Statement of Basis

Sklar Exploration Company, LLC (Sklar) operates Castleberry Oil & Gas Field, Area No. 5 (Area 5) under Major Source Operating Permit (MSOP) No. 103-0039 and Air Permit no. 103-0039-X002 in southeastern Conecuh County, east of Brooklyn, AL. Area 5 is comprised of several oil & gas wells, including planned & unconstructed ones. On January 5, 2018, the Department issued the initial MSOP 103-0039.

On January 23, 2019, Sklar submitted an application to modify their MSOP to include the addition of three wells acquired from Pruet Production Company (Pruet)—the CCL&T 34-12, CCL&T 34-15, and CCL&T 35-13 (the "Pruet wells"). The wells came under the control of Sklar as of January 1, 2019, after the Alabama Oil & Gas Board unitized the oil field into several large, contiguous, single-operator units rather than the patchwork of ¼ square mile sections of mineral rights that had existed previously. The Department had been in communication with Pruet and Sklar regarding the impending change of ownership prior to the new year.

PROJECT DESCRIPTION

Sklar seeks a direct modification of their MSOP, since no construction permit is warranted for these Pruet wells which have been in operation for years.

PROCESS DESCRIPTION

At each well, the produced full well-stream is separated into gas and liquid phases in the high-pressure separator and heater treater before the liquid phase flows to the power oil tank and flashes. An electrically driven pump may be used to recirculate crude from the power oil tank back into the well to a bottom-hole venturi pump. Flash vapor from the power oil tank and breathing and working losses from all the storage tanks is collected and sent to the flare for combustion or to the pipeline for sales. Each well is connected to the power grid and requires no generator. This process for the Pruet wells is identical to that of the existing, permitted Sklar wells.

EMISSIONS

The potential emissions of the produced gas at the Pruet wells, accounting for their flares, are based on continuously burning well gas at a rate of 70 mscf/d, which is the average production for the two wells over the last year. Tank vapor emissions are determined using EPA's Tanks 4.0.9 program and the Vasquez-Beggs Equation. The emissions from the wells' heaters are based on AP-42 factors. Table 1 below reflects the potential emissions from the project, and Table 2 shows the potential emissions of the facility as a whole from the project added to existing facility emissions. The existing facility emissions are derived from the January 4, 2018 Statement of Basis and the first Title V renewal application.

	Pollutant	Heaters	Flares	Total Emissions
Criteria Pollutant Emissions (TPY)	PM	0.049	0.103	0.152
	SO_2	0.004	0.026	0.030
	NO_X	0.644	3.527	4.171
	CO	0.541	19.191	19.732
	VOC	0.035	14.821	14.856
	Total HAPs	0.012	0.647	0.659
GHG Emissions (TPY)	CO_2	768.533	6,480.691	7,249.223
	N_2O	0.001	0.011	0.013
	CH_4	0.014	23.472	23.487
	CO_{2e}	769.327	7,070.903	7,840.230

Table 1 – Pruet Wells Potential Emissions

	Pollutant	Heaters	Engines	Flares	Total Emissions
Criteria Pollutant Emissions (TPY)	PM	0.278	0.245	1.873	2.396
	SO_2	0.012	0.000	0.296	0.308
	NO_X	3.650	3.220	72.507	79.377
	CO	3.066	2.710	394.511	400.287
	VOC	0.201	0.180	392.551	392.931
	Total HAPs	0.012	0.580	51.157	51.749
GHG Emissions (TPY)	CO_2	4,352.348	0.000	12,140.009	16,492.357
	N_2O	2.016	0.000	634.838	636.854
	CH_4	1.705	0.000	26.515	28.220
	CO_{2e}	4,356.846	0.000	13,368.091	17,724.937

Table 2 – Facility Potential Emissions

Sklar would retain their facility-wide anti-PSD limits of 245 TPY for criteria pollutants. Those limits would be met by Sklar not flaring continuously and instead selling their gas; actual emissions from the wells are historically significantly less than their potential emissions.

REGULATIONS

The Pruet wells acquired by Sklar have the same regulatory status as their existing wells in terms of both state and federal regulations, except for the following:

40 CFR 60 Subpart OOOOa, "Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification, or Reconstruction Commenced after September 18, 2015"

This regulation was promulgated by EPA on June 3, 2016 and it contains SO_2 and VOC requirements for oil & gas production wells and natural gas processing plants constructed, reconstructed, or modified after September 18, 2015. The following following table summarizes the portions of this regulation that specifically might apply to the CCL&T 35-13, which was drilled after 2015:

AFFECTED SOURCES	APPLICABILITY
Each single well [§60.5365a(a)]	This applies to a well that is hydraulically fractured or re-fractured
Pneumatic Controller [§60.5365a(d)(1)]	This applies to a single continuous-bleed natural-gas-driven pneumatic controllers with a bleed rate of > 6 scf/hr at an oil or natural gas production segment
Storage Vessels [§60.5365a(e)]	This applies to a single storage vessels located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment that has potential uncontrolled VOC emissions > 6 TPY
Collection of fugitive emission components (FEC) at a well site [§60.5365a(i)]	This applies to FEC (valves, flanges, PRVs, tank hatches, etc.) at well sites

Each Single Well

The CCL&T 35-13 well is not an affected source under this section of this subpart since it was not hydraulically fractured.

Pneumatic Controller

The pneumatic controllers at the CCL&T 35-13 are not continuous-bleed gas-driven controllers; therefore, there are no affected sources under this section of this subpart.

Storage Vessels

The storage vessels at the CCL&T 35-13 were constructed after September 18, 2015; the power oil tank is considered a Group 2 storage vessel under this subpart based on its uncontrolled emissions. At the well, tank vapor is routed to a flare for combustion. §60.5365a(e) however only applies to tanks with an uncontrolled PTE of greater than 6 TPY of VOCs, and the determination of PTE "may take into account requirements under a legally and practically enforceable limit in an operating permit or other requirement established under a Federal, State, local or tribal authority". Because the permit includes a stipulation that Pruet may not emit gas without combustion, the closed-vent system and flare should be included in the PTE determination of potentially subject tanks. Post-control device, the VOC emissions from all tanks are <6 TPY, and the tanks do not meet the definition of *storage vessels* under Subpart OOOOa.

Collection of Fugitive Emission Components (FEC) at a well site

The CCL&T 35-13 well and its respective collection of FEC is *new* with regards to Subpart OOOOa. FEC are defined in §60.5430a as new pumps, pressure relief devices, valves, connectors, hatches on tanks not already subject to §60.5365a(e), and other required devices/systems (except compressors) capable of leaking methane or VOC. As outlined in §60.5397a(a), the aforementioned equipment are subject to the leak standards in §60.5397a(b)-(g), the reporting requirements of §60.5397a(j) and the recordkeeping requirements of §60.5397a(i).

RECOMMENDATIONS

I recommend that MSOP 103-0039 be modified to include the three aforementioned Pruet wells to be included in the Summary Page of Facility Wells.

May 21, 2019
Date

R. Jackson Rogers, Jr.
Industrial Minerals Section
Energy Branch
Air Division
ADEM

ATTACHMENT A

TABLES

	Pollutant	Heaters	Flares	Total Emissions
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	SO_2	0.004	0.026	0.030
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	CH_4	1.705	0.000	26.515	28.220
	CO_{2e}	4,356.846	0.000	13,368.091	17,724.937

Table 2 – Facility Potential Emissions

ATTACHMENT B

CALCULATIONS

Flare Potential Emissions

Data	Total		Separator Gas		Tank Gas		Pilot Gas	
Volume	**3,112.020**	scf/hr (Ind.)	70.0	Mscf/day	3.0	Mscf/day	1.7	Mscf/day
H_2S mol%	0.0004%	mol%	0.0004%	mol%	0.0000%	mol%	0.0000%	mol%
Heat Content	1268.43	Btu/scf (Ind)	1237.60	Btu/scf (Ind)	2124.62	Btu/scf (Ind)	1020.00	Btu/scf (Ind)
VOC MW	**6.90**	lb/lb-mol[2]	**6.18**	lb/lb-mol[2]	**27.41**	lb/lb-mol[2]	**0.15**	lb/lb-mol[2]
CO_2	**0.25%**	mol%	**0.25%**	mol%	**0.18%**	mol%	**0.50%**	mol%
CH_4	**68.10%**	mol%	**69.09%**	mol%	**30.03%**	mol%	**95.00%**	mol%
C_6	**0.30**	lb/lb-mol[2]	**0.27**	lb/lb-mol[2]	**1.17**	lb/lb-mol[2]	**0.01**	lb/lb-mol[2]
OP Hours	8760	Hrs						
Destruction Eff	**98.00%**	DRE	Heat Input		**3.95**	MMBtu/hr[1]		

GWP (11/29/2013)	
N_20=	298
CO_2=	1
CH_4=	25

40 CFR Part 98 Sub C GHG Emission Factors (Table C-1)		
N_20=	0.0001	kg/MMBtu
AP 42 Emissions Factors[7]		
NO_X=	0.068	lb/MMBtu
CO=	0.37	lb/MMBtu
PM_1=	40	µg/L

(Ind. STP)	scf/lbmol=	380.67	60	°F	14.65 psia
(EPA STP)	scf/lbmol=	385.5	68	°F	14.696 psia

Potential Flare Emission Calculations

Pollutants

PM_1	40 µg / L	×	3112.0 scf (Ind.) / Hr	×	2.2E-9 lb / µg	×	8,760 Hr / Year	×	1 Ton / 2,000 Lb	×	28.31685 L / scf (EPA)	×	1.01 scf(EPA) / 1 scf(Ind.)	=	**0.034 Tons / Year**
SO_2	168.3 Lb SO_2[4] / MScf (Ind.)	×	3.112 MScf (Ind.) / Hr	×	0.000% H_2S Mol%	×	8,760 Hr / Year	×	1 Ton / 2,000 Lb					=	**0.009 Tons / Year**
NO_X	0.068 lb / MMBtu	×	3.947 MMBtu / Hr	×	8,760 Hr / Year	×	1 Ton / 2,000 Lb							=	**1.176 Tons / Year**
CO	0.37 lb / MMBtu	×	3.947 MMBtu / Hr	×	8,760 Hr / Year	×	1 Ton / 2,000 Lb							=	**6.397 Tons / Year**
VOC[5]	3,112.0 Scf (Ind.) / Hr	×	1 lb-mol / 380.67 scf (Ind.)	×	6.90 Lb VOC / Lb-Mole	×	8,760 Hr / Year	×	1 Ton / 2,000 Lb	×	2.00% Inv. DRE			=	**4.940 Tons / Year**
HAPs[8]	3,112.0 Scf (Ind.) / Hr	×	1 lb-mol / 380.67 scf (Ind.)	×	0.30 Lb C_6 / Lb-Mole	×	8,760 Hr / Year	×	1 Ton / 2,000 Lb	×	2.00% Inv. DRE			=	**0.216 Tons / Year**
CO_2[5,6] of Combustion	98.00% DRE	×	2.73E+07 Scf (Ind.) / Yr	×	1.40 lb-mol CO_2 (stoich.) / 1 lb-mol gas (stoich.)	×	1 lb-mol gas / 380.67 scf (Ind.)	×	44.01 lb CO_2 / lb-mole CO_2	×	1 Ton / 2,000 Lb	=			**2,156.25 Tons / Year**
CO_2 of Fuel	2.73E+07 Scf (Ind.) / Yr	×	0.25% mol% CO_2	×	1 lb-mol / 380.67 scf (Ind.)	×	44.01 Lb CO2 / Lb-mole	×	1 Ton / 2,000 Lb					=	**3.98 Tons / Year**
N_2O	0.001 M Ton / kg	×	0.001268 MMBtu / Scf (Ind.)	×	3,112.0 Scf (Ind.) / Hr	×	0.0001 kg / MMBtu	×	8,760 Hr / Year	×	1.1023 Tons / 1 Metric Ton			=	**0.0038 Tons / Year**
CH_4 Uncombusted	2.73E+07 Scf (Ind.) / Yr	×	2.00% Inv. DRE	×	68.10% mol% CH_4	×	1 lb-mol / 380.675 scf (Ind.)	×	16.043 Lb CH4 / Lb-mole	×	1 Ton / 2,000 Lb	=			**7.82 Tons / Year**
Mass Sum	2,160.23 Tons / Year (CO2)	+		+	0.0038 Tons / Year (N2O)	+		+	7.82 Tons / Year (CH4)	=					**2,168.06 Tons / Year**
CO_2e	2,160.23 TPY (CO2)	X	1	+	0.0038 TPY (N2O)	X	298	+	7.82 TP (CH4)	X	25	=			**2,356.97 Tons / Year**
	2,160.23 (CO2)	+		+	1.14 (N2O)	+		+	195.60 (CH4)						

[1] Rated Heat Capacity (MMBtu/Hr) = Flowrate (Scf/Hr) * Heat Content (Btu/Scf) * (MMBtu/10^6 Btu)

[2] VOC (Lb/Lb-mole) = Σ(Mole% of Each Compound)* (1%/100)*MW of Each Compound) -See Flare GHG Spreed Sheet for gas analysis

[3] Has to be maintained <500 lb/hr or 20 ppbv offsite concentration could potentially be exceeded

H_2S (Lb/hr) = Volume (Scf/hr) * (1 lb-mol/380.67) *(H_2S mol%) * (34.08 Lb H_2S/Lb-mol)

[4] SO_2 Conversion Factor 168.3 Lb SO_2/MScf of Gas

=(1,000 Scf/MScf) *(1Lb-Mole/380.67 Scf)* (64.066 Lb SO_2/Lb-Mole)

[5] Assuming the flare is 98% efficient

[6] Calculated using the gas analysis:

$\Sigma Y_j * R_j$ where, Y_j= mole fraction of gas hydrocarbon constituents' j (such as methane, ethane, propane, carbon dioxide, etc.) and R_j= number of carbon atoms in gas hydrocarbon constituent j: 1 for methane and carbon dioxide, 2 for ethane, 3 for propane, etc.

[7] Flare assumed to be "lightly smoking" in AP-42 table 13.5-1

[8] n-Hexane, Benzene, Toluene, etc are HAPs, but i-Hexanes, n-Heptane, n-Octane, etc are not. Assume by mass 50% Hexanes and 10% Heptanes+ are HAPS

Tank Vapor Potential Emissions

Multiplier for Power Oil Recirculation Rate[7]	3	In Series, Parallel, or Branching?[2]	Branching	Production bbl/day	140.0	scf/bbl[6]	19.27						
Tank Information			FLASH Emissions			EPA Tanks 4.09 Program Outputs		Total Working & Breathing Emissions @ MW = 39.228			VOC only emissions				
													TOTALS	79061.26	39.53
Tanks	Material Stored	Capacity (barrel)[1]	bbl/day	scf/day	lbs/yr	Working Loss[3] (lbs/yr)	Breathing Loss[3] (lbs/yr)	Working Loss[5] (lbs/yr)	Breathing Loss[5] (lbs/yr)	Breathing & Working Losses (scf/day)[6]	Working Loss[3] (lbs/yr)	Breathing Loss[3] (lbs/yr)	Flash Emissions[4,6] (lbs/yr)	Total VOC (lbs/yr)	Total VOC TPY
T-01	Power Oil	500.0	140.0	2697.9	102030.34	3087.73	900.34	7267.62	2119.14	249.56	5077.72	1480.59	70900.67	77458.99	38.73
T-02	Condensate	400.0				2091.65	831.35	820.52	326.13	30.49	573.28	227.86		801.14	0.40
T-03	Condensate	400.0						820.52	326.13	30.49	573.28	227.86		801.14	0.40