From:	Blackburn, Terrie A.
To:	Wilson, Aimee
Cc:	Blackburn, Terrie A.
Subject:	RE: (External) ONEOK Frac 3 and 4
Date:	Thursday, April 03, 2014 10:45:13 AM
Attachments:	2014-04 Frac and EP Splitter - Frac-3 and Frac-4.pdf

Aimee,

Attached are updated GHG application pages. The only change made to these pages was to increase the number of significant figures printed in the N2O calculations.
This effectively removes the rounding that was previously represented.

Please let me know if you have additional questions.

T**errie Blackburn**
ESH Regulatory Compliance | ONEOK Partners, NGL | (918) 561-8052 office | (918) 237-5239 cell

From: Blackburn, Terrie A.
Sent: Wednesday, March 19, 2014 4:13 PM
To: Wilson, Aimee
Subject: RE: (External) ONEOK Frac 3 and 4

Aimee,
See response from WAID;
The emissions from the process vent contribution to the heaters are not already included in the heater emissions. The combined total would be ~461,000 TPY CO_2e. We kept the totals separate in the application because the TCEQ tracks these as separate facility identification numbers, and because the compliance measurement approaches are based on flow to the heaters, which are tracked separately.
Regarding the N_2O emissions, the difference relates to rounding and the number of significant figures printed on the page. Where a rounded value of 0.1 is shown on the printed copy, this is rounded from an actual value of 0.135. The corresponding result in CO_2e is 40 tons per year (298*0.135 = 40.2)

Let me know if you have further questions. Terrie

T**errie Blackburn**
ESH Regulatory Compliance | ONEOK Partners, NGL | (918) 561-8052 office | (918) 237-5239 cell

From: Wilson, Aimee [mailto:Wilson.Aimee@epa.gov]
Sent: Wednesday, March 19, 2014 1:24 PM
To: Blackburn, Terrie A.
Subject: RE: (External) ONEOK Frac 3 and 4

Terrie,

Are the emissions from the process vents to the heaters (30,000 TPY CO e) already included in the

heater emissions of 430,651 TPY CO_2e? Also – The N_2O emissions do not add up on the heaters. Each has 0.1 TPY N_2O, but the CO_2e from N_2O is shown to be 40 TPY, but I get 30 (298*0.1=29.8).

Thanks,
Aimee

From: Blackburn, Terrie A. [mailto:Terrie.Blackburn@oneok.com]
Sent: Monday, March 03, 2014 2:14 PM
To: Wilson, Aimee
Cc: Blackburn, Terrie A.
Subject: RE: (External) ONEOK Frac 3 and 4

Aimee,

I spoke with WAID regarding your questions and below is our response:

- Are there any technical issues why CCS cannot be utilized on the Hot Oil Heaters? What is the exact CO_2 concentration of the exhaust gas? Would there be issues with back pressure or any other safety or process design limitations?

The hot oil heaters for this project are predicted to have a CO_2 exhaust gas concentration of only 8.4 mole percent (wet basis). By contrast, the concentrations of CO_2 in streams for which EPA determined in its recently proposed Electric Utility GHG NSPS are technically feasible and economical are on the order of 30-32% for coal-fired, IGCC utility boilers. The streams in this project are 4 times more dilute. From 79 FR 1436: "In fact, CCS technology has primarily been applied to gas streams that have a relatively high to very high concentration of CO_2 (such as that from a coal combustion or coal gasification unit). The concentration of CO_2 in the flue gas stream of a coal combustion unit is normally about four times higher than the concentration of CO_2 in a natural gas-fired unit."

As with any add-on processing system, back pressure would be a concern with CCS. The fundamental design of the process heaters would have to be changed to accommodate the back pressure and integrate the necessary process safety systems, at significant cost to the project.

- Why can the BACT limit for the hot oil heaters not be met when firing process vent gas? I'm worried this is an issue Sierra Club would comment on. Can ONEOK meet the heater BACT limit at all times on either a 365-day rolling average or a 12-month rolling average?

Consistent with the terms of issued Permit No. PSD-TX-106921-GHG, the proposed BACT limit for the hot oil heaters in this application includes emissions from combustion of natural gas and recovered flare gas in the hot oil heater burners. We separated GHG emissions from the process vent streams (treater vents) consistent with EPA's direction to provide a BACT limit for comparison

to other NGL fractionation permit applications. It is our understanding that other permit applicants propose to combust treater vent streams in thermal oxidizers. Our proposed GHG emission limit is structured to provide a benchmark on the same basis as those of other applications. Given the differences in how NGL plants are designed, we do not think it would be appropriate to combine the vent gas control aspect of the emission limit with the fuel gas/recovered gas combustion aspect.

If you have additional question, please let me know.

Regards, Terrie

T**errie Blackburn**
ESH Regulatory Compliance | ONEOK Partners, NGL | (918) 561-8052 office | (918) 237-5239 cell

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From: Wilson, Aimee [mailto:Wilson.Aimee@epa.gov]
Sent: Friday, February 28, 2014 8:53 AM
To: Blackburn, Terrie A.
Subject: (External) ONEOK Frac 3 and 4

Terrie,

I am reviewing the draft permit and SOB for the ONEOK Frac 3 and 4 GHG PSD Permit. I have a few questions.

- Are there any technical issues why CCS cannot be utilized on the Hot Oil Heaters? What is the exact CO_2 concentration of the exhaust gas? Would there be issues with back pressure or any other safety or process design limitations?
- Why can the BACT limit for the hot oil heaters not be met when firing process vent gas? I'm worried this is an issue Sierra Club would comment on. Can ONEOK meet the heater BACT limit at all times on either a 365-day rolling average or a 12-month rolling average?

Thanks,
Aimee

Hot Oil Heater 7

EPN: **H-07**
FIN: **H-07**

Annual Average Duty:	140	MM Btu/hr (HHV)
Maximum Duty:	154	MM Btu/hr (24-hr average, HHV)
Hours of Operation:	8760	hr/yr
Fuel Heating Value:	1000	Btu/scf (HHV basis, natural gas average)

Pollutant	Assumed MW	Emission Factor				Emissions		GWP	CO2e	
		lb/MM scf	lb/MM Btu	ppmvd @ 3% O2	Source	lb/hr	(ton/yr)		lb/hr	(ton/yr)
CH4			0.00220		40 CFR 98 Subpart C, Table C-2	0.3	1.4	25.00	9	35
CO2			116.9		40 CFR 98 Subpart C, Table C-1	18,000	71,700	1.00	18,000	71,700
N2O			0.00022		40 CFR 98 Subpart C, Table C-2	0.034	0.135	298.00	10	40
								Total CO2e	18,019	71,775

Notes
1. lb/hr Emissions = Maximum Duty * Emission Factor
2. ton/yr Emissions = Annual Average Duty * Annual Operating Hours* Emission Factor / 2000

Hot Oil Heater 8

EPN: **H-08**
FIN: **H-08**

Annual Average Duty:	140	MM Btu/hr (HHV)
Maximum Duty:	154	MM Btu/hr (24-hr average, HHV)
Hours of Operation:	8760	hr/yr
Fuel Heating Value:	1000	Btu/scf (HHV basis, natural gas average)

Pollutant	Assumed MW	Emission Factor				Emissions		GWP	CO2e	
		lb/MM scf	lb/MM Btu	ppmvd @ 3% O2	Source	lb/hr	(ton/yr)		lb/hr	(ton/yr)
CH4			0.00220		40 CFR 98 Subpart C, Table C-2	0.3	1.4	25.00	9	35
CO2			116.9		40 CFR 98 Subpart C, Table C-1	18,000	71,700	1.00	18,000	71,700
N2O			0.00022		40 CFR 98 Subpart C, Table C-2	0.034	0.135	298.00	10	40
								Total CO2e	18,019	71,775

Notes
1. lb/hr Emissions = Maximum Duty * Emission Factor
2. ton/yr Emissions = Annual Average Duty * Annual Operating Hours* Emission Factor / 2000

Hot Oil Heater 9

EPN: **H-09**
FIN: **H-09**

Annual Average Duty:	140	MM Btu/hr (HHV)	
Maximum Duty:	154	MM Btu/hr (24-hr average, HHV)	
Hours of Operation:	8760	hr/yr	
Fuel Heating Value:	1000	Btu/scf	(HHV basis, natural gas average)

Pollutant	Assumed MW	Emission Factor				Emissions		GWP	CO2e	
		lb/MM scf	lb/MM Btu	ppmvd @ 3% O2	Source	lb/hr	(ton/yr)		lb/hr	(ton/yr)
CH4			0.00220		40 CFR 98 Subpart C, Table C-2	0.3	1.4	25.00	9	35
CO2			116.9		40 CFR 98 Subpart C, Table C-1	18,000	71,700	1.00	18,000	71,700
N2O			0.00022		40 CFR 98 Subpart C, Table C-2	0.034	0.135	298.00	10	40
								Total CO2e	18,019	71,775

Notes
1. lb/hr Emissions = Maximum Duty * Emission Factor
2. ton/yr Emissions = Annual Average Duty * Annual Operating Hours* Emission Factor / 2000

Hot Oil Heater 10

EPN: **H-10**
FIN: **H-10**

Annual Average Duty:	140	MM Btu/hr (HHV)
Maximum Duty:	154	MM Btu/hr (24-hr average, HHV)
Hours of Operation:	8760	hr/yr
Fuel Heating Value:	1000	Btu/scf (HHV basis, natural gas average)

Pollutant	Assumed MW	Emission Factor				Emissions		GWP	CO2e	
		lb/MM scf	lb/MM Btu	ppmvd @ 3% O2	Source	lb/hr	(ton/yr)		lb/hr	(ton/yr)
CH4			0.00220		40 CFR 98 Subpart C, Table C-2	0.3	1.4	25.00	9	35
CO2			116.9		40 CFR 98 Subpart C, Table C-1	18,000	71,700	1.00	18,000	71,700
N2O			0.00022		40 CFR 98 Subpart C, Table C-2	0.034	0.135	298.00	10	40
								Total CO2e	18,019	71,775

Notes
1. lb/hr Emissions = Maximum Duty * Emission Factor
2. ton/yr Emissions = Annual Average Duty * Annual Operating Hours* Emission Factor / 2000

Hot Oil Heater 11

EPN: **H-11**
FIN: **H-11**

Annual Average Duty:	140	MM Btu/hr (HHV)
Maximum Duty:	154	MM Btu/hr (24-hr average, HHV)
Hours of Operation:	8760	hr/yr
Fuel Heating Value:	1000	Btu/scf (HHV basis, natural gas average)

Pollutant	Assumed MW	Emission Factor				Emissions		GWP	CO2e	
		lb/MM scf	lb/MM Btu	ppmvd @ 3% O2	Source	lb/hr	(ton/yr)		lb/hr	(ton/yr)
CH4			0.00220		40 CFR 98 Subpart C, Table C-2	0.3	1.4	25.00	9	35
CO2			116.9		40 CFR 98 Subpart C, Table C-1	18,000	71,700	1.00	18,000	71,700
N2O			0.00022		40 CFR 98 Subpart C, Table C-2	0.034	0.135	298.00	10	40
								Total CO2e	18,019	71,775

Notes
1. lb/hr Emissions = Maximum Duty * Emission Factor
2. ton/yr Emissions = Annual Average Duty * Annual Operating Hours* Emission Factor / 2000

Hot Oil Heater 12

EPN: **H-12**
FIN: **H-12**

Annual Average Duty:	140	MM Btu/hr (HHV)
Maximum Duty:	154	MM Btu/hr (24-hr average, HHV)
Hours of Operation:	8760	hr/yr
Fuel Heating Value:	1000	Btu/scf (HHV basis, natural gas average)

Pollutant	Assumed MW	Emission Factor				Emissions		GWP	CO2e	
		lb/MM scf	lb/MM Btu	ppmvd @ 3% O2	Source	lb/hr	(ton/yr)		lb/hr	(ton/yr)
CH4			0.00220		40 CFR 98 Subpart C, Table C-2	0.3	1.4	25.00	9	35
CO2			116.9		40 CFR 98 Subpart C, Table C-1	18,000	71,700	1.00	18,000	71,700
N2O			0.00022		40 CFR 98 Subpart C, Table C-2	0.034	0.135	298.00	10	40
								Total CO2e	18,019	71,775

Notes
1. lb/hr Emissions = Maximum Duty * Emission Factor
2. ton/yr Emissions = Annual Average Duty * Annual Operating Hours* Emission Factor / 2000