

***Post-Grant Review of
U.S. Patent 11,574,372: PGR2023-00039***

**Crusoe Energy Systems, LLC (“Crusoe”)
Petitioner**

v.

**Upstream Data Inc. (“Upstream”)
Patent Owner**

**Patent Owner Upstream’s Demonstratives
Oral Hearing: October 25, 2024**

- Petitioner's claim constructions are not relevant to any obviousness ground
- Prior art does not disclose claimed “mining processor”
- Secondary considerations support validity
- Motivation to combine is based on hindsight
- Petitioner fails to establish that claims are directed to ineligible subject matter

Claim Construction



Claim Term	Crusoe	Upstream
“blockchain mining device”	“any computing device that is capable of performing blockchain mining without regard to processor speed or power” <i>(Petition at 4-5)</i>	- No construction necessary - Plain and ordinary meaning <i>(‘POR at 4-5.)</i>

- “For purposes of this Decision, and based on the record before us, we do not discern any claim-construction issue affecting Petitioner’s demonstration that it is more likely than not to prevail. Thus, at this stage, we do not find it necessary to construe expressly any language of the challenged claims.”

(Institution Decision at 19.)

Claim Construction



Claim Term	Crusoe	Upstream
“mining processor”	“any processor that is capable of performing blockchain mining without regard to processor speed or power” (<i>Petition at 6.</i>)	“at a minimum: a processor with blockchain mining circuitry” (<i>POR at 5.</i>)

- Claim language: “mining processors... adapted to mine transactions”
(*EX1001, claim 1*)
- Specification: “[e]ach mining processor 92 may have a variety of configurations, but generally may include at least a power supply, a controller board and *mining circuitry*, such an ASIC circuit” (*EX1001, 17:9-12*)
- Petitioner’s negative limitation is unsupported
- Petitioner relies on teaching regarding “nodes,” but nodes “maintain... records” and are not mining processors. (*EX1001, 14:22-63*)

Claim Construction



Claim Term	Crusoe	Upstream
“a continuous flow of combustible gas”	“a flow of combustible gas that is continuous for at least a time period (e.g., an hour, a day, a week, a month, or longer)” <i>(Petition at 6.)</i>	- No construction necessary - Plain and ordinary meaning <i>(‘POR at 6-8.)</i>

- Petitioner’s construction reads out “continuous” – even a momentary flow would suffice *(POR at 6-7.)*
- “Continuous flow” refers to flow of flare gas while well is operational – it may be variable but continuous *(POR at 6-7; EX2010, ¶45; EX1001, 6:35-51, 7:54-60.)*

Claim Construction



Claim Term	Crusoe	Upstream
"sales gas line"	"a pipeline for long-distance transportation of sales gas meeting sales-gas specification from a hydrocarbon production, storage or processing facility to a customer connected to the pipeline" <i>(Petition at 7)</i>	- Upstream did not dispute this construction

- "For purposes of this Decision, and based on the record before us, we do not discern any claim-construction issue affecting Petitioner's demonstration that it is more likely than not to prevail. Thus, at this stage, we do not find it necessary to construe expressly any language of the challenged claims."

(Institution Decision at 19.)

“Mining Processor” – All Obviousness Grounds



- Petition did not adequately identify “mining processor”

Limitation [1c_i]

CryptoKube is built inside an ISO shipping container and is filled with spondooliestech SP35 servers, that is, blockchain mining devices, each necessarily having a mining processor. [EX1006, 1-4]. CryptoKube also provides “a best of (Petition at 23.)

Limitation [1c_iii]

CryptoKube is built inside an ISO shipping container and is filled with Bitcoin miners such as spondooliestech SP35 servers. [EX1006, 1-4]. A POSITA would have understood that to mine Bitcoin, the mining processors need to be connected to a network interface and adapted to mine transactions associated with the blockchain database and to communicate with the blockchain database, which (Petition at 25.)

“Mining Processor” – All Obviousness Grounds



- “Arguments in a petition must be made with particularity, not opacity” *Microsoft Corp. v. FG SRC, LLC*, 860 F. App’x 708, 713 (Fed. Cir 2021). (POR at 42.)
- Petition “must... identify [] specific portions of the evidence that support the challenge.” 37 C.F.R. § 42.104(b)(5).
- “Necessarily having a mining processor” is opaque and non-specific
- Petition identified no evidence for what the “mining processor” is or how it is connected to the network interface or adapted to communicate as recited in 1c[iii]

(POR at 42-43.)

“Mining Processor” – All Obviousness Grounds



- At his deposition Petitioner’s expert for first time identified mining ASIC as “mining processor”

12 Q. And so the mining processor that you are
13 saying is necessarily present is an ASIC chip,
14 correct?

15 **A. The mining processor in an SP35 or SP31 is**
16 **an ASIC chip.**

17 Q. And this ASIC chip is an integrated circuit
18 dedicated to performing crypto mining operations,
19 correct?

20 **A. That is correct.**

(EX2022, 60:12-20; POR at 43-44.)

“Mining Processor” – All Obviousness Grounds



- Neither Petition nor Mr. Kasdorf provided any evidence that ASIC chip was “adapted... to communicate with the blockchain database” as recited in claim 1c[iii]
- To the contrary, the prior art ASIC is “adapted” for only one function – mining transactions – and nothing else

1 Q. And I'm focusing specifically on the chip
2 itself as opposed to the server. And so I'm asking
3 you other than performing crypto mining operations
4 for which the ASIC chip is designed, you are not
5 aware of any other functions that it would perform,
6 correct?

7 A. Correct.

(EX2010, ¶¶ 106-109, 112;
EX1009, 76; EX1001, 17:15-21,
POR at 44-50.)

(EX2022, 61:1-7; POR at 48.)

“Mining Processor” – All Obviousness Grounds



- Szhmigielski reference:

In this chapter, we will take a look at mining with **Application Specific Integrated Circuits** or **ASICs**. They are microprocessors built for a single purpose. In the case of Bitcoin mining, they are built to perform the SHA-256 hash function that is used in Bitcoin. ASICs have a clear advantage over other mining hardware, as they are the

(EX1009, 76; POR at 49.)

- ‘372 patent:

ASIC (application specific integrated circuit). The components of an ASIC mining processor include the hash boards (each board has numerous chips that is doing the hashing), a controller (to communicate with the network and optimize the mining processors chip frequency and fans for cooling), and a power supply (typically converts AC input power to DC power for the ASIC). Each mining processor **92** may be

(EX1001, 17:51-21; POR at 46.)

“Mining Processor” – All Obviousness Grounds



- Petitioner’s Reply embraces the untimely “ASIC chip” theory but cannot cure its deficiency:

chip. EX2022, 59:9-60:16. To enable mining, the ASIC chip is necessarily connected to the network interface, and adapted to exchanges data (i.e., communicates)³ with the blockchain database. EX1033, 204:5-12 and 207:22-

(Reply at 10.)

“Mining Processor” – All Obviousness Grounds



- None of the “evidence” cited by Petitioner in Reply supports its theory *(Reply at 10, citing EX1033, 204:5-12, 207:22-208:5; EX1034, 34:6-9, 197:1-10, 199:23-200:1; Sur-Reply at 2-3.)*
- Mr. Barbour did not testify that the ASIC chip is itself connected to the network or adapted to communicate with blockchain database:

Q. And now, for the ASIC chip to mine transactions, does it need Internet access?

THE WITNESS: In one way or the other, an ASIC chip needs to be controlled and have access to up-to-date information on the network. Again, our expert's opinion is probably more relevant.

(EX1033, 206:22-207:4; Sur-Reply at 2-3.)

“Mining Processor” – All Obviousness Grounds



- Mining server controller – not ASIC chip – is adapted for network communications:

already. The controller on a mining server interfaces between a number of things, but including network communications, with a blockchain database, among other things. So it's an interface between the chips and other components on the miner.

(EX1033, 205:14-19; Sur-Reply at 2-3.)

“Mining Processor” – All Obviousness Grounds



- Dr. You did not testify that the ASIC chip is itself connected to the network or adapted to communicate with blockchain database:

Q. Do you need internet connection in order to mine cryptocurrency?

A. I believe network connectivity is important and necessary in this particular case.

(EX1034, 34:6-9, 197:1-10; Sur-Reply at 2-3.)

So does the ASIC, itself, need to exchange data with the blockchain database when it performed the mining function?

A. So when you are talking about blockchain mining, the whole term of blockchain mining would require connections and communications with the blockchain database. But if we are talking about running the algorithms on the ASIC chip itself, the chip could run algorithms without network connection.

“Mining Processor” – All Obviousness Grounds



- Dr. You did not testify that the ASIC chip is itself connected to the network or adapted to communicate with blockchain database:

Q. So in order to mine Bitcoin, doesn't ASIC chip need to exchange data with a blockchain database?

A. Well, again, to mine Bitcoin, exchanging with the blockchain database will be necessary.

*(EX1034, 198:23-199:6;
Sur-Reply at 2-3.)*

Q. I see.

A. The ASIC chip running the network connection is not a must, but to get a bit -- crypto -- or to get a digital currency, connection communication with the blockchain database will be necessary.

“Mining Processor” – All Obviousness Grounds



- The mining server (e.g., Spondoolies Sp35) communicates using its controller, not the ASIC chip:

109. Accordingly, mining was the *only* activity performed by ASIC chips such as those in spondooliestech SP35 and similar ASIC mining servers known at the time of the invention and used in miners such as CryptoKube. EX1001, 17:15-21; EX2022, 61:1-7. Therefore, such ASIC chips were not “connected to the

(EX2010, ¶¶ 109-110; POR at 46-47.)

110. Network connection and communication with the blockchain database was handled by other components in ASIC mining servers known at the time of the invention and used in miners like CryptoKube. For example, the '372 patent specification discloses a controller component of an ASIC mining processor “to communicate with the network.” EX1001, 17:15-19. However, a POSITA would

“Mining Processor” – All Obviousness Grounds



- Petitioner offers a new theory in Reply: “a combination of an ASIC chip and a controller” *(Reply at 11.)*
- Only support is testimony by PO’s expert Dr. You regarding PO’s products, not prior art *(Reply at 11, citing EX1034, 213:1-19; Sur-Reply at 3-4)*
- This testimony is irrelevant because Dr. You considered the whole server as “mining processor” in PO’s products *(Sur-Reply at 3; EX2010, ¶¶ 76-84.)*
- Dr. You did not testify that prior art “ASIC chip and a controller” meet the limitation *(EX1034, 213:1-19; Sur-Reply at 3-4)*

Secondary Considerations – Commercial Success



- Petitioner's assertion that Upstream's products do not practice the claims is entirely unsupported *(Reply, 14-15; Sur-Reply at 17-20)*
- Petitioner and its expert do not identify *any* missing limitations of claims 1 and 24 *(Reply, 14-15; EX1036, ¶24.)*
- Petitioner's sole argument is that *some* configurations do not meet the claims "according to Upstream:"
 - "single-device deployments"
 - deployments powered by "the electric grid or commercial sales gas lines"*(Reply, 14-15; EX1036, ¶24.)*

Secondary Considerations – Commercial Success



- Petitioner does not dispute that multi-device deployments (approximately 219 or 66% of total deployments) practice claims 1 and 24 (*Reply*, 14-15; *EX1036*, ¶24; *EX2010*, ¶¶ 76-84; *POR* at 13-19; *Sur-Reply* at 17-19)
- Petitioner does not dispute that these hundreds of sales demonstrate commercial success (*Reply*, 14-15; *EX1036*, ¶¶ 24-26; *EX2024*, 104:3-6; *Sur-Reply* at 17-19.)
- Petitioner does not dispute that if its “ASIC chip is a mining processor” theory is accepted then single-device deployments likewise practice the claims (*EX2024*, 116:17-117:24; *EX2010*, ¶¶ 83, 76-77; *POR* at 14, 17; *Sur-Reply* at 19.)
- Upstream did not count non-flare gas deployments towards commercial success or assert that they practice the claims (*EX2011*, ¶24; *EX1033*, 156:9-160:4; *Sur-Reply* at 17-18.)

- Upstream's pioneering systems undisputedly practice '372 claims, establishing a strong nexus

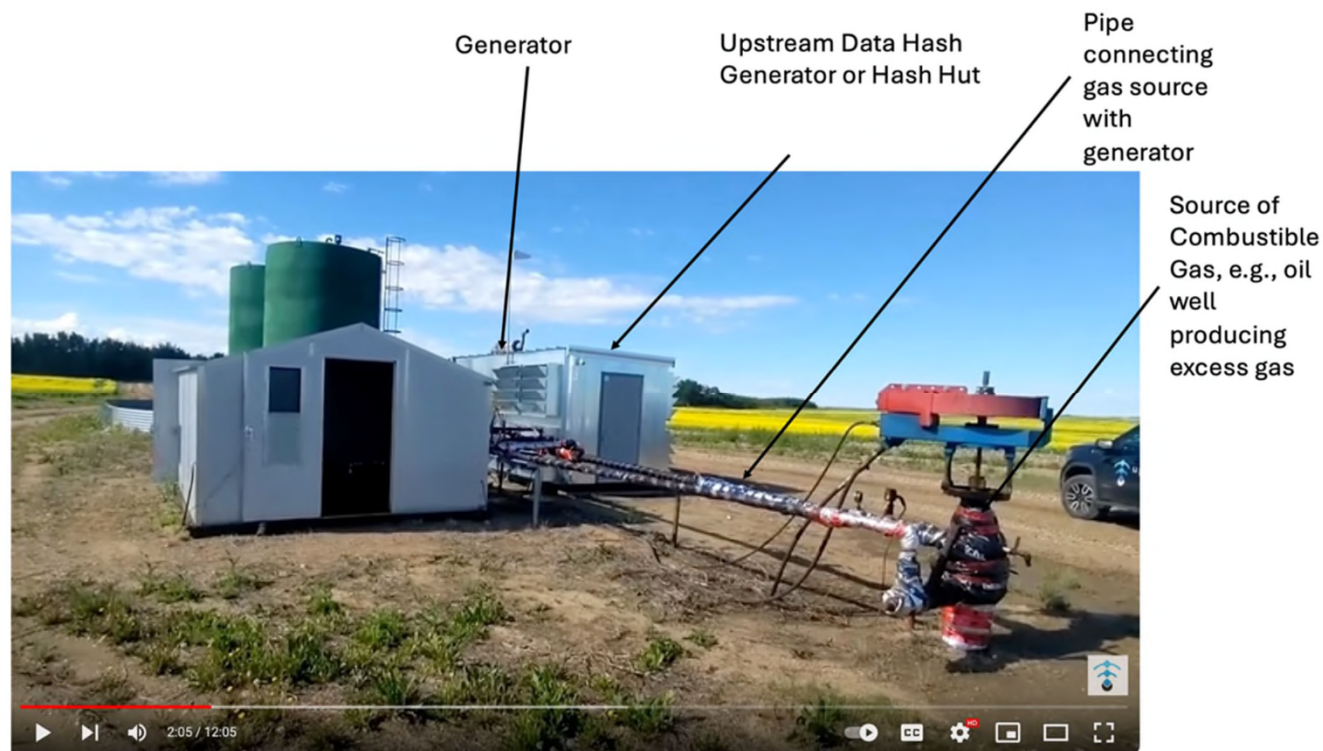
(EX2010, ¶¶ 76-85; POR at 13-19;
Sur-Reply at 17-19.)

- Where evidence shows that product is “the invention disclosed and claimed in the patent, we presume that any commercial success of these products is due to the patented invention. This is true even when the product has additional, unclaimed features.” *PPC Broadband, Inc. v. Corning Optical Comm. RF, LLC*, 815 F3d 734, 747 (Fed. Cir. 2016) (internal citations omitted)

Secondary Considerations - Nexus



- There are no “critical unclaimed features” *(Reply at 12-13; Sur-Reply at 16-17.)*



(EX2010, ¶¶ 76-85; Sur-Reply at 16-17.)

- There are no “critical unclaimed features” *(Reply at 12-13; Sur-Reply at 16-17.)*
 - US Pat. No. 11,907,029 was filed on May 15, 2019, over two years after ‘372 patent *(EX1025; Sur-Reply at 16-17.)*
 - The ‘029 claimed features not introduced until 2019-2020 *(Sur-Reply at 16-17.)*
 - Upstream products achieved commercial success well before ‘029 patent *(EX1033, 269:21-271:6; Sur-Reply at 16-17.)*
 - ‘029 patent covers passive heat recirculation option relevant only to cold climates – no evidence this option is critical or even significant *(EX1033, 233:16-234:8; Sur-Reply at 16-17.)*

(EX2010, ¶¶ 76-85; Sur-Reply at 16-17.)

- There are no “critical unclaimed features” *(Reply at 12-13; Sur-Reply at 16-17.)*
 - US Pat. No. 11,659,682 claims priority to a March 21, 2020 Canadian application, over two years after ‘372 patent *(EX1024; Sur-Reply at 16-17.)*
 - Upstream products achieved commercial success well before ‘682 patent *(Sur-Reply at 16-17.)*
 - ‘682 patent covers a cooling system option that “is presently not what we are building and selling” and was used “in maybe one to three dozen” units sold mostly in Canada *(EX1033, 131:15-133:6; Sur-Reply at 16-17.)*

Secondary Considerations - Nexus



- There are no “critical unclaimed features” (Reply at 12-13; Sur-Reply at 16-17.)
 - EX1026 is a printout from Upstream’s *current* product website and shows features that do not bear on historical commercial success (Reply at 13; Sur-Reply at 16-17.)
 - Only feature circled by Petitioner is the optional “passive heat recirc” of the ‘029 patent:



(EX1026; Reply at 13; Sur-Reply at 16-17.)

Secondary Considerations – Unmet Need



- Petitioner's assertion that there was "no unmet need in utilizing byproduct gas from oil wells" is hindsight *(Reply at 17; Sur-Reply at 21-22.)*

- Petitioner itself recognized this need in a 2019 patent:

Accordingly, there remains a need for systems and methods for generating electricity from natural gas produced from oil wells. It would be beneficial if such electricity could be produced and consumed on-site, for example, by using it to operate power-intensive, modular processing units. It would be further beneficial if such processing units could be employed to mine cryptocurrency or perform other distributed computing tasks to generate additional revenue.

(EX2002, 2:35-43; POR at 23-24; Sur-Reply at 21.)

Secondary Considerations – Unmet Need



- Petitioner’s argument and evidence at Reply page 15 contradict its assertion at page 17 that the claims “cover “systems drawing power from primary product gas from gas wells, and even gas from sales gas lines” and “the electric grid” *(Reply at 17-18; Sur-Reply at 21-22.)*
 - When arguing against commercial success, Petitioner relied on Upstream’s representation that the claims do not cover such deployments *(Reply at 15; Sur-Reply at 21-22.)*
 - Evidence cited at p. 15 confirms that the claims are not directed to sales gas lines or the electric grid *(Reply at 15, citing EX1034, 104:21-106:8, 107:16-109:7; EX1033, 96:15-98:2; Sur-Reply at 21-22.)*
 - None of the deposition citations at Reply p. 17 show that claims are directed to sales gas lines or the electric grid *(Reply at 17-18; Sur-Reply at 21-22.)*
 - Aside from deposition citations, Petitioner presents no other evidence *(Reply at 17-18; Sur-Reply at 21-22.)*

Secondary Considerations – Unmet Need



- Reply at page 15:

does not meet the limitation”). Further, an unknown number of Upstream’s products were deployed to utilize power from either the electric grid or sales gas lines. EX1033., 148:5-150:9 (explaining 36-100 customers connected Upstream’s products to the electric grid —“I would guess we are under a hundred Hash huts sold where the customer applied it to a utility connect”), 151:5-10 (explaining “at least some customers” have connected Upstream’s products to sales gas lines).

According to Upstream, these electric grid and sales gas line based deployments do not embody claim 1 either. EX1034, 104:21-106:8 (“a commercial sales line,

(Reply at 15; Sur-Reply at 21-22.)

Secondary Considerations – Unmet Need



- Petitioner's expert agreed that claim 1 does not cover products drawing power from electric grid or sales gas

Q And so if -- they do not meet claim 1 because they utilize power from either the electric grid or commercial sales gas lines; correct?

A That do not meet the claim.

Q As you state in the sentence, "They do not meet claim 1" -- Upstream's products because they "are deployed to utilize power from either the electric grid or commercial sales gas lines"; correct?

A Correct.

(EX2024, 112:1-9; Sur-Reply at 21-22.)

Secondary Considerations – Skepticism



- Petitioner does not rebut evidence of industry skepticism
- Instead, Petitioner alleges “bias” by Upstream, but the evidence comes from independent sources and predates the litigation between Upstream and Petitioner

(Reply at 18-19;; Sur-Reply at 22-23.)

- These are not “biased” sources:
 - ***“Laughed out of the room”*** (EX2016; POR at 25-27.)
 - ***“Stupidest thing I’ve ever heard”*** (EX2016; POR at 25-27.)
 - ***“Bewildered crowd”*** (EX2017; POR at 25-27.)
 - ***“Pipe dream”*** (EX2018; POR at 25-27.)
 - ***“No version of this will ever work”*** (EX2019; POR at 25-28.)

No Motivation to Combine



- Petitioner does not rebut the fact that a POSITA desired to operate CryptoKube at maximum uptime and full hashrate:

67. Thus, the conventional knowledge in the art before the invention of the '372 patent held that industrial ASIC miners like CryptoKube should operate at maximum uptime and at full hashrate. These requirements informed a POSITA as to what power sources were sufficiently *reliable* in addition to inexpensive – a POSITA chose a power source that could drive its crypto miners at (1) lowest cost (Szhmigielski's "inexpensive" requirement) while (2) sustaining full hashrate and maximum uptime (Szhmigielski's "reliable" requirement).

(EX2010, ¶67; POR at 36.)

No Motivation to Combine



- Petitioner’s “free excess electricity” motivation makes no sense *(EX2010, ¶158; POR at 32.)*
- Petitioner does not dispute that Dickerson was sized to generate sufficient power for its primary oil and gas load *(EX2010, ¶159; POR at 32.)*
- Petitioner does not dispute that CryptoKube required a 200A service and up to 72kW of power *(EX2010, ¶159; POR at 32.)*
- Petitioner does not dispute that a POSITA would not expect Dickerson to consistently supply sufficient excess power for CryptoKube *(EX2010, ¶159; POR at 32.)*
- Therefore, a POSITA believed Dickerson to be unsuitable *(EX2010, ¶169; POR at 37; Sur-Reply at 10.)*

No Motivation to Combine



- Petitioner suggests making “minor adjustments” such as “adjusting the generation capacity” in Dickerson *(Reply at 6.)*
 - Adjusting generation capacity by adding “engine and membrane units” is hardly a minor adjustment
(Sur-Reply at 10-11; EX2010, ¶58.)
- Petitioner does not address why a POSITA would go to the trouble and expense of modifying Dickerson when inexpensive hydro power was an established power source in the art? *(Sur-Reply at 10; EX2010, ¶¶36-37, 58, 68-70, 73.)*
- A POSITA would have believed that this modification was completely undesirable because the electricity would be more expensive than hydro power *(Sur-Reply at 11; EX2010, ¶¶58-60, 68-69.)*

No Motivation to Combine



- Petitioner attempts to solve the unreliability of Dickerson's left-over “free” electricity by suggesting that “any power system can be modified to be reliable” *(Reply at 7.)*
 - Petitioner never considers why a POSITA would be motivated to modify Dickerson when cheap and reliable hydro power could power CryptoKube
(Sur-Reply at 11-12; EX2010, ¶¶ 58-60, 64-71.)
- Petitioner argues that Dickerson and MAGS are reliable because they power production facilities *(Reply at 7.)*
 - They may be reliable *for that purpose* because power output is sized for primary load *(Sur-Reply at 12; EX2010, ¶¶ 69, 67.)*
 - A POSITA considered the “left-over” power as too unreliable and backup generator expensive *(Sur-Reply at 12; EX2010, ¶¶ 69, 67, 71.)*

No Motivation to Combine



- Petitioner alleges an Upstream admission that “a POSITA knew how to setup the system to use only a small chunk of the available gas supply to ensure reliability” *(Reply at 7-8.)*
- There was no “admission:” the cited testimony by Mr. Barbour was about customers’ use of Upstream products practicing the invention, not prior art

(Sur-Reply at 12-13; EX1033, 216:17-217:5, 255:21-256:16.)

No Motivation to Combine - MAGS



- Petitioner does not dispute that MAGS output is insufficient to power Polivka *(Reply at 25, Sur-Reply at 13-14; EX2010, ¶¶141-145.)*
- Petitioner in Reply proposes a new theory: adding “multiple MAGS-200” *(Reply at 25.)*
- This theory is untimely because Petition relied on a single MAGS *(Petition at 77, 81-84; EX2022, 84:19-22.)*
- A POSITA would not add another MAGS because it was expensive relative to hydro power *(Sur-Reply at 14; EX2010, ¶145.)*
- A POSITA would not derate Polivka because it was known to operate expensive industrial miners at full hashrate *(Sur-Reply at 14; EX2010, ¶¶142, 145.)*

- Instead of clearing up the deficiency of Ground 3, Petitioner introduces an untimely new theory *(Reply at 23, Sur-Reply at 7.)*
 - Petition relied only on Boot's generator for limitation 1[b]:

Limitation [1b]

Boot discloses that the genset 102 includes a driver (engine) 112 coupled to a generator 114. [EX1012, 2: 29-30]. As discussed above, Boot further discloses that the engine 112 operates on methane, ethane or other gases produced in the

(Sur-Reply at 7; Petition at 69-70.)

- Petitioner now rewrites Ground 3 with Dickerson's generator:

bank to absorb excess power"). Thus, it is clear that Ground 3's combination uses Dickerson's engine, adding Boot's load bank.

(Reply at 23; Sur-Reply at 7.)

- Petitioner's section 101 arguments were considered and rejected by examiner, as noted in Institution Decision

(ID at 58; POR at 70-71.)

- Ground 6 did not apply the Patent Office's Subject Matter Eligibility Guidance, MPEP § 2106 *(POR at 74-75.)*
- '372 claims are not mathematical concepts, methods of organizing human activity, or mental processes under MPEP § 2106.04(a) *(POR at 74-75.)*
 - "If the identified limitation(s) do not fall within any of the groupings of abstract ideas, it is reasonable to find that the claim does not recite an abstract idea [and] [t]his concludes the abstract idea judicial exception eligibility analysis."

(MPEP § 2106.4(a)(1); POR at 75.)

Ground 6 – Section 101



- To support its “abstract idea” arguments, Petitioner takes positions regarding claim scope rejected by its own expert
 - For example, central to Petitioner’s argument is an assertion that claims extend to “gas from sales gas lines, and even systems drawing power from the electric grid” (*Reply at 26-27; Petition at 115, 117.*)
 - Petitioner’s expert agreed that this is incorrect:

Q And so if -- they do not meet claim 1 because they utilize power from either the electric grid or commercial sales gas lines; correct?

A That do not meet the claim.

Q As you state in the sentence, “They do not meet claim 1” -- Upstream's products because they “are deployed to utilize power from either the electric grid or commercial sales gas lines”; correct?

A Correct.

(EX2024, 112:1-9; POR at 72-73.)

- ‘372 claims are much more than an alleged “abstract idea” of using natural gas to power a blockchain mine
(POR at 72-73.)
- Claims recite concrete, physical machine components that have express practical application within a hydrocarbon facility, including: (EX1001, claim 1; POR at 72-73.)
 - a generator using a continuous flow of natural gas
 - the gas coming from a source comprising hydrocarbon production, storage or processing facility
 - generator powering blockchain mining devices
 - blockchain mining devices including mining processors
 - mining processors connected to network interface
 - mining processors adapted to mine transactions
 - mining processors communicating with blockchain database