ENGINEERING ANALYSIS
WARRIOR MET COAL GAS, LLC
CASSIDY NO. 6 COMPRESSOR STATION
TUSCALOOSA COUNTY, ALABAMA
FACILITY NO. 413-0102
SMOP NO. X002

On April 8, 2025, the Air Division received a complete Air Permit application from Warrior Met Coal Gas, LLC (Warrior Met Coal) for the review of a catalyst that was originally installed with the existing 203 hp Caterpillar 4-stroke, rich-burn (4SRB) natural gas-fired reciprocating internal combustion engine (RICE) (Existing N007) at the existing Cassidy No. 6 Compressor Station located in Tuscaloosa County. Applications for this RICE were originally received on October 24, 2023, but did not include the appropriate ADEM Form 110 for the catalyst. During a different permitting action, the Air Division became aware that this RICE (Existing N007) was equipped with a catalyst. The facility is currently a minor source under both Title V and PSD regulations. Based on the information provided in the updated application for the existing RICE equipped with a catalyst, the facility would remain a minor source for PSD regulations, however it would become a synthetic minor source under Title V regulations. This facility was pulled into the one-mile radius sensible grouping analysis for the Cassidy 29-07-02 Gob Well. For the Cassidy 29-07-02 Gob Well to remain a minor source under Title V regulations, the Cassidy 6 Compressor Station would be required to operate with a catalyst. Warrior Met Coal would be issued Synthetic Minor Operating Permit Proposed SMOP No. X002 due to close vicinity to the Casidy 29-07-02 Gob Well. Synthetic Minor Operating Permit No. X002 would be issued for the existing 203 hp Caterpillar 4SRB natural gas-fired RICE and associated catalyst.

Proposed Modification

Warrior Met Coal utilizes compressors to increase the pressure and continue the flow of natural gas that has been extracted from various wells (i.e. coalbed methane) within the Black Warrior Basin. Each compressor is driven by a natural gas-fired RICE. Warrior Met Coal is proposing to include the existing catalyst that is equipped on a 203 hp Caterpillar G3406TA, 4SRB natural gas-fired RICE (Existing N007).

Emissions

The pollutants of concern that would be emitted from the existing RICE equipped with the catalyst would be nitrogen oxides (NO_x), carbon monoxide (CO) and formaldehyde (CH_2O). Emissions of other criteria and hazardous air pollutants (HAP) were reviewed but determined to be insignificant. Emission calculations for the engine are included as Appendix A, and the emissions calculations for the aggregated facilities are included as Appendix B.

State Regulations

Although the existing RICE equipped with the catalyst would be a fuel combustion source, it would not be subject to any particulate matter (as TSP) emission limitation of ADEM Admin. Code chap. 335-3-4 or any sulfur dioxide (SO_2) emission limitation of ADEM Admin. Code chap. 335-3-5 because it would not meet the definition of fuel burning equipment nor would it be considered one of the process industries, general or specific. The RICE equipped with a catalyst would, however, be subject to the state visible emission standard of ADEM Admin. Code r. 335-3-4-.01, which states that no air emission source may emit particulate of an opacity greater than 20% (as measured by a six-minute average) more than once during any 60minute period and at no time shall emit

particulate of an opacity greater than 40% (as measured by a six-minute average). The RICE equipped with a catalyst would be expected to be able to comply with this standard because it would be fired exclusively by natural gas.

Federal Regulations

Title V

The facility is currently a minor source under Title V regulations. Based on the location coordinates provided in the applications, this facility would be located within a one-mile radius of the Cassidy 30-2-119 compressor station and Cassidy 29-07-02 gob well compressor station; therefore, their potential emissions would be aggregated together in accordance with the State's sensible grouping policy to determine Title V status. The facility would become a synthetic minor source under Title V regulations because the potential emissions of NO_x would exceed 100 TPY without the emissions reduction from the catalyst under review when calculations are accounted for from the facilities included within the one-mile radius. The facility would be a minor source of HAP because the potential emissions of each individual HAP would not exceed 10 TPY, and the potential emissions of combined HAP would not exceed 25 TPY

PSD

The facility operations are not one of the 28 listed major source categories, and the facility is located in an attainment area for all criteria pollutants; therefore, the major source threshold of concern is 250 TPY for criteria pollutants. Based on the location coordinates provided in the applications, this facility would be located within a one-mile radius of the Cassidy 30-2-119 compressor station and Cassidy 29-07-02 gob well compressor station; therefore, their potential emissions would be aggregated together in accordance with the State's sensible grouping policy to determine PSD status. After accounting for the existing catalyst, the facility-wide uncontrolled potential emissions would be less than 250 TPY for each criteria pollutant; therefore, Warrior Met Coal would remain a minor source under PSD regulations.

NESHAP/MACT

40 CFR Part 63 Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary RICE (Subpart ZZZZ) applies to existing RICE at area sources. This RICE equipped with a catalyst, was manufactured in 1997 and has been operated at other locations. Therefore, the existing RICE equipped with a catalyst would be considered an existing non-emergency 4SRB RICE less than 500 hp located at an area source.

Emission/Operation Limitations

There are no emission limitations for this RICE under Subpart ZZZZ.

In accordance with Table 2d to Subpart ZZZZ, Warrior Met Coal would be required to change the oil and filter every 1,440 hours of operation or annually, whichever comes first; inspect spark plugs every 1,440 hours of operation or annually, whichever comes first and replace as necessary; and inspect all hoses and belts every 1,440 hours of operation or annually, whichever comes first, and replace as necessary.

Testing Requirements

There are no emission testing requirements for this RICE equipped with a catalyst under Subpart ZZZZ.

Continuous Compliance Monitoring

Warrior Met Coal would be required to operate and maintain the RICE equipped with a catalyst in a manner consistent with safety and good air pollution control practices for minimizing emissions, as required by Subpart ZZZZ.

Notifications

There are no notification requirements for this RICE equipped with a catalyst under Subpart ZZZZ.

Reports

There are no reporting requirements for this RICE equipped with a catalyst under Subpart ZZZZ.

Recordkeeping

The recordkeeping requirements are outlined in Table 6 to Subpart ZZZZ to show continuous compliance. Warrior Met Coal would be required to develop a maintenance plan and to keep records of the maintenance conducted on the stationary RICE equipped with a catalyst.

NSPS

Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (SI ICE)

40 CFR §60.4230(a)(4)(iii) states that SI ICE with a maximum engine power less than 500 hp are subject to this Subpart if construction commences after June 12, 2006, and the SI ICE are manufactured on or after July 1, 2008. Since the existing SI ICE equipped with a catalyst was manufactured prior to 2008, it would not be subject to this Subpart.

Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced After August 23, 2011, and on or before September 18, 2015

The compressor associated with the existing RICE equipped with a catalyst would not be subject to this Subpart because it would utilize a rotary screw package compressor and not a rod packing compressor.

Subpart OOOOa, Standards of Performance for Crude Oil and Natural Gas Facilities for Which Construction, Modification or Reconstruction Commenced After September 18, 2015 and On or Before December 6, 2022

The compressor associated with the existing RICE equipped with a catalyst would not be subject to this Subpart since this unit would utilize a rotary screw package compressor and not a rod packing compressor.

Subpart OOOOb, Standards of Performance for Crude Oil and Natural Gas facilities for which Construction, Modification or Reconstruction Commenced After December 6, 2022

The compressor associated with the existing RICE equipped with a catalyst would not meet the definition of a reciprocating compressor as listed in 40 CFR §60.5430b, because this unit would utilize a rotary screw package compressor and not a rod packing compressor. In addition, the facility would not be subject to the fugitive emissions monitoring outlined in 40 CFR §60.5397b because this replacement would not meet the definition of a modification as defined in 40 CFR §60.5365b(i).

Air Quality Impact

This facility is located in Tuscaloosa County, an attainment area for all criteria pollutants. It is located greater than 100 km from the Sipsey Wilderness Area, the nearest Class I Area. However, this equipment would not be expected to have a significant impact on this area.

Public Participation

In accordance with ADEM Admin. Code r. 335-3-15-.05, the Air Division will initiate a 15-day public comment period for the existing 1203 hp Caterpillar 4SRB natural gas-fired RICE equipped with a catalyst (Proposed SMOP No. X002) to solicit public input regarding the Department's preliminary determination to issue Synthetic Minor Operating Permit Nos. X002 to Warrior Met Coal.

Recommendations

Upon receipt of the payment of fees and the resolution of any comments received during the 15-day public comment period, I recommend that SMOP No. X002 be issued to Warrior Met Coal for the existing 203 hp Caterpillar 4SRB natural gas-fired RICE equipped with a catalyst.

Brandon Cranford
Chemical Branch
Air Division

Brandon Cranford

Date

413-0102 125 06-18-2025 ENGA BRC SMOP X002

APPENDIX A
WARRIOR MET COAL GAS, LLC
CASSIDY NO. 6 COMPRESSOR STATION
EMISSION CALCULATIONS
SMOP NO. X002

POTENTIAL EMISSIONS

(Existing) X002 - 203 hp Caterpillar G3306TA, 4-Stroke Rich-Burn Natural Gas-Fired Reciprocating Internal Combustion Engine w/ Catalyst

Uncontrolled

NO_x (based on manufacturer's data)

7.39 lb	8760 hr	T	**= 32.37 TPY**
hr	yr	2000 lb	

CO (based on manufacturer's data)

7.39 lb	8760 hr	T	= **32.37 TPY**
hr	yr	2000 lb	

VOC (based on manufacturer's data)

0.05 lb	8760 hr	T	= **0.22 TPY**
hr	yr	2000 lb	

Formaldehyde (based on manufacturer's data)

0.11 lb	8760 hr	T	= **0.48 TPY**
hr	yr	2000 lb	

PM_{10} (based on AP-42 emission factors Table 3.2-3)

0.0095 lb	1.648 MMBtu	8760 hr	T	**= 0.069 TPY**
MMBtu	hr	Yr	2000 lb	

PM_{con} (based on AP-42 emission factors Table 3.2-3)

0.00991 lb	1.648 MMBtu	8760 hr	T	**= 0.07 TPY**
MMBtu	Hr	Yr	2000 lb	

SO_2 (based on AP-42 emission factors Table 3.2-2)

0.000588 lb	1.648 MMBtu	8760 hr	T	**= 0.004 TPY**
MMBtu	Hr	Yr	2000 lb	

APPENDIX A
WARRIOR MET COAL GAS, LLC
CASSIDY 6 COMPRESSOR STATION
EMISSION CALCULATIONS

(Existing) N007 - 203 hp Caterpillar G3306TA, 4-Stroke Rich-Burn Natural Gas-Fired Reciprocating Internal Combustion Engine w/ Catalyst

Control Efficiency
NO_x – 92%
CO – 85%
VOC – 74%

Controlled

NO_x (based on manufacturer's guaranteed emission rate)

0.59 lb	8760 hr	T	**= 2.58 TPY**
hr	yr	2000 lb	

CO (based on manufacturer's guaranteed emission rate)

1.11 lb	8760 hr	T	= **4.86 TPY**
hr	yr	2000 lb	

VOC (based on manufacturer's guaranteed emission rate)

0.01 lb	8760 hr	T	= **0.04 TPY**
hr	yr	2000 lb	

Formaldehyde (based on manufacturer's guaranteed emission rate)

0.11 lb	8760 hr	T	= **0.48 TPY**
hr	yr	2000 lb	

PM_{10} (based on AP-42 emission factors Table 3.2-3)

0.0095 lb	1.648 MMBtu	8760 hr	T	**= 0.069 TPY**
MMBtu	hr	Yr	2000 lb	

PM_{con} (based on AP-42 emission factors Table 3.2-3)

0.00991 lb	1.648 MMBtu	8760 hr	T	**= 0.07 TPY**
MMBtu	hr	Yr	2000 lb	

SO_2 (based on AP-42 emission factors Table 3.2-2)

0.000588 lb	1.648 MMBtu	8760 hr	T	**= 0.004 TPY**
MMBtu	hr	Yr	2000 lb	

APPENDIX A
WARRIOR MET COAL GAS, LLC
CASSIDY 6 COMPRESSOR STATION
EMISSION CALCULATIONS

Facility-Wide Potential Uncontrolled Emissions (TPY) Cassidy 6 (1-Mile Radius)

Facility Name	Unit Description	Potential Emissions			
		NO_x	CO	VOC	Formaldehyde
Cassidy 30-2-119	26 hp Gemini	0.91	1.53	0.01	0.008
Cassidy 6	203 hp Caterpillar w/CC	32.27	32.27	0.22	0.48
Cassidy 29-07-02 Gob Station	400 hp Waukesha	7.71	4.99	0.96	0.70
Proposed Total		**40.89**	**38.79**	**1.19**	**1.19**

Facility-Wide Potential Controlled Emissions (TPY) Cassidy 6 (1-Mile Radius)

Facility Name	Unit Description	Potential Emissions			
		NO_x	CO	VOC	Formaldehyde
Cassidy 30-2-119	26 hp Gemini	0.91	1.53	0.01	0.008
Cassidy 6	203 hp Caterpillar w/CC	2.58	4.56	0.04	0.48
Cassidy 29-07-02 Gob Station	400 hp Waukesha	7.71	4.99	0.96	0.70
Proposed Total		**11.20**	**11.08**	**1.01**	**1.19**

APPENDIX A
WARRIOR MET COAL GAS, LLC
CASSIDY 6 COMPRESSOR STATION
EMISSION CALCULATIONS

Facility-Wide Potential Emissions (TPY) Cassidy 29-07-02 (1-Mile Radius)

Facility Name	Unit Description	Potential Uncontrolled Emissions			
		NO_x	CO	VOC	Formaldehyde
Cassidy 29-07-02	400 hp Waukesha	7.71	4.99	0.96	0.70
GSPC 28-12-1038	13 hp Honda	0.01	0.02	0.0001	0.0009
Brown Foundation 28-11-1037	14 hp Honda	0.01	0.02	0.0002	0.0001
Cassidy 30-2-119	26 hp Gemini	0.91	1.53	0.01	0.008
Cassidy 6	203 hp Caterpillar	32.37	32.37	0.22	0.48
Cassidy 29-16-11 Gob Station	145 hp Catrpillar/20 MMBtu-hr Flare	46.86	28.24	0.22	0.32
Cassidy 32-07-02 Gob Station	143 hp Caterpillar	33.77	1.97	0.22	0.16
	Proposed Total	**121.64**	**69.14**	**1.63**	**1.67**

Facility-Wide Potential Emissions (TPY) Cassidy 29-07-02 (1-Mile Radius)

Facility Name	Unit Description	Potential Controlled Emissions			
		NO_x	CO	VOC	Formaldehyde
Cassidy 29-07-02	400 hp Waukesha	7.71	4.99	0.96	0.70
GSPC 28-12-1038	13 hp Honda	0.01	0.02	0.0001	0.0009
Brown Foundation 28-11-1037	14 hp Honda	0.01	0.02	0.0002	0.0001
Cassidy 30-2-119	26 hp Gemini	0.91	1.53	0.01	0.008
Cassidy 6	203 hp Caterpillar w/CC	2.58	4.86	0.04	0.48
Cassidy 29-16-11 Gob Station	145 hp Catrpillar/20 MMBtu-hr Flare	46.86	28.24	0.22	0.32
Cassidy 32-07-02 Gob Station	143 hp Caterpillar	33.77	1.97	0.22	0.16
	Proposed Total	**91.85**	**41.63**	**1.45**	**1.67**

APPENDIX B
WARRIOR MET COAL GAS, LLC
CASSIDY NO. 6 COMPRESSOR STATION
AGGREGATE FACILITY CALCULATIONS
FACILITY NO. 413-0102
SMOP NO. X002

(Unpermitted) Cassidy 30-2-119

N001 - 26 hp Gemini 4-Stroke Rich-Burn Natural Gas-fired RICE

Uncontrolled Emissions

Conversion

Btu/hr = hp x 2544.43 Btu/hr
26 hp x 2544.43 Btu/hr 66,155.18 Btu/hr
66,155.18 Btu/hr/1,000,000 = **0.66 MMBtu/hr**
This unit operates approximately 1 day a week (1,248 hr/yr)

NO_x (based on AP-42 emission factors Section 3.2, Table 3.2-3)

2.21 lb	0.66 MMBtu	1248 hr	T	**= 0.91 TPY**
MMBtu	Hr	yr	2000 lb	

CO (based on AP-42 emission factors Section 3.3, Table 3.3-3)

3.72 lb	0.66 MMBtu	1248 hr	T	**= 1.53 TPY**
MMBtu	Hr	yr	2000 lb	

VOC (based on AP-42 emission factors Section 3.3, Table 3.3-3)

0.0296 lb	0.66 MMBtu	1248 hr	T	**= 0.01 TPY**
MMBtu	Hr	yr	2000 lb	

SO_2 (based on AP-42 emission factors Section 3.3, Table 3.3-3)

0.000588 lb	0.66 MMBtu	1248 hr	T	**= 0.0002 TPY**
MMBtu	Hr	yr	2000 lb	

$PM_{10}/PM_{2.5}$ (based on AP-42 emission factors Section 3.3, Table 3.3-3)

0.0095 lb	0.66 MMBtu	1248 hr	T	**= 0.004 TPY**
MMBtu	Hr	yr	2000 lb	

PMcon (based on AP-42 emission factors Section 3.3, Table 3.3-3)

0.00991 lb	0.66 MMBtu	1248 hr	T	**= 0.004 TPY**
MMBtu	Hr	yr	2000 lb	

Formaldehyde (based on AP-42 emission factors Section 3.3, Table 3.3-3)

0.0205 lb	0.66 MMBtu	1248hr	T	**= 0.008 TPY**
MMBtu	Hr	yr	2000 lb	

APPENDIX B
WARRIOR MET COAL GAS, LLC
CASSIDY NO. 6 COMPRESSOR STATION
AGGREGATE FACILITY CALCULATIONS
FACILITY NO. 413-0102
SMOP NO. X002

(Unpermitted) Cassidy 29-07-02

N001 - 400 hp Waukesha, F18GL, 4-stroke, Lean Burn, (4SLB) Natural Gas-fired Reciprocating Internal Combustion Engine (RICE)

Uncontrolled Emissions

NO_x (based on manufacturer's data)

$$\frac{1.76\ \text{lb}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{7.71 TPY}$$

CO (based on manufacturer's data)

$$\frac{1.14\ \text{lb}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{4.99 TPY}$$

VOC (based on manufacturer's data)

$$\frac{0.22\ \text{lb}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{0.96 TPY}$$

$PM_{10}/PM_{2.5}$ (based on AP-42 emission factors Section 3.2 Table 3.2-2)

$$\frac{0.0000771\ \text{lb}}{\text{MMBtu}} \times \frac{3.01\ \text{MMBtu}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{0.001 TPY}$$

PMcon (based on AP-42 emission factors Section 3.2, Table 3.2-2)

$$\frac{0.00991\ \text{lb}}{\text{MMBtu}} \times \frac{3.01\ \text{MMBtu}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{0.13 TPY}$$

SO_2 (based on AP-42 emission factors Section 3.2, Table 3.2-2)

$$\frac{0.000588\ \text{lb}}{\text{MMBtu}} \times \frac{3.01\ \text{MMBtu}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{0.008 TPY}$$

Formaldehyde (based on AP-42 emission factors Section 3.2, Table 3.2-2)

$$\frac{0.0528\ \text{lb}}{\text{MMBtu}} \times \frac{3.01\ \text{MMBtu}}{\text{hr}} \times \frac{8760\ \text{hr}}{\text{yr}} \times \frac{\text{T}}{2000\ \text{lb}} = \textbf{0.70 TPY}$$