

STATEMENT OF BASIS

For the issuance of Draft Air Permit # 1936-AOP-R7 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:

Jesse Smith

4. NAICS DESCRIPTION AND CODE:

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

5. SUBMITTALS:

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
3/23/2016	Renewal	Corrected heat capacity of SN-05 and power rating of SN-32 and SN-34. Removal of SN-35

6. REVIEWER'S NOTES:

K Entergy Arkansas, Inc. owns and operates a 620 megawatt (MW) natural gas-fired combined-cycle electric power plant located at 696 Black Branch Road, Malvern, Hot Spring County, Arkansas 72104. This permitting action is necessary to renew the facility's title V permit with the following changes:

- Revise HAP emission limits to be consistent with the most recent ADEQ non-criteria pollutant control strategy,
- Update NSPS Da and NESHAP ZZZZ conditions to be consistent with the subparts,

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- Correct heat capacity of SN-05 and power rating of SN-32 and SN-34,
- Remove SN-35 and associated permit conditions,
- And update to the insignificant activities list.

The total permitted annual emission rate decreased by 0.6 tpy PM₁₀, 4.9 tpy SO₂, 15.5 tpy VOC, 13.3 tpy CO, and 14.7 tpy NO_x. PM emissions increased by 3.5 tpy.

7. COMPLIANCE STATUS:

The following summarizes the current compliance of the facility including active/pending enforcement actions and recent compliance activities and issues.

The facility was most recently inspected on February 2, 2016. There were no areas of concern noted during this inspection.

8. PSD APPLICABILITY:

a) Did the facility undergo PSD review in this permit (i.e., BACT, Modeling, etc.)? N

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, 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 & 34	HAPs	NESHAP Subpart ZZZZ

10. EMISSION CHANGES AND FEE CALCULATION:

See emission change and fee calculation spreadsheet in Appendix A.

11. AMBIENT AIR EVALUATIONS:

a) Reserved.

b) Non-Criteria Pollutants:

The non-criteria pollutants listed below were evaluated. Based on Department procedures for review of non-criteria pollutants, emissions of all other non-criteria pollutants are below thresholds of concern.

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

Pollutant	TLV (mg/m ³)	PAER (lb/hr) = 0.11 × TLV	Proposed lb/hr	Pass?
Cadmium	0.00218	0.00033	0.0048	N
Cobalt	0.02	0.0022	0.00037	Y
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

c) H₂S Modeling:

A.C.A. §8-3-103 requires hydrogen sulfide emissions to meet specific ambient standards. Many sources are exempt from this regulation, refer to the Arkansas Code for details.

Is the facility exempt from the H₂S Standards Y

If exempt, explain: No H₂S emissions

Pollutant	Threshold value	Modeled Concentration (ppb)	Pass?
H ₂ S	20 parts per million (5-minute average*)	-	Y
	80 parts per billion (8-hour average) residential area	-	Y
	100 parts per billion (8-hour average)	-	Y

Pollutant	Threshold value	Modeled Concentration (ppb)	Pass?
	nonresidential area		

*To determine the 5-minute average use the following equation

$$C_p = C_m (t_m/t_p)^{0.2} \text{ where}$$

C_p = 5-minute average concentration

C_m = 1-hour average concentration

t_m = 60 minutes

t_p = 5 minutes

12. 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>& 1.4-4 <u>Turbine</u>^C US EPA memo 08/21/01 "HAP Em Control Tech for New Stationary CT" from</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> <p>^A 1,3-butadiene – 4.30E-07 = 8.63E-04 lb/hr</p> <p>^A ethylbenzene – 3.20E-05 = 6.42E-02 lb/hr</p> <p>^C frmldehyd – 2.02E-04 = 0.41lb/hr</p> <p>^A lead – ND</p> <p>^A naphthalene – 1.30E-06 = 2.61E-03 lb/hr</p>	SCR and low NO _x burners	71.4% for NO _x	<p><u>Combustion Turbines (CT)/HRSG</u> <u>SN-01 & SN-02 (Identical)</u> Natural gas (NG) is the only fuel used @ 8,760 hrs/yr CT Power Gen Cap = 170 MW CT Heat Input Cap = 2,007 MMBtu/hr Duct Burner (DB) Heat Input = 500 MMBtu/hr 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> <p>^B Duct Burner Heat Input = 500 MMBtu/hr</p> <p>^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</p>

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
	Sims Roy US EPA OAQPS Em Stds group - Combustion Div	^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			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
05	^A BACT ^B AP-42 Table 1.4-2 (7/98) ^C AP-42 Table 1.4-3 (7/98) ^D AP-42 Table 1.4-4 (7/98)	^A PM ₁₀ - 0.01 Lb/MMBtu 0.3 lb/hr ^A SO ₂ - 2.0 gr/100scf = 0.2 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 <u>lb/MMscf</u> ^B lead - 5.00E-04 = 1.42E-05	None	N/A	<u>Auxiliary Boiler</u> Natural gas (NG) is the only fuel used @2,000 hrs/yr 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

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
		$\frac{\text{lb}}{\text{hr}}$ ^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			(MMBtu/hr) x 2 (MW SO ₂ /MW S) / 7000 (gr/lb) x 1020 (MMBtu/10 ⁶ scf) <u>HAP</u> 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 % wt VOC - 1.1 CO - 3.0 g/bhp-hr NO _x - 14 <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, MMBtu/hr x EF, lb/MMBtu</u> <u>SO₂ emission rate (lb/hr) = % fuel S content x MMBtu/hr x 2 (ratio MWSO₂/MW S) x 10⁶ Btu/MMBtu / 19,300 Btu/lb</u>
34	AP-42 3.3 Tables 3.3-1 & 2	<u>lb/MMBtu</u> PM/PM ₁₀ - 0.31 SO ₂ - 0.29 VOC - 0.36 CO - 0.95 NO _x - 4.41 Acrolein - 9.25E-05 Benzene - 9.33E-04 Formaldehyde - 1.18E-03	None	N/A	Emergency-use Fire Pump Max Heat Input = 1.4 MMBtu/hr @ 500 hrs/yr max w/diesel fuel Design Power Output = 200 bhp <u>Emissions calc as MMBtu/hr x EF lb/MMBtu</u>

SN	Emission Factor Source (AP-42, testing, etc.)	Emission Factor (lb/ton, lb/hr, etc.)	Control Equipment	Control Equipment Efficiency	Comments
		PAH – 1.68E-04 Toluene – 4.09E-04 Xylene – 2.85E-04			

13. TESTING REQUIREMENTS:

The permit requires testing of the following sources.

SN	Pollutants	Test Method	Test Interval	Justification
01, 02 CTs	PM/PM ₁₀	5 and/or 201A	Alternate CTs every 5 years	Confirmation of BACT Limits
	VOC	25A		
	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
05	NO _x	7E	Initial only	Confirmation of BACT Limits
07 through 16	TDS		Monthly	§18.1004

14. 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

15. 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 & 34	Operating Hours	Nte 500 op hours each per consecutive 12-month period	Monthly	Yes
32 & 34	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	On-going	Yes

SN	Recorded Item	Permit Limit	Frequency	Report (Y/N)
		periodic testing.		
32 & 34	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

16. 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 & 34	20%	§19.503 and A.C.A.	Use of diesel fuel

17. DELETED CONDITIONS:

Former SC	Justification for removal
58-71	SN-35 was removed from the permit. These conditions were all referencing SN-35.

18. GROUP A INSIGNIFICANT ACTIVITIES:

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	A-3	0.0	0.0	0.00005	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

19. VOIDED, SUPERSEDED, OR SUBSUMED PERMITS:

List all active permits voided/superseded/subsumed by the issuance of this permit.

Permit #
1936-AOP-R6

APPENDIX A – EMISSION CHANGES AND FEE CALCULATION

Fee Calculation for Major Source

Revised 03-11-16

Entergy Arkansas, Inc. - Hot Spring Energy Facility
 Permit #: 1936-AOP-R7
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\$/ton factor	23.93	Annual Chargeable Emissions (tpy)	1105.3
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)	-31.6
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 condensible 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		263	247.7	3.5	3.5	266.5
PM ₁₀		245.7	247.7	-0.6		
PM _{2.5}		0	0	0		
SO ₂		112.1	117	-4.9	-4.9	107.2
VOC		179.6	167.5	-15.5	-15.5	164.1
CO		976.1	1018.8	-13.3		
NO _x		287	290.5	-14.7	-14.7	272.3
Lead	<input type="checkbox"/>	0.03	0.03	0		

Pollutant (tpy)	Check if Chargeable Emission	Old Permit	New Permit	Change in Emissions	Permit Fee Chargeable Emissions	Annual Chargeable Emissions
Acrolein	<input type="checkbox"/>	0.15	0	-0.15		
Benzene	<input type="checkbox"/>	0.27	0	-0.27		
1,3-Butadiene	<input type="checkbox"/>	0.03	0	-0.03		
Formaldehyde	<input type="checkbox"/>	4.45	0	-4.45		
Hexane	<input type="checkbox"/>	7.78	0	-7.78		
PAH/POM	<input type="checkbox"/>	0.08	0	-0.08		
Propylene Oxide	<input type="checkbox"/>	0.52	0	-0.52		
Toluene	<input type="checkbox"/>	2.34	0	-2.34		
Xylene	<input type="checkbox"/>	1.17	0	-1.17		
Arsenic	<input type="checkbox"/>	0.03	0	-0.03		
Cadmium	<input type="checkbox"/>	0.03	0	-0.03		
Mercury	<input type="checkbox"/>	0.03	0	-0.03		
Ammonia	<input checked="" type="checkbox"/>	295.2	295.2	0	0	295.2
Total HAPs	<input type="checkbox"/>	0	17.32	17.32		