

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIBERTY ENERGY, INC. AND LIBERTY OILFIELD SERVICES LLC,
Petitioners,

v.

U.S. WELL SERVICES, LLC,
Patent Owner.

IPR2024-01274
U.S. Patent No. 11,091,992 B2

**DECLARATION OF MICHAEL NIKOLAOU IN SUPPORT OF PATENT
OWNER'S REVISED MOTION TO AMEND**

TABLE OF CONTENTS

	Page
I. INTRODUCTION	5
II. QUALIFICATIONS AND COMPENSATION.....	15
III. RELEVANT LEGAL STANDARDS.....	21
A. Patent Claims.....	21
A. Burden of Proof for Invalidity.....	22
B. Anticipation.....	22
C. Obviousness.....	23
D. Written Description	26
E. Construing the Meaning of Claim Terms.....	27
F. Person of Ordinary Skill in the Art	28
G. Prior Art.....	28
IV. U.S. PATENT NO. 11,091,992	29
V. CLAIM CONSTRUCTION	30
VI. OVERVIEW OF ALLEGED PRIOR ART REFERENCES	30
A. Coli (EX-1004).....	31
B. Birch (EX-1005).....	32
C. Rusnak (EX-1007).....	32
D. Dykstra (EX-1006).....	33
E. Hunt (EX-1008).....	33
VII. PATENT OWNER’S SUBSTITUTE CLAIMS ARE PATENTABLE	34
A. Proposed Substitute Claims.....	34

B.	The Original Application for the '992 Patent Includes Support for the Proposed Substitute Claims	45
C.	The Proposed Substitute Claims are Patentable Over the Cited Prior Art.....	99
1.	Ground 1A – The Combination of Coli, Birch, and Rusnak	99
2.	Ground 1B – The Combination of Coli, Birch, Rusnak, and Dykstra	101
3.	Ground 2A – The Combination of Coli, Birch, Rusnak, and Hunt.....	103
4.	Ground 2B – The Combination of Coli, Birch, Rusnak, Dykstra, and Hunt	104
5.	Ground 3A – The Combination of Coli, Birch, Rusnak, Broussard079, and Broussard601	105
6.	Ground 4A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman.....	106
7.	Ground 5A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and Gensel	113
8.	Ground 6A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Gensel, and Omont.....	115
9.	Ground 7A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, and Bromell	117
10.	Ground 8A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, Bromell, and Thompson	118
11.	Ground 9A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, and Broussard601	120
12.	Ground 10A – The Combination of Coli, Birch, Rusnak, Broussard079, Broussard601, and Discenzo	121
13.	Ground 11A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and McIver	124
14.	Additional references considered.....	126

VIII. CONCLUSION.....	126
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I, Michael Nikolaou, make this declaration in connection with patent owner Revised Motion to Amend submitted by Patent Owner for U.S. Patent No. 11,091,992. All statements made herein of my own knowledge are true, and all statement made herein based 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 fine or imprisonment, under Section 1001 of Title 18 of the United States Code. Although I am being compensated for my time in preparing this declaration, the opinions expressed herein are my own, and I have no stake in the outcome of this proceeding or any related litigation or administrative proceedings.

Date: October 20, 2025

A handwritten signature in black ink, appearing to read "Michael Nikolaou", with a long horizontal flourish extending to the right.

Michael Nikolaou, Ph.D.

I. INTRODUCTION

1. I have been retained as an independent consultant on behalf of U.S. Well Services, LLC in the matter of the *Inter Partes* Review of U.S. Patent No. 11,091,992 (the “’992 Patent”) (EX-1001)¹ to Broussard et al. (“Broussard”), assigned to U.S. Well Services, LLC (“Patent Owner” or “USWS”). I am being compensated for the time I spend on this matter, in addition to expenses. My compensation in this case is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

2. For my Second Declaration, I have reviewed proposed substitute claims 41–59 (“Substitute Claims”)² in the Revised Motion to Amend, Appendix A. As I discuss in detail below, it is my opinion that the Substitute Claims of the ’992 Patent are patentable, and that the limitations of the Substitute Claims are not disclosed by the prior art references cited by Petitioners in this *Inter Partes* Review.

¹ In this Declaration, I reference documents by exhibit numbers that, as I understand, are attached as exhibits in this *Inter Partes* review of the ’992 Patent.

² For purposes of this Second Declaration, the term “Substitute Claims” refers to proposed substitute claims 41–59.

3. I have been asked to consider, and provide my opinions regarding, whether the Substitute Claims 41–59 are patentable. I have also been asked to consider and provide my opinions regarding whether the alleged prior art references cited in this proceeding disclose the features recited in certain claims of the '992 Patent (Substitute Claims 41–59, substituted in place of original claims 1–20), which I understand Petitioners have challenged in this IPR proceeding. It is my opinion that the alleged prior art references do not teach or disclose Substitute Claims 41–59. This declaration is based on the information currently available to me. To the extent that additional information becomes available, I reserve the right to continue my investigation and analysis, which may include review of documents and information that may be produced, as well as testimony from depositions that have not yet taken place. My opinions are set forth below.

4. I have previously provided a declaration Exhibit 2007 (“First Declaration”) in this IPR, which accompanied Patent Owner’s Motion to Amend. This Second Declaration is provided to accompany Patent Owner’s Revised Motion to Amend. In many instances, my First Declaration remains applicable to the Revised Motion to Amend. Thus, to the extent necessary, I incorporate my First Declaration into this Second Declaration.

5. In the preparation of this declaration, I have reviewed the Parties' papers and exhibits in this case (IPR2024-01274), including the following documents:

Exhibit No.	Description
1001	U.S. Patent No. 11,091,992 by Joel Broussard et al. entitled "System for Centralized Monitoring and Control of Electric Powered Hydraulic Fracturing Fleet" (the "'992 Patent")
1002	File History for U.S. Patent No. 11,091,992
1003	Declaration of Dr. Robert Durham
1004	U.S. Patent Publication No. 2012/0255734 by Coli et al., "Mobile, modular, electrically powered system for use in fracturing underground formations," ("Coli") filed April 6, 2012 and published October 11, 2012.
1005	U.S. Patent No. 5,606,853 to Birch et al., "Gaseous Fuel Compression and Control System for Gas Turbine Engine," ("Birch") filed April 28, 1995 and issued on March 4, 1997.
1006	U.S. Patent Publication No. 2008/0236818 by Dykstra, "Method and Apparatus for Controlling the Manufacture of Well Treatment Fluid," ("Dykstra") filed March 27, 2007 and published on October 2, 2008.
1007	U.S. Patent Publication No. 2008/0288115 by Rusnak et al., "Intelligent Pump System," ("Rusnak") filed May 14, 2007 and published November 20, 2008.
1008	U.S. Patent Publication No. 2010/0038907 by Hunt et al., "Power Generation," ("Hunt") filed April 30, 2009 and published February 18, 2010.
1009	IEEE100: THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS, 7 th ed. (IEEE Press: 2000), ISBN: 0-7381-2601-2 ("IEEE Standards Dictionary")

1010	U.S. Patent No. 9,410,410
1011	U.S. Patent No. 9,970,278
1012	Chart Comparing Claims of the '992 Patent and the '278 Parent Patent
1013	Complaint SDTX-4-24-cv-00839-1
1014	Interim Procedure for Discretionary Denials
1015	Federal Court Management Statistics June 30, 2024
1016	Roe
1017	Electrical Engineering Reference Manual for the Electrical and Computer PE Exam, Sixth Edition
1018	US. Patent No. 1,743,771
1019	Standard Handbook for Electrical Engineers, Thirteenth Edition
1020	U.S. Patent Publication No. 2011/0241590A1
1021	Red Book
1022	Second Declaration of Dr. Robert Durham
1023	Deposition Transcript of Dr. Michael Nikolaou in IPR2024-01274
1024	U.S. Patent Pub. No. 2014/0138079 by Broussard et al., "System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps," ("Broussard079"), filed Nov. 16, 2012, published May 22, 2014
1025	U.S. Patent No. 8,789,601 by Broussard et al., "System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps," ("Broussard601"), filed Feb. 26, 2014, published Jun. 26, 2014, and issued Jul. 29, 2014
1026	U.S. Patent No. 5,790,972 by Kohlenberger, "Method and Apparatus for Cooling the Inlet Air of Gas Turbine and Internal Combustion Engine Prime Movers," ("Kohlenberger"), filed Aug. 24, 1995, and issued Aug. 4, 1998

1027	U.S. Patent No. 8,747,533 by Ekanayake and Scipio, “Systems and Methods to Determine Fouling in a Gas Turbine Filter,” (“Ekanayake”), Apr. 30, 2013, and issued June 10, 2014
1028	U.S. Patent No. 8,552,728 by Weiher, “Sluggish Circuit Breaker Detection System and Method,” (“Weiher”), filed Nov. 30, 2010, and issued Oct. 8, 2013
1029	European Patent No. 0023879 by Newman, “Engine module life tracking system,” (“Newman”), filed August 4, 1980, and published January 30, 1985
1030	Rosemount Model 3051 Transmitter Product Manual
1031	Rosemount 848T High Density Temperature Transmitter Reference Manual
1032	Declaration of Mina Ching, Internet Archive
1033	U.S. Patent App. Pub. No. 2009/0188682 by Gensel <i>et al.</i>
1034	Whitaker, “AC Power System Handbook,” 3rd Ed., CRC Press (2007)
1035	U.S. Patent No. 1,717,071, by Smith and Smith
1036	U.S. Patent No. 3,605,919, by Bromell and Homanick
1037	U.S. Patent App. Pub. No. 2009/0181582 by Thompson
1038	U.S. Patent No. 7,949,483 by Discenzo et al
1039	U.S. Patent App. Pub. No. 2013/0142601 by McIver and Cunningham
1040	International Publication No. WO2016/019219 by Omont et al
1041	Gardner Denver GD-2500 Quintuplex Well Servicing Pump Operating and Service Manual
1042	Tutterow, V. and McKane, A. T., “Variable Speed Pumping: A Guide to Successful Applications,” Europump and Hydraulic Institute, 2004

1043	Mark's Standard Handbook for Mechanical Engineers, Eleventh Edition, McGraw-Hill Companies, New York, 2007
1044	Langewis, Jr., C. and Gleeson, C. W., "Practical Hydraulics of Positive Displacement Pumps for High-Pressure Waterflood Installations," Society of Petroleum Engineers, February 1971
1046	NFPA 79, "Electrical Standard for Industrial Machinery" National Fire Protection Association, Quincy, Mass, 1962-2007
1047	Pearson, "Proposed HSE guidelines on emergency shutdown systems," 1989 A First International Conference on the Use of Programmable Electronic Systems in Safety Related Applications Computers and Safety, 1989, pp. 55-58
1048	Gilson, Bill. "Fast Response System for Large-Volume Acid Stimulation." Paper presented at the Offshore Technology Conference, Houston, Texas, May 1996
1049	Rex Burgos; Marc Allcorn; Robin Mallalieu; Jorge Vicens "Eliminating Human Error during Coiled Tubing Operations," SPE Production & Operations 22 (03) (June 2006): 335–338. DOI: 10.2118/100164-PA
1050	J. J. Sammarco, "Programmable electronic and hardwired emergency shutdown systems: a quantified safety analysis," Fortieth IAS Annual Meeting. Conference Record of the 2005 Industry Applications Conference, 2005., 2005, pp. 210-217 Vol. 1, doi: 10.1109/IAS.2005.1518312
1051	Kurz, Rainer, and Robert C. White. "Modeling Emergency Shutdowns of Centrifugal Compressors." Paper presented at the PSIG Annual Meeting, Galveston, Texas, May 2009

6. Further, I have considered the following additional references:

Ex. No.	Patent No.	Issue Date	Name of Patentee / Applicant
2008	US 8789601	2014-07-29	Broussard
2009	US 2014/0138079	2014-05-22	Broussard
2010	US 10,227,854	2019-03-12	Glass
2011	US 9,284,829	2016-03-15	Craig
2012	US 10,246,984	2019-04-02	Payne
2013	Canadian Patent No. 2,733,843		Coli-CA
2014	US 7,841,394	2010-11-30	McNeel
2015	US 8,997,904	2015-04-07	Cryer
2016	US 7,836,949	2010-11-23	Dykstra
2017	US 6,167,965	2001-01-02	Bearden
2018	US 8,874,383	2014-10-28	Gambier
2019	CN 202463670	2012-10-03	Li
2020	US 5,865,247	1999-02-02	Paterson
2021	US 5,189,388	1993-02-23	Mosley
2022	US 5,606,853	1997-03-04	Birch
2023	US 2007/0125544	2007-06-07	Robinson
2024	US 2016/0177678	2016-06-23	Morris
2025	US 2011/0063942	2011-03-17	Hagan
2026	US 2008/0264625	2008-10-30	Ochoa
2027	US 2008/0029267	2008-02-07	Shampine
2028	US 2013/0306322	2013-11-21	Sanborn
2029	US 2015/0078924	2015-03-19	Zhang
2030	US 2010/0310384	2010-12-09	Stephenson
2031	US 2007/0201305	2007-08-30	Heilman
2032	US 2011/0061855	2011-03-17	Case
2033	US 2016/0258267	2016-09-08	Payne
2034	US 2008/0137266	2008-06-12	Jensen
2035	US 2004/0167738	2004-08-26	Miller
2036	US 2012/0085541	2012-04-12	Love
2037	US 6,116,040	2000-09-12	Stark
2038	US 7,312,593	2007-12-25	Streicher
2039	US 2011/0241590	2011-10-06	Horikoshi
2040	US 2011/0197988	2011-08-18	Vliet
2041	US 8,379,424	2013-02-19	Grbovic
2042	US 8,174,853	2012-05-12	Kane

Ex. No.	Patent No.	Issue Date	Name of Patentee / Applicant
2043	US 5,712,802	1998-01-27	Kumar
2044	US 8,503,180	2013-08-6	Nojima
2045	2011/0194256	2011-08-11	De Rijck
2046	US 7,949,483	2011-05-24	Discenzo-483
2047	CA2707269	2018-08-21	Kidd
2048	US 8,155,922	2012-04-10	Loucks
2049	US 1,486,883	1924-03-18	Halliburton
2050	US 1,791,498	1931-02-10	Halliburton
2051	61/710,393	2015-09-22	Coli
2052	US 9,893,500	2018-02-13	Oehring
2053	CN 102602322	2014-04-30	Li
2054	CN 103089226	2016-04-20	Wang
2055	CN 204402781	2015-06-17	Yu
2056	CN 207829871	2018-09-07	Zhang
2057	US 2015/0114652	2015-04-30	Lestz
2058	US 2019/0003329	2019-12-31	Morris
2059	US 2019/0067991	2019-02-28	Davis
2060	US 2020/0040878	2023-11-14	Morris
2061	US 2020/0088202	2020-03-19	Sigmar
2062	WO 2017/039,692	2017-03-09	Beisel
2064	CN 105090423	2018-01-02	Yang
2065	CN 105134581	2017-08-29	Yu
2066	CN 203783839	2014-08-20	Yi
2067	CN 205025703	2016-02-10	Liu
2068	GB 1487208	1977-09-28	Vodafone '208
2069	GB 2235246	1989-08-09	Rostron '246
2070	US 3,518,897	1970-07-07	Bixby '897
2071	US 4,100,822	1978-07-18	Allan '822
2072	US 4,309,152	1982-01-05	Hagen '152
2073	US 7,901,314	2011-03-08	Salvaire '314
2074	US 8,596,165	2013-12-03	Kovach '165
2075	US 2004/0219040	2004-11-04	Kugelev '040
2076	US 2010/0093484	2010-04-15	Huang '484

Ex. No.	Patent No.	Issue Date	Name of Patentee / Applicant
2077	US 2017/0051732	2017-02-23	Hernandez '732
2078	US 2023/0265839	2023-08-24	Buckley '839
2079	WO 2015/024005	2015-02-19	Dalton '005
2080	WO 2015/027394	2015-03-05	Yao '394
2081	US 62/562,943	N/A	Buckley '943
2082	US 10,134, 257	2018-11-20	Zhang '257
2083	US 10,246,984	2019-04-02	Payne '984
2084	US 10,697,517	2020-06-30	Snir '517
2085	US 11,339,769	2022-05-24	Buckley '769
2086	US 2016/0032703	2016-02-04	Broussard '703
2087	US 7,621,328	2009-11-24	Case '328
2088	US 2015/0252661	2015-09-15	Glass
2089	US 2015/0027712	2015-01-29	Vicknair
2090	US 2009/0176417	2009-07-09	Rembach

7. In addition, I have considered the following exhibits:

Exhibit No.	Description
2002	US Patent 11,136,870 to Broussard
2003	Dr. Robert Durham Deposition Taken November 15, 2023 in IPR2025-00558 regarding U.S. Patent No. 11,136,870
2004	Declaration of Dr. Robert A. Durham, dated February 10, 2023 in IPR2025-00558 addressing U.S. Patent No. 11,136,870
2005	US 14/884,363 CIP Application filed 10-15-2025 to Broussard
2108	Dr. Robert Durham Deposition Taken October 8, 2025

8. In forming my opinions expressed below, I have considered the documents listed in above paragraphs 5 through 7, along with any other references cited in my declaration, as well as my knowledge and experience based on my work in this area as described below.

9. I have been asked to consider the time of the alleged invention to be around October 15, 2015, which I understand is the filing date of U.S. Patent App. 14/884,363 (EX-2005), to which the '992 Patent claims priority. I am familiar with the technology at issue and am aware of the state of the art around this time. It is my opinion that, as of October 15, 2015, a person of ordinary skill in the art ("POSITA") pertinent to the subject matter of the '992 Patent would have at least (1) a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Petroleum Engineering, or an equivalent field, as well as at least 2 years of academic or industry experience in the oil and gas industry, including well drilling, completion, or production, or (2) at least four years of industry experience in the oil and gas industry including well drilling, completion, or production. Further, it is my opinion that someone with additional education but less professional experience, and vice versa, may qualify as a POSITA. Based on this description, I qualified as a POSITA as of October 15, 2015. My analysis and opinions below are given from the perspective of a POSITA in this technological field in the relevant time frame, unless stated otherwise.

II. QUALIFICATIONS AND COMPENSATION

10. I am a Professor and Associate Chair of Chemical and Biomolecular Engineering in the Cullen College of Engineering at the University of Houston.

11. I graduated with a diploma in chemical engineering from the National Technical University in Athens, Greece in 1984. I then earned a Ph.D. in chemical engineering at the University of California, Los Angeles in 1989. Prior to coming to the University of Houston, I was an Assistant (and then (Associate) Professor at Texas A&M University for eight years. After my promotion to Associate Professor and tenure at Texas A&M, I took a sabbatical leave as a Visiting Scientist at MIT. I have taught at the University of Houston for over 20 years.

12. In my role as a professor at the University of Houston I teach both undergraduate and graduate courses every year. At the undergraduate level, these courses include Analytical Methods for Chemical Engineers, Numerical Methods for Chemical Engineers, Plant Economics, Plant Design, Thermodynamics, Statistical Methods in Chemical Engineering, Statistical Quality Control Methods, and Chemical Process Control. At the graduate level, I teach Mathematical Methods in Chemical Engineering, Advanced Process Control, and Natural Gas Engineering. I also routinely advise both undergraduate and graduate (master and Ph.D.) students.

13. I have extensive experience in process systems engineering and mathematical modeling. My research interests are in computer-aided systems

engineering, i.e., development and use of computer-based methods for the design, optimization, monitoring, and automatic control of various kinds of systems, in a diverse array of industries, including the oil and gas industry.

14. In my 35 years of academic and industrial consulting experience I have worked on problems in several industries, including the oil and gas industry and oil refining and petrochemicals. Much of my work tackles fundamental research issues and is described in a number of publications, as discussed below. A substantial portion of my work is directed to concrete solutions to problems faced by industrial partners and has resulted in specific commercial products (e.g., for Lam Research, <https://www.lamresearch.com/>), patents, and the formation (by the corresponding project's managers) of a small company that was eventually bought by Schlumberger, a major global oilfield services company (http://www.slb.com/services/drilling/drilling_services_systems/directional_drilling/slider.aspx).

15. In addition to teaching, I have also served as a consultant for various oil and gas companies over the past 27 years, working with both major companies and smaller, independent companies, both “upstream” (i.e., oil and gas exploration and production) and “downstream” (oil and gas transportation, oil refining, and chemicals). I have consulted on a variety of matters for ENI, Schlumberger, WildHorse / RotoSlide, Synergy Fluid Services, XGas/EPT, IQPC Oil & Gas,

Intelligent Agents Corporation, Landmark, ECOPETROL, Lam Research, Shell Global Solutions, Noble Drilling, AspenTech, General Electric, Simulation Sciences, Bryan Research & Engineering, Frito-Lay, Shell Development, and Union Pacific Resources.

16. I have published over 150 peer-reviewed publications in journals and conference proceedings in the area of computer-aided systems engineering. My publications focus on applications to the design, optimization, monitoring, and automatic control of various kinds of systems, in oil and gas, oil refining and petrochemicals, snack food production, semiconductor manufacturing, and development and administration of antibiotics against resistant infections. Three of my refereed journal publications have been featured on the cover of high-impact journals (*AIChE Journal*, 2011; *IEEE Control Systems Magazine*, 2006; *PLoS Computational Biology*, 2011).

17. I have also presented my work as a speaker at numerous academic conferences, whether in regular sessions, invited sessions, or as a keynote speaker. As an example, I have been invited twice (in 1996 and 2011) to give presentations in the flagship conference on Chemical Process Control, held every five years (CPC-V and CPC-VIII), and was a keynote speaker at the 2017 International Petroleum & Petrochemical Technology Conference (IPPTC) in Beijing, China. I have also published five book chapters on various aspects of computer-aided systems

engineering. Finally, I serve regularly as a peer reviewer at several major engineering and scientific journals (including *Automatica*, *PLoS*, *AIChE Journal*, *SPE Journal*, *Journal of Process Control*, *Computers & Chemical Engineering*) as well as at federal and international funding agencies, including National Science Foundation (NSF), Petroleum Research Fund (PRF), National Institutes of Health (NIH), and the Qatar National Research Fund (QNRF).

18. I am a member of the American Institute of Chemical Engineers, the Society of Petroleum Engineers, and Omega Chi Epsilon. I serve as a co-organizer or co-chair of several major international conferences, including the AIChE Annual Meeting and the AIChE Spring Meeting.

19. I have received numerous teaching awards from both Texas A&M and University of Houston, including the Dow Excellence in Teaching Award, and the Cullen College of Engineering Teaching Award. I have also been named a Top Reviewer by *Automatica*, and, in 2007, I received the Computing & Systems Technology (CAST) Directors Award from the American Institute of Chemical Engineering. In 2017, I received the Abraham E. Dukler Distinguished Engineering Faculty Award at the University of Houston, which is given to faculty members that have made significant contributions to society and whose accomplishments and careers have brought credit to the University of Houston Cullen College of Engineering. In 2019, I received the Fluor Corp. Faculty Excellence Award at the

Cullen College of Engineering. This award is the highest distinction bestowed to faculty of this college.

20. My curriculum vitae, which includes a complete list of my publications, is included as EX-2006.

21. I have previously given testimony in the following cases:

a) *Eurecat United States, Inc. v. Soren Marklund, Douglas Wene, and Chem 32 LLC*, Trial Ct. Cause No. 2012-5700, Harris Cty. Ct. (Tex.).

b) *TDE Petroleum Data Solutions, Inc. v. AKM Enterprise, Inc. DBA Mobilize, Inc.*, Case No. 4:15-cv-01821 (S.D. TEX-2015).

c) *Arrona et al. v. Bluestone Natural Resources, LLC*, Case No. 4:15-cv-02680 (S.D. TEX-2017).

d) *Sunoco Partners Marketing & Terminals L.P. v. Powder Springs Logistics, LLC, et al.*, Case No. 1:17-cv-01390 (D. Del. 2017).

e) *Magellan Midstream Partners L.P. v. Sunoco Partners Marketing & Terminals*, Case No. IPR2019-00024 (U.S. Patent No. 9,494,948).

f) *Magellan Midstream Partners L.P. v. Sunoco Partners Marketing & Terminals*, Case No. IPR2019-00025 (U.S. Patent No. 9,606,548).

g) *ProFrac Holding Corporation et al v. Halliburton Energy Services, Inc.*, Case No. IPR2023-01318 (U.S. Patent No. 7,931,082).

h) *ProFrac Holding Corporation et al v. Halliburton Energy Services, Inc.*, Case No. IPR2023-01319 (U.S. Patent No. 7,841,394).

i) *ProFrac Holding Corporation et al v. Halliburton Energy Services, Inc.*, Case No. PGR2023-00023 (U.S. Patent No. 11,373,058).

j) *Halliburton Energy Services, Inc. v. U.S. Well Services, LLC*, Case No. IPR2023-00558 (U.S. Patent No. 11,136,870).

k) *Liberty Energy Inc. and Liberty Energy Services LLC v. U.S. Well Services, LLC*, Case No. IPR2025-00105 (U.S. Patent No. 11,959,533).

l) *Liberty Energy Inc. and Liberty Energy Services LLC v. U.S. Well Services, LLC*, Case No. IPR2025-00066 (U.S. Patent No. 10,598,258).

22. I am being compensated in this matter at my standard consulting hourly rate of \$700 per hour. My compensation is not dependent on the substance of my statements in this declaration.

23. I am over the age of 18 and am competent to write this declaration. I have personal knowledge, or have developed knowledge, of the technologies discussed in this declaration based upon my education, training, or experience with the matters discussed herein. It is my opinion that, in accordance with the above, I am qualified to provide opinions from the perspective of a POSITA.

III. RELEVANT LEGAL STANDARDS

A. Patent Claims

24. Patent claims³ describe the invention made by the inventors and describe what the patent owner owns and what the patent owner may prevent others from doing.

25. Claims may describe products, such as machines or chemical solutions, or processes for making or using a product. Claims are usually divided into separate parts or steps called limitations.

26. Claims may be independent or dependent. An independent claim sets forth all the requirements that must be met to be covered by that claim. It is not necessary to look at any other claim to determine what an independent claim covers. A dependent claim does not itself recite all the requirements of the claim, but refers to another claim for some of its requirements. Thus, the dependent claim depends on another claim. It is my understanding that the law considers a dependent claim to incorporate all the requirements of the claims to which it refers and/or depends.

27. It is my understanding that a dependent claim adds its own additional requirements over and above the requirements of the independent claim(s) from

³ My understanding of the relevant legal standards discussed herein is based on communications with counsel.

which it depends. I understand that to determine what a dependent claims covers, it is necessary to look at both the dependent claim and any other claims to which it refers/depends.

28. It is my understanding that, in that case, the dependent claims incorporate the limitations of the independent claim upon which they depend and, if a reference fails to disclose any of the limitations of an independent claim, the claims which depend on that claim cannot be made invalid by that reference. It is my understanding that, as a result, any of the references at issue in this proceeding that fail to disclose all the limitations of an independent claim necessarily also fail to disclose all of the limitations of claims which depend on that claim.

A. Burden of Proof for Invalidity

29. It is my understanding that the party challenging the validity of an issued U.S. patent in an IPR proceeding bears the burden of proving invalidity through the facts supported by preponderance of the evidence. It is my understanding that a “preponderance of the evidence” means evidence sufficient to prove that a fact is more likely true than not true.

B. Anticipation

30. I understand that a patent claim can be found invalid as anticipated if each element of that claim, as properly construed, is found either explicitly or inherently in a single prior art reference. It is further my understanding that if the

single reference does not disclose any one claim limitation, then that claim is not anticipated. I further understand that the single prior art reference cannot merely disclose each element, but it must disclose all the elements as arranged in the claim. It is my understanding that for a prior art reference to “inherently” disclose something, the reference must necessarily function with, or include the claimed limitations, to anticipate. The missing descriptive matter cannot merely probably or possibly include the claimed limitations. It is my understanding that, with respect to an anticipation analysis, it is improper to combine separate, distinct embodiments of a single prior art reference.

31. It is my understanding that for a claim to be anticipated, each claim limitation must be disclosed in a single prior art reference, and the claimed arrangement or combination of those limitations must also be disclosed in that same prior art reference. I also understand that for a reference to be anticipatory, it must contain an enabling disclosure. It is further my understanding that merely naming or describing the subject matter is insufficient if it cannot be produced without undue experimentation.

C. Obviousness

32. I understand that obviousness is analyzed from the perspective of a POSITA at the time of the alleged invention. I also understand that a POSITA is

presumed to have been aware of all pertinent prior art at the time of the alleged invention.

33. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSITA in view of the prior art and in light of the general knowledge of the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSITA would have reached the claimed invention through routine experimentation.

34. I understand that obviousness can be established by combining or modifying the disclosures of the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSITA.

35. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a POSITA

has good reason to pursue the known options within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

36. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness, also known as “secondary considerations,” include failure of others, copying, unexpected results, information that “teaches away” from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that for objective indicia of non-obviousness to be applicable, the indicia must have some sort of nexus to the subject matter in the claim that was not known in the art. I understand that this nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged. I also understand that an independently made invention that is made within a comparatively short period is evidence that the claimed invention was the product of ordinary skill.

37. Finally, I understand that patent examiners at the U.S. Patent and Trademark Office (“PTO”) rely upon certain exemplary rationales in reviewing patent applications to understand whether the subject matter of the claims is obvious. I understand that the following is the list of exemplary rationales relied upon by patent examiners at the PTO: (i) combining prior art elements according to known methods to yield predictable results; (ii) simple substitution of one known element for another to obtain predictable results; (iii) use of a known technique to improve similar devices (methods, or products) in the same way; (iv) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (v) “obvious to try”—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (vi) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art.

D. Written Description

38. I understand that an original application needs to provide sufficient written description support for the claimed invention. If the patent claims priority to an earlier filed application, I understand that the priority application must also provide sufficient written description support for the claimed invention. I further understand that the test for sufficiency of support in an application is not the presence

or absence of literal support in the specification for the claim language, but instead, it is whether the disclosure of the application relied upon reasonably conveys to a person of ordinary skill in the art (“POSITA”) that the inventor had possession of the later claimed subject matter.

39. I understand that the disclosure must be viewed from the perspective of a POSITA and, as such, the disclosure does not need to restate the claims verbatim. I further understand that there is no requirement for an applicant to repeat what is readily known in the art. Instead, the applicant must adequately describe improvements to the art.

E. Construing the Meaning of Claim Terms

40. I understand that an inter partes review (“IPR”) is a proceeding for evaluating the validity of issued patent claims. I understand that, in an IPR, a claim term is interpreted in a manner consistent with the standard used in patent litigation, as set forth in a case known as *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). That standard generally construes the claims according to their “ordinary and customary” meaning in view of the claim language, specification, file history, and, where applicable, relevant other evidence.

41. I understand that a patent’s “specification” includes all the figures, written descriptions, and claims within the patent. I understand that the PTO will look to the specification and prosecution history to see if there is a definition for a

given claim term and, if not, will apply the ordinary and customary meaning from the perspective of a POSITA at the time in which the alleged invention was made.

42. As discussed above and detailed in my curriculum vitae, I was very familiar with hydraulic fracturing processes at both the individual well and oil-field level, as well as control systems for such processes and well treatment methods, technologies and was aware of the state of the art as of the earliest claimed priority date of the '992 Patent. I believe that I would qualify as understanding the knowledge and skill of a POSITA as of October 15, 2015, and I have a sufficient level of knowledge, experience, and expertise to provide an expert opinion in the field of the '992 Patent.

F. Person of Ordinary Skill in the Art

43. I understand that a person having ordinary skill in the art ("POSITA") may be defined by factors such as: (a) the levels of education and experience of the inventor and other persons actively involved in the field; (b) the types of problems encountered in the field; (c) prior art solutions to those problems; (d) rapidity which innovations are made; and (e) the sophistication of the technology.

G. Prior Art

44. I understand that a patent cannot be invalidated based on one person's testimony alone without corroborating evidence, particularly documentary evidence. I also understand that corroboration is require of any witness whose testimony alone

is asserted to invalidate a patent, regardless of his or her level of interest in relation to that patent. Thus, even if the testifying individual has no interest in the litigation, I understand that collaboration is still required.

45. In this declaration, I may use the term “prior art” when describing specific references. My use of this term should not be interpreted as agreement that the item(s) described qualify as prior art under the patent laws. I merely use this phrase to address the items labeled as “prior art” by Petitioners and their expert.

IV. U.S. PATENT NO. 11,091,992

46. The following paragraphs regarding hydraulic fracturing are based on the '992 Patent. For purposes of this declaration, I have been asked to assume that the earliest priority date of the '992 Patent is October 15, 2015.

47. The '992 Patent regards hydraulic fracturing of underground formations in an oil or gas well to extract oil or gas from the formation. EX-1001, 1:60–64. In particular, this technology is related to pumping fracturing fluid into an oil or gas well using pumps powered by electric motors. *Id.*, 1:64–2:1.

48. In hydraulic fracturing operations, fracture fluid is pumped into a wellbore a very high pressure. *Id.*, 1:29-30. Typically, this pumping is performed by large diesel-powered pumps. *Id.*, 1:38–39. Diesel-powered pumps can pump fracturing fluid into a wellbore at a high enough pressure to crack a formation, but have drawbacks including being very heavy, requiring heavy duty trailers for

transport thus making their use expensive and inefficient, requiring a relatively high level of expensive maintenance, and having an increasing operational cost as the cost of diesel fuel is much higher than in the past. *Id.*, 1:40–49. The use of pumps powered by electric motors and natural gas powered generators to pump fracturing fluid into a well overcomes many of problems associated with using diesel-powered pumps, including the advantages of offering lighter equipment weight and relative ease of loading. *Id.* 6:60–7:5.

V. CLAIM CONSTRUCTION

49. It is my understanding that claim terms are typically given their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art at the time of the alleged invention. Regarding the meaning of the claims, it is my understanding that one must consider the claim language, specification, prosecution history, and the knowledge of a person of ordinary skill in the art at the relevant time. It is my opinion that none of the terms in the present matter require construction.

VI. OVERVIEW OF ALLEGED PRIOR ART REFERENCES

50. In this Petition (Paper 1), Petitioners present four grounds challenging claims 1–20 using various combinations of Coli, Birch, Rusnak, Dykstra, and Hunt. These references are described briefly below.

A. Coli (EX-1004)

51. Coli relates to hydraulic fracturing in hydrocarbon-bearing wells. EX-1004, [0003]. Coli recognizes drawbacks of the diesel motors typically used in such drilling. *Id.*, [0005], [0008]. Coli purports to improve upon known fracturing systems by using electric motors and generators powered by natural gas to drive the pumps. *Id.*, [0009]–[0011], [0038]. Coli purports that this use of electric components beneficially reduces the amount of infrastructure, makes control safer and easier, facilitates syncing the equipment within the system, and reduces costs. *Id.*, [0039], [0066], [0071], [0073]. Figure 3 is a schematic plan view of Coli’s fracturing trailer and is reproduced below.

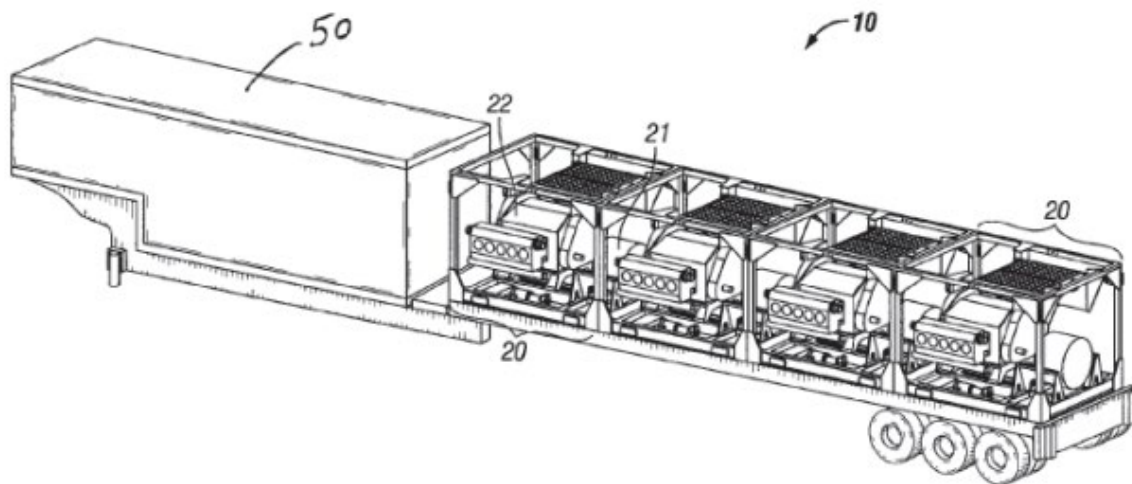


FIG. 3

B. Birch (EX-1005)

52. Birch is directed to a gaseous fuel compression and control system for use with a gas turbine. EX-1005, Abstract. Birch recognizes the drawbacks of conventional gaseous fuel compression and control systems that employ reciprocating compressors, which often require complex control systems and whose many mechanical connections are susceptible to gas leaks precipitated by intense vibrations associated with reciprocating compressors. *Id.*, 1:22–44. Birch purports to address these drawbacks of conventional reciprocating compressor systems by providing a screw compressor system driven by an electric motor with simplified controls for delivering fuel to a gas turbine engine. *Id.*, 1:49–65.

C. Rusnak (EX-1007)

53. Rusnak is directed to a system and method for controlling a centrifugal pump in a fluid pumping system in which a controller operates a variable frequency drive coupled to an AC motor that turns a centrifugal pump. EX-1007, [0005], [0023]. The controller operates the VFD to control flow, speed, and pressure of the pumping system and to identify and report pump system problems. *Id.*, [0020]. Rusnak recognizes the drawbacks of pumping systems that require external sensors and the calculation of multiple performance speeds that must be stored in memory. *Id.*, [0004]. Rusnak purports to solve these drawbacks by incorporating pump-specific optimization software to control an industrial grade variable frequency drive

while also providing a menu-driven user interface to simplify VFD controller set-up and operation. *Id.*, [0020], Abstract.

D. Dykstra (EX-1006)

54. Dykstra is directed to a method and apparatus for producing well treatment fluid for use in oil-and-gas drilling operations EX-1006, Abstract, [0003]. Dykstra features virtual rate control 320 that uses real-time operational data (e.g., sand rate, water rate, pump rate) and desired rate to compute pump rate adjustments, which it implements by sending pump drive signal 350 to pump systems 351 for setting new pump output rates as shown in Figure 3 and reproduced below. *Id.*, [0025]–[0026].

E. Hunt (EX-1008)

55. Hunt is directed to capturing off-gas from a wellhead of an oil producing well and using it to power a generator for generating electricity. EX-1008, Abstract. Hunt recognizes the economic challenges of capturing and storing off-gas from oil producing wells, which often prompt producers to vent or flair the off-gas. Hunt also recognizes the drawbacks of venting or flaring off-gas, which include atmospheric pollution, health and nuisance issues for nearby residents, and wasting natural resources. *Id.*, [0024]. Hunt purports to solve these problems by providing on-site power generation using off-gas, whereby changes in pressure are used to sense changes in available off-gas and to adjust a torque supplied by a prime mover

to a generator to vary the amount of electricity generated by the generator. *Id.*, [0006].

VII. PATENT OWNER'S SUBSTITUTE CLAIMS ARE PATENTABLE

56. I understand that Patent Owner has proposed substituting claims as listed below. The proposed amendments cancel claims 1–20 and substitute proposed Substitute Claims 41–59. The proposed Substitute Claims do not broaden the claim scope or introduce new subject matter. The proposed claim amendments also limit the method and/or system of each of these proposed Substitute Claims by adding additional limitations. These amendments distinguish the claims over the prior art and narrow the claim scope. The claims are also patentable over art from original prosecution. It is my opinion that a POSITA would have understood that the inventor possessed the substitute claims as of the priority date. It is further my opinion that the specification and figures provide a POSITA with an enabling disclosure for making and using the invention as recited in Substitute Claims 41–59. It is thus my opinion that Patent Owner's proposed Substitute Claims 41–59 are patentable.

A. Proposed Substitute Claims

57. I understand that Patent Owner has proposed that the original claims of the '992 Patent be canceled and replaced with the proposed Substitute Claims. I have been asked to evaluate these proposed Substitute Claims. It is my understanding that these are not currently claims in the '992 Patent. Counsel has informed me that text

that is underlined is proposed to be added to the original claims, and text that is struck through is proposed to be removed from the original claims.

Claim 41. (Proposed substitute for original claim 1) [41p] A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

[41a] an electric pump fluidly connected to the well, and configured to pump fluid into the wellbore; and

[41b] a centralized control unit coupled to the electric pump,

[41c] wherein the centralized control unit is configured to:

monitor the electric pump; and

[41d] a variable frequency drive that controls a speed of the electric pump;

[41e] the system further comprising a generator electrically connected to the electric pump to provide power to the electric pump,

[41f] wherein the generator is a natural gas generator,

[41g] the system further comprising a gas filtration skid,

[41h] wherein the centralized control unit is further configured to monitor operating characteristics of the gas filtration skid;

[41i] wherein the monitored operating characteristics of the gas filtration skid include at least water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status;

[41j] wherein the centralized control unit is further configured to control operating characteristics of the gas filtration skid;

[41k] wherein the controllable operating characteristics of the gas filtration skid include at least inlet valves, outlet valves, bypass valves, and pressure release;

[41l] the system further comprising a gas compressor,

[41m] wherein the centralized control unit is further configured to monitor operating characteristics of the gas compressor;

[41n] wherein the monitored operating characteristics of the gas compressor include at least compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, and oil pump discharge pressure;

[41o] wherein the centralized control unit is coupled to the electric pump via one or more of cabling, Ethernet, or wirelessly; and

[41q] wherein the centralized control unit is further configured to reset a fault occurring in the variable frequency drive.

Claim 42. (Proposed substitute for original claim 2) [42a] The system of ~~claim 1~~ claim 41, further comprising:

a generator electrically connected to the electric pump to provide power to the electric pump, wherein the generator is powered by liquefied natural gas, and

[42b] wherein the centralized control unit is further configured to monitor and control compression of the natural gas.

Claim 43. (Proposed substitute for original claim 4) [43a] The system of ~~claim 1~~ claim 41, wherein the electric pump is a plurality of electric pumps,

[43b] the system further comprising a switch gear,

[43c] wherein the centralized control unit is further configured to monitor operating characteristics of the switch gear,

[43d] wherein the monitored operating characteristics of the switch gear include at least the status of a fire alarm.

Claim 44. (Proposed substitute for original claim 5) [44a] The system of ~~claim 4~~ claim 43, further comprising: a variable frequency drive that controls the plurality of electric pumps,

[44b] the system further comprising a hydraulic system,

[44c] wherein the system is configured to monitor operating characteristics of the hydraulic system,

[44d] wherein the operating characteristics of the hydraulic system include at least system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

Claim 45. (Proposed substitute for original claim 6) [45a] The system of ~~claim 2~~ claim 42, further comprising an emergency power off unit coupled to the centralized control unit, the electric pump, and the generator,

[45b] wherein the emergency power off unit is configured to substantially immediately cut power from the generator when activated,

[45c] wherein the emergency power off unit is operated by a switch that sounds an audible alarm.

Claim 46. (Proposed substitute for original claim 7) [46a] The system of ~~claim 6~~ claim 45, the emergency power off unit comprising an auxiliary power and a switchgear, each coupled to the generator and the centralized control unit,

[46b] wherein the switchgear is responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the generator,

[46c] wherein the signal is transmitted over armored shielded CAT5E cabling.

Claim 47. (Proposed substitute for original claim 8) [47a] A method, comprising:

pumping fracturing fluid into a well in a formation with an electrically powered pump, the fracturing fluid having at least a liquid component and a solid proppant, and inserting the solid proppant into the cracks to maintain the cracks open, thereby allowing passage of oil and gas through the cracks;

[47b] monitoring at a centralized control unit the electrically powered pump;

[47c] wherein the centralized control unit is coupled to the electrically powered pump via one or more of cabling, Ethernet, or wirelessly; and

[47d] controlling the speed of the pump with a variable frequency drive,

[47e] wherein the centralized control unit is configured to reset a fault occurring in the variable frequency drive;

[47f] the method further comprising powering the electrically powered pump with a generator,

[47g] wherein the generator is a turbine generator;

[47h] the method further comprising monitoring operating characteristics of the turbine generator; and

[47i] wherein the monitored operating characteristics of the turbine generator include at least turbine air inlet filter transmitter failure.

Claim 48. (Proposed substitute for original claim 9) [48a] The method of ~~claim 8~~ claim 47, further comprising:

powering the electrically powered pump with a generator, wherein the generator is fueled by liquefied natural gas; and

[48b] monitoring compression of natural gas.

Claim 49. (Proposed substitute for original claim 10) [49a] The method of ~~claim 9~~ claim 48, wherein the natural gas is selected from the group consisting of field natural gas, compressed natural gas, and liquid natural gas, the method further comprising monitoring, by the centralized control unit, operating characteristics of a switch gear, wherein:

[49b] the operating characteristics including the status of a fire alarm.

Claim 50. (Proposed substitute for original claim 11) [50a] The method of ~~claim 9~~ claim 48, further comprising controlling compression of the liquefied natural gas;

[50b] wherein the generator is fueled by liquefied natural gas,

[50c] the method further comprising monitoring operating characteristics of a hydraulic system

[50d] wherein the monitored operating characteristics of the hydraulic system include system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

Claim 51. (Proposed substitute for original claim 12) [51a] The method of ~~claim 9~~ claim 48, wherein the generator is a turbine generator; the method further comprising

[51b] monitoring operating characteristics of the turbine generator

[51c] wherein the monitored operating characteristics of the turbine generator include at least fuel system air supply pressure transmitter failure, thermocouple input module thermistor failure, start VFD configuration failure, generator circuit breaker failure to open, gas fuel supply pressure transmitter failure, gas fuel control pressure transmitter failure, utility circuit breaker closed, generator frequency, and engine serial number.

Claim 52. (Proposed substitute for original claim 13) [52a] The method of ~~claim 9~~ claim 48, wherein the generator is a turbine generator; the method further comprising:

controlling the turbine generator-and

[52b] monitoring operating characteristics of the turbine generator

[52c] wherein the monitored operating characteristics of the turbine generator include gas fuel main valve discharge pressure transmitter failure, and backup system relay failure.

Claim 53. (Proposed substitute for original claim 14) [53a] The method of ~~claim 8~~ claim 47, further comprising resetting a fault occurring in the variable frequency drive from the centralized control unit,

[53b] the method further comprising monitoring operating characteristics of the variable frequency drive,

[53c] wherein the monitored operating characteristics of the variable frequency drive include motor winding temperatures, the motor RPM, the voltage, the torque, and the current (amperage).

Claim 54. (Proposed substitute for original claim 15) [54a] The method of ~~claim 9~~ claim 48, further comprising:

providing an emergency power off unit coupled to the centralized control unit, the electrically powered pump and the generator; and

substantially immediately cutting power to the generator by activating the emergency power off unit

[54b] wherein the emergency power off unit is operated by a switch that sounds an audible alarm.

Claim 55. (Proposed substitute for original claim 16) [55a] The method of ~~claim 15~~ claim 54, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the generator and the centralized control unit, the method further comprising

signaling the switchgear from the centralized control unit to open a breaker to substantially immediately cut power to the generator

[55b] wherein signaling is transmitted over armored shielded CAT5E cabling.

Claim 56. (Proposed substitute for original claim 17) [56p] A system for centralized monitoring and control of a hydraulic fracturing operation, comprising:

[56a] an electric powered fracturing fleet, the electric powered fracturing fleet comprising:

a combination of one or more of: electric powered pumps, electric motors, turbine generators, blenders, sand silos, chemical storage units, conveyor belts, manifold trailers, hydration units, variable frequency drives, switchgear, transformers, compressors;

[56b] a centralized control unit coupled to electric powered fracturing fleet; and

[56c] an emergency power off unit coupled to the centralized control unit, the electric powered pumps and the turbine generators, the emergency power off unit configured to substantially immediately cut power to the turbine generators when activated,

[56d] wherein the centralized control unit is configured to:

monitor one or more operating characteristics of the electric powered fracturing fleet; and control one or more operating characteristics of the electric powered fracturing fleet;

[56e] wherein the centralized control unit is coupled to the electric powered fracturing fleet via one or more of cabling, Ethernet, or wirelessly;

[56f] the system further comprising one or more generators electrically connected to the electric pump to provide power to the electric pump;

[56g] wherein the one or more generators are turbine generators, and

[56h] wherein the centralized control unit is further configured to monitor operating characteristics and control the one or more turbine generators, and

[56i] wherein the monitored operating characteristics of the one or more turbine generators include at least turbine air inlet filter transmitter failure.

Claim 57. (Proposed substitute for original claim 18) [57a] The system of ~~claim 17~~ claim 56, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the one or more turbine generators and the centralized control unit, the switchgear responsive to a signal from

the centralized control unit to open a breaker to substantially immediately cut power to the one or more turbine generators;

[57b] wherein the centralized control unit is further configured to monitor operating characteristics of the switch gear,

[57c] wherein the monitored operating characteristics of the switch gear include at least the status of a fire alarm.

Claim 58. (Proposed substitute for original claim 19) [58] The system of ~~claim 17~~ claim 56, wherein the centralized control unit is further configured to monitor and control all of the following: compression of natural gas, electric motors, switchgear, transformers, mobile turbines, rate and pressure of the overall system, vertical sand silos, and an electrical conveyor belt.

Claim 59. (Proposed substitute for original claim 20) [59a] The system of ~~claim 17~~ claim 56, wherein the centralized control unit is further configured to monitor and control the one or more turbine generators,

[59b] wherein the one or more turbine generators are fueled by liquefied natural gas.

B. The Original Application for the '992 Patent Includes Support for the Proposed Substitute Claims

58. I have been asked to provide my opinions regarding whether the proposed Substitute Claims are supported by the original application for the '992

Patent, U.S. Patent Application No. 15/978,838 (“’838 Application”) (EX-1002, 409–458), and U.S. Patent Application No. 14/884,363 (“’363 Application”) (EX-2005), to which the ’838 Application claims priority. The ’838 Application is found at pages 409–458 of Exhibit EX-1002. The ’363 Application is found at pages 1-57 of Exhibit EX-2005. In performing my analysis, I have applied the plain and ordinary meaning of the claim terms. I include exemplary citations to the ’838 Application and the ’363 Application for both the original limitations of the claims and the limitations added by each proposed substitute claim.

59. As I noted above, proposed Substitute Claims 41–59 replace claims 1–20 and include additional limitations. The below features, found in the proposed Substitute Claims, are supported by the ’838 Application and the ’363 Application as I illustrate below. A POSITA would have found that the inventor was in possession of the features, as well as each claim as a whole, as of the filing of both the ’838 Application and the ’363 Application.

Substitute Claim No. 41(Substitute for original claim No. 1)

60. As I noted above, Claim 1 has been rewritten as substitute Claims 41, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
41[p] A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:	¶ 6 (“Disclosed herein is a system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation”); Claim 1.	¶ 6 (“Disclosed herein is a system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation”); Claim 1.
41[a] an electric pump fluidly connected to the well, and configured to pump fluid into the wellbore; and	¶ 6 (“The system includes a plurality of electric pumps fluidly connected to the well, and configured to pump fluid into the wellbore at high pressure ...”); Claim 1.	¶ 6 (“The system includes a plurality of electric pumps fluidly connected to the well, and configured to pump fluid into the wellbore at high pressure ...”); Claim 1.
41[b] a centralized control unit coupled to the electric pump,	¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and	¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”); Claim 1.

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	the plurality of generators.”); Claim 1.	
41[c] wherein the centralized control unit is configured to: monitor the electric pump; and	¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”); Claim 1.	¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”); Claim 1.
41[d] a variable frequency drive that controls a speed of the electric pump;	¶ 15 (“In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) that controls the speed of the electric motor 14, and hence the speed of the pump 10.”); claim 5.	¶ 15 (“In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) that controls the speed of the electric motor 14, and hence the speed of the pump 10.”); claim 4.
41[e] <u>the system further comprising a generator electrically connected to the electric pump to provide power to the electric pump,</u>	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	natural gas. For example, the generators can be powered by liquefied natural gas.”); claim 13.	example, the generators can be powered by liquefied natural gas.”).
<u>41[f] wherein the generator is a natural gas generator,</u>	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”); claim 13.	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).
<u>41[g] the system further comprising a gas filtration skid,</u>	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid.”).	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid.”).
<u>41[h] wherein the centralized control unit is further configured to monitor operating characteristics of the gas filtration skid;</u>	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).”).	separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).
<u>41[i] wherein the monitored operating characteristics of the gas filtration skid include at least water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status;</u>	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).”).	characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).
<u>41[j] wherein the centralized control unit is further configured to control operating characteristics of the gas filtration skid;</u>	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).”).	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
41[k] <u>wherein the controllable operating characteristics of the gas filtration skid include at least inlet valves, outlet valves, bypass valves, and pressure release;</u>	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).”).	¶ 82 (“In an embodiment, the electrically powered fracking fleet can include a gas filtration skid. The operating characteristics of the gas filtration skid that can be monitored can include, for example, water separator status, particulate filter status, gas Pressures (at the inlet, outlet, or internal), gas temperatures (at the inlet, outlet, or internal), valve statuses (open/closed), and filter bypass status. The operating characteristics of the gas filtration skid that can be controlled can include, for example, the inlet valves, outlet valves, bypass valves, and pressure release (i.e., blow off).”).
41[l] <u>the system further comprising a gas compressor,</u>	¶ 83 (“In an embodiment, the electrically powered fracking fleet can include a gas compressor.”).	¶ 83 (“In an embodiment, the electrically powered fracking fleet can include a gas compressor.”).
41[m] <u>wherein the centralized control unit is further configured to monitor</u>	¶ 83 (“In an embodiment, the electrically powered fracking fleet can include a gas compressor.	¶ 83 (“In an embodiment, the electrically powered fracking fleet can include a gas compressor. Operating

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
<u>operating characteristics of the gas compressor;</u>	Operating characteristics of the gas compressor that can be monitored can include, for example, compressor motor run status, ... oil pump run status, enclosure exhaust fan run status, ... compressor inlet pressure, compressor discharge pressure, [and] oil pump discharge pressure”).	characteristics of the gas compressor that can be monitored can include, for example, compressor motor run status, ... oil pump run status, enclosure exhaust fan run status, ... compressor inlet pressure, compressor discharge pressure, [and] oil pump discharge pressure”).
<u>41[n] wherein the monitored operating characteristics of the gas compressor include at least compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, and oil pump discharge pressure;</u>	¶ 83 (“In an embodiment, the electrically powered fracking fleet can include a gas compressor. Operating characteristics of the gas compressor that can be monitored can include, for example, compressor motor run status, ... oil pump run status, enclosure exhaust fan run status, ... compressor inlet pressure, compressor discharge pressure, [and] oil pump discharge pressure”).	¶ 83 (“In an embodiment, the electrically powered fracking fleet can include a gas compressor. Operating characteristics of the gas compressor that can be monitored can include, for example, compressor motor run status, ... oil pump run status, enclosure exhaust fan run status, ... compressor inlet pressure, compressor discharge pressure, [and] oil pump discharge pressure”).
41[o] wherein the centralized control unit is coupled to the electric pump via one or more of cabling, Ethernet, or wirelessly; and	¶¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”), 8 (“The electric powered fracturing fleet can	¶¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”), 8 (“The electric powered fracturing fleet can

Substitute Claim 41 (1)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	also include a centralized control unit coupled to electric powered fracturing fleet.”), 25 (“Monitoring and control for the above functions can be accomplished with cables (not shown), Ethernet, or wireless capability.”); claim 6, claim 7.	also include a centralized control unit coupled to electric powered fracturing fleet.”), 25 (“Monitoring and control for the above functions can be accomplished with cables (not shown), Ethernet, or wireless capability.”).
41[q] wherein the centralized control unit is further configured to reset a fault occurring in the variable frequency drive.	¶¶ 23 (“Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, ...”), 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: ... monitoring and resetting faults on the variable frequency drives”), 64 (“In an embodiment, the pump control station can also include a VFD fault reset.”); claim 8.	¶¶ 23 (“Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, ...”), 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: ... monitoring and resetting faults on the variable frequency drives”), 64 (“In an embodiment, the pump control station can also include a VFD fault reset.”); claim 15.

Substitute Claim No. 42 (Substitute for original claim No. 2)

61. As I noted above, Claim 2 has been rewritten as substitute Claim 42, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 42 (2)	'838 App. Support EX-1002, 409– <u>458</u>	'363 App. Support (EX-2005)
42[a] The system of ~~claim 1~~ <u>claim 41</u> , further comprising: a generator electrically connected to the electric pump to provide power to the electric pump, wherein the generator is powered by <u>liquefied</u> natural gas, and	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).
42[b] wherein the centralized control unit is further configured to monitor and	¶¶ 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread	¶¶ 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread

Substitute Claim 42 (2)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
control compression of the natural gas.	across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the turbines ...”), 26 (“For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, ...”), 34 (“Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23.”); claim 2.	across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the turbines ...”), 26 (“For example, over CA TSE cabling, breakers will open in both switchgear to cut power to the site, and gas compression will tum off, ...”), 34 (“Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will tum off, cutting fuel to the turbine(s) 23.”).

Substitute Claim No. 43 (Substitute for original claim No. 4)

62. As I noted above, Claim 4 has been rewritten as substitute Claim 43, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 43 (4)	'838 App. Support EX-1002, 409– <u>458</u>	'363 App. Support (EX-2005)
43[a] The system of ~~claim 1~~ <u>claim 41</u> , wherein the electric pump is a plurality of electric pumps.	¶¶ 6 (“The system includes a plurality of electric pumps fluidly connected to the well,”), 7 (“the plurality of electric pumps”), 14, 27 (“The ability to load two pumps 110 on one trailer 112 is possible because of the relatively light weight of the electric pumps 110 ...”); claim 2; Fig. 1, Fig. 2; claim 4.	¶¶ 6 (“The system includes a plurality of electric pumps fluidly connected to the well,”), 7 (“the plurality of electric pumps”), 14, 27 (“The ability to load two pumps 110 on one trailer 112 is possible because of the relatively light weight of the electric pumps 110 ...”); claim 2; Fig. 1, Fig. 2.
43[b] <u>the system further comprising a switch gear,</u>	¶¶ 8 (“The electric powered fracturing fleet can include a combination of one or more of: ... switchgear, ...”), 24 (“The functions can include: ... monitoring and control of the electric distribution equipment, switchgear and transformers,”), 26, 30, 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47	¶¶ 8 (“The electric powered fracturing fleet can include a combination of one or more of: ... switchgear, ...”), 24 (“The functions can include: ... monitoring and control of the electric distribution equipment, switchgear and transformers,”), 26, 30, 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s)

Substitute Claim 43 (4)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines).”), 69, 74; claims 10, 22, 23, 25; Fig. 3.	coupled to the turbines).”), 69, 74; claims 10, 22, 23, 25; Fig. 3.
43[c] <u>wherein the centralized control unit is further configured to monitor operating characteristics of the switch gear,</u>	¶¶ 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet”), 74 (“Operating characteristics relating to the switch gear that can be monitored include the Emergency Power Off Status, ...”).	¶¶ 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet”), 74 (“Operating characteristics relating to the switch gear that can be monitored include the Emergency Power Off Status, ...”).
43[d] <u>wherein the monitored operating characteristics of the switchgear include at least the status of a fire alarm.</u>	¶ 74 (“Operating characteristics relating to the switch gear that can be monitored include ... the status of the fire alarm ...”).	¶ 74 (“Operating characteristics relating to the switch gear that can be monitored include ... the status of the fire alarm ...”).

Substitute Claim No. 44 (Substitute for original claim No. 5)

63. As I noted above, Claim 5 has been rewritten as substitute Claim 44, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 44 (5)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
44[a] The system of ~~claim 4~~ <u>claim 43</u> , further comprising: a variable frequency drive that controls the plurality of electric pumps,	¶¶ 15 (“In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) that controls the speed of the electric motor 14, and hence the speed of the pump 10.”), 17, 23, 27 (“Furthermore, each electric motor 114 can be equipped with a VFD that controls the speed of the motor 114, and hence the speed of the pumps 110.”); claim 5.	¶¶ 15 (“In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) that controls the speed of the electric motor 14, and hence the speed of the pump 10.”), 17, 23, 27 (“Furthermore, each electric motor 114 can be equipped with a VFD that controls the speed of the motor 114, and hence the speed of the pumps 110.”); claim 4.
44[b] <u>the system further comprising a hydraulic system,</u>	¶¶ 44 (“In an embodiment, the electrically powered fracking fleet can include a hydraulic motor.”), 45, 46 (“In an embodiment, the electrically powered fracking fleet can include hydraulic system monitoring for the equipment,”), 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge pressure,	¶¶ 44 (“In an embodiment, the electrically powered fracking fleet can include a hydraulic motor.”), 45, 46 (“In an embodiment, the electrically powered fracking fleet can include hydraulic system monitoring for the equipment,”), 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure,

Substitute Claim 44 (5)	'838 App. Support EX-1002, 409– <u>458</u>	'363 App. Support (EX-2005)
	temperature, hydraulic oil level, and filter status.”).	charge pressure, temperature, hydraulic oil level, and filter status.”).
44[c] <u>wherein the system is configured to monitor operating characteristics of the hydraulic system,</u>	¶¶ 44–46, 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge pressure, temperature, hydraulic oil level, and filter status.”).	¶¶ 44–46, 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge pressure, temperature, hydraulic oil level, and filter status.”).
44[d] <u>wherein the monitored operating characteristics of the hydraulic system include at least system pressure, charge pressure, temperature, hydraulic oil level, and filter status.</u>	¶ 46 (“In an embodiment, the electrically powered fracking fleet can include hydraulic system monitoring for the equipment, including the system pressure, the charge pressure, the temperature, the hydraulic oil level, and the filter status.”), 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge	¶ 46 (“In an embodiment, the electrically powered fracking fleet can include hydraulic system monitoring for the equipment, including the system pressure, the charge pressure, the temperature, the hydraulic oil level, and the filter status.”), 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge pressure, temperature, hydraulic oil level, and filter status.”).

Substitute Claim 44 (5)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	pressure, temperature, hydraulic oil level, and filter status.”).	

Substitute Claim No. 45 (Substitute for original claim No. 6)

64. As I noted above, Claim 6 has been rewritten as substitute Claim 45, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 45 (6)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
45[a] The system of ~~claim 2~~ <u>claim 42</u> , further comprising an emergency power off unit coupled to the centralized control unit, the electric pump, and the generator,	¶¶ 12 (“FIG. 3 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology, including an emergency power off circuit.”), 26 (“The monitor/control data van 40 further includes an Emergency Power Off (EPO) 43 functionality, ...”), 34 (“Referring now to FIG. 3,	¶¶ 12 (“FIG. 3 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology, including an emergency power off circuit.”), 26 (“The monitor/control data van 40 further includes an Emergency Power Off (EPO) 43 functionality, ...”), 34 (“Referring now to FIG. 3, the EPO 43

Substitute Claim 45 (6)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23.”); Fig. 3; claim 9.	can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23.”); Fig. 3; claim 7.
45[b] wherein the emergency power off unit is configured to substantially immediately cut power from the generator when activated,	¶¶ 26 (“The monitor/control data van 40 further includes an Emergency Power Off (EPO) 43 functionality, which allows for the entire site to be shut off completely. For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, cutting the connection for	¶¶ 26 (“The monitor/control data van 40 further includes an Emergency Power Off (EPO) 43 functionality, which allows for the entire site to be shut off completely. For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, cutting the connection for fuel to the

Substitute Claim 45 (6)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	fuel to the turbine.”), 34 (“Upon activation of the EPO 43, breakers open in the switchgear 47, cutting power to the generator 22.”); claim 9.	turbine.”), 34 (“Upon activation of the EPO 43, breakers open in the switchgear 47, cutting power to the generator 22.”); claim 7.
45[c] <u>wherein the emergency power off unit is operated by a switch that sounds an audible alarm.</u>	¶ 34 (“Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”).	¶ 34 (“Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”).

Substitute Claim No. 46 (Substitute for original claim No. 7)

65. As I noted above, Claim 7 has been rewritten as substitute Claim 46, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 46 (7)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
46[a] The system of ~~claim 6~~ <u>claim 45</u> , the emergency power	¶¶ 26, 34 (“Referring now to FIG. 3, the EPO 43 can include power (or	¶¶ 26, 34 (“Referring now to FIG. 3, the EPO 43 can include power (or

Substitute Claim 46 (7)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
off unit comprising an auxiliary power and a switchgear, each coupled to the generator and the centralized control unit,	optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 4 7. The switchgear 4 7 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines).”), Fig. 3; claim 10.	optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines).”), Fig. 3; claim 8.
46[b] wherein the switchgear is responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the generator ₂ ,	¶ 34 (“In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the BER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22.”); claim 10.	¶ 34 (“In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the BER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22.”); claim 8.
46[c] <u>wherein the signal is transmitted over armored shielded CAT5E cabling.</u>	¶ 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E	¶ 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E

Substitute Claim 46 (7)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23. Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3.	cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23. Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3.

Substitute Claim No. 47 (Substitute for original claim No. 8)

66. As I noted above, Claim 8 has been rewritten as substitute Claim 47, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 47 (8)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
47[a] A method, comprising: pumping fracturing fluid into a well in a formation with an electrically powered pump, the fracturing fluid having at least a liquid component and a solid proppant, and inserting the solid proppant into the cracks to maintain the cracks open, thereby allowing passage of oil and gas through the cracks;	¶¶ 6, 7 (“The process includes the steps of pumping fracturing fluid into the well with an electrically powered pump or fleet of pumps at a high pressure so that the fracturing fluid enters and cracks the formation, the fracturing fluid having at least a liquid component and (typically) a solid proppant, and inserting the solid proppant into the cracks to maintain the cracks open, thereby allowing passage of oil and gas through the cracks.”); claim 11.	¶¶ 6, 7 (“The process includes the steps of pumping fracturing fluid into the well with an electrically powered pump or fleet of pumps at a high pressure so that the fracturing fluid enters and cracks the formation, the fracturing fluid having at least a liquid component and (typically) a solid proppant, and inserting the solid proppant into the cracks to maintain the cracks open, thereby allowing passage of oil and gas through the cracks.”); claim 9.
47[b] monitoring at a centralized control unit the electrically powered pump;	¶ 7 (“The process can further include monitoring at a centralized control unit at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc.	¶ 7 (“The process can further include monitoring at a centralized control unit at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”); claim 9.

Substitute Claim 47 (8)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	of the plurality of electric pumps and the plurality of generators.”); claim 11.	
47[c] wherein the centralized control unit is coupled to the electrically powered pump via one or more of cabling, Ethernet, or wirelessly; and	¶¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”), 8 (“The electric powered fracturing fleet can also include a centralized control unit coupled to electric powered fracturing fleet.”), 25 (“Monitoring and control for the above functions can be accomplished with cables (not shown), Ethernet, or wireless capability.”), 70, 75; claim 19; claim 20.	¶¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”), 8 (“The electric powered fracturing fleet can also include a centralized control unit coupled to electric powered fracturing fleet.”), 25 (“Monitoring and control for the above functions can be accomplished with cables (not shown), Ethernet, or wireless capability.”), 70, 75.
47[d] controlling the speed of the pump with a variable frequency drive,	¶ 15 (“In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) that controls the speed of the electric motor 14, and hence the speed of the pump 10.”); claim 17.	¶ 15 (“In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) that controls the speed of the electric motor 14, and hence the speed of the pump 10.”); claim 14.

Substitute Claim 47 (8)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
47[e] wherein the centralized control unit is configured to reset a fault occurring in the variable frequency drive;	¶¶ 23 (“Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, ...”), 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: ... monitoring and resetting faults on the variable frequency drives”), 64 (“In an embodiment, the pump control station can also include a VFD fault reset.”); claim 18.	¶¶ 23 (“Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, ...”), 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: ... monitoring and resetting faults on the variable frequency drives”), 64 (“In an embodiment, the pump control station can also include a VFD fault reset.”); claim 15.
47[f] <u>the method further comprising powering the electrically powered pump with a generator,</u>	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain

Substitute Claim 47 (8)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”); claim 13.	embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).
47[g] <u>wherein the generator is a turbine generator;</u>	¶¶ 20 (“If desired by an operator, the electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.”), 30 (“Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122 ...”), 32 (“Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons.”); claim 15.	¶¶ 20 (“If desired by an operator, the electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.”), 30 (“Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122 ...”), 32 (“Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons.”); claim 12.
47[h] <u>the method further comprising monitoring operating characteristics of the turbine generator; and</u>	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the

Substitute Claim 47 (8)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103.	plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103.
47[i] <u>wherein the monitored operating characteristics of the turbine generator include at least turbine air inlet filter transmitter failure.</u>	¶ 88 (“Operating characteristics of the turbine that can be also monitored can include, for example, turbine air inlet filter transmitter failure”).	¶ 88 (“Operating characteristics of the turbine that can be also monitored can include, for example, turbine air inlet filter transmitter failure”).

Substitute Claim No. 48 (Substitute for original claim No. 9)

67. As I noted above, Claim 9 has been rewritten as substitute Claim 48, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 48 (9)	'838 App. Support EX-1002, 409– <u>458</u>	'363 App. Support (EX-2005)
48[a] The method of ~~claim 8~~ <u>claim 47</u> , further comprising: powering the electrically powered pump with a generator, wherein the generator is fueled by <u>liquefied</u> natural gas; and	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”); claim 13.	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).
48[b] monitoring compression of natural gas.	¶¶ 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression	¶¶ 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the

Substitute Claim 48 (9)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	for the turbines ...”), 26 (“For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, ...”), 34 (“Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23.”).	turbines ...”), 26 (“For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, ...”), 34 (“Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23.”); claim 10.

Substitute Claim No. 49 (Substitute for original claim No. 10)

68. As I noted above, Claim 10 has been rewritten as substitute Claim 49, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 49 (10)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
49[a] The method of ~~claim 9~~ <u>claim 48</u> , wherein the natural	¶¶ 8 (“The electric powered fracturing fleet can include a	¶¶ 8 (“The electric powered fracturing fleet can include a combination of one

Substitute Claim 49 (10)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
gas is selected from the group consisting of field natural gas, compressed natural gas, and liquid natural gas, <u>the method further comprising monitoring, by the centralized control unit, operating characteristics of a switch gear, wherein:</u>	combination of one or more of: ... switchgear, ...”, “The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet”), 24, 26, 30, 34, 69, 74 (“Operating characteristics relating to the switch gear that can be monitored include the Emergency Power Off Status, ...”); claims 10, 22, 23, 25; Fig. 3.	or more of: ... switchgear, ...”, “The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet”), 24, 26, 30, 34, 69, 74 (“Operating characteristics relating to the switch gear that can be monitored include the Emergency Power Off Status, ...”); claims 10, 22, 23, 25; Fig. 3.
49[b] <u>the operating characteristics of the switch gear include the status of a fire alarm.</u>	¶¶ 8, 74 (“Operating characteristics relating to the switch gear that can be monitored include ... the status of the fire alarm ...”), 85.	¶¶ 8, 74 (“Operating characteristics relating to the switch gear that can be monitored include ... the status of the fire alarm ...”), 85.

Substitute Claim No. 50 (Substitute for original claim No. 11)

69. As I noted above, Claim 11 has been rewritten as substitute Claim 50, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 50 (11)	'838 App. Support EX-1002, 409– <u>458</u>	'363 App. Support (EX-2005)
50[a] The method of ~~claim 9~~ <u>claim 48</u> , further comprising controlling compression of <u>the</u> <u>liquefied</u> natural gas;	¶¶ 20, 24 (“The functions can include: monitoring and control of the gas compression for the turbines (and in particular, of pressure and temperature, or load percentage)”), 26, 34, claim 13; claim 14.	¶¶ 20, 24 (“The functions can include: monitoring and control of the gas compression for the turbines (and in particular, of pressure and temperature, or load percentage)”), 26, 34; claim 2.
50[b] wherein the generator is fueled by <u>liquefied</u> natural gas,	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”), 22; claim 13.	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”), 22.
50[c] <u>the method further</u> <u>comprising monitoring</u> <u>operating characteristics of a</u> <u>hydraulic system</u>	¶¶ 44–46, 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge	¶¶ 44–46, 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge

Substitute Claim 50 (11)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	pressure, temperature, hydraulic oil level, and filter status.”).	pressure, temperature, hydraulic oil level, and filter status.”).
<u>50[d] wherein the monitored operating characteristics of the hydraulic system include system pressure, charge pressure, temperature, hydraulic oil level, and filter status.</u>	¶ 46 (“In an embodiment, the electrically powered fracking fleet can include hydraulic system monitoring for the equipment, including the system pressure, the charge pressure, the temperature, the hydraulic oil level, and the filter status.”), 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge pressure, temperature, hydraulic oil level, and filter status.”).	¶ 46 (“In an embodiment, the electrically powered fracking fleet can include hydraulic system monitoring for the equipment, including the system pressure, the charge pressure, the temperature, the hydraulic oil level, and the filter status.”), 59 (“In an embodiment, monitoring at the hydraulic motor of the hydration unit can include hydraulic system monitoring, including of operating characteristics such as system pressure, charge pressure, temperature, hydraulic oil level, and filter status.”).

Substitute Claim No. 51 (Substitute for original claim No. 12)

70. As I noted above, Claim 12 has been rewritten as substitute Claim 51, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 51 (12)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
51[a] The method of ~~claim 9~~ <u>claim 48</u> , wherein the generator is a turbine generator; the method further comprising	¶¶ 20 (“If desired by an operator, the electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.”), 30 (“Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122 ...”), 32 (“Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons.”); claim 15.	¶¶ 20 (“If desired by an operator, the electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.”), 30 (“Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122 ...”), 32 (“Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons.”); claim 12.
51[b] monitoring <u>operating characteristics of</u> the turbine generator;	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or

Substitute Claim 51 (12)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	more operating characteristics of the electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103.	more operating characteristics of the electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103.
<u>51[c] wherein the monitored operating characteristics of the turbine generator include at least fuel system air supply pressure transmitter failure, thermocouple input module thermistor failure, start VFD configuration failure, generator circuit breaker failure to open, gas fuel supply pressure transmitter failure, gas fuel control pressure transmitter failure, utility circuit breaker closed, generator frequency, and engine serial number.</u>	¶¶ 87 (“Operating characteristics of the turbine that can be also monitored can include, for example, fuel system air supply pressure transmitter failure, ... , thermocouple input module thermistor failure, ..., start VFD configuration failure”), 88 (“turbine air inlet filter transmitter failure”), 89 (“Operating characteristics of the turbine that can be also monitored can include, ... generator circuit breaker failure to open”), 92 (“gas fuel supply pressure transmitter failure, ..., gas fuel control pressure transmitter	¶¶ 87 (“Operating characteristics of the turbine that can be also monitored can include, for example, fuel system air supply pressure transmitter failure, ... , thermocouple input module thermistor failure, ..., start VFD configuration failure”), 88 (“turbine air inlet filter transmitter failure”), 89 (“Operating characteristics of the turbine that can be also monitored can include, ... generator circuit breaker failure to open”), 92 (“gas fuel supply pressure transmitter failure, ..., gas fuel control pressure transmitter

Substitute Claim 51 (12)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	failure,”), 95 (“utility circuit breaker closed,”), 98 (“generator frequency”), 100 (“engine serial number”), 101.	failure,”), 95 (“utility circuit breaker closed,”), 98 (“generator frequency”), 100 (“engine serial number”), 101.

Substitute Claim No. 52 (Substitute for original claim No. 13)

71. As I noted above, Claim 13 has been rewritten as substitute Claim 52, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 53 (13)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
52[a] The method of ~~claim 9~~ <u>claim 48</u> , wherein the generator is a turbine generator; the method further comprising controlling the turbine generator <u>and</u>	¶¶ 6, 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 20, 24 (“The monitor/control data van 40 incorporate various functions in a	¶¶ 6, 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 20, 24 (“The monitor/control data van 40 incorporate various functions in a

Substitute Claim 53 (13)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the turbines (and in particular, of pressure and temperature, or load percentage), monitoring and control of the mobile turbines (and in particular, of pressure and temperature)'), 30, 32, 85–103; Fig. 2; claim 15, claim 16.	centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the turbines (and in particular, of pressure and temperature, or load percentage), monitoring and control of the mobile turbines (and in particular, of pressure and temperature)'), 30, 32, 85–103; Fig. 2; claim 12.
<u>52[b] monitoring operating characteristics of the turbine generator</u>	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the

Substitute Claim 53 (13)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103.	electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103.
<u>52[c] wherein the monitored operating characteristics of the turbine generator include gas fuel main valve discharge pressure transmitter failure, and backup system relay failure.</u>	¶ 92 (“Operating characteristics of the turbine that can be also monitored can include, for example, ... gas fuel main valve discharge pressure transmitter failure, ... backup system relay failure”).	¶ 92 (“Operating characteristics of the turbine that can be also monitored can include, for example, ... gas fuel main valve discharge pressure transmitter failure, ... backup system relay failure”).

Substitute Claim No. 53 (Substitute for original claim No. 14)

72. As I noted above, Claim 14 has been rewritten as substitute Claim 53, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 53 (14)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
53[a] The method of ~~claim 8~~ <u>claim 47</u> , further comprising resetting a fault occurring in the variable frequency drive from the centralized control unit.	¶¶ 23 (“Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, ...”), 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: ... monitoring and resetting faults on the variable frequency drives”), 64 (“In an embodiment, the pump control station can also include a VFD fault reset.”); claim 18.	¶¶ 23 (“Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, ...”), 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: ... monitoring and resetting faults on the variable frequency drives”), 64 (“In an embodiment, the pump control station can also include a VFD fault reset.”); claim 15.
53[b] <u>the method further comprising monitoring operating characteristics of the variable frequency drive,</u>	¶¶ 43 (“In an embodiment, the electrically powered fracking fleet can include a discharge motor. For the discharge motor, monitoring can include monitoring the VFD, such as the motor winding temperatures, the motor RPM, the voltage, the	¶¶ 43 (“In an embodiment, the electrically powered fracking fleet can include a discharge motor. For the discharge motor, monitoring can include monitoring the VFD, such as the motor winding temperatures, the motor RPM, the voltage, the torque,

Substitute Claim 53 (14)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	torque, and the current (amperage).”), 72 (“In an embodiment, operating characteristics of the VFD of the fracturing pump that can be monitored can include kilowatt load, current, voltage, load percentage, VFD temperature, power factor, torque load, and faults.”), 78 (“In an embodiment, the electrically powered fracking fleet can include an Auxiliary Unit. The auxiliary unit includes capability to monitor the VFD, including operating characteristics of the auxiliary unit VFD”).	and the current (amperage).”), 72 (“In an embodiment, operating characteristics of the VFD of the fracturing pump that can be monitored can include kilowatt load, current, voltage, load percentage, VFD temperature, power factor, torque load, and faults.”), 78 (“In an embodiment, the electrically powered fracking fleet can include an Auxiliary Unit. The auxiliary unit includes capability to monitor the VFD, including operating characteristics of the auxiliary unit VFD”).
<u>53[c] wherein the monitored operating characteristics of the variable frequency drive include motor winding temperatures, the motor RPM, the voltage, the torque, and the current (amperage).</u>	¶ 43 (“In an embodiment, the electrically powered fracking fleet can include a discharge motor. For the discharge motor, monitoring can include monitoring the VFD, such as the motor winding temperatures, the motor RPM, the voltage, the torque, and the current (amperage).”).	¶ 43 (“In an embodiment, the electrically powered fracking fleet can include a discharge motor. For the discharge motor, monitoring can include monitoring the VFD, such as the motor winding temperatures, the motor RPM, the voltage, the torque, and the current (amperage).”).

Substitute Claim No. 54 (Substitute for original claim No. 15)

73. As I noted above, Claim 15 has been rewritten as substitute Claim 54, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 54 (15)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
54[a] The method of ~~claim 9~~ <u>claim 48</u> , further comprising: providing an emergency power off unit coupled to the centralized control unit, the electrically powered pump and the generator; and substantially immediately cutting power to the generator by activating the emergency power off unit	¶¶ 12 (“FIG. 3 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology, including an emergency power off circuit.”), 26 (“The monitor/control data van 40 further includes an Emergency Power Off (EPO) 43 functionality, which allows for the entire site to be shut off completely. For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, cutting the connection for fuel to the turbine.”), 34 (“Referring	¶¶ 12 (“FIG. 3 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology, including an emergency power off circuit.”), 26 (“The monitor/control data van 40 further includes an Emergency Power Off (EPO) 43 functionality, which allows for the entire site to be shut off completely. For example, over CAT5E cabling, breakers will open in both switchgear to cut power to the site, and gas compression will turn off, cutting the connection for fuel to the turbine.”), 34 (“Referring now to FIG.

Substitute Claim 54 (15)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23.”); Fig. 3; claim 21.	3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23.”); Fig. 3; claim 17.
<u>54[b] wherein the emergency power off unit is operated by a switch that sounds an audible alarm.</u>	¶ 34 (“Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”).	¶ 34 (“Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”).

Substitute Claim No. 55 (Substitute for original claim No. 16)

74. As I noted above, Claim 16 has been rewritten as substitute Claim 55, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 55 (16)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
55[a] The method of ~~claim 15~~ <u>claim 54</u> , the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the generator and the centralized control unit, the method further comprising signaling the switchgear from the centralized control unit to open a breaker to substantially immediately cut power to the generator	¶ 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will tum off, cutting fuel to the turbine(s) 23. Optionally,	¶ 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will tum off, cutting fuel to the turbine(s) 23. Optionally,

Substitute Claim 55 (16)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3; claim 22.	the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3; claim 18.
55[b] <u>wherein signaling is transmitted over armored shielded CAT5E cabling.</u>	¶ 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will tum off, cutting	¶ 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22. The gas compression will tum off, cutting

Substitute Claim 55 (16)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	fuel to the turbine(s) 23. Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3.	fuel to the turbine(s) 23. Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3.

Substitute Claim No. 56 (Substitute for original claim No. 17)

75. As I noted above, Claim 17 has been rewritten as substitute Claim 56, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
56[p] A system for centralized monitoring and control of a hydraulic fracturing operation, comprising:	¶¶ 6, 7, 8 (“Also disclosed is a system for centralized monitoring and control of an electrically powered hydraulic fracturing operation.”); claim 23.	¶¶ 6, 7, 8 (“Also disclosed is a system for centralized monitoring and control of an electrically powered hydraulic fracturing operation.”); claim 19.
56[a] an electric powered fracturing fleet, the electric	¶¶ 8 (“The system can include, for example, an electric powered fracturing fleet. The electric powered	¶¶ 8 (“The system can include, for example, an electric powered fracturing fleet. The electric powered

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
powered fracturing fleet comprising: a combination of one or more of: electric powered pumps, <u>electric motors</u> , turbine generators, blenders, sand silos, chemical storage units, conveyor belts, manifold trailers, hydration units, variable frequency drives, switchgear, transformers, compressors;	fracturing fleet can include a combination of one or more of: electric powered pumps, turbine generators, blenders, sand silos, chemical storage units, conveyor belts, manifold trailers, hydration units, variable frequency drives, switchgear, transformers, and compressors.”), 14 (“In the embodiment shown, the pumps 10 are powered by electric motors 14”), 15–17; Fig. 1; claim 23.	fracturing fleet can include a combination of one or more of: electric powered pumps, turbine generators, blenders, sand silos, chemical storage units, conveyor belts, manifold trailers, hydration units, variable frequency drives, switchgear, transformers, and compressors.”), 14 (“In the embodiment shown, the pumps 10 are powered by electric motors 14”), 15–17; Fig. 1; claim 19.
56[b] a centralized control unit coupled to electric powered fracturing fleet; and	¶¶ 6, 8 (“The electric powered fracturing fleet can also include a centralized control unit coupled to electric powered fracturing fleet.”); claim 23.	¶¶ 6, 8 (“The electric powered fracturing fleet can also include a centralized control unit coupled to electric powered fracturing fleet.”); claim 19.
56[c] an emergency power off unit coupled to the centralized control unit, the electric powered pumps and the turbine generators, the emergency power off unit configured to substantially immediately cut	¶¶ 12 (“FIG. 3 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology, including an emergency power off circuit.”), 26, 34 (“Referring now to FIG. 3, the EPO	¶¶ 12 (“FIG. 3 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology, including an emergency power off circuit.”), 26, 34 (“Referring now to FIG. 3, the EPO 43 can include power

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
power to the turbine generators when activated,	43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 47, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23. Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3.; claim 24.	(or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 47. The switchgear 47 couples the data van 40 to turbine(s) 23 (or the EER(s) coupled to the turbines). In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the EER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 47, cutting power to the generator 22. The gas compression will turn off, cutting fuel to the turbine(s) 23. Optionally, the EPO 43 is operated by a switch in the control vehicle 42 that sounds an audible alarm that the EPO 43 is imminently deployable.”); Fig. 3.; claim 20.

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
56[d] wherein the centralized control unit is configured to: monitor one or more operating characteristics of the electric powered fracturing fleet; and control one or more operating characteristics of the electric powered fracturing fleet;	¶ 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”); claim 23.	¶ 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”); claim 19.
56[e] wherein the centralized control unit is coupled to the electric powered fracturing fleet via one or more of cabling, Ethernet, or wirelessly;	¶¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”), 8 (“The electric powered fracturing fleet can also include a centralized control unit coupled to electric powered fracturing fleet.”), 25 (“Monitoring and control for the above functions can be accomplished with cables (not shown), Ethernet, or wireless capability.”), 70, 75; claims 6, 19, 28.	¶¶ 6 (“The system can also include a centralized control unit coupled to the plurality of electric pumps and the plurality of generators.”), 8 (“The electric powered fracturing fleet can also include a centralized control unit coupled to electric powered fracturing fleet.”), 25 (“Monitoring and control for the above functions can be accomplished with cables (not shown), Ethernet, or wireless capability.”), 70, 75.
<u>56[f] the system further comprising one or more generators electrically</u>	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
<u>connected to the electric pump to provide power to the electric pump;</u>	pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).	pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).
<u>56[g] wherein the one or more generators are turbine generators, and</u>	¶¶ 20 (“If desired by an operator, the electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.”), 30 (“Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122 ...”), 32 (“Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons.”); claim 3.	¶¶ 20 (“If desired by an operator, the electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.”), 30 (“Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122”), 32 (“Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons.”); claim 3.

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
<u>56[h] wherein the centralized control unit is further configured to monitor operating characteristics and control the one or more turbine generators, and</u>	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103; claim 3.	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103; claim 3.
<u>56[i] wherein the monitored operating characteristics of the one or more turbine generators</u>	¶ 88 (“Operating characteristics of the turbine that can be also monitored can include, for example,	¶ 88 (“Operating characteristics of the turbine that can be also monitored can include, for example, turbine air inlet filter transmitter failure”).

Substitute Claim 56 (17)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
<u>include at least turbine air inlet filter transmitter failure.</u>	turbine air inlet filter transmitter failure”).	

Substitute Claim No. 57 (Substitute for original claim No. 18)

76. As I noted above, Claim 18 has been rewritten as substitute Claim 57, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 58 (18)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
57[a] The system of ~~claim 17~~ <u>claim 56</u> , the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the <u>one or more turbine</u> generators and the centralized control unit, the switchgear responsive to a signal from the centralized	¶¶ 26, 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 4 7. The switchgear 4 7 couples the data van 40 to turbine(s) 23 (or the EER(s)	¶¶ 26, 34 (“Referring now to FIG. 3, the EPO 43 can include power (or optionally, plural auxiliary power sources) coupled to the monitor/control data van 40 via, for example, armored shielded CAT5E cabling to a switchgear 4 7. The switchgear 4 7 couples the data van 40

Substitute Claim 58 (18)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
control unit to open a breaker to substantially immediately cut power to the <u>one or more</u> turbine generators;	coupled to the turbines).” ... “In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the BER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22.”), Fig. 3; claim 25.	to turbine(s) 23 (or the EER(s) coupled to the turbines).” ... “In certain embodiments, the shielded CAT5E cabling may run from the data van 40, to an auxiliary trailer that includes switchgear 47, to a gas compressor (not shown), and to the BER/Turbine 23. Upon activation of the EPO 43, breakers open in the switchgear 4 7, cutting power to the generator 22.”), Fig. 3; claim 21.
<u>57[b] wherein the centralized control unit is further configured to monitor operating characteristics of the switch gear,</u>	¶¶ 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet”), 24, 26, 30, 34, 69, 74 (“Operating characteristics relating to the switch gear that can be monitored include the Emergency Power Off Status, ...”); claims 10, 22, 23, 25; Fig. 3.	¶¶ 8 (“The centralized control unit is configured to monitor one or more operating characteristics of the electric powered fracturing fleet”), 24, 26, 30, 34, 69, 74 (“Operating characteristics relating to the switch gear that can be monitored include the Emergency Power Off Status, ...”); Fig. 3; claims 10, 22, 23, 25.
<u>57[c] wherein the monitored operating characteristics of the switch gear include at least the status of a fire alarm.</u>	¶¶ 8, 74 (“Operating characteristics relating to the switch gear that can be monitored include ... the status of the fire alarm ...”), 85.	¶¶ 8, 74 (“Operating characteristics relating to the switch gear that can be monitored include ... the status of the fire alarm ...”), 85.

Substitute Claim No. 58 (Substitute for original claim No. 19)

77. As I noted above, Claim 19 has been rewritten as substitute Claim 58, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 58 (19)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
58 The system of ~~claim 17~~ <u>claim 56</u> , wherein the centralized control unit is further configured to monitor and control <u>all of the following</u> : compression of natural gas, <u>electric motors, switchgear, transformers, mobile turbines, rate and pressure of the overall system, vertical sand silos, and an electrical conveyor belt</u> .	¶¶ 23, 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the turbines (and in particular, of pressure and temperature, or load percentage), monitoring and control of the mobile turbines ..., switchgear and transformers, ... monitoring and control of the electric motors, monitoring and control of	¶¶ 23, 24 (“The monitor/control data van 40 incorporate various functions in a centralized location such that compressors and turbines spread across a plurality of trucks can be monitored by a single operator. The functions can include: monitoring and control of the gas compression for the turbines (and in particular, of pressure and temperature, or load percentage), monitoring and control of the mobile turbines ..., switchgear and transformers, ... monitoring and control of the electric motors, monitoring and control of rate

Substitute Claim 58 (19)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	rate and pressure of the overall system, ... and monitoring and control of vertical sand silos and electrical conveyor belt.”).	and pressure of the overall system, ... and monitoring and control of vertical sand silos and electrical conveyor belt.”).

Substitute Claim No. 59 (Substitute for original claim No. 20)

78. As I noted above, Claim 20 has been rewritten as substitute Claim 59, shown below. Also, as shown below, each of the newly amended features is supported by both the '838 Application and the '363 Application:

Substitute Claim 59 (20)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
59[a] The system of ~~claim 17~~ claim 56 , wherein the centralized control unit is further configured to monitor and control the <u>one or more</u> turbine generators,	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating	¶¶ 6 (“The centralized control unit monitors at least one of pressure, temperature, fluid rate, fluid density, concentration, volts, amps, etc. of the plurality of electric pumps and the plurality of generators.”), 7, 8 (“The centralized control unit is configured to monitor one or more operating

Substitute Claim 59 (20)	<u>'838 App. Support EX-1002, 409–458</u>	<u>'363 App. Support (EX-2005)</u>
	characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 23 (“For example, the monitor/control data van 40 can include a computer console that controls the VFD, and thus the speed of the electric motor 14 and the pump 10.”) 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103; claim 27.	characteristics of the electric powered fracturing fleet and control one or more operating characteristics of the electric powered fracturing fleet.”), 23 (“For example, the monitor/control data van 40 can include a computer console that controls the VFD, and thus the speed of the electric motor 14 and the pump 10.”) 85 (“In an embodiment, the electrically powered fracking fleet can include a turbine. Operating characteristics of the turbine that can be monitored can include, for example, calibration faults, node channel faults, ...”), 86–103; claim 23.
<u>59[b] wherein the one or more turbine generators are fueled by liquefied natural gas.</u>	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In	¶¶ 6 (“The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas.”), 20 (“In certain

Substitute Claim 59 (20)	<u>'838 App. Support EX-1002, 409– 458</u>	<u>'363 App. Support (EX-2005)</u>
	certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).	embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas.”).

C. The Proposed Substitute Claims are Patentable Over the Cited Prior Art

1. Ground 1A – The Combination of Coli, Birch, and Rusnak

79. In Ground 1A, the Petition asserts that the combination of Coli, Birch, and Rusnak renders obvious claims 1–5 and 8–14. Petition, 19. Claims 1–2, 4–5, and 8–14 correspond to proposed substitute claims 41–42, 43–44, and 47–53, respectively. It is my opinion that the combination of Coli, Birch, and Rusnak does not disclose proposed Substitute Claims 41–59, much less the subset of proposed Substitute Claims 41–42, 43–44, and 47–53.

80. Specifically, proposed substitute claim 41 includes the following additional elements:

[41e] the system further comprising a generator electrically connected to the electric pump to provide power to the electric pump,

[41f] wherein the generator is a natural gas generator,

[41g] the system further comprising a gas filtration skid,

[41h] wherein the centralized control unit is further configured to monitor operating characteristics of the gas filtration skid;

[41i] wherein the monitored operating characteristics of the gas filtration skid include at least water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status;

[41j] wherein the centralized control unit is further configured to control operating characteristics of the gas filtration skid;

[41k] wherein the controllable operating characteristics of the gas filtration skid include at least inlet valves, outlet valves, bypass valves, and pressure release;

[41l] the system further comprising a gas compressor,

[41m] wherein the centralized control unit is further configured to monitor operating characteristics of the gas compressor;

[41n] wherein the operating characteristics of the gas compressor include at least compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, and oil pump discharge pressure;

It is my opinion that none of Coli, Birch, and Rusnak disclose all of these claim elements. First, none of Coli, Birch or Rusnak discloses a gas filtration skid. Second, neither Coli nor Rusnak discloses a gas compressor. Third, none of Coli, Birch or Rusnak discloses or suggests monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, and filter bypass status. Fourth, none of Coli, Birch or Rusnak discloses or suggests controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Fifth, none of Coli, Birch or Rusnak discloses or

suggests monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. For at least these reasons, none of Coli, Birch or Rusnak discloses proposed Substitute Claims 41–46.

81. Additionally, proposed substitute claims 47–59 include—whether directly or indirectly due to dependance from other claims—the system further comprises one or more generators electrically connected to the electric pump to provide power to the electric pump, wherein the one or more generators are turbine generators, and wherein the centralized control unit is further configured to monitor operating characteristics and control the one or more turbine generators, wherein the operating characteristics of the one or more turbine generators include at least turbine air inlet filter transmitter failure. It is my opinion that none of Coli, Birch or Rusnak discloses these additional limitations, including, *inter alia*, that none of Coli Birch, or Rusnak discloses monitoring for a turbine air inlet filter transmitter failure.

2. Ground 1B – The Combination of Coli, Birch, Rusnak, and Dykstra

82. In Ground 1B, the Petition asserts that the combination of Coli, Birch, Rusnak, and Dykstra renders obvious claims 1–5 and 8–14. Petition, 44. As I discussed previously, claims 1–2, 4–5, and 8–14 correspond to proposed substitute

claims 41–42, 43–44, and 47–53, respectively. It is my opinion that the combination of Coli, Birch, Rusnak, and Dykstra does not disclose proposed Substitute Claims 41–59, much less the subset of proposed Substitute Claims 41–42, 43–44, and 47–53.

83. For example, as I discussed in Section VII.D.1, the combination of Coli, Birch and Rusnak does not disclose proposed substitute claims 41–59. Dykstra also does not disclose a gas filtration skid or a gas compressor. It is further my opinion that Dykstra does not disclose monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Further, Dykstra does not disclose controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, Dykstra does not disclose monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. It is thus my opinion that the combination of Coli, Birch, Rusnak, and Dykstra does not disclose proposed substitute claims 41–46 for at least the reasons I discussed above in this section and Section VIII.D.1.

84. Dykstra further does not disclose a turbine, much less monitoring for a turbine air inlet filter transmitter failure. It is thus my opinion that the combination

of Coli, Birch, Rusnak, and Dykstra does not disclose proposed substitute claims 47–59 for at least the reasons I discussed above in this section and Section VIII.D.1.

3. Ground 2A – The Combination of Coli, Birch, Rusnak, and Hunt

85. In Ground 2A, the Petition asserts that the combination of Coli, Birch, Rusnak, and Hunt renders obvious claims 6, 7, and 15–20. Petition, 53. Claims 6, 7, and 15–20 correspond to proposed substitute claims 45, 46, and 54–59, respectively. It is my opinion that the combination of Coli, Birch, Rusnak, and Hunt does not disclose proposed substitute claims 41–59, much less the subset of proposed substitute claims 45, 46, and 54–59.

86. For example, as I discussed in Section VII.D.1, the combination of Coli, Birch and Rusnak does not disclose proposed substitute claims 41–59. Hunt also does not disclose a gas filtration skid or a gas compressor. It is further my opinion that Hunt does not disclose monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas temperatures, valve statuses, and filter bypass status. Further, Hunt does not disclose controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, Hunt does not disclose monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor

inlet pressure, compressor discharge pressure, or oil pump discharge pressure. It is thus my opinion that the combination of Coli, Birch, Rusnak, and Hunt does not disclose proposed substitute claims 41–46 for at least the reasons I discussed above in this section and Section VIII.D.1.

87. Hunt further does not disclose a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure. It is thus my opinion that the combination of Coli, Birch, Rusnak, and Hunt does not disclose proposed substitute claims 47–59 for at least the reasons I discussed above in this section and Section VIII.D.1.

4. Ground 2B – The Combination of Coli, Birch, Rusnak, Dykstra, and Hunt

88. In Ground 2B, the Petition asserts that the combination of Coli, Birch, Rusnak, Dykstra and Hunt renders obvious claims 6, 7, and 15–20. Petition, 70. Claims 6, 7, and 15–20 correspond to proposed substitute claims 45, 46, and 54–59, respectively. It is my opinion that the combination of Coli, Birch, Rusnak, Dykstra and Hunt does not disclose proposed substitute claims 41–59, much less the subset of proposed substitute claims 45, 46, and 54–59.

89. For example, as I discussed in Section VII.D.3, the combination of Coli, Birch, Rusnak, and Hunt does not disclose proposed substitute claims 41–59. As I discussed in Section VII.D.2, Dykstra does not disclose gas filtration skid or gas

compressor requirements. It is thus my opinion that the combination of Coli, Birch, Rusnak, Dykstra and Hunt does not disclose proposed substitute claims 41–59 for at least the reasons I discussed above in this section, Section VIII.D.2, and Section VIII.D.3.

5. Ground 3A – The Combination of Coli, Birch, Rusnak, Broussard079, and Broussard601

90. In Ground 3A, Petitioners assert in their Opposition (Paper 16) (“Opp.”) that the combination of Coli, Birch, Rusnak, Broussard079, and Broussard601 renders obvious Previously Proposed Substitute Claims 21, 22, 28, and 29. Opp., 5. It is my opinion that the combination of Coli, Birch, Rusnak, Broussard079, and Broussard601 does not disclose proposed substitute claims 41–59.

91. For example, as I discussed in Section VII.D.1, the combination of Coli, Birch, and Rusnak does not disclose proposed substitute claims 41–59. It is further my opinion that neither Broussard079 nor Broussard601 discloses monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Neither Broussard079 nor Broussard601 discloses a gas filtration skid or a gas compressor. Further, neither Broussard079 nor Broussard601 discloses controlling the following operating characteristics of a gas filtration skid: inlet

valves, outlet valves, bypass valves, or pressure release. Additionally, neither Broussard079 nor Broussard601 discloses monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. It is thus my opinion that the combination of Coli, Birch, Rusnak, Broussard079, and Broussard601 does not disclose proposed substitute claims 41–46 for at least the reasons I discussed above in this section and Section VIII.D.1.

92. As I discussed in Section VII.D.1, the combination of Coli, Birch and Rusnak does not disclose proposed substitute claims 41–59. Neither Broussard079 nor Broussard601 disclose a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure. It is thus my opinion that the combination of Coli, Birch, Rusnak, Broussard079, and Broussard601 does not disclose proposed Substitute Claims 47–59 for at least the reasons I discussed above in this section and Section VIII.D.1.

6. Ground 4A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman

93. In Ground 4A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman renders obvious Previously

Proposed Substitute Claims 23, 32. Opp., 8. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman does not disclose proposed substitute claims 41–59.

94. For example, as I discussed in Section VII.D.3, the combination of Coli, Birch, Rusnak, and Hunt does not disclose proposed substitute claims 41–59. As I discussed in Section VII.D.5, the combination of Coli, Birch, Rusnak, Broussard079, and Broussard601 does not disclose proposed substitute claims 41–59. Additionally, none of Kohlenberger, Ekanayake, Weiher, or Newman discloses a gas filtration skid or a gas compressor. It is further my opinion that none of Kohlenberger, Ekanayake, Weiher, or Newman discloses monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Further, none of Kohlenberger, Ekanayake, Weiher, or Newman discloses controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, none of Kohlenberger, Ekanayake, Weiher, or Newman discloses monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure.

95. I further note that Petitioners rely on Ekanayake in Ground 4A of their Opposition for disclosing a filter assembly. Opp., 10. It is my opinion that any of Ekanayake’s disclosures regarding filter assemblies is limited to gas turbine filtration systems. EX-1027, 1:16–19 (“The subject matter disclosed herein generally *relates to filter systems for gas turbines* and more particularly to systems for monitoring the degree of *fouling of gas turbine filters*.”) (emphasis added). It is thus my opinion that any of Ekanayake’s disclosures regarding filter assemblies or filter systems does not apply to proposed substitute claims 41–46, at least because proposed substitute claims 41–46 do not require a gas turbine as the generator.

96. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman does not disclose proposed substitute claims 41–46 for at least the reasons I discussed above in this section, Section VIII.D.3 and Section VIII.D.5.

97. None of Kohlenberger, Weiher, or Newman disclose a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure. Petitioners contend that “Ekanayake discloses a ‘filter assembly’ that filters ‘air entering a gas turbine for power generation application.’”. Opp., 10. Petitioners further contend that “[t]he filter assembly further ‘includes a fouling detection instrument’ for detecting the extent to which the filter assembly has been ‘fouled’ and ‘a wireless communications module’ for ‘wirelessly communicating the degree of fouling’”. *Id.*

Petitioners further claim that “[i]t would have been obvious to a POSITA that Coli’s control system would have monitored the status of Ekanayake’s filter assembly and associated wireless communication module (i.e., ‘turbine air inlet filter transmitter’).” *Id.* I disagree. I understand, and agree with, the Board in its Preliminary Guidance (Paper 20) (“Preliminary Guidance”) determined “the detection of the ‘fouled’ filters does not mean that there is a detection of a transmitter failure.” Preliminary Guidance, 21. I understand that, and agree with, the Board further explained that “if the filters have a ‘foul’ odor or are defective in any way, the transmitter that transmits such data is still operational and there is no ‘filter transmitter failure’” and that “Petitioner does not explain otherwise.” *Id.* I agree with the Board that detection of fouled filters does not indicate a transmitter failure. I further agree with the Board that communication of a foul odor or defective filter does not teach or suggest a turbine air inlet filter transmitter failure. Further, Ekanayake does not teach or suggest monitoring for any failures, let alone monitoring for a turbine air inlet filter transmitter failure. I understand, and agree with, Dr. Durham admitted as much. EX-2108, 23:16–19 (“Q: Ekanayake does not expressly discuss monitoring for a transmitter failure. Right? A: I agree with that. Q: Ekanayake does not expressly discuss monitoring for failures. Right? A: It does not use the term ‘failure,’ no. Ekanayake does not.”). It is thus my opinion that

Ekanayake does not disclose or suggest monitoring for a turbine air inlet filter transmitter failure.

98. It is also my opinion that Coli does not disclose or suggest comprehensive failure diagnostics. I note that Coli does not disclose monitoring for any failures, and Coli does not provide any direction for a POSITA to implement failure monitoring and failure detection. For example, Coli does not disclose which parameters a POSITA should consider monitoring out of the thousands of parameters that could be monitored as part of a fracturing operation. In my opinion, Coli instead teaches proactive system regulation and coordination where changes in one system are promulgated to other systems. EX-1004, ¶ [0065]. I POSITA reading Coli would understand Coli's focus is to teach a coordinated operational system—as opposed to a diagnostic system—where “all equipment can be synced or slaved to each other” so that “a change at one single point will be carried out by all pieces of equipment. EX-1004, ¶ [0070]. It is thus my opinion that rather than teaching a diagnostic and failure detection system, Coli teaches a proactive, coordinated system.

99. It is also my opinion that Coli fails to teach implementation of a comprehensive failure detection and/or isolation system. I note that Coli only mentions the term “failure” twice, and that neither is regarding monitoring for failure conditions. See EX-1004, ¶ [0067]. I further note that Coli fails to teach or suggest

monitoring for error codes because Coli mentions the term “error” only once, and that instance is unrelated to error codes. EX-1004, ¶ [0067].

100. It is further my opinion that it was not known in the art to monitor the claimed operating characteristics, and I never agreed that it was. I never agreed that a POSITA would know to monitor or monitor the claimed operating characteristics; I instead agreed that the technology existed at the time of invention where a POSITA could monitor some of the claimed operating characteristics. EX-1023, 35:14–21 (“Sure, At the time of the 992 patent application in 2015, was it known to monitor failure of a turbine generator’s fuel system air supply pressure transmitter? A: *Are you asking whether that technology was known at the time?* Q: Yes. A. Yes, it was.”) (emphasis added). Even where the technology existed, the asserted prior art fails to disclose or suggest which of the thousands of potential operating characteristics that could be monitored are operating characteristics that should be monitored.

101. I also note that Coli teaches that its system could include “*suitable* controls and computer monitoring for the entire fracturing operation” (EX-1004, ¶ [0072] (emphasis added)), but Coli does not teach or suggest monitoring all equipment on the fracturing site. A POSITA reading Coli would not understand Coli to provide a blueprint or indication of which operating characteristics are “suitable” versus which ones are not worth adding.

102. Thus, it is my opinion that a POSITA would not have found it obvious to monitor the claimed operating characteristics based on Coli, especially without a blueprint for which operating characteristics to monitor such as the blueprint provided by the 992 Patent.

103. It is also my opinion that Kohlenberger does not disclose or suggest monitoring for fuel system air supply pressure transmitter failures. Petitioners contend that Kohlenberger “has sensors (not shown) within the air inlet to insure that the air entering the turbine cabinet 48 is of constant temperature and pressure to optimize the performance of the gas turbine 42.”. Opp., 8. But I note that Kohlenberger does not disclose or suggest monitoring for a failure of air inlet sensors. I understand that, and agree with, Dr. Durham admitted as much. EX-2108, 18:12–16 (“Q: Kohlenberger does not expressly discuss monitoring for a failure of air inlet sensors. Right? A: I agree with that.”) (objections omitted). It is further my opinion that combining with Coli does not teach or suggest monitoring for fuel system air supply pressure transmitter failures, at least because Coli does not disclose monitoring for transmitter failures. I understand that, and agree with, Dr. Durham admitted as much. EX-2108, 64:5–8 (“Q: Coli does not expressly discuss monitoring for transmitter failures. Right? A: It does not use the term “transmitter failure”).

104. It is also my opinion that Birch does not disclose or suggest monitoring for a thermocouple input module thermistor failure. I first note that Birch does not discuss thermistors. I understand that, and agree with, Dr. Durham admitted as much. EX-2108, 37:10–22 (“Q: Birch does not expressly discuss a thermistor. Right? A: Correct. I agree -- well, let me check. Hold on. Correct, it does not.”) (objections omitted). I also note that Birch not only does not disclose or suggest monitoring for a failure of a thermocouple input module thermistor, Birch does not disclose or suggest monitoring for any thermocouple failures. I understand, and agree with, Dr. Durham admits as much. EX-2108, 37:16–38:9 (“Q: Birch does not expressly discuss the thermocouple input module thermistor. Right? A: Correct. Q: Birch does not expressly discuss a thermocouple input module thermistor failure. Right? A: I agree with that. Q: Birch does not expressly discuss monitoring for a failure of the thermocouple input module thermistor. Right? A: I agree with that. Q: Birch does not expressly discuss monitoring for any failures of the thermocouple. Right? A: I believe that is correct. I don't recall any.”).

105. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman does not disclose proposed Substitute Claims 47–59 for at least the reasons I discussed above in this section, Section VIII.D.3 and Section VIII.D.5.

7. Ground 5A – The Combination of Coli, Birch, Rusnak, Hunt,

Broussard079, Broussard601, and Gensel

106. In Ground 5A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and Gensel renders obvious Previously Proposed Substitute Claims 24, 30, and 38. Opp., 14. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and Gensel does not disclose proposed substitute claims 41–59.

107. For example, as I discussed in Section VII.D.6, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman does not disclose proposed substitute claims 41–59. Here, it is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601 does not disclose proposed substitute claims 41–59 for the same reasons I discussed in Section VII.D.6.

108. Further, Gensel does not disclose a gas filtration skid or a gas compressor. It is further my opinion that Gensel does not disclose or suggest monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Gensel also does not disclose or suggest controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, Gensel does not disclose

monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. I also note that Gensel does not disclose a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and Gensel does not disclose proposed substitute claims 41–59 for at least the reasons I discussed above in this section and Section VIII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics.

8. Ground 6A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Gensel, and Omont

109. In Ground 6A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Gensel, and Omont renders obvious Previously Proposed Substitute Claims 25 and 31. Opp., 16–18. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Gensel, and Omont does not disclose proposed substitute claims 41–59.

110. For example, as I discussed in Section VII.D.7, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and Gensel does not disclose or suggest proposed substitute claims 41–59. Further, Omont does not disclose a gas

filtration skid or a gas compressor. It is further my opinion that Omont does not disclose monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, and filter bypass status. Omont also does not disclose or suggest controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, Omont does not disclose monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. I also note that Omont does not disclose a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure.

111. It is also my opinion that Omont does not disclose or suggest monitoring “hydraulic oil level” I understand that, and agree with, Dr. Durham admitted as much. EX-2108, 56:21–57:3; EX-2107, ¶¶ 109–110. I understand that Petitioners make three attempts at claiming Omont discloses monitoring “hydraulic oil level”. Opp., 17–18. It is my opinion that a POSITA would understand “dates of engine oil ... and other fluid changes” (Opp., 17–18) are dates fluids are changed and not hydraulic oil level. I understand that, and agree with, Dr. Durham admitted as much. EX-2108, 56:21–57:3. It is also my opinion that “tub level of fracturing fluid” (Opp., 18) and “level of materials in a container” do not disclose or suggest

monitoring hydraulic oil level, at least because fracturing fluid is not hydraulic oil, hydraulic oil level is not measured by a tub level, and hydraulic oil would not be understood by a POSITA as “materials in a container”.

112. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Gensel, and Omont does not disclose or suggest proposed substitute claims 41–59 for at least the reasons I discussed above in this section, Section VIII.D.7, and Section VIII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics.

9. Ground 7A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, and Bromell

113. In Ground 7A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, and Bromell renders obvious Previously Proposed Substitute Claims 26 and 35. Opp., 18–20. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, and Bromell does not disclose proposed substitute claims 41–59.

114. For example, as I discussed in Section VII.D.7, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and Gensel does not disclose or suggest proposed substitute claims 41–59. Here, it is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, and Broussard601 does

not disclose or suggest proposed substitute claims 41–59 for at least the same reasons I discussed in Section VII.D.7.

115. Further, neither Smith nor Bromell discloses or suggests a gas filtration skid or a gas compressor. It is further my opinion that neither Smith nor Bromell discloses monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Neither Smith nor Bromell discloses or suggests controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, neither Smith nor Bromell discloses or suggests monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. I also note that neither Smith nor Bromell discloses or suggests a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, and Bromell does not disclose or suggest proposed substitute claims 41–59 for at least the reasons I discussed above in this section, Section VIII.D.7, and Section VIII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics..

10. Ground 8A – The Combination of Coli, Birch, Rusnak, Hunt,

Broussard079, Broussard601, Smith, Bromell, and Thompson

116. In Ground 8A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, Bromell, and Thompson renders obvious Previously Proposed Substitute Claims 27 and 36. Opp., 4, 20–21. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, Bromell, and Thompson does not disclose proposed substitute claims 41–59.

117. For example, as I discussed in Section VII.D.9, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, and Bromell does not disclose or suggest proposed substitute claims 41–59. Further, Thompson does not disclose or suggest a gas filtration skid or a gas compressor. It is further my opinion that Thompson does not disclose monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Thompson does not disclose or suggest controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, Thompson does not disclose or suggest monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. I also note that Thompson does

not disclose or suggest a turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure.

118. I understand Petitioners contend a POSITA would have been motivated to “look to additional references that teach particular types of Ethernet cables” based on Ground 8A references. I disagree. None of the Ground 8A references discuss or suggest Ethernet cables. It is thus my opinion that a POSITA would not have been motivated to look to additional communications options, especially given the five communications options, “PSTN, DSL, CATV, BPL, and/or wireless services” provided by Hunt. EX-1008, ¶ [0076].

119. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Smith, Bromell, and Thompson does not disclose or suggest proposed substitute claims 41–59 for at least the reasons I discussed above in this section, Section VIII.D.9, and Section VIII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics.

11. Ground 9A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, and Broussard601

120. In Ground 9A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, and Broussard601 renders obvious Previously Proposed Substitute Claims 33, 37, and 40. Opp., 4, 21–23. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt,

Broussard079, and Broussard601 does not disclose proposed substitute claims 41–59.

121. For example, as I discussed in Section VII.D.6, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman does not disclose or suggest proposed substitute claims 41–59. Here, it is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, and Broussard601 does not disclose or suggest proposed substitute claims 41–59 for at least the same reasons I discussed in Section VII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics.

122. It is further my opinion that Birch does not disclose or suggest either a gas fuel main valve discharge pressure transmitter or monitoring for failure of a gas fuel main valve discharge pressure transmitter failure. Birch discusses “under and over pressure electronic sensors 6a and 6b” (EX-1005, 2:31–39), but a POSITA would understand these sensors as sensing an under or over pressure condition and not a sensing and transmission of actual pressure values. For at least these reasons, Birch does not disclose monitoring for a “gas fuel main valve discharge pressure transmitter failure”.

12. Ground 10A – The Combination of Coli, Birch, Rusnak,

Broussard079, Broussard601, and Discenzo

123. In Ground 10A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Broussard079, Broussard601, and Discenzo renders obvious Previously Proposed Substitute Claim 34. Opp., 4, 23–25. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Broussard079, Broussard601, and Discenzo does not disclose proposed substitute claims 41–59.

124. For example, as I discussed in Section VII.D.6, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, and Broussard601 does not disclose or suggest proposed substitute claims 41–59. Here, it is my opinion that the combination of Coli, Birch, Rusnak, Broussard079, Broussard601 does not disclose or suggest proposed substitute claims 41–59 for at least the same reasons I discussed in Section VII.D.6.

125. Further, Discenzo does not disclose or suggest a gas filtration skid or a gas compressor. It is further my opinion that Discenzo does not disclose monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. Discenzo does not disclose or suggest controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, Discenzo does not disclose or suggest

monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. I also note that Discenzo does not disclose or suggest a turbine or turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure.

126. It is also my opinion that Rusnak does not disclose or suggest monitoring “the torque”. Instead, it is my opinion that Rusnak teaches against monitoring the torque. EX-1007, ¶ [0004] (“[I]t would be useful to have a pump controller that *neither requires an external sensor, nor does it require performance values calculated* at multiple speeds to be stored in memory. Also, it would be useful to have a controller that *does not require generation of any unique performance curves, i.e. TDH vs. Torque*. Such features would *simplify the set-up and operation* of a VFD controller for a centrifugal pump”) (emphasis added). It is further my opinion that Rusnak instead teaches “internally monitoring automatically output current and voltage of the VFD to the AC motor *without the need for an external [torque] sensor*. EX-1007, ¶ [0005]. A POSITA would understand that Rusnak’s method does not require measuring the torque value. I understand that, and agree with, that Dr. Durham admits as much. EX-2108, 65:19–66:6 (“Q: So while Rusnak discusses selecting power limits, in its embodiment it is not expressly discussing measuring the torque value, as opposed to setting power limits. Correct? A: Correct.

I can -- *I can agree that Rusnak's method does not require measuring the torque value.* It monitors it from the standard performance curves and the Affinity relationships based on speed.”) (objections omitted) (emphasis added). It is thus my opinion that Rusnak teaches away from monitoring the torque, and, as such, it would not be obvious for Coli’s system to monitor torque, especially without the blueprint provided by the 992 Patent.

127. It is thus my opinion that the combination of Coli, Birch, Rusnak, Broussard079, Broussard601, and Discenzo does not disclose or suggest proposed substitute claims 41–59 for at least the reasons I discussed above in this section and Section VIII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics..

13. Ground 11A – The Combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and McIver

128. In Ground 11A, Petitioners assert in their Opposition that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and McIver renders obvious Previously Proposed Substitute Claims 39. Opp., 4, 25–30. I disagree. It is my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and McIver does not disclose or suggest proposed substitute claims 41–59.

129. For example, as I discussed in Section VII.D.11, the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601 does not disclose or suggest proposed substitute claims 41–59. Further, McIver does not disclose or suggest a gas filtration skid or a gas compressor. It is further my opinion that McIver does not disclose monitoring the following operating characteristics of a gas filtration skid: water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status. McIver does not disclose or suggest controlling the following operating characteristics of a gas filtration skid: inlet valves, outlet valves, bypass valves, or pressure release. Additionally, McIver does not disclose or suggest monitoring the following operating characteristics of a gas compressor: compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, or oil pump discharge pressure. I also note that McIver does not disclose or suggest a turbine or turbine air inlet filter, much less monitoring for a turbine air inlet filter transmitter failure.

130. I further note that Coli does not expressly state that it is monitoring transformers. I understand that, and agree with, Dr. Durham admitted as much. EX-2108, 53:9–14 (“[Coli] does not use the term that it’s monitoring. [Coli] does not expressly use the term that it’s monitoring transformers. Right? A: It does not expressly use the term ‘monitoring transformers,’ I’d agree with that”) (objections omitted).

131. It is thus my opinion that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, and McIver does not disclose or suggest proposed substitute claims 41–59 for at least the reasons I discussed above in this section, Section VIII.D.11, and Section VIII.D.6, including my opinion that Coli does not disclose or suggest comprehensive failure diagnostics.

14. Additional references considered

132. I understand that Patent Owner is submitting additional references that I have considered in my analysis. None of the references that I considered listed in paragraph 4 of this declaration disclose the amended features of the proposed substitute independent claims in combination with the remaining limitations of the substitute claims.

VIII. CONCLUSION

133. This declaration represents my opinions that I have formed to date based on material currently available to me. I reserve the right to revise, supplement, and/or amend my opinions stated in this declaration based on new information that becomes available to me and on my continuing analysis of the materials available to me.