invention do not demonstrate unexpected results. The applicant's data is unclear as it is either HBr (as specified in the actual graph) or NaBr (as specified in the legend). Further the 18.2 data point has no labeling on what the promoter is. None of the data points include what amount is being specified, wt%, vol% etc. The results would be expected by one having ordinary skill in the art as the wt% (if we are to assume the amount specified is wt) of the amount supported on the upper most line is greater than that of the wt% on the middle trending line. Further claim 1 does not include NaBr on coal. Lastly is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods.

The second graph on page 14 comparing NaBr on coal to HBr treated AC and it is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods. To do that the graph would have to be comparing HBr in the present method to HBr in the prior art method. Further the applicant has not shown the amount of promoter supported by each (wt%) data point. Lastly claim 1 does not include NaBr on coal.

The third graph on page 15 compares HBr treated AC and NaBr on coal with AC injected into flue gas. The graph states Milligram of HBr/MMacF/1%Hg Removed. As HBr is not a part of the current application data points it is unclear how to interpret this graph. Claim 1 does not include NaBr on coal. Further it is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods.

II(B)(2). The applicant contends that there is no way a person of ordinary skill in the art could predict from the cited references that in-flight promotion of a sorbent with bromide promoters is more effective for mercury removal.

The examiner contends that the applicant has not established that it is more effective.

II(C)(1). The applicant contends that one having ordinary skill in the art would not have predicted in-flight chloride promotion of activated carbon to be more effective for mercury removal than in-flight chloride promotion.

The examiner disagrees. Nelson discloses that bromide is a better promoter of AC for the purpose of mercury removal as shown above. Therefore one having ordinary skill in the art would expect an in-flight bromide promoted sorbent to be superior to an in-flight chloride promoted sorbent.

II(C)(2). The applicant argues that one having ordinary skill in the art would not predict this advantage from the cited references.

The examiner disagrees for the reasons stated above.

II(D)(2). The applicant contends that "Even if a person of ordinary skill in the art compared the mercury removal of Felsvang's activated carbons promoted with Chloride in the flue gas to activated carbon treated with HCl outside of the flue gas, they would not determine that in-flight promotion provides the same or better mercury removal properties".

This appears to be merely conjecture by the applicant as no factual evidence has been presented.

The graphs on pages 20 and 22, has NaCl compared to HCl. It is unclear if the results are because of the different components being reacted or because of the different method being used. In order to establish that the method being used has unexpected results the components used must be the same for both methods. Further the examiner points to the y-axis which has HCl which is not included in one set (NaCl) of the data points so it is unclear how the data points are being obtained.

The applicant contends that using activated carbon treated with bromide additives outside the flue gas and subsequently injected into the flue gas containing bromide promoters for in-flight promotion results in greater mercury removal than using activated carbon only treated with bromide additives.

The results shown only described HCl and Br₂, HCl not being within the current claim set and Br₂ not encompassing each of the limitations claimed. Therefore the results shown are not commensurate with the scope of the claim. Further the results shown in the Mercury Vapor Species at ESP Outlet and %Hg Removal, disclose NaBr and NaCl, which is not claimed. Lastly the assertion is not commensurate with the scope of the claim as activated carbon treated with bromide additives outside the flue gas is not being claimed. Further the examiner asserts that merely adding more bromide to the activated carbon to produce more Hg removal would be expected as a great amount of bromide added to activated carbon results in greater Hg removal (Nelson paragraph [0054]).

Response to Amendment

The Declaration under 37 CFR 1.132 filed 12/03/2018 is insufficient to overcome the rejection of claims based upon pre-AIA 35 U.S.C 103(a), Felsvang et al. US 5,435,80 in view of Nelson Jr. US 2004/0003716 as set forth in the last Office action because: the facts presented are not germane to the rejection at issues and the showings are not commensurate in scope with the claims.

Sections 2-5 details experimental parameters.

Section 5 and 6 detail data comparing NaBr on coal and injectin untreated activated carbon into the flue gas, placing NaBr on the coal and injecting 5% wt HCl outside the flue gas provided greater mercury removal.

The results shown only described HCl and Br₂, HCl not being within the current claim set and Br₂ not encompassing each of the limitations claimed. Therefore the results shown are not commensurate with the scope of the claim. Further the results shown in the Mercury Vapor Species at ESP Outlet and %Hg Removal, disclose NaBr and NaCl, which is not claimed.

Further the appellant contends that injecting activated carbon into the flue gas treated with Br₂ outside the flue gas compared to NaBr on the coal an injecting activated carbon into the flue gas treated with Br₂ outside the flue gas provided greater mercury removal, the latter having a greater removal rate than the former being unexpected.

The examiner disagrees. the examiner asserts that merely adding more bromide to the activated carbon to produce more Hg removal would be expected as a great amount of bromide added to activated carbo results in greater Hg removal (Nelson paragraph [0054]).

Sections 7-9 detail using NaBr on coal with injection of the HCl-treated active carbon and with injection of the HCl activated carbon from the procedure at item 3 without NaBr on coal. Section 9 asserts that NaBr on the coal and injecting activated carbon into the flue gas treated with HCl outside

Art Unit: 1776

the flue gas provided greater mercury removal than that of only activated carbon without NaBr injected into the flue gas stream and then treated with HCl.

Again the examiner asserts that this is not unexpected as it was known within the prior art to add more additives/promoters so as to remove more mercury. See Nelson and Felsvang et al both of which detail adding more Bromine and/or Chlorine for greater removal of mercury. Further the results shown detail NaBr and HCl which are not currently claimed and therefore the results shown are not commensurate with the scope of the claim.

Sections 10-12 detail experimental parameters.

Section 14 details that compared to placing NaBr on coal and injecting untreated activated carbon into the flue gas, placing NaBr on coal and injecting activated carbon into the flue gas treated with Br₂ outside the flue gas provided greater mercury removal.

The examiner asserts that this is not unexpected as it was known within the prior art to add more additives/promoters so as to remove more mercury (see Nelson above). Further the results shown are not commensurate with the scope of the claims as NaBr is not claimed and the process of placing NaBr on coal and injecting activated carbon into the flue gas treated with Br₂ outside the flue gas is not claimed.

Sections 15-16 detail experimental parameters.

Section 17 details comparing placing NaCl on coal and injecting untreated activated carbon into the flue gas and placing NaCl on the coal and injecting activated carbon into the flue gas treated with HCl outside the flue gas provided greater mercury removal.

The examiner asserts that this is not unexpected as it was known within the prior art to add more additives/promoters so as to remove more mercury. See above which details Felsvang et al above which discloses multiple injection points of HCl as well as in-flight promotion. In fact the entire point of Felsvang is that increasing the amount of Cl within the gas stream by whatever means increases the

mercury removal (column 3, lines 56-66). Further the results shown are not commensurate with the scope of the claims as NaCl and HCl are not claimed.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMBER ROSE ORLANDO whose telephone number is (571)270-3149. The examiner can normally be reached on Monday-Thursday 7:00-5:30.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571)272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained

Art Unit: 1776

from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AMBER ROSE. ORLANDO
Primary Examiner
Art Unit 1776

/AMBER R ORLANDO/
Primary Examiner, Art Unit 1776

<i>Search Notes</i> 	Application/Control No. 15/974,343	Applicant(s)/Patent Under Reexamination Olson et al.
	Examiner AMBER R ORLANDO	Art Unit 1776

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Text Search (SEE EAST SEARCH HISTORY)	07/23/2018	AO
IDS Search (EAST and DAV)	07/23/2018	AO
Inventor Search (EAST)	07/23/2018	AO
Inventor Search (EAST)	10/24/2018	AO
Text Search (SEE EAST SEARCH HISTORY)	10/24/2018	AO
Text Search (SEE EAST SEARCH HISTORY)	01/07/2019	AO

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/AMBER R ORLANDO/ Primary Examiner, Art Unit 1776	
--	--

Modified form PTO/SB/08A(04-07) OMB 851-0031

US Patent & Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)	<i>Complete if Known</i>	
	Application Number	15/974,343
	Filing Date	May 8, 2018
	First Named Inventor	Edwin S. Olson
	Group Art Unit	1776
	Examiner Name	Amber Orlando
Sheet 1 of 1	Attorney Docket No: 4820.001US9	

US PATENT DOCUMENTS

Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document
	US-10,130,930	11/20/2018	Olson, Edwin S
	US-20180229182A1	8/16/2018	Olson, Edwin S., et al.
	US-20180280870A1	10/4/2018	Olson, Edwin S, et al.

FOREIGN PATENT DOCUMENTS

Examiner Initial *	Foreign Document Number	Publication Date	Name of Patentee or Applicant of cited Document	T 1

OTHER DOCUMENTS - NON PATENT LITERATURE DOCUMENTS

Examiner Initial *	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 1
	"Application Serial No. 14/712,558, Non Final Office Action mailed 10-19-18", 26 pgs	
	"Application Serial No. 14/712,558, Non-Final Office Action mailed 10-19-18", 35 pgs	
	"Application Serial No. 14/712,558, Response filed 08-14-18 to Non Final Office Action mailed 07-02-18", 11 pgs	
	"Application Serial No. 15/295,594, Non Final Office Action mailed 10-23-18", 20 pgs	
	"Application Serial No. 15/382,114, Response filed 09-12-18 to Restriction Requirement mailed 08-28-18", 8 pgs.	
	"Application Serial No. 15/382,114, Restriction Requirement mailed 08-28-18", 9 pgs	
	"Application Serial No. 15/589,359, Final Office Action mailed 09-12-18", 14 pgs	
	"Application Serial No. 15/589,359, Non Final Office Action mailed 10-22-18", 12 pgs	
	"Application Serial No. 15/589,359, Response filed 09-14-18 to Final Office Action mailed 09-12-18", 18 pgs.	
	"Application Serial No. 15/978,760, Non Final Office Action mailed 10-10-18", 17 pgs	
	"Application Serial No. 15/997,091, Non Final Office Action mailed 11-02-18", 27 pgs	
	"Application Serial No. 15/997,091, Response filed 08-14-2018 to Non Final Office Action mailed 07-27-18", 10 pgs	
	PIETRZAK, et al., "Preparation of nitrogen-enriched activated carbons from brown coal", Energy and Fuels 20.3, (2006), 1275-1280	

EXAMINER /AMBER R ORLANDO/

DATE CONSIDERED 01/07/2019

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.R.O/

Exhibit 2044

Page 392

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	45	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S2	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorben and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:19
S3	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and sorbent and promoter and activated carbond and mercury	US-PGPUB; USPAT	ADJ	ON	2013/09/09 09:20
S7	73	("20020150516" "4786483" "5409522" "5505766" "6383981" "6878358" "20020033097" "4530765" "5346674" "6080281" "4708853" "6027551" "6136072" "6258334" "6818043" "20060057044" "20080207443" "20010002387" "3826618" "4814152" "4820318" "4889698" "5891324" "6528030" "20050227146" "5419834" "7942566" "20080134888" "3662523" "3849267" "4196173" "4500327" "6942840" "20020134242" "20030136509" "20050147549" "20060112823" "20080134888" "6471936" "20010003116" "20050019240" "20060048646" "4956162" "5575982" "6372187" "6375909" "7435286" "7514052" "20050074380" "20090081092" "5288306" "1984164" "4101631" "5695726" "6080281" "6848374" "20050000197" "5300137" "5607496" "5672323" "6214304" "6953494" "5245120" "20070168213" "7938571" "20040003716" "20040013589" "3194629" "3786619" "5827352" "20040109800" "20070295347" "5435980" "6136749" "20030206846").PN.	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:25
S8	13	"11209163"	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S9	3	"11209163" and non carbon	US-PGPUB; USPAT	ADJ	ON	2015/03/17 12:28
S10	161	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:49
S11	0	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50

		sorbent and promoter and activated carbon and mercury				
S12	116	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/03/17 13:50
S13	172	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S14	67	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2015/08/20 22:04
S15	67	"6136749"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:11
S16	20	"684374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S17	1	"20040003716"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S18	68	"6848374"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:12
S19	41	"7435286"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S20	13	"8168147"	US-PGPUB; USPAT	ADJ	ON	2016/05/27 09:13
S21	69	(95/134.ccls. or 95/142.ccls. or 110/345.ccls. or 423/210.ccls.) and activated carbon and promoter	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S22	181	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/06/07 09:06
S25	28	"5266280"	US-PGPUB; USPAT	ADJ	ON	2016/06/07 13:41
S26	281	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:01
S27	148	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 15:02
S28	159	sorbent with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/09/29 16:18
S29	206	(sorbent or activated carbon) with mercury and (diameter or size) with ("30" or "40" or "50" or "60" or "70") with (sorbent or carbon) and halogen\$4 and	US-PGPUB; USPAT; USOCR; FPRS;	ADJ	ON	2016/09/29 16:22

		activated carbon	EPO; JPO; DERWENT; IBM_TDB			
S30	195	(B01D53/64, B01D2257/602, B01D2253/104, B01D2253/10, B01D53/10).cpc. and (halogen or halide of HBr) with sorbent	US-PGPUB; USPAT	ADJ	ON	2016/09/30 13:48
S33	6	"20040003719"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:56
S34	49	"2004003716"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:57
S35	81	"6848374"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 10:58
S36	56	"7435286"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:02
S37	7	olson.in. and ("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:04
S38	0	("40" microns and halocarbon sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S39	0	(halocarbon sorbent).clm. and "40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:05
S40	65	"40" microns and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	ADJ	ON	2016/11/16 11:06

			DERWENT; IBM_TDB			
S41	3907	("40" microns).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S42	29	("40" microns and sorbent).clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:06
S43	1	(halocarbon sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S44	36	(sorbent).clm. and olson.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S45	0	(sorbent).clm. and olson.in. and "40" micron	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:08
S46	17	"11209163"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:09
S47	2	"20110233133"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:27
S48	7	"20110023427"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2016/11/16 11:28
S49	15	"2004025274"	US-PGPUB; USPAT; USOCR;	ADJ	ON	2016/11/16 11:32