

STATEMENT OF BASIS

For the issuance of Air Permit # 1936-AOP-R8 AFIN: 30-00229

1. PERMITTING AUTHORITY:

Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

2. APPLICANT:

Entergy Arkansas, Inc. - Hot Spring Energy Facility
696 Black Branch Road
Malvern, Arkansas 72104

3. PERMIT WRITER:

Alexander Sudibjo

4. NAICS DESCRIPTION AND CODE:

NAICS Description: Fossil Fuel Electric Power Generation
NAICS Code: 221112

5. ALL SUBMITTALS:

The following is a list of ALL permit applications included in this permit revision.

Date of Application	Type of Application (New, Renewal, Modification, Deminimis/Minor Mod, or Administrative Amendment)	Short Description of Any Changes That Would Be Considered New or Modified Emissions
9/18/2017	Minor Mod	Adding 2 new emergency engines
9/18/2017	Modification	Removing PM testing condition

6. REVIEWER'S NOTES:

With this modification, the permit is removing the 240 hp diesel-fueled emergency fire pump (SN-34) and replacing it with a new 220 hp diesel-fueled emergency fire pump. The facility is also installing a new 40 kW propane-fired emergency generator to provide back-up power for the telecom tower and a new 500 gallon diesel storage tank as an insignificant activity. Lastly, this modification removes periodic PM testing requirement for the combustion turbines (SN-01 and SN-02) since the facility only combusts natural gas, there is no add-on pollution control equipment for PM, and the facility has passed all

previous tests. The facility's permitted annual emissions are increasing by 0.1 tpy PM/PM₁₀, 0.2 tpy SO₂, 0.6 tpy VOC, 0.9 tpy CO, and 0.02 tpy Total HAPs. The facility's permitted annual emissions are decreasing by 0.6 tpy NO_x.

7. COMPLIANCE STATUS:

As of September 18, 2017, there are no compliance issues with the facility.

8. PSD/GHG APPLICABILITY:

a) Did the facility undergo PSD review in this permit (i.e., BACT, Modeling, etc.)? N
If yes, were GHG emission increases significant?

b) Is the facility categorized as a major source for PSD? Y

- *Single pollutant ≥ 100 tpy and on the list of 28 or single pollutant ≥ 250 tpy and not on list*

If yes for 8(b), explain why this permit modification is not PSD. The current permit modification does not significantly increase any of the criteria pollutants.

9. SOURCE AND POLLUTANT SPECIFIC REGULATORY APPLICABILITY:

Source	Pollutant	Regulation (NSPS, NESHAP or PSD)
01 & 02	PM ₁₀ , SO ₂ , VOC, CO and NO _x	PSD
01 & 02	PM/PM ₁₀ , SO ₂ , NO _x	NSPS Subpart Da
01 & 02	SO ₂ & NO _x	NSPS Subpart GG
05	Records only	NSPS Subpart Dc
32, 36, and 37	HAPs	NESHAP Subpart ZZZZ
36	VOC, NO _x , PM	NSPS Subpart IIII
37	VOC, NO _x , PM	NSPS Subpart JJJJ

10. PERMIT SHIELD – TITLE V PERMITS ONLY:

Did the facility request a permit shield in this application? Y

(Note - permit shields are not allowed to be added, but existing ones can remain, for minor modification applications or any Regulation 18 requirement.)

If yes, are applicable requirements included and specifically identified in the permit? Y

If not, explain why.

For any requested inapplicable regulation in the permit shield, explain the reason why it is not applicable in the table below.

Source	Inapplicable Regulation	Reason
N/A		

11. EMISSION CHANGES AND FEE CALCULATION:

See emission change and fee calculation spreadsheet in Appendix A.

12. AMBIENT AIR EVALUATIONS:

Include the results for any ambient air evaluations or modeling. Include NSR/PSD permits and permits that require an evaluation in accordance with revisions to the Arkansas State Implementation Plan, National Ambient Air Quality Standards, Infrastructure SIPs and NAAQS SIP per Ark Code Ann. § 8-4-318, dated March 2017 and the ADEQ Air Permit Screening Modeling Instructions.

a) Reserved.

b) Non-Criteria Pollutants:

Permit #1936-AOP-R8 added two new emergency engines. Since emergency engines are not required to be modeled, no new modeling was done for this modification. Modeling results were taken from permit #1936-AOP-R7.

1st Tier Screening (PAER)

Estimated hourly emissions from the following sources were compared to the Presumptively Acceptable Emission Rate (PAER) for each compound. The Department has deemed the PAER to be the product, in lb/hr, of 0.11 and the Threshold Limit Value (mg/m³), as listed by the American Conference of Governmental Industrial Hygienists (ACGIH).

Pollutant	TLV (mg/m ³)	PAER (lb/hr) = 0.11 × TLV	Proposed lb/hr	Pass?
Acrolein	0.23	0.0253	0.026	N
Arsenic	0.01	0.0011	0.0001	Y
Beryllium	0.01	0.0011	0.00001	Y
Cadmium	0.00218	0.00033	0.0048	N
Cobalt	0.02	0.0022	0.00037	Y

Pollutant	TLV (mg/m ³)	PAER (lb/hr) = 0.11 × TLV	Proposed lb/hr	Pass?
Mercury	0.01	0.0011	0.0012	N
Nickel	0.02	0.0022	0.0091	Y

2nd Tier Screening (PAIL)

AERMOD air dispersion modeling was performed on the estimated hourly emissions from the following sources, in order to predict ambient concentrations beyond the property boundary. The Presumptively Acceptable Impact Level (PAIL) for each compound has been deemed by the Department to be one one-hundredth of the Threshold Limit Value as listed by the ACGIH.

Pollutant	PAIL (µg/m ³) = 1/100 of Threshold Limit Value	Modeled Concentration (µg/m ³)	Pass?
Acrolein	2.3	0.00388	Y
Cadmium	0.218	0.00071	Y
Mercury	0.1	0.00016	Y

13. CALCULATIONS:

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
01 & 02	<p>*Manufr's Specs – criteria pollutants – BACT emissions except for ammonia</p> <p><u>Turbine</u>^A HAPs - AP-42 Table 3.1-3 (4/00) (except for Formaldehyde)^C</p> <p><u>Burner</u>^B ^B AP-42 Table 1.4-2 (7/98)</p> <p>^C AP-42 Table 1.4-3 (7/98)</p> <p>^D AP-42 Table 1.4-4 (7/98)</p>	<p>OEM Specs</p> <p>*PM/PM₁₀ – 27.8 lb/hr</p> <p>*SO₂ – 2.0 gr/100scf = 13.3 lb/hr</p> <p>*VOC – 9.4 ppm = 19.0 lb/hr</p> <p>*CO – 21 ppm = 115.6 lb/hr</p> <p>*NO_x – 3.5 ppm = 31.9 lb/hr</p> <p>ammonia – 10.0 ppm = 33.7 lb/hr</p> <p>CT EF lb/MMBtu = lb/hr</p> <p>^A acetaldehyde - 4.00E-05 = 8.03E-02 lb/hr</p> <p>^A acrolein – 6.40E-06 = 1.28E-02</p> <p>^A benzene – 1.20E-05 = 2.41E-02</p>	SCR and low NO _x burners	71.4% for NO _x	<p><u>Combustion Turbines (CT)/HRSG</u></p> <p><u>SN-01 & SN-02 (Identical)</u></p> <p>Natural gas (NG) is the only fuel used @ 8,760 hrs/yr</p> <p>CT Power Gen Cap = 170 MW</p> <p>CT Heat Input Cap = 2,007 MMBtu/hr</p> <p>Duct Burner (DB) Heat Input = 500 MMBtu/hr</p> <p>DB NG HHV = 1,020 MMBtu/10⁶ scf</p> <p>HAP emissions calculated as (Heat Input Capacity (Cap), MMBtu/hr) x (Emission Factor, lb/MMscf) / (MMBtu/MMscf)</p> <p>^A Turbine Heat Input = 2007 MMBtu/hr</p>

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
	<p>& 1.4-4 Turbine^C US EPA memo 08/21/01 "HAP Em Control Tech for New Stationary CT" from Sims Roy US EPA OAQPS Em Stds group – Combustion Div</p>	<p>^A 1,3-butadiene – 4.30E-07 = 8.63E-04 lb/hr ^A ethylbenzene – 3.20E-05 = 6.42E-02 lb/hr ^C frmldehyd – 2.02E-04= 0.41lb/hr ^A lead – ND ^A naphthalene – 1.30E-06 = 2.61E-03 lb/hr ^A PAH –2.20E-06 =4.42E- 03 ^A propylene oxide – 2.90E- 05 = 5.82E-02 lb/hr ^A toluene -1.30E-04 =2.61E-01 ^A xylene – 6.40E-05 = 1.28E-01 <u>Duct Burners Emission Factor</u> <u>lb/MMscf = lb/hr</u> ^B acetaldehyde = 0.0 ^B acrolein – 0.0 ^D arsenic – 2.0E-04 = 9.80E-05 ^C benzene – 2.10E-03 = 1.03E-03 ^D cadmium – 1.1E-03 = 5.39E-04 ^C formaldehyde – 7.50E-02 = 3.68E-02 lb/hr ^C hexane – 1.80E+00 = 8.82E-01 ^B lead – 5.00E-04 = 2.45E- 04 ^D mercury – 2.6E-04 = 1.27E-04 ^B naphthalene – 6.10E-04 = 2.99E-04 lb/hr ^B PAH – 8.82E-05 = 4.32E- 03 ^B propylene oxide – 0.0 ^C toluene - 3.40E-03 = 1.67E-03 ^B xylene – 0.0</p>			<p>^B Duct Burner Heat Input = 500 MMBtu/hr ^C Formaldehyde – Tests on lean premix stationary CT ranging in size from 10 MW to 170 MW, 95th percentile, EPA memo noted.</p> <p>To convert from (lb/MMBtu) to (lb/106 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp- hr) use the following equation: lb/hp & hr ' lb/MMBtu heat input, MMBtu/hr 1/operating HP, 1/hp</p>
05	<p>^ABACT ^B AP-42 Table 1.4-2</p>	<p>^APM/PM₁₀ – 0.01 Lb/MMBtu 0.3 lb/hr ^ASO₂ – 2.0 gr/100scf = 0.2</p>	None	N/A	<p><u>Auxiliary Boiler</u> Natural gas (NG) is the only fuel used @2,000 hrs/yr</p>

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
	(7/98) ^C AP-42 Table 1.4-3 (7/98) ^D AP-42 Table 1.4-4 (7/98)	lb/hr ^A VOC – 0.016 Lb/MMBtu = 0.5 lb/hr ^A CO – 0.15 Lb/MMBtu =4.4 lb/hr ^A NO _x – 0.12 Lb/MMBtu =3.5 lb/hr ^B lead – 5.00E-04 = 1.42E-05 lb/MMscf ^C benzene –2.10E-03 =5.97E-05 lb/hr ^C formaldehyde –7.50E-02 =2.13E-03 lb/hr ^C hexane – 1.80E+00 =5.12E-02 lb/hr ^C PAH/POM – 8.82E-05 =2.51E-06 lb/hr ^C toluene - 3.40E-03 = 9.67E-05 lb/hr ^D arsenic – 2.00E-04 = 5.69E-06 lb/hr ^D cadmium –1.10E-03 =3.13E-05 lb/hr ^D mercury – 2.60E-04 = 7.39E-06 lb/hr			Heat Input Cap = 29 MMBtu/hr NG HHV = 1,020 Btu/ scf Design Fuel Rate = 0.028 MMscf/hr Criteria emissions calculations (except SO ₂) - (Heat Input Cap, MMBtu/hr) x (BACT EF, lb/MMBtu) SO ₂ Em Rate (lb/hr) = Fuel S content (gr/100 scf) x Heat Rate (MMBtu/hr) x 2 (MW SO ₂ /MW S) / 7000 (gr/lb) x 1020 (MMBtu/10 ⁶ scf) HAP emissions calc as (Heat Input Capacity (Cap), MMBtu/hr) x (Emission Factor, lb/MMscf) / (MMBtu/MMscf)
07-16	Manuf. Spec	10.5 MM gallons circulating water	Drift eliminator, inherent to the design	Reduce to 0.005%	<u>Cooling Tower 1</u> (10-cell) @8,760 hrs/yr
32	BACT & AP-42 3.4 Tables 3.4-3 & 4	<u>BACT</u> PM/PM ₁₀ : 1.77 lb/hr SO ₂ : 0.05 % by wt VOC: 1.1 g/bhp-hr CO: 3.0 g/bhp-hr NO _x : 14 g/bhp-hr <u>Lb/MMBtu</u> Acrolein: 9.25E-05 Benzene: 9.33E-04 Formaldehyde: 1.18E-03 PAH: 1.68E-04 Toluene: 4.09E-04 Xylene: 2.85E-04	None	N/A	Emergency-use Generator @ 500 hrs/yr max w/diesel fuel Design Power Output = 500 kW Max heat Input = 4.69 MMBtu/hr Design Output = 670.5 bhp Heating Value Diesel = 19,300 Btu/lb <u>PM/PM₁₀ & SO₂ calc as bhp x EF, g/bhp-hr / 453.59 g/lb</u> <u>HAP emissions calc.</u> MMBtu/hr x EF, lb/MMBtu <u>SO₂ emission rate (lb/hr) =</u> % fuel S content x MMBtu/hr x 2 (ratio MW SO ₂ /MW S) x 10 ⁶ Btu/MMBtu / 19,300 Btu/lb
36	AP-42, 3.3	<u>lb/MMBtu</u>	None	N/A	220 bhp

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
37		SO ₂ : 0.29 Acetaldehyde: 7.67E-04 Acrolein: 9.25E-05 Benzene: 9.33E-04 1,3-Butadiene: 3.91E-05 Formaldehyde: 1.18E-03 PAH: 1.68E-04 Toluene: 4.09E-04 Xylene: 2.85E-04			164.5 kW 1.58 MMBtu/hr 500 hr/yr
	NSPS III	<u>g/KW-hr</u> PM/PM ₁₀ : 0.2 VOC: 4.0 CO: 3.5 NO _x : 4.0			
37	AP-42, 3.2	<u>lb/MMBtu</u> PM/PM ₁₀ : 1.94E-02 SO ₂ : 5.88E-04 Acetaldehyde: 8.36E-03 Acrolein: 5.14E-03 Benzene: 1.58E-03 Formaldehyde: 5.28E-02 PAH: 1.41E-04 Toluene: 5.58E-04 Xylene: 1.95E-04	None	N/A	61 bhp 45.3 kW 0.61 MMBtu/hr 500 hr/yr 20% safety factor when using AP-42 factors
	Manufacturer's Specs	<u>g/KW-hr</u> VOC: 8.17 CO: 32.02 NO _x : 8.17			

14. TESTING REQUIREMENTS:

The permit requires testing of the following sources.

SN	Pollutants	Test Method	Test Interval	Justification
01, 02 CTs	VOC	25A	Alternate CTs every 5 years	Confirmation of BACT Limits
	SO ₂ , CO & NO _x	7E	Initial only	
	Ammonia (NH ₃)	ADEQ approved methodology	Alternate CTs every 5 years	§18.1004 To assure accurately estimated emissions

SN	Pollutants	Test Method	Test Interval	Justification
05	NO _x	7E	Initial only	Confirmation of BACT Limits
07 through 16	TDS		Monthly	§18.1004

15. MONITORING OR CEMS:

The permittee must monitor the following parameters with CEMS or other monitoring equipment (temperature, pressure differential, etc.)

SN	Parameter or Pollutant to be Monitored	Method (CEM, Pressure Gauge, etc.)	Frequency	Report (Y/N)
01 & 02	CO	CEMS	Continuous	Y
	NO _x	CEMS	Continuous	Y

16. RECORDKEEPING REQUIREMENTS:

The following are items (such as throughput, fuel usage, VOC content, etc.) that must be tracked and recorded.

SN	Recorded Item	Permit Limit	Frequency	Report (Y/N)
01, 02, 05	All Performance Tests	N/A	On-going	Yes
01, 02	Sulfur in natural gas fuel	0.0006 lb SO ₂ / MMBtu of heat input	Monthly	Yes
01, 02, 05	Natural gas only	N/A	Verify by Inspector	Yes
01, 02	Start-up & Shutdown Provisions which direct result of start-up and/or shut down	“Upset Condition” is reportable as stated in SC #31	On-going Real Time	Yes
05	Operating Hours	Nte 2,000 operating hours per rolling 12-month period	Monthly	Yes
05	Quantity of Fuel Used	No limit	Monthly	No
07 - 16	TDS	Nte Level of 1280 ppm-w	Monthly	Yes
32	Operating Hours	Nte 500 op hours per consecutive 12-month	Monthly	Yes

SN	Recorded Item	Permit Limit	Frequency	Report (Y/N)
		period		
32	Sulfur in Diesel Fuel	valid gas tariff; fuel purchase or pipeline transportation contract; vendor certification based on fuel sampling and analysis or other appropriate doc; or periodic testing.	On-going	Yes
32	Develop and follow Routine Maintenance Plan	1. Change oil & filter every 500 op hrs or annually, whichever is first 2. Inspect air cleaner filter annually 3. inspect hoses/belts every 500 hrs or annually, whichever is first	On-going	No
36 and 37	Operating Hours	Nte 500 op hours each per calendar year	Monthly	Yes

17. OPACITY:

SN	Opacity	Justification for limit	Compliance Mechanism
01, 02 & 05	5%	§18.501 and A.C.A.	Use of natural gas as the only fuel.
07 through 16	20%	§19.503 and A.C.A.	Use of drift eliminators
32 & 36	20%	§19.503 and A.C.A.	Use of diesel fuel
37	5%	§18.501 and A.C.A.	Use of LPG as the only fuel.

18. DELETED CONDITIONS:

Former SC	Justification for removal
5	The facility only combusts natural gas, there is no add-on pollution control equipment for PM, and the facility has passed all previous tests

19. GROUP A INSIGNIFICANT ACTIVITIES:

The following is a list of Insignificant Activities including revisions by this permit.

Source Name	Group A Category	Emissions (tpy)						
		PM/ PM ₁₀ / PM _{2.5}	SO ₂	VOC	CO	NO _x	HAPs	
							Single	Total
Diesel Storage Tank, 250 gal cap	A-2	0.0	0.0	0.0008	0.0	0.0	0	0
Diesel Storage Tank, 800 gal cap	A-3	0.0	0.0	0.0005	0.0	0.0	0	0
Contractor Diesel Tank, 500 gal cap	A-3	0.0	0.0	0.0003	0.0	0.0	0	0
Glycol Tank, 400 gal cap	A-3	0.0	0.0	0.00005	0.0	0.0	0	0
Diesel Storage Tank, 500 gal cap	A-3	0.0	0.0	0.00025	0.0	0.0	0	0
Oil/Water Separator (WW Treatment)	A-13	0.0	0.0	0.7	0.0	0.0	0	0
4 Inlet Chiller Cooling Towers	A-13	1.31	0.0	0.0	0.0	0.0	0	0
Sludge Press	A-13	0.00007	0.0	0.0	0.0	0.0	0	0
Parts Washer	A-13	0.0	0.0	1.53	0.0	0.0	0	0
Glove Box Grit Blaster	A-13	0.05	0.0	0.0	0.0	0.0	0	0
Aerosol Can Puncture Station	A-13	0.0	0.0	0.19	0.0	0.0	0	0

20. VOIDED, SUPERSEDED, OR SUBSUMED PERMITS:

The following is a list of all active permits voided/superseded/subsumed by the issuance of this permit.

Permit #
1936-AOP-R7

APPENDIX A – EMISSION CHANGES AND FEE CALCULATION

Fee Calculation for Major Source

Revised 03-11-16

Facility Name: Entergy Arkansas, Inc - Hot Spring
 Energy Facility
 Permit Number: 1936-AOP-R8
 AFIN: 30-00229

\$/ton factor	23.93	Annual Chargeable Emissions (tpy)	1105.6
Permit Type	Modification	Permit Fee \$	1000

Minor Modification Fee \$	500
Minimum Modification Fee \$	1000
Renewal with Minor Modification \$	500
Check if Facility Holds an Active Minor Source or Minor Source General Permit	<input type="checkbox"/>
If Hold Active Permit, Amt of Last Annual Air Permit Invoice \$	0
Total Permit Fee Chargeable Emissions (tpy)	0.3
Initial Title V Permit Fee Chargeable Emissions (tpy)	

HAPs not included in VOC or PM:

Chlorine, Hydrazine, HCl, HF, Methyl Chloroform, Methylene Chloride, Phosphine, Tetrachloroethylene, Titanium Tetrachloride

Air Contaminants:

All air contaminants are chargeable unless they are included in other totals (e.g., H2SO4 in condensable PM, H2S in TRS, etc.)

Pollutant (tpy)	Check if Chargeable Emission	Old Permit	New Permit	Change in Emissions	Permit Fee Chargeable Emissions	Annual Chargeable Emissions
PM		266.5	266.6	0.1	0.1	266.6
PM ₁₀		245.1	245.2	0.1		
PM _{2.5}		0	0	0		
SO ₂		107.2	107.4	0.2	0.2	107.4
VOC		164.1	164.7	0.6	0.6	164.7
CO		962.8	963.7	0.9		
NO _x		272.3	271.7	-0.6	-0.6	271.7
Lead	<input type="checkbox"/>	0.03	0.03	0		

