

From: Kathy McDonnell [mailto:kathymcdonnell@comcast.net]
Sent: Tuesday, February 11, 2014 2:19 PM
To: Gary Crane
Cc: martha hyder
Subject: Bowie - Turbine Shutdown Emissions

Gary – Wayne made a great catch on the shutdown emissions problems.

As we discussed, there were actually two related problems. The first is that I included an outdated reference sheet for the turbine NO_x and CO shutdown emissions, and the second is that I indicated on the spreadsheet that the NO_x and CO shutdown emissions were uncontrolled values when they were actually controlled values.

I reviewed the emissions workbook and the application and the only things that change with the shutdown emissions corrections are:

- 1) The turbine NO_x and CO uncontrolled shutdown emissions go up. We stated on the “Turbine Shutdown Emissions” spreadsheet that we conservatively assumed that shutdown emissions were not controlled. That statement was not correct for NO_x and CO as we actually used the controlled emissions in the modeling and BACT analyses. Because we used controlled emissions, correction of the uncontrolled emissions does not necessitate revision of the numbers for those analyses, but does require removal of the statement that we used uncontrolled shutdown emissions from the spreadsheet.
- 2) The facility-wide uncontrolled NO_x and CO emissions go up. Those emissions were not used in any analyses.

I’ve attached the correct reference document from Kiewit for the turbine NO_x and CO shutdown emissions. Note that Kiewit did not provide controlled shutdown VOC emissions. Those uncontrolled VOC emissions were included on a version of the sheet right before the “Turbine Shutdown Emissions” sheet in the Appendix B pdf. Again, I included an incorrect version of the reference page. I’ve attached the correct version of that reference page also.

To understand the emissions on the turbine NO_x and CO shutdown emissions reference page, it is necessary to know that there are two phases to shutdown. The first is from minimum compliance load to full speed no load. During that phase, emissions can be controlled, and Kiewit calculated controlled emissions. The second phase of shutdown is from full speed no load to flameout. Emissions cannot be controlled during that phase. GE provided Kiewit with emissions for that phase. Those emissions are not varied by temperature. The total controlled emissions are the sum of emissions from the two phases.

I corrected the shutdown spreadsheet in the attached Excel file, had it internally QA’d, and have attached it. On the shutdown spreadsheet I separated the top part of the spreadsheet into uncontrolled and controlled portions and calculated uncontrolled annual emissions. The uncontrolled NO_x and CO emissions from the “Turbine Shutdown Emissions” spreadsheet are now reflected on the “Combined Turbine and Duct Burner Annual Emissions” spreadsheet and the “Annual Criteria Pollutant Emissions Summary – Uncontrolled” spreadsheet.

Wayne is probably the only other person besides me who really understands all of the emission numbers in the workbook, and he had to sort things out the hard way. I think it's easier to put the numbers and calculations in than to do what Wayne has done.

Please let me know if you have any questions about the turbine shutdown emissions or anything else in the emissions workbook or application.

Kathy McDonnell
Wind River Environmental Group LLC
(303) 987-2557

Ambient Temperature (F)	Revised 6-15-13														
	10			59			102			10	59	102			
	Cold Start	Warm Start	Hot Start	Cold Start	Warm Start	Hot Start	Cold Start	Warm Start	Hot Start	Shutdown					
Definition of Start Type	>72 hr	8 to 72 hr	<8 hr	>72 hr	8 to 72 hr	<8 hr	>72 hr	8 to 72 hr	<8 hr	8 to 72 hr	<8 hr	N/A	N/A	N/A	
Definition of End of Event	Stack Emissions Compliance			Stack Emissions Compliance			Stack Emissions Compliance			Stack Emissions Compliance			Flameout		
Duration, minutes	60	60	30	60	60	30	60	60	30	60	60	30			
Total NO _x Emissions, lb/event	78.91	78.91	50.66	69.86	69.86	43.54	71.03	71.03	46.41	71.03	71.03	46.41			
Total CO Emissions, lb/event	145.03	145.03	131.14	134.46	134.46	121.66	132.03	132.03	120.14	132.03	132.03	120.14			
Total VOCs Emissions, lb/event	10.12	10.12	8.78	9.63	9.63	8.38	9.21	9.21	8.03	9.21	9.21	8.03	6.43	5.94	5.68