

January 28, 2015

[Via: Email](#)

Mindy Bowman
Environmental Engineer
Bureau of Air-KDHE
1000 SW Jackson, Suite 310
Topeka, Kansas 66612

Re: Source ID 0670173
Application and BACT Analysis for Particulate Matter Limit for
Mid-Kansas Electric Company, LLC
Rubart Station Gas Engines

Dear Ms Bowman:

The Prevention of Significant Deterioration (PSD) air permit (Source ID 0670173) issued to Mid-Kansas Electric Company, LLC (Mid-Kansas Electric) for Rubart Station was issued in January 2013. In September and November 2014, stack testing was performed as required in the PSD permit. The testing showed that the engines could not meet the filterable particulate matter (fPM) limit. Therefore, Mid-Kansas Electric agreed to enter into a consent agreement to effect a particulate matter limitation change in the PSD permit.

This letter includes a Best Available Control Technology (BACT) Analysis to support the appropriate emission limitation for particulate matter (PM). In addition, supporting information based on test results is also presented to further support the selection of the PM BACT.

The BACT analysis shows, and the Rubart testing data confirms, that the PM limit for the gas engines at Rubart should be 1.31 lb/hr for normal operation and 1.68 lb/hr for startup. This limitation is lower than all but one limitation identified in the accompanying BACT analysis¹. This is the same limitation as PM₁₀ and PM_{2.5}. The information available in support of these rates is discussed below.

¹ The fPM limitation for Woodland 3 equates to about 0.60 lb/hr is BACT-plus, perhaps even LAER. [Evaluate]

BACT Analysis

The original PSD air permit application included a BACT analysis specifically for PM₁₀ and PM_{2.5} and included both filterable and condensable particulate matter. A separate BACT analysis that looked only at fPM was not performed. Therefore, this BACT analysis for fPM is supplemental to the original BACT determination and is Attachment 1.

Testing Data Analysis

Attachment 2 is a statistical presentation identifying five specific issues related to Rubart Station initial compliance stack testing, which shows the following items which are each discussed in more detail:

1. The full load fPM limit of 0.25 lb/hr was not achievable
2. Test results confirm that the NAAQS impacts modelled in the permit analysis were not exceeded in operation, and thus validates the conclusion that the facility does not cause or contribute to NAAQS non-attainment for total PM₁₀/PM_{2.5}
3. Analysis of the test data validates the changes requested for the fPM BACT limit and assures that compliance with the total PM₁₀/PM_{2.5} emission limitation can be reasonably met
4. All Rubart gas engines met the total start-up compliance requirement of 1.68 lb/hr
5. Regardless, the startup testing method is not an EPA-approved method and an alternative method is further proposed for approval for subsequent testing.

Unachievable full load fPM BACT emission limitation:

The 0.25 lb/hr fPM limitation established in the PSD permit was not correctly established. During the initial testing, performed in September 2014, only one of the 12 engines conformed to this 0.25 lb/hr limitation. The appropriate compliance test method was EPA-Method 5 for three 1-hour test duration for each individual engine.

The initial test report, filed on November 17, 2014, identifies 36 individual test-run values between 0.12 and 10.2 lb/hr², which in turn yielded 3-run averages for the 12 engines between 0.25 and 6.0 lb/hr. Two of three RT02 individual runs were well above the remaining 34 and a statistical analysis of the 36 data points indicated these two results were indeed outliers in the data set³. Regardless, 10 of the remaining 11 engines did not conform to the 0.25 lb/hr fPM emission limitation. Initial speculation

²Run 2 returned filterable PM results of 10.21, and run 3 was 7.21 lb/hr. The resultant 99.5% CI was 5.99 lb/hr; accordingly both runs were statistically outside the expected values, thus outliers for all but compliance demonstration purposes.

³Not outliers for purposes of compliance demonstration, but outliers statistically in determining a range of values within which an individual test run might be expected to fall.

about the RT02 result led to some concern about the effects of perhaps excessive oil-consumption on the filterable PM results. The subsequent evaluations did not substantiate this concern, and a retest of RT02 was scheduled for mid-November.

An evaluation of other fPM test data of other new gas-fired RICE EGUs facilities for which fPM test results were publically available indicated that Rubart test results are not abnormal and a review of recent PSD permits for RICE gas engines clearly indicated the PSD fPM limitation established for Rubart was inappropriately low.

Further, reference to EPA's RACT/BACT/LAER Clearinghouse (RBLC) database and recent KDHE and other state-issued PSD permits support the conclusion that the original determination for the Rubart limitation was too low. This is discussed in the BACT analysis in Attachment 1.

Finally, a statistical review of the individual fPM test results, including the revised RT02 tests, yielded the results in Attachment 2. Using the 36 test results reported (the original RT02 tests were not included in this evaluation), the mean test run was 0.48 lb/hr and the 99.9% confidence interval expectation was 1.22 lb/hr⁴. Thus it can be reasonably predicted that the individual Rubart engines would perform in compliance with a revised fPM emission limitation as identified below.

Test results validate that the NAAQS is protected:

In addition to the too-low fPM limit that was established in the PSD permit an additional BACT-based full-load limitation for total PM₁₀/PM_{2.5} was established at 1.31 lb/hr. This individual permitted (1.31 lb/hr per engine) limitation, extended to the 24 engines permitted for the facility equates to the 32.64 lb/hr total emissions modelled for NAAQS impact. The 12-engines together emitted 6.29 lb/hr, and the 1.31 full-load BACT limitation extended for either 12 or 24 engines adequately protects the NAAQS.

Validation of a revised fPM emission limitation and its impact on total PM₁₀/PM_{2.5} compliance:

While a NAAQS for fPM is not established by EPA, the Method 5 test results for fPM (1.22 lb/hr) referenced above is but one of two components necessary to the final validation that total PM₁₀/PM_{2.5} compliance can be reasonably predicted from a suite of existing test data. The second component determination, condensable particulate matter (CPM), is made using EPA Method 202. The analysis for CPM returns a 99.9% CI value of 0.21 lb/hr for these 36 test runs.

⁴ An individual compliance test run would be expected to be greater than 1.22 lb/hr one time in a thousand.

In order to assess the probability of complying with a given total PM₁₀/PM_{2.5} permit limitation when the sum of two distinct test methods are to be used it is necessary to combine the two statistically determined CI values in some appropriate way. One “common-sense” way of combining them is to merely add the 99.9% CI values, which would, in this case, yield 1.43 lb/hr as an appropriate PSD permit limit. Another, perhaps less appropriate method, would be to perform the same analysis on the sum of the two methods results. While not statistically accurate such method would yield a value of 1.41 lb/hr. A third method is to apply the least squares fit to the results, which yield a value of 1.24 lb/hr. In this case either of these methods for the data set available would suggest that long-term compliance with the 1.31 lb/hr BACT-based limitation for total PM₁₀/PM_{2.5} is probable.

All Rubart gas engines did meet the total start-up compliance requirement of 1.68 lb/hr for total (filterable plus condensable) PM₁₀/PM_{2.5}.

The initial test report identified that RT02 and RT03 did not conform to the startup emission limitation of 1.68 lb/hr. Regardless, the total SU emissions for the 12 engines (15.42 lb/hr) would still have been far less than the extended value (32.64 lb/hr) in NAAQS emission modeling.

The initial test report, filed on November 17, 2014, identified 12 individual startup test-run values between 0.32 and 4.15 lb/hr⁵. Two of three RT02 individual full-load runs were very high and a statistical analysis of the 36 data points indicated these two results were indeed outliers in the data set³. Further RT03 startup test result (4.78 lb/hr) was above 99.5% CI value of 4.66 lb/hr and we determined to retest RT03 as well.

An analysis of the final 30-minute startup test protocol indicates a 99.9 CI value of 2.17 – too high to be valid when the total PM calculation must be less than 1.31 lb/hr. The inherent inaccuracies associated with using EPA Methods 5 and 202 for startup testing when the required isokinetic conditions cannot possibly be satisfied during the variable volumetric flow conditions over the full 30-minute test period are clearly obvious.

Regardless Attachment 2 identifies that subsequent testing on RT02 and RT03 which did yield startup test results that conform to the 1.68 lb/hr requirement. Thus all Rubart gas engines have met their initial compliance SU requirements. Further, the overall extended SU emissions were less than those modeled for protection of the NAAQS.

⁵RT03 was 4.78 lb/hr in the 30-minute SU run. The resultant 99.5% CI was 4.66 lb/hr. RT03 was retested for compliance purposes in mid-November. RT02 full-load compliance was also retested and the effect is also included in a revision of the RT02 1-hour SU compliance determination as established in the permit.

Establishing a proper startup emission test protocol:

In the specific case of Rubart, the time for the gas engines to reach full load is about 10 minutes. The testing protocol for fPM includes using a nozzle of a certain size as determined to maintain isokinetic flow during the period of the test. Nozzle selection, or the requirement to change nozzles during the test inappropriately leads to significant periods of time when isokinetic sampling just isn't possible. Such nozzle manipulation then results in a modified Method 5 procedure to utilize two different nozzles for specified periods of time. Further the 30-minute sample mass calculation must be added to an equivalent 30-minute full load determination in order to determine compliance with the limitation. The mechanics of such process is both more complex and more complicated than is necessary.

We suggest that, in as much as normal full-load gas flows (not for purposes of NO_x control, but for total PM₁₀/PM_{2.5} volumetric flow measurement) on an engine can normally be achieved in a 10-minute period, any subsequent startup testing as may be required to demonstrate compliance, be extended to a one-hour period. In such a case, isokinetic conditions would then exist for 50 of the 60 minute test period, rather than 20 of the 30 minute test period utilized in the initial compliance demonstration. Since this is a modification to the EPA-approved test methods, it requires approval by the EPA Administrator/KDHE Secretary. In this event the total PM₁₀/PM_{2.5} SU compliance calculation would hereafter be determined on the basis of the single 1-hour startup test without any dependence whatsoever on the full-load test data.

We respectfully request that the PSD permit clearly identify that the EPA-approved methods, as are currently available, are not adequate to demonstrate compliance with the SU limitation, and that the proposed 1-hour specific startup test, or an overall plant startup emissions evaluation, better serves for overall startup compliance estimation.

Please feel free to contact me at (620)277-4522 or Mary Hauner-Davis with Burns & McDonnell at 816-822-4252. Thank you for your time on our project.

Sincerely,

Signature: 
Paul E Reynolds (Jan 28, 2015)

Email: preynolds@sunflower.net

Paul Reynolds
Sr Manager, Generation Engineering/Environment

Encl. Attachments 1 and 2

c. SunflowerRecords@sunflower.net
 Russ Brichacek, KDHE
 Javier Ahumada, KDHE
 Del Kaps, Mid-Kansas Electric
 Wayne Penrod, Mid-Kansas Electric
 Mary Hauner-Davis, Burns & McDonnell

PR/cb

ATTACHMENT 1
BACT ANALYSIS FOR FILTERABLE PM

1.0 BACT FOR PARTICULATE MATTER (PM) – RICE

1.1 STEP 1. IDENTIFY POTENTIAL CONTROL STRATEGIES

PM emissions included only the filterable portion of emissions using Method 5. This differs from $PM_{10}/PM_{2.5}$ in that PM_{10} and $PM_{2.5}$ emissions include the condensable portion of PM as well as the filterable portion. Filterable PM (fPM) emissions from natural gas combustion sources consist of several components: a) inert contaminants in natural gas; b) sulfates from fuel sulfur or mercaptans used as odorants, c) dust drawn in from the ambient air, and d) particulate of carbon and hydrocarbons resulting from incomplete combustion. Therefore, units firing fuels with low ash content and high combustion efficiency exhibit correspondingly low particulate emissions.

Because of their extremely low particulate concentrations and resulting large costs per ton of particulate matter removed, post-combustion controls, such as electrostatic precipitators (ESPs) or baghouses, have not been applied to commercial gas-fired engines. In addition, no vendors of the RICE to be used for the Project have identified any similar engines that have particulate control devices. Therefore, the use of ESPs and baghouse filters are both technically infeasible and do not represent an available control technology.

In the absence of add-on controls, the most effective control method demonstrated for gas engines is the use of low ash fuel, such as natural gas, and combustion controls. This was confirmed by a survey of the RBLC database (Table A-1, Appendix A) which disclosed no add-on $PM/PM_{10}/PM_{2.5}$ control technologies for the RICE to be used for this Project.

Because proper combustion control and the firing of fuels with negligible or zero ash content (such as natural gas) are the only control methods, they are BACT for the RICE. Further control technology is not necessary or appropriate.

1.2 STEP 5. PM BACT EMISSION LIMITATION

The original BACT analysis submitted with the PSD air permit application included a table of emission limitations for similar-size RICE electrical generating units (EGUs). This was included as Table 5-4 in the application. Since these units are comparable to the engines at Rubart, a review of their PM (filterable only) emission limitations (BACT or otherwise) was performed. Table A-2, Appendix A, displays the EGUs examined in the original BACT analysis, along with other similar units that have been permitted since Rubart. The table examines both PM_{10} (filterable plus condensable (total)) and PM (filterable only) emission limitations. Review of the permits also included reviewing the test methods to determine if it was filterable only testing for PM.

The table shows that in most cases, where a separate PM (filterable only) limitation was assigned, the limit was the same as the PM₁₀ total emission limitation, which further supports a BACT determination for PM that is the equivalent to the PM₁₀/PM_{2.5} total emission limitation. In addition, in this table, only one unit had a PM limit that was lower than the proposed emission limitation for Rubart. This limit is not a BACT limit but is rather a state regulation limitation. The Woodland 3 site is located in the San Joaquin Valley Air Pollution Control District which is nonattainment for both ozone and PM_{2.5}, which is why the limit is so low for filterable PM. Rubart Station is not located in a nonattainment area and thus is not directly comparable to this limit.

1.2.1 PM BACT Emission Limitation (Normal Operation)

The use of low ash fuels and good combustion control will limit steady state PM emissions to 1.31 lb/hr. **Therefore, the BACT emission limitation for PM emissions from the RICE is 1.31 lb/hr. This limitation includes filterable PM emissions only.**

1.2.2 PM BACT Emission Limitation (Start-up)

Start-up emissions follows the same trend in permitting as normal operation, therefore, **the PM BACT emission limitation is 1.68 lb/hr on a 24-hour basis, which is consistent with the PM₁₀/PM_{2.5} start-up BACT emission limitation.**

Table 1-1 displays the BACT summary for filterable PM.

Table 1-1. Summary of PM BACT Results: RICE

Pollutant ^A	Control Technology	BACT Emission Limitation	Averaging Time
PM – Normal Operation ^B	Combustion Controls and Low Ash Fuels	1.31 lb/hr	3-hr
PM – Start-up ^C	Combustion Controls and Low Ash Fuels	1.68 lb/hr	24-hr

^APM is filterable PM only, as determined by a Method 5 or Method 201A test.

^BNormal operation when operating from 25% to 100% load, not including start-up and shutdown.

^CStart-up is defined as the time that the RICE starts combusting fuel and ends after 30 minutes.

**APPENDIX A TO BACT ANALYSIS
TABLES**

Table A-1 - RBL Results for PMPM₁₀ Emissions for RICE (Natural Gas) (In Order of Lowest to Highest Emission Limits)

RBLCID	Permit Date	Facility Name	Corporation	State	Throughput	Units	Control Device	Emission Limit 1	Units	Type
CA-1068	4/17/2001	NEO CALIFORNIA POWER, LLC	NEO CALIFORNIA POWER, LLC	CA	3870	HP		0.02	G/B-HP-H	BACT-PSD
TX-0364	1/31/2003	SALT CREEK GAS PLANT	EXXON MOBIL CORPORATION	TX	1330	HP	NONE INDICATED	0.12	LB/H	Other Case-by-Case
WV-0020	2/14/2003	COLUMBIA GAS TRANSMISSIONS LOST RIVER	COLUMBIA GAS TRANSMISSIONS LOST RIVER	WV	4640	HP		0.12	G/B-HP-H	BACT-PSD
TX-0408	11/22/2002	INDIAN ROCK GATHERING COMPANY LP	INDIAN ROCK GATHERING COMPANY LP	TX	800	HP	GOOD COMBUSTION PRACTICE	0.3	LB/H	BACT-PSD
IA-0077	6/8/2005	STATION 204	NATURAL GAS PIPELINE OF AMERICA	IA	4735	HP		0.36	LB/H	Other Case-by-Case
TX-0364	1/31/2003	SALT CREEK GAS PLANT	EXXON MOBIL CORPORATION	TX	2000	HP EACH	NONE INDICATED	0.53	LB/H	Other Case-by-Case
TX-0364	1/31/2003	SALT CREEK GAS PLANT	EXXON MOBIL CORPORATION	TX	2400	HP	NONE INDICATED	0.62	LB/H	Other Case-by-Case
WA-0289	2/22/2002	TRANSALTA CENTRALIA GENERATION LLC	TRANSALTA	WA	1448	HP		0.94	LB/H	BACT-PSD
WA-0289	2/22/2002	TRANSALTA CENTRALIA GENERATION LLC	TRANSALTA	WA	1448	HP		0.94	LB/H	BACT-PSD
TX-0364	1/31/2003	SALT CREEK GAS PLANT	EXXON MOBIL CORPORATION	TX	3105	HP	NONE INDICATED	1.09	LB/H	Other Case-by-Case
TX-0541	5/18/2009	POWER LANE STEAM PLANT	GEUS	TX	8.44	MW EACH	TCEQ EMISSION LIMITS WERE NOT VERY COMPARABLE TO THE PROCESS GEUS IS USING. SO GEUS PROPOSES THE USE OF CLEAN FUELS AND GOOD	4.5	LB/H	BACT-PSD
TX-0542	1/23/2009	PEARSALL POWER PLANT	SOUTH TEXAS ELECTRIC COOPERATIVE INC.	TX	8.44	MW EACH	TCEQ'S CURRENT BACT GUIDELINES PROVIDE NO GUIDANCE FOR PM EMISSIONS FOR THIS TYPE OF ENGINE. LOW ASH FUEL AND COMBUSTION	4.5	LB/H	BACT-PSD

Table A-2: PM10 Total and PM Filterable Emission Limitation Comparison

Plant	State	PM10 Total Emission Limitation			PM Filterable Emission Limitation			Notes
		Emission Limitation	Units	Equivalent g/hp-hr ^B	Emission Limitation	Units	Equivalent g/hp-hr ^B	
Western 102	Nevada	2.59	lb/hr	0.094	2.59	lb/hr	0.094	
Plains End 2	Colorado	0.0355	lb/MMBtu	0.102	0.0355	lb/MMBtu	0.102	PM appears to include condensables as well
Goodman	Kansas	28.4	tpy		28.4	tpy		2014 Non-PSD Permit
Humboldt	California	3.6	lb/hr	0.075	None			Natural gas limit only shown.
Pearsall	Texas	4.5	lb/hr	0.181	None			
Antelope	Texas	37	lb/hr all units combined	0.075	None			
Lea County	New Mexico	2.2	lb/hr	0.080	2.2	lb/hr	0.080	Not PSD
Woodland 3	California	1.3	lb/hr	0.052	0.02	g/bhp-hr	0.02	PM limit is state regulation, not BACT
Hutchinson	Minnesota	0.11	g/kw-hr	0.082	0.11	g/kw-hr	0.082	
Quail Brush	California	1.379	lb/hr	0.050	None			
Greenville Electric	Texas	4.5	lb/hr	0.181	None			
Lacey Randall	Kansas	2.22	lb/hr (no su/sd)	0.080	1.44	lb/hr including su/sd	0.052	PSD
Akin Energy	Illinois	1.54	lb/hr	0.056	1.54	lb/hr	0.056	
Rubart Station	Kansas	1.31	lb/hr	0.044	1.31	lb/hr (proposed)	0.044	

^A Many of these plants were not subject to PSD review. All units have CO catalysts and SCR, except for Hutchinson which does not have a CO catalyst. Note that emissions levels vary based on engine size, type and location. Engine size varies between facilities.

^B The values are originally given in different units and here converted to similar units for comparison purposes (rounded to integral values).

ATTACHMENT 2
STACK TEST STATISTICAL ANALYSIS

Attachment 2
Statistical Analysis of PM Test Results for Rubart Station RICE

Substitution notes:

Substitute 11/18/2014 RT02 retest data for 9/15/2014 startup and 3 runs

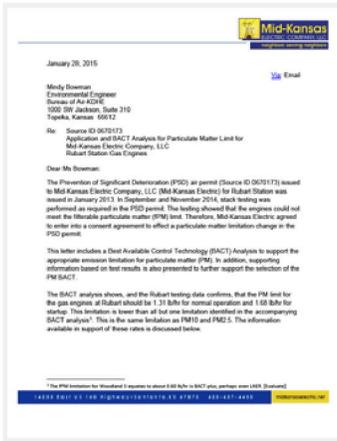
Substitute 11/19/2014 RT03 retest data for 9/18/2014 startup only

RTS fPM Compliance Test Results										
	Startup Compliance Test Results [Method 5 modified]			Full Load Compliance Test Results (lb/hr) [Method 5]				Daily Emission Profile		
	30-min Start-up test (lb/hr)	30-min Start-up (lb)	Start-up (high 1-hour) (lb/hr)	Run 1	Run 2	Run 3	Average	Total 24-hour - 3 starts/engine/day (lb/day)	Total 24-hr average (lb/hr)	
Permit Limitation							0.25			
RT01	Filterable Particulate Matter	1.19	0.60	0.76	0.35	0.32	0.31	0.33	9.14	0.38
RT02	Filterable Particulate Matter	1.86	0.93	1.21	0.51	0.49	0.69	0.56	15.47	0.64
RT03	Filterable Particulate Matter	0.76	0.38	0.82	1.48	0.67	0.51	0.89	21.09	0.88
RT04	Filterable Particulate Matter	1.3	0.65	0.90	0.49	0.54	0.48	0.50	13.28	0.55
RT05	Filterable Particulate Matter	2.54	1.27	1.50	0.39	0.58	0.42	0.46	14.24	0.59
RT06	Filterable Particulate Matter	1.42	0.71	0.89	0.38	0.40	0.30	0.36	10.23	0.43
RT07	Filterable Particulate Matter	0.64	0.32	0.45	0.12	0.27	0.36	0.25	6.59	0.27
RT08	Filterable Particulate Matter	0.92	0.46	0.70	0.39	0.41	0.62	0.48	12.18	0.51
RT09	Filterable Particulate Matter	1.31	0.66	0.97	0.49	0.75	0.64	0.62	15.92	0.66
RT10	Filterable Particulate Matter	0.19	0.10	0.29	0.60	0.26	0.31	0.39	9.06	0.38
RT11	Filterable Particulate Matter	0.59	0.30	0.47	0.32	0.31	0.39	0.34	8.54	0.36
RT12	Filterable Particulate Matter	0.99	0.50	0.80	1.01	0.42	0.41	0.61	15.29	0.64
Total			6.86	9.75				5.80	150.99	6.29
	Max	2.54			1.48					
	Min	0.19			0.12					
	Mean	1.14			0.48					
	Std. Dev.	0.33			0.238					
	85% CI UPL	1.49			0.73			1.036		
	95% CI UPL	1.69			0.88			1.645		
	99.5% CI UPL	2.00			1.10			2.576		
	99.9% CI UPL	2.17			1.22			3.090		

Attachment 2
Statistical Analysis of PM Test Results for Rubart Station RICE

RTS CPM Compliance Test Results										
	Startup Compliance Test Results [Method 202 modified]			Full Load Compliance Test Results (lb/hr) [Method 202]				Daily Emission Profile		
	30-min Start-up test (lb/hr)	30-min Start-up (lb)	Start-up (high 1-hour) (lb/hr)	Run 1	Run 2	Run 3	Average	Total 24-hour - 3 starts/engine/day (lb/day)	Total 24-hr average (lb/hr)	
RT01	Condensable Particulate Matter	0.42	0.21	0.24	0.05	0.07	0.08	0.07	2.13	0.09
RT02	Condensable Particulate Matter	0.13	0.07	0.09	0.10	0.00	0.03	0.04	1.17	0.05
RT03	Condensable Particulate Matter	0.10	0.05	0.05	0.00	0.00	0.01	0.00	0.23	0.01
RT04	Condensable Particulate Matter	0.00	0.00	0.01	0.07	0.01	0.00	0.03	0.60	0.03
RT05	Condensable Particulate Matter	0.09	0.05	0.06	0.00	0.07	0.02	0.03	0.81	0.03
RT06	Condensable Particulate Matter	0.02	0.01	0.08	0.11	0.13	0.17	0.14	3.11	0.13
RT07	Condensable Particulate Matter	0.22	0.11	0.14	0.02	0.00	0.13	0.05	1.46	0.06
RT08	Condensable Particulate Matter	0.21	0.11	0.12	0.00	0.08	0.00	0.03	0.92	0.04
RT09	Condensable Particulate Matter	0.02	0.01	0.02	0.00	0.00	0.03	0.01	0.26	0.01
RT10	Condensable Particulate Matter	0.00	0.00	0.03	0.00	0.19	0.00	0.06	1.43	0.06
RT11	Condensable Particulate Matter	0.00	0.00	0.02	0.07	0.03	0.01	0.04	0.83	0.03
RT12	Condensable Particulate Matter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total			0.61	0.85				0.49	12.92	0.54
	Max	0.42			0.19					
	Min	0.00			0.00					
	Mean	0.10			0.04					
	Std. Dev.	0.13			0.053					
	85% CI UPL	0.23			0.10			CI Factors	1.036	
	95% CI UPL	0.31			0.13				1.645	
	99.5% CI UPL	0.43			0.18				2.576	
	99.9% CI UPL	0.50			0.21				3.090	

RTS Total PM Compliance Test Results with Statistical Summary										
	Startup Compliance Test Results [Methods 5, 202 modified]			Full Load Compliance Test Results (lb/hr) [Methods 5, 202]				Daily Emission Profile		
	30-min Start-up test (lb/hr)	30-min Start-up (lb)	Start-up (high 1-hour) (lb/hr)	Run 1	Run 2	Run 3	Average	Total 24-hour - 3 starts/engine/day (lb/day)	Total 24-hr average (lb/hr)	
	Permit Limitation		1.68				1.31			
RT01	Total Particulate Matter	1.62	0.81	1.01	0.40	0.38	0.39	0.39	11.21	0.47
RT02	Total Particulate Matter	1.99	1.00	1.30	0.61	0.49	0.72	0.61	16.64	0.69
RT03	Total Particulate Matter	0.86	0.43	0.88	1.48	0.67	0.52	0.89	21.32	0.89
RT04	Total Particulate Matter	1.30	0.65	0.91	0.56	0.55	0.48	0.53	13.84	0.58
RT05	Total Particulate Matter	2.63	1.32	1.56	0.39	0.64	0.44	0.49	14.97	0.62
RT06	Total Particulate Matter	1.44	0.72	0.97	0.49	0.53	0.48	0.50	13.41	0.56
RT07	Total Particulate Matter	0.86	0.43	0.58	0.14	0.27	0.5	0.30	8.12	0.34
RT08	Total Particulate Matter	1.13	0.57	0.82	0.39	0.50	0.62	0.50	13.02	0.54
RT09	Total Particulate Matter	1.33	0.67	0.98	0.49	0.75	0.67	0.64	16.32	0.68
RT10	Total Particulate Matter	0.19	0.10	0.32	0.60	0.45	0.31	0.45	10.49	0.44
RT11	Total Particulate Matter	0.59	0.30	0.48	0.39	0.34	0.39	0.37	9.29	0.39
RT12	Total Particulate Matter	0.99	0.50	0.80	1.01	0.42	0.41	0.61	15.29	0.64
Total			7.47	10.61				6.29	163.88	6.83
	NAAQS Modeled Emission Rate/engine			1.36					32.64	
	NAAQS Modeled Emission Rate - 12 engines			16.32					391.68	
	NAAQS Modeled Emission Rate - 24 engines			32.64					783.36	



150128 RTS Application and BACT Analysis

EchoSign Document History

January 28, 2015

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By:	Carol Blackburn (cblackburn@sunflower.net)
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February 10, 2015

Via: FedEx #

Mindy Bowman
Kansas Department of Health and Environment
Bureau of Air and Radiation
1000 SW Jackson, Suite 310
Topeka, Kansas 66612-1366

RECEIVED

FEB 11 2015

BUREAU OF AIR

Re: Source ID 0670173 PSD Permit Modification

Dear Mindy Bowman:

A Prevention of Significant Deterioration (PSD) air construction permit modification associated with the new electrical generating facility is being submitted by Mid-Kansas Electric Company (Mid-Kansas). The \$1500 permit application fee for the Rubart Station Source ID 0670173 permit modification is attached with this letter.

Mid-Kansas appreciates the input and efforts to date by your office to help expedite the permit modification. If we can be of any assistance to facilitate your staff's efforts, please do not hesitate to contact us.

Sincerely,

Del E. Kaps
Air Quality Supervisor
Phone: 620-277-4518

Encl.

c. SunflowerRecords@sunflower.net
Paul Reynolds

DEK/DEK