

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

P110968177

FACILITY: PharmaCann	SRN / ID: P1109
LOCATION: 21590 Hoover Road, WARREN	DISTRICT: Warren
CITY: WARREN	COUNTY: MACOMB
CONTACT: Evan Dupree , Senior Manager - Operational Compliance	ACTIVITY DATE: 04/19/2023
STAFF: Iranna Konanahalli	COMPLIANCE STATUS: Compliance
SUBJECT: FY 2023 SM scheduled inspection of LIVWELL MICHIGAN, LLC ("LivWell"), owned by PharmaCann, located at 21590 Hoover Road, Warren, Michigan 48089.	
RESOLVED COMPLAINTS:	

Livwell Michigan, LLC (P1109)
fka Hoover Rd Real Estate, LLC during the construction phase
owned by PharmaCann
21590 Hoover Road, Warren, MI 48089

<http://www.PharmaCann.com>

Name change: Hoover Rd Real Estate, LLC (P1109) during the construction phase → Livwell Michigan, LLC (P1109). The companies are owned by PharmaCann, Inc.

Contacts:

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2. **Christopher Seidl** (Phone: NA; Cell: 954-830-0012; E-mail: Christopher.Seidl@pharmacann.com), Manager of Production Compliance
3. **James (Jim) J. Kelly** (Cell: 303-601-5681; E-mail: Jim.Kelly@CultivatedPower.net), President and Owner, Cultivated Power, the power to grow. www.CultivatedPower.net. Kelly is responsible for the electric power generation equipment such as CoGen.
4. **Cody Joner** (Cell: 602-469-7849; cJoner@GenTechUS.com), Field Service Tech, Arizona Generator Technologies, Glendale, AZ.
5. **Lamie Rece** (Cell: 720-232-0064), Extraction Manager

VNs & Active Permit-to-Install Number (PTI No.): PTI No. **10-20B** dated November 4, 2022, issued to LivWell Michigan, LLC, for cogeneration (CoGen) for power consisting of six (6) natural gas-fired engines equipped with Selective Catalytic Reduction (SCR for nitrogen oxides (NOx) reduction using aqueous urea (known as Diesel Exhaust Fluid, or DEF)) and an Oxidation Catalysts, ULSD CI RICE Emergency generator engines, extraction units, boilers, emergency generator engines, etc. This modification was for eight (8) diesel emergency engines, one boiler, and one extraction unit. The modification was to resolve the Violation Notices (VNs): December 20, 2021 (for installing an extraction unit without a

permit) and September 07, 2022 (for installing the fourth dual fueled boiler without a permit). The building for growing of cannabis is not covered by the permit because the emissions (odorous) from the cannabis plants during their growth & flowering are unknowns.

PTI voids: PTI No. 10-20 (Approved: 5/29/2020 & Voided: 12/2/2020) dated May 29, 2020, was issued to Hoover Road Real Estate, LLC for five (5) 1 MW natural gas-fired engines (six engines in all), one diesel-fired engine, growing operations, and extraction operations for cannabis. PTI No. 10-20A (Approved: 12/2/2020 & Voided: 11/4/2022) dated December 2, 2020, was issued to Hoover Road Real Estate, LLC for one additional natural gas engine and three (3) dual fueled boilers.

PTI denied: AQD denied the permit application No. APP-2022 0053 for incompleteness of the application.

On **April 19, 2023**, I conducted a level 2 annual **FY 2023 SM scheduled inspection** of LIVWELL MICHIGAN, LLC (“LivWell”), owned by PharmaCann, located at 21590 Hoover Road, Warren, Michigan 48089. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451; and Environment, Great Lakes & Energy, Air Quality Division (EGLE-AQD) rules; and Permit to Install No. **10-20B**.

During the inspection, **James (Jim) J. Kelly** (power supply, generator engines, Cogen) of Cultivated Power and Christopher Seidl (cannabis and extraction) of Livwell assisted me. Mr. Kelly is responsible for the engineering and installation of the CoGen powerplant (natural gas fired SI RICE Engines).

LivWell Michigan, LLC, owned by PharmaCann, is one of the largest licensed marijuana indoor grow facilities in Michigan. LivWell is licensed by the Michigan Department of Licensing and Regulatory Affairs - Cannabis Regulatory Agency to grow and process marijuana. This facility is licensed to grow 50,000 marijuana plants. It occupies a total of 207,000 square feet of space, of which 193,000 square feet is dedicated to growing marijuana. LivWell has multilayer ownership.

Founded in 2014, PharmaCann (500 employees) is one of the country’s largest vertically integrated cannabis companies, providing safe, reliable, top-quality cannabis products.

PTI No. 10-20B Emission Units (EUs)

PTI No. 10-20B Emission Units (EUs)

Emission Unit ID	Emission Unit Description	Flexible Group ID
EUGEN1	A 1,431 HP (1,067 kW) natural gas-fueled engine manufactured in 2019.	FGCOGEN
EUGEN2	A 1,431 HP (1,067 kW) natural gas-fueled engine manufactured in 2019	FGCOGEN
EUGEN3	A 1,431 HP (1,067 kW) natural gas-fueled engine manufactured in 2019	FGCOGEN
EUGEN4	A 1,431 HP (1,067 kW) natural gas-fueled engine manufactured in 2019	FGCOGEN
EUGEN5	A 1,431 HP (1,067 kW) natural gas-fueled engine manufactured in 2019	FGCOGEN
EUGEN6		FGCOGEN

A 1,431 HP (1,067 kW) natural gas-fueled engine manufactured in 2020	
EUGEN1 thru EUGEN6 Model Nos.: SGE56SL (56-liter engine).	
EUGEN1 thru EUGEN6 NG Engine Serial Numbers (Nos.): A9B0018, A9C0007, A9A0027, A9B0001, A9B0011 & BOD0008	
<p>EUGEN1-6: Six NG-fired (natural gas fired) SI RICE (Spark Ignition Reciprocating Internal Combustion Engines) engines (6 MW (1 MW each), 10,000 amps bus at 480 Volts) run constantly 24/7/365 (depending upon power demand, not all engines are running at the same time and in addition some engines are not running at full load; furthermore, some may be idle) because the facility is not connected to DTE Grid for electric power supply due to high initial costs (substation installation) and waiting / delay time as DTE had to install additional equipment to supply electric power. 6,000 LED lamps drawing 1.5-3.0 MW, 4,000-ton AC (Air Conditioning (24/7/365 AC to remove moisture, high efficiency COP = 23 compressor) drawing 2-3 MW run continuously. Light (24/7/365, decreases to daily rate of 24-18-12 hours as the plants grow and flower) is required for Cannabis plants to grow. Further, AC provides appropriate temperature and humidity for optimum plant growth. All six (6: 4 -Stroke Lean-Burn Engines) natural gas-fired engines are equipped with a Selective Catalytic Reduction (SCR) and Oxidation Catalysts: EUGEN1, EUGEN2, and EUGEN6 SCR = 95% reduction for NOx & EUGEN3, EUGEN4, and EUGEN5 SCR = 86% reduction for NOx. The oxidation catalysts have a 98% reduction for CO and 90% reduction for VOC for EUGEN1 and EUGEN2 (ultra clean exhaust gas as the IC Engine combustion emissions may exhaust to in-plant environment). These engines have the capability to route their exhaust back into the building to supply CO₂ as a part of photosynthesis for the cannabis plants. The rest of the engines (EUGEN3, EUGEN4, EUGEN5 and EUGEN6) exhaust to outside ambient air with lower emissions of 75% reduction for CO and 60% reduction for VOC.</p>	
<p>In addition to the generation of power, the CoGen plant is designed to capture waste heat, using heat exchangers (HE), from both the engine exhaust and hot water loops. Hot water is generated by both the engine cooling loop as well as the Turbo Charger (fans cooling) cooling circuit. This heat is utilized both for heating during the cooler months (mostly winter) in Michigan and the year-round for dehumidification process via heating air (relative not absolute humidity) as AC removes excess water from air. Besides, dehumidification (relative humidity) via heating adjusts the temperature to one that is ideal for the cannabis plant to grow.</p>	
<p>PharmaCann has the capability to operate several different scenarios at the facility. EUGEN1 and EUGEN2 can be venting into the building for CO₂ fertilization for the cannabis plants or vented vertically into the atmosphere. Oxidation Catalysts remove from engine exhausts CO (carbon monoxide) HC (hydrocarbons) for human health and safety when recycled into the building.</p>	
<p>The permit allows only one of two engines to be routed into the building at any given time. When this happens, they are exhausted through two energy recovery ventilation (ERV). ERV1 has been designed at 62% of the total flow and ERV2 has been designed at 38% of the total flow. It may be noted that only Engine Nos. 1 & No. 2 have an option to bypass their stacks and be rerouted into the building and out of two different Energy Recovery Ventilation units (ERV).</p>	
<p>Both intake and output air into the Marijuana building are equipped with HEPA filters. The building is maintained under positive pressure such that outside ambient air does not leak in.</p>	
<p>Odor: As cannabis plants grow, they release a distinctive range of odors which are partially made up of different types of VOCs called terpenes. Hence, the building is</p>	

equipped with Carbon Filtration System (CFS) for exhausting odor laden air to outside ambient air. Carbon filtration is the best control technology for reducing VOC (odor) emissions from cannabis cultivation facilities. The carbon filtration can remove 50-98% of VOC. The carbon filters must be replaced once every 6-12 months based upon adsorption break-through analysis. PharmaCann replaces the filters biannually (1/6 months). Carbon filters are simple to install, effective, and reliable, if they are properly maintained and regularly changed. The odor control system (Activated Carbon Filtration) is not a part of this permit.

Unlike Volvo Tier IV engines, which are certified by both US EPA and CARB, NG-fired engines (SI RICE EUGEN1, EUGEN2, EUGEN3, EUGEN4, EUGEN5, EUGEN6) are not US EPA certified (and hence annual (or 1/8,760 hours of an engine operation) testing is required).

NSPS 4J: The engines (EUGEN1-6 manufactured in 2019 which are **not** US EPA certified) are subject to NSPS 4J, 40 CFR, Part 60, Subpart JJJJ—Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (natural gas fired Spark Ignition). The provisions of NSPS 4J are applicable to owners, operators and manufacturers. Owners or operators of Emergency SI RICE are subject to this NSPS 4J if engine is manufactured after January 1, 2009, with greater than 19 kW (25 HP) engine power.

Compliance with NSPS 4J is deemed compliance with MACT 4Z.

The required **annual** (8,760 hours) NSPS 4J testing is performed (most recent in February 2023) showing compliance with NSPS 4J limits.

EUDIESEL	A 1,528 HP (1,139 kW) diesel-fueled standby engine with a model year of 2019, and a displacement of 3 liters/cylinder.	NA
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GENRAC 2019 Tier 2 MHI (**Mitsubishi**) Diesel Generator Model: SD/MD1000

kWe Rating: 1000
 Engine Family: KMVXL37.1BBA
 Rated Engine Power (BHP)*: 1528 & Fuel Consumption (gal/hr)*: 77.9 at rated RPM: 1,800 rpm.

EPA Certificate Number: KMVXL37.1BBA-014 (Stationary Emergency CI, 40 CFR Part 60 Subpart IIII or NSPS 4I)

Emissions based on engine power of specific Engine Model:

1. CO = 0.80, NOx + NMHC = 5.69 & PM = 0.15 Grams/kW-hr
2. CO = 0.60, NOx + NMHC = 4.25 & PM = 0.11 Grams/bhp-hr

(These values are actual composite weighted exhaust emissions results over the EPA 5-mode test cycle.)

The Diesel unit SN is 3005672755

PharmaCann submitted MAP based upon 1 MW Generac (Mitsubishi) Operations and Maintenance Manual

NSPS 4I: Pharma Cann’s one (US EPA Certified engines known as EUDIESEL, manufactured after April 1, 2006, 2019) of is subject to: NSPS IIII or 4I, New Source Standards of Performance for Stationary Compression Ignition Internal Combustion Engines,

Pharma Cann’s emergency generator may be subject to: CI RICE MACT 4Z, Area Source NESHAP / MACT ZZZZ, Standards of Performance for Stationary

Spark Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. As AQD has NOT taken delegation of Area MACT from US EPA for funding issues, AQD has not evaluated PharmaCan's compliance with Area CI RICE MACT 4Z, Area Source NESHAP / MACT ZZZZ.

However, compliance with NSPS 4I is deemed compliance with MACT 4Z.

EUC1D1-1	A Solvent based extraction unit and associated equipment that uses Liquid Petroleum Gas for cannabis extraction	FGEXTRACTION
EUC1D1-2	A Solvent based extraction unit and associated equipment that uses Liquid Petroleum Gas for cannabis extraction	FGEXTRACTION
EUC1D2	A Solvent based extraction unit and associated equipment that uses Ethanol for cannabis extraction	FGEXTRACTION

Extraction processes: VOC emissions from the extraction process are calculated using a mass balance method (VOC: everything consumed is emissions). **Cannabidiol** (CBD), which provides pain relief, and **tetrahydrocannabinol** (THC), which has psychedelic effect, are two natural compounds found in plants of the Cannabis genus. THC is a main product from Cannabis flower. One TGI Extraction Room is present. Mixture of 90% propane & 10% butane is used in extraction process to produce waxy material that is inhalable, edible or injectable. Ethanol extraction is performed to produce THCA in Apollo X-still. Distillation process is used to produce crude hash oil in three distillation fractions. VOC emissions are calculated on mass balance basis: all used is emitted. One Reverse Osmosis (RO) unit is present in another room for pure water (ultra clean water for the cannabis plants).

EUBOILER1	A 6.0 MMBtu/hr dual fuel natural gas and propane boiler	FGBOILERS
EUBOILER2	A 6.0 MMBtu/hr dual fuel natural gas and propane boiler	FGBOILERS
EUBOILER3	A 6.0 MMBtu/hr dual fuel natural gas and propane boiler	FGBOILERS
EUBOILER4	A 6.0 MMBtu/hr dual fuel natural gas and propane boiler	FGBOILERS

EUBOILER1-4: Four dual fuel natural gas and propane boilers Nos. 1-4 are exempt from Rule 336.1201 but are included in the permit for ROP Opt-out purposes.

The Boiler Nos.1-4 are used for testing purposes only as all heat requirements are met by NG-fired CoGen engines.

Rule 336.1201: Pursuant to Rule 336.1282(2)(b)(i), the boilers burning sweet natural gas (up to 50 million BTU per hour) are exempt from Rule 336.1201 (Permit-to-Install).

NSPS Dc: PharmaCan's four (4: 6 < 10 million Btu per hour) NG-fired boilers are **NOT** subject to: NSPS Dc, New Source Performance Standards (NSPS) for Small Industrial-Commercial-Institutional Steam Generating Units (40 CFR, Part 60, Subpart Dc) as design capacity is less than 10 million BTU per hour.

NESHAP / MACT 6J: The boilers (Nos. 1-4) may be subject to: Area Source **NESHAP / MACT 6J**, 40 CFR Part 63, Subpart JJJJJJ / 6J National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers, As AQD has NOT taken delegation of Area MACT from US EPA for funding issues, AQD has not evaluated PharmaCan's compliance with Area Source Boiler MACT, NESHAP / MACT 6J.

Propane, which is substantially more expensive than natural gas, is a backup fuel only in case there is an interruption of natural gas (NG) supply.		
EUENGINE1	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE2	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE3	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE4	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE5	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE6	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE7	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
EUENGINE8	A 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.	FGEMENGINES
<p>The Tier 4 engines (Volvo) engines are not installed yet.</p> <p>EUENGINE1-8: The eight (8) emergency diesel-fired engines (CI RICE) are Tier 4 engines (Volvo). The engines are deemed Large Uncontrolled Stationary Diesel Engines. The Diesel (CI RICE) engines provide emergency electric power together with generators when NG SI RICE engines cannot be used.</p>		

NSPS 4I: All Pharma Cann's emergency generator engines (CI RICE Engine Nos. 1-8, 15 ppm S Ultra Low Sulfur Diesel or ULSD) are subject to: NSPS IIII or 4I, New Source Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (manufactured on or after April 01, 2006; actual Mfg. Date: after 2018).

Area Source NESHAP / MACT ZZZZ: All Pharma Cann's emergency generator engines (CI RICE Engine Nos. 1-8, 15 ppm S) may be subject to: CI RICE MACT 4Z, Area Source NESHAP / MACT ZZZZ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines / Final rule As AQD has NOT taken delegation of Area MACT from US EPA for funding issues, AQD has not evaluated Pharma Cann's compliance with Area CI RICE MACT 4Z, Area Source NESHAP / MACT ZZZZ.

Unlike NG-fired engines (SI RICE), all Volvo Tier IV engines are certified by both US EPA and CARB.

EPA and CARB on the Volvo Tier IV engines:

AB Volvo Penta Certificate No. LVPXL16.1CDC-003. Effective Date: 2019-10-02 & Exp. Date: 2020-12-31.

Model Year: 2020

Engine Family: LVPXL16.1CDC

Power Cat.: 560 < kW <= 900 Diesel

CARB (13 CCR Sec. 2424, 2425, 2426) Certificate: Model Year: 2020 & Engine Family: LVPXL16.1CDC Diesel (Displacement: 16.1 liters) Generator Set (560 kW < Generator <= 900 kW Tier 4 Diesel):

CARB Standard: NMHC = 0.19, NOx =0.67, NOx + NMHC = NA, CO = 0.35, PM = 0.03 Grams/bhp-hr

CARB Certificate: NMHC = 0.003, NOx =0.33, NOx + NMHC = NA, CO = 0.1, PM = 0.02 Grams/bhp-hr

All diesel engines use Marathon Ultra Low Sulfur (S) No. 2 DIESEL (No. 2 MV15, ULSD < 15 ppm Sulfur / S): Cetane Index (ASTM D 4737-B, D 976) > 40, Distillation, °F (ASTM D 86) = 90% recovered at 540 °F min./ max. 640 °F

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PTI No. 10-20B Compliance

PTI No. 10-20B, EU-DIESEL

EU-DIESEL: One 1,528 HP (1,139 kW or 1.1 > 1.0 MW) diesel-fueled standby engine with a model year of 2019, and a displacement of 3 liters/cylinder

All diesel engines are certified by both US EPA and CARB.

PTI No. 10-20B, EU-DIESEL, I.1-6

If the engines operated as certified engines the limits I.1-6 deemed to have been met.

Emissions based on engine power of specific Engine Model:

1. CO = 0.80 < 3.5 (I.3), NO_x + NMHC = 5.69 < 6.4 (I.1) & PM = 0.15 < 0.2 (I.5)
Grams/kW-hr
2. CO = 0.60, NO_x + NMHC = 4.25 & PM = 0.11 Grams/bhp-hr

(These values are actual composite weighted exhaust emissions results over the EPA 5-mode test cycle.).

It is **compulsory** to operate the engine according to US EPA Certificate and manufacturer's recommendations in order to comply with the permit and NSPS 4I.

PTI No. 10-20B, EU-DIESEL, II.1

Only, as stated above, Ultra Low Sulfur Diesel (ULSD < 15 ppm Sulfur (S)) is burnt in the CI RICE Diesel engine.(1.1 MW).

PTI No. 10-20B, EU-DIESEL, III.1

EU-DIESEL operated for 168 hours in CY 2022 (PTI No. 10-20B, EU-DIESEL, III.1: < 186 hours per year on a 12-month rolling period). Commissioned in July 2020. 568 hours is current (June 15, 2023) hours-meter reading. The installers (Bumler Mechanical of Sterling Heights, MI 48314) used up more hours for installation testing purposes.

PharmaCann submitted a malfunction abatement plan (MAP) for EPA certified Tier 2 diesel. MAP is based upon 1MW Generac (Mitsubishi) Operations and Maintenance Manual

PTI No. 10-20B, EU-DIESEL, IV.1-2

Run time hours (CY2022: 168 hrs/yr) are based on non-resettable hours meter and rated power output of EU-DIESEL does not exceed 1,341 HP (1,000 kW) (PTI No. 10-20B, EU-DIESEL, IV.1-2: non-resettable hours meter & rated power <= 1,341 HP (1,000 kW or 1 MW))

PTI No. 10-20B, EU-DIESEL, V.1-3

The engines is certified engines by US EPA and is operated and maintained according to the manufacturer's emission-related written instructions. The emissions testing is NOT necessary at this time; maybe in future.

PTI No. 10-20B, EU-DIESEL, VI.1-4

The engine, EU-DIESEL, operated for 168 hours in CY 2022 using 12,900 gallons of ULSD (< 16 ppm S), the emissions calculations are performed, a copy of US EPA Certificate is kept on file, and operated accordingly.

PTI No. 10-20B, Flexible Groups (FGs)**PTI No. 10-20B, FG-COGEN**

FG-COGEN (EUGEN1, EUGEN2, EUGEN3, EUGEN4, EUGEN5, EUGEN6): Six (6) natural gas-fired engines used for electricity generation for the cannabis cultivation, extraction, processing, and distribution operations. Each engine is equipment with a SCR for control of NO_x and CO and oxidation catalyst for control of VOC and formaldehyde. The SCR system includes two 1,100-gallon Urea tanks shared by all six engines.

Siemens, SGE-56SL, Unit #1-6 lean burn engines, with oxidation catalyst and ammonia injection, are rated at 1,431 horsepower.

Emissions control: Each engine is equipment with a SCR and oxidation catalyst for control of NO_x, CO, VOC, and formaldehyde. The SCR system includes a 1,000-gallon Urea tank.

Selective Catalytic Reduction (SCR) is an active emissions control system. Hot exhaust gases flow out of the engine and into the SCR system where aqueous urea (NH₂CONH₂) is sprayed onto a special catalyst. The aqueous urea (urea (NH₂CONH₂ or CO(NH₂)₂.) is a crystalline solid form of ammonia (NH₃) for safety purposes) sets off a chemical reaction in the exhaust on a special catalyst that converts nitrogen oxides into nitrogen, water, and tiny amounts of carbon dioxide (CO₂), natural components of the air we breathe. The exhaust also passes through a particulate filter and is then expelled to ambient air.

PTI No. 10-20B, FG-COGEN, I.1-11

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Monitoring / Testing Method	Air Hygiene, Inc. Feb 15-21, 2023 Test
1. NO _x	1.0 g/hp-hr Or 82 ppmvd @ 15% O ₂	Hourly	Each engine in FGCOGEN	SC III.2, SC V.2.	2.04, 3.65, 11.90, 8.53, 9.873.66 (Units 1-6) < 82 NO _x (ppm@15% O ₂)
2. NO _x	0.05 g/hp-hr (for each engine)	Hourly	EUGEN1 EUGEN2 EUGEN6	SC V.1.	0.027, 0.046, 0.049 (Units 1-2 & 6) < 0.05 g/(hp-hr)
3. NO _x	0.14 g/hp-hr (for each engine)	Hourly	EUGEN3 EUGEN4 EUGEN5	SC V.1	0.113, 0.109, 0.118 (Units 3-5) < 0.14 g/(hp-hr)
4. CO	2.0 g/hp-hr Or 270 ppmvd @15% O ₂	Hourly	Each engine in FGCOGEN	SC III.2, SC V.2.	0.032, 0.000, 0.013, 0.000, 0.013, 0.025 (Units 1-6) < 2 g/(hp-hr)
5. CO	0.036 g/hp-hr	Hourly	EUGEN1 EUGEN2	SC V.1.	0.032, 0.000, (Units 1-2) < 0.036 g/(hp-hr)

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Monitoring / Testing Method	Air Hygiene, Inc. Feb 15-21, 2023 Test
	(for each engine)				
6. CO	0.45 g/hp-hr (for each engine)	Hourly	EUGEN3 EUGEN4 EUGEN5 EUGEN6	SC V.1	0.013, 0.000, 0.013, 0.025 (Units 3-6) < 0.45 g/(hp-hr)
7. VOC ^A	0.7 g/hp-hr Or 60 ppmvd @15% O ₂	Hourly	Each engine in FGCOGEN	SC III.2, SC V.2.	1.05, 0.78, 13.44, 15.63, 13.41, 9.00 (Units 1-6) NMHC (as C ₃ H ₈) (ppm@15% O ₂) < 60 ppmvd @15% O ₂
8. VOC	0.07 g/hp-hr (for each engine)	Hourly	EUGEN1 EUGEN2	SC V.1.	0.01, 0.01 (Units 1-2) < 0.07 g/(hp-hr) NMHC (as C ₃ H ₈) (g/hp*hr)
9. VOC	0.28 g/hp-hr (for each engine)	Hourly	EUGEN3 EUGEN4 EUGEN5 EUGEN6	SC V.1	0.12, 0.19, 0.15, 0.12 (Units 3-6) < 0.28 g/(hp-hr) NMHC (as C ₃ H ₈) (g/hp*hr)
10. NH ₃ ¹	5 ppm @15% O ₂	Hourly	EUGEN1 EUGEN2	SC V.1	1.88, 2.20 (Units 1-2) < 5 ppm @15% O ₂
11. NH ₃ ¹	3.5 ppm @15% O ₂	Hourly	EUGEN3 EUGEN4 EUGEN5 EUGEN6	SC V.1	3.21, 0.12, 3.28, 1.15 (Units 3-6) < 3.5 ppm @15% O ₂
ppmvd = parts per million by volume at 15 percent oxygen and on a dry gas basis. ^A Per footnote "d" of Table 1 of 40 CFR Part 60 Subpart JJJJ, when calculating emissions of VOCs, emissions of formaldehyde should not be included. Air Hygiene, Inc. of Broken Arrow, OK 7012 (AirHygiene.com 888-461-8788) conducted the sampling during February 15-21, 2023. The above results are based upon TABLE 2.1, SUMMARY OF SIEMENS, SGE-56SL, UNIT #EUGEN1, SERIAL #A9B0018 RESULTS, the Air Hygiene test report dated April 09, 2023 (Sampling: Feb 15-21, 2023)					

Performance test sampling during February 15-21, 2023.

PTI No. 10-20B, FG-COGEN, II.

Only pipeline quality natural gas is burned in each engine (EUGEN1 thru EUGEN6) (PTI No. 10-20B, FG-COGEN, II.2: only pipeline

quality natural gas)

PTI No. 10-20B, FG-COGEN, III.

PharmaCann has implemented Malfunction Abatement Plan (MAP) dated April 14, 2022, based on the **AeriNOx LW OM Manual** and the **AeriNOx Service Intervals** documents. (PTI No. 10-20B, FG-COGEN, III.1-2)

PharmaCann meets the emissions limits based on the annual stack testing (PTI No. 10-20B, FG-COGEN, III.2: malfunction abatement plan (MAP) & meet the emission limits for FGCOGEN)

PTI No. 10-20B, FG-COGEN, IV.I-3.

Unlike Volvo Tier IV engines (emergency diesel-fired), CoGen NG-fired engines (SI RICE: EUGEN1, EUGEN2, EUGEN3, EUGEN4, EUGEN5, EUGEN6) are **not** US EPA certified; and hence annual (or 1/8,760 hours of an engine operation) testing is required. The engine design capacity is 1 MW. All six (6: 4-Stroke Lean-Burn Engines) natural gas-fired engines are equipped with a Selective Catalytic Reduction (SCR) and Oxidation Catalysts. Natural gas usage records are kept.

PTI No. 10-20B, FG-COGEN, V.I-3.

Most recent annual or 8,760 hours testing was performed during February 15-21, 2023.

PTI No. 10-20B, FG-COGEN, V.I-3.

PharmaCann performs the required calculations, submits non-certified engines (FGCOGEN) annual performance reports, carries out periodic maintenance as required by MAP, records the hours of operation & natural gas usage of each engine, etc.

PTI No. 10-20B, FG-BOILERS

FG-BOILERS (EUBOILER1, EUBOILER2, EUBOILER3, EUBOILER4): Four (4) dual fueled (mostly natural gas & propane only during NG supply interruption) boilers that provide hot water to the facility.

Control: Each boiler is equipment with low NOx burners

PTI No. 10-20B, FG-BOILERS, II.1 (only NG)

Only pipeline quality natural gas is burned in each boiler.

PTI No. 10-20B, FG-BOILERS, III.1-4

Expensive propane is not burned except during the NG supply interruption which has not occurred. As back-up boilers and most heat is supplied by the engines in FG-COGEN, fuel is mostly used for testing purposes. Hence, the the boilers are neither operated more than 500 hours per year using natural gas **nor** more than 300 hours per year using propane.

As all required heat is supplied by waste heat from the CoGen engines, the boilers are for backup purposes only.

The boilers were installed in July 2022.

Based upon the current meter readings dated February 23, 2023, the hours of operation are: Boiler1 = 699 (anomaly), Boiler2 = 204, Boiler3 = 7, Boiler4 = 6 hours. Most hours of operation, Boiler1 especially, happened during the installation process.

CY 2022: MAERS-2022 erroneously indicated 5.786 MM SCF per year natural gas usage in each boiler. It should have been 0.005786 MM SCF.

PTI No. 10-20B, FG-BOILERS, VI.1-4

Natural gas & propane (Zero for CY 2022) usage are kept, the required calculations are performed, hours of operations records are maintained.

PTI No. 10-20B, FG-EXTRACTION

FG-EXTRACTION (EUC1D1-1, EUC1D1-2, EUC1D2): Three (3) solvent-based extraction units and associated equipment for cannabis extraction.

PTI No. 10-20B, FG-EXTRACTION, I.1

CY 2022: LNG extraction VOC = 1.08 & ethanol extraction VOC = 0.79 tons of VOC per year (PTI No. 10-20B, FG-EXTRACTION, I.1 VOC limit: 17 tpy)

Only Liquid Petroleum Gas in EUC1D1-1, EUC1D1-2 is used and Ethanol in EUC1D2 is used (PTI No. 10-20B, FG-EXTRACTION, II.3-4)

PTI No. 10-20B, FG-EXTRACTION, VI.1-2

The usage records kept, and the required calculations are performed per mass balance principles that all solvents used in the extraction process deemed to have been emitted (PTI No. 10-20B, Appendix A).

PTI No. 10-20B, FG-EMENGINES

FG-EMENGINES (EUENGINE1, EUENGINE2, EUENGINE3, EUENGINE4, EUENGINE5, EUENGINE6, EUENGINE7, EUENGINE8): Eight (8) 796 HP (615 kW) diesel-fired emergency engine with a model year of 2011 or later, and a displacement of <10 liters/cylinder. The engine is designed to be compliant with Tier IV emission standards.

Control: Designed for Tier IV (Volvo) emission standards and diesel particulate filter meeting emissions standards via US EPA and CARB Certification.

PTI No. 10-20B, FG-EMENGINES, I.1-7

CARB Standard: NMHC = 0.19, NO_x = 0.67, NO_x + NMHC = NA, CO = 0.35, PM = 0.03 Grams/bhp-hr

CARB Certificate: NMHC = 0.003, NO_x = 0.33, NO_x + NMHC = NA, CO = 0.1 < 3.5 g/kW-hr = 2.59 grams/bhp-hr (1.3), PM = 0.02 < 0.20 g/kW-hr = 0.15 grams/bhp-hr (1.5) Grams/bhp-hr

FG-EMENGINES, I.1 limit for NOx + NMHC = 6.4 g/kW-hr = 4.74 grams/bhp-hr > 0.33 grams/bhp-hr NOx CARB Certificate

PTI No. 10-20B, FG-EMENGINES, II.1

All diesel engines use Marathon Ultra Low Sulfur (S) No. 2 DIESEL (No. 2 MV15, ULSD < 15 ppm Sulfur / S) (PTI No. 10-20B, FG-EMENGINES, II.1: only < 15 ppm S)

PTI No. 10-20B, FG-EMENGINES, III.1-5

The certified Tier IV (Volvo) engines (one engine at a time) will be operated for the necessary maintenance checks and readiness testing.

Complete compliance evaluation will be performed upon installation of the diesel engines. The eight emergency diesel engines are not installed yet (as of July 2023).

Conclusion

PharmaCann is in compliance with PTI No. 10-20B. FG-EMENGINES (8 emergency diesel engines) are yet to be installed.

NAME *J. S. Marshall*

DATE July 31, 2023

SUPERVISOR *Joyce*