Smith, Claudia

From: Brad Rogers <bradr@samson.com>
Sent: Thursday, February 20, 2014 9:31 AM
To: Smith, Claudia
Cc: Paser, Kathleen; Wortman, Eric; Jarrell, Brenda
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications
Attachments: Response to EPA info Request - Samson Resources Jaques and South Ignacio - Feb 2014.pdf

Hi Claudia,

Please find attached the additional information that your department has requested for Samson's Jaques and S. Ignacio faciliites. IF you need additional information, please do not hesitate to contact me. You should receive the original hardcopy by FEDEX tomorrow. Thank you.

Regards,

Brad M. Rogers
Sr. Environmental Specialist
Samson Resources
370 17th Street, Suite 3000
Denver, CO 80202
(o) 720.239.4406
(c) 303.229.1228
bradr@samson.com

Samson Resources

From: Smith, Claudia [mailto:Smith.Claudia@epa.gov]
Sent: Tuesday, February 04, 2014 2:42 PM
To: Brad Rogers
Cc: Paser, Kathleen; Wortman, Eric; Jarrell, Brenda
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

Samson Resources

PO Box 9
Bayfield, CO 81122
USA
970/884-5085
Fax 970/563-4296

February 19, 2014

Ms. Claudia Smith
US EPA Region 8 Air Program
1595 Wynkoop Street
Mail Code 8P-AR
Denver, CO 80202

Re: Additional Information Request
Jaques Compressor Station (V-SU-0043-06.02)
South Ignacio Central Delivery Point (V-SU-0031-08.00)
Samson Resources Company

Dear Ms Smith:

The Samson Resources Company (Samson) is herein submitting the additional information requested for the synthetic minor permit applications for the Jaques Compressor Station and South Ignacio Central Delivery Point. The facilities are located in Section 26, Township 33 North, Range 8 West, and Section 32, Township 33 North, Range 7 West in La Plata County, Colorado.

Greenhouse Gas (GHG) Emissions
Greenhouse gas emission estimates and sample calculations were included as the final section of the application for both the Jaques Compressor Station and South Ignacio Central Delivery Point. These sections are attached to this letter.

South Ignacio Emission Limits
Samson would like to maintain the same emission limits for the engines as those in the Part 71 Operating Permit. Samson would like to keep the existing CO emission limits for all of the engines and the NO_X emission limit for E1. The engine emissions presented in the application for the South Ignacio Central Delivery Point matched the permitted values and the potential to emit of each engine was calculated based on the controlled values. The original application contains these calculations and emission limits.

Jaques Dehydration Units
The backup TEG dehydration unit, D3, was not included in the application for the Jaques Compressor Station because this unit is no longer needed or operational. This unit has not

operated at the facility since July of 2009. The unit was disconnected from service in early of 2009. The unit was removed from the facility September 2009.

If you require any additional information please feel free to contact me at (720) 239-4406 or via email at bradr@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Brad M. Rogers
Senior Environmental Specialist

Cc: CPI

GREENHOUSE GAS EMISSIONS

Total Greenhouse Gas PTE
Samson Resources Company
Jaques Compressor Station

Source ID	Description	Green House Gases Emissions		
		CO_2	Methane	N_2O
		tpy	tpy	tpy
E1	Waukesha L5794LT	5137.13	112.45	0.01
E2	Waukesha L5794LT	5137.13	112.45	0.01
E3	Waukesha L5794LT	5137.13	112.45	0.01
E4	Waukesha L5794LT	5137.13	112.45	0.01
E5	Waukesha L5794LT	5137.13	112.45	0.01
E6	Waukesha L5794LT	5137.13	112.45	0.01
D1	0.375 MMBtu/hr Reboiler	191.59	0.00	0.00
	Glycol Process Vents	16.78	2.83	0.00
D2	1.25 MMBtu/hr Reboiler	638.63	0.01	0.00
	Glycol Process Vents	27.20	4.60	0.00
FUG	Fugitive Leaks	2.75	18.24	0.00
IEUs	Insignificant Units	1982.04	0.03	0.00
Total		33681.77	700.40	0.06
CO_2e		33681.77	14708.32	19.62

Total GHG PTE **34,382 tpy**
Total CO_2e **48,410 tpy**

Compressor Engine GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Waukesha L5794LT Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1400	hp
Operating Hours	8760	hours/year
Fuel Consuption	7155	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,171	5,128	1.41	6.19	241.14	2.41	3.24	0.08	5,137.13	40 CFR Part 98, Subpart C, Table C-1
Methane	1.250	12.521	54.843	9.37	41.06	1598.55	15.99	21.48	0.56	112.45	AP-42 Table 3.2-2
N_2O	0.0002	0.002	0.010	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Glycol Dehydration Process Vents GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Unit	Dehydration Units D1 & D2	
D1 Annual Throughput	18	MMscfd
D2 Annual Throughput	30	MMscfd
Hours of Operation	8760	hrs

Emissions Based on GLYCalc 3.0 Model

D1 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	3.83	16.78	3.83	16.78
Methane	0.647	2.83	0.647	2.83
N_2O	0.0	0	0.0	0.0

D2 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	6.21	27.20	6.21	27.20
Methane	1.05	4.60	1.05	4.60
N_2O	0.0	0	0.0	0.0

Natural Gas Fired Burner GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Dehydration Unit Reboilers
Hours of Operation	8760 hrs
D1 Rating	0.375 MMBtu/hr
D2 Rating	1.25 MMBtu/hr

D1 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D1 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	43.74	191.59	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

D2 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D2 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	145.81	638.63	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.003	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

Fugitive GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Fugitive Emissions
CO_2	12.881 wt%
CH_4	85.392 wt%

Emissions Estimate

Component	Count	Emission Factor (kg/component-hr)	CO2		Methane	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)
Flanges	40	3.90E-04	0.00	0.02	0.03	0.13
Valves	258	4.50E-03	0.33	1.44	2.18	9.56
Connectors	86	2.00E-04	0.00	0.02	0.03	0.14
Press Relief	0	2.00E-03	0.00	0.00	0.00	0.00
Pump Seals	0	2.40E-03	0.00	0.00	0.00	0.00
Other	116	8.80E-03	0.29	1.27	1.92	8.41
Total			**0.63**	**2.75**	**4.17**	**18.24**

Emission factors obtained from the 1995 Protocol for Equipment Leak Emission Estimates Document EPA-453/R-95-017 Table 2-4: Oil and Gas Production

IEU GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor Source
CO_2	53.0200	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	40 CFR Part 98, Subpart C, Table C-2

Heaters and Burners <100 MMBtu/hr

Unit ID	Description	Heater Size	CO_2		Methane		N_2O	
		(MMBtu/hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU7	Regenerator Heaters	0.60	69.99	306.54	0.00	0.01	0.000	0.00
	Regenerator Heaters	0.60	69.99	306.54	0.00	0.01	0.000	0.00
IEU8	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
IEU13	Slug Catcher Burner	0.125	14.58	63.86	0.00	0.00	0.000	0.00
	Slug Catcher Burner	0.125	14.58	63.86	0.00	0.00	0.000	0.00
IEU15	Production Unit Burner	0.50	58.32	255.45	0.00	0.00	0.000	0.00
Heater/Burner Total				**1731.95**		**0.03**		**0.00**

Pump Engines

Unit ID	Description	Rating	CO_2		Methane		N_2O	
		(hp)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU9	Ford 460 Pump Engine	34	35.30	154.60	0.00	0.00	0.00	0.00
IEU12	Ford Pump Engine	21	21.80	95.49	0.00	0.00	0.00	0.00
Pump Engine Total				**250.09**		**0.00**		**0.00**

IEU Total				**1982.04**		**0.03**		**0.00**

Example GHG Emission Calculations
Jaques Compressor Station

Cylinder Rod Packing Vents

$$\frac{60\ scf}{hr * cylinder} * \frac{4\ cylinder}{compressor} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} = 1.41\ \frac{lb\ CO_2}{hr}$$

$$1.41\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 2.41\ tpy\ CO_2$$

$$\frac{60\ scf}{hr * cylinder} * \frac{4\ cylinder}{compressor} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} = 9.37\ \frac{lb\ CH_4}{hr}$$

$$9.37\ \frac{lb\ CH_4}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 41.06\ tpy\ CH_4$$

Blowdown Emissions

$$\frac{40{,}927\ scf}{event} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} = 241.14\ \frac{lb\ CO_2}{event}$$

$$241.14\ \frac{lb\ CO_2}{event} * \frac{20\ events}{yr} * \frac{ton}{2000\ lb} = 2.41\ tpy\ CO_2$$

$$\frac{40{,}927\ scf}{event} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} = 1598.55\ \frac{lb\ CH_4}{event}$$

$$1598.55\ \frac{lb\ CH_4}{event} * \frac{20\ events}{yr} * \frac{ton}{2000\ lb} = 15.99\ tpy\ CH_4$$

Starter Emissions

$$\frac{1100\ scf}{min} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} * \frac{0.5\ min}{event} = 3.24\ \frac{lb\ CO_2}{event}$$

$$3.24\ \frac{lb\ CO_2}{event} * \frac{52\ events}{yr} * \frac{ton}{2000\ lb} = 0.08\ tpy\ CO_2$$

$$\frac{1100\ scf}{min} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} * \frac{0.5\ min}{event} = 21.48\ \frac{lb\ CH_4}{event}$$

$$21.48\ \frac{lb\ CH_4}{event} * \frac{52\ events}{yr} * \frac{ton}{2000\ lb} = 0.56\ tpy\ CH_4$$

Reboilers/Heaters/Burners

$$\frac{1.25\ MMBtu}{hr} * \frac{53.02\ kg\ CO_2}{MMBtu} * \frac{2.2\ lb\ CO_2}{kg\ CO_2} = 145.81\ \frac{lb\ CO_2}{hr}$$

$$145.81\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 638.63\ tpy\ CO_2$$

Pump Engines

$$21\ hp * \frac{8900\ Btu}{hp - hr} * \frac{MMBtu}{1{,}000{,}000\ Btu} * \frac{53.02\ kg\ CO_2}{MMBtu} * \frac{2.2\ lb\ CO_2}{kg\ CO_2} = 21.80\ \frac{lb\ CO_2}{hr}$$

$$21.80\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 95.49\ tpy\ CO_2$$

GREENHOUSE GAS EMISSIONS

Total Greenhouse Gas PTE
Samson Resources Company
South Ignacio Central Delivery Point

Source ID	Description	Green House Gases Emissions		
		CO_2	Methane	N_2O
		tpy	tpy	tpy
E1	Waukesha L7044GSI	6700.59	57.93	0.01
E2	Waukesha L7042GL	4491.21	57.90	0.01
E3	Waukesha L7042GL	4491.21	57.90	0.01
E4	Waukesha L7042GL	4735.31	57.90	0.01
E5	Waukesha L5794LT	5137.33	57.91	0.01
E6	Waukesha L5794LT	5137.33	57.91	0.01
E7	Waukesha L5794LT	5137.33	57.91	0.01
E8	Waukesha L5794LT	5137.33	57.91	0.01
D1	1.25 MMBtu/hr Reboiler	638.63	0.01	0.00
	Glycol Process Vents	85.41	3.99	0.00
D2	0.75 MMBtu/hr Reboiler	383.18	0.01	0.00
	Glycol Process Vents	96.80	4.51	0.00
FUG	Fugitive Leaks	2.83	18.38	0.00
IEUs	Insignificant Units	306.54	0.01	0.00
Total		42481.04	490.17	0.08
CO_2e		42481.04	10293.49	24.67

Total GHG PTE **42,971 tpy**
Total CO_2e **52,799 tpy**

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E1	
	Waukesha L7044GSI Compressor Engine	
Combustion	4 Stroke Rich Burn	
Rating	1680	hp
Operating Hours	8760	hours/year
Fuel Consuption	7780	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,528	6,692	1.45	6.34	246.77	2.47	3.32	0.09	6,700.59	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.026	0.114	9.41	41.21	1604.59	16.05	21.56	0.56	57.93	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.003	0.013	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E2, E3	
	Waukesha L7042GL Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1267	hp
Operating Hours	8760	hours/year
Fuel Consuption	6910	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,023	4,482	1.45	6.34	246.77	2.47	3.32	0.09	4,491.21	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.018	0.077	9.41	41.21	1604.59	16.05	21.56	0.56	57.90	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.008	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E4	
	Waukesha L7042GL Compressor Engine	
Combustion	4 Stroke Lean Burn	
Rating	1336	hp
Operating Hours	8760	hours/year
Fuel Consuption	6910	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,079	4,726	1.45	6.34	246.77	2.47	3.32	0.09	4,735.31	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.018	0.081	9.41	41.21	1604.59	16.05	21.56	0.56	57.90	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.009	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Compressor Engine GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	E5, E6, E7, E8	
	Waukesha L5794LT Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1400	hp
Operating Hours	8760	hours/year
Fuel Consuption	7155	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,171	5,128	1.45	6.34	246.77	2.47	3.32	0.09	5,137.33	40 CFR Part 98, Subpart C, Table C-1
Methane	0.002	0.020	0.088	9.41	41.21	1604.59	16.05	21.56	0.56	57.91	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0002	0.002	0.010	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Natural Gas Fired Burner GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	Dehydration Unit Reboilers
Hours of Operation	8760 hrs
D1 Rating	1.25 MMBtu/hr
D2 Rating	0.75 MMBtu/hr

D1 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D1 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	145.81	638.63	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.00	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

D2 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D2 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	87.48	383.18	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.002	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

Glycol Dehydration Process Vents GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Unit	Dehydration Units D1 & D2	
D1 Annual Throughput	30	MMscfd
D2 Annual Throughput	40	MMscfd
Hours of Operation	8760	hrs

Emissions Based on GLYCalc 3.0 Model

D1 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	19.5	85.41	19.5	85.41
Methane	0.911	3.99	0.911	3.99
N_2O	0.0	0	0.0	0.0

D2 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	22.1	96.80	22.1	96.80
Methane	1.03	4.51	1.03	4.51
N_2O	0.0	0	0.0	0.0

Fugitive GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Basis

Units	Fugitive Emissions
CO_2	13.232 wt%
CH_4	86.038 wt%

Emissions Estimate

Component	Count	Emission Factor (kg/component-hr)	CO2		Methane	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)
Flanges	40	3.90E-04	0.00	0.02	0.03	0.13
Valves	258	4.50E-03	0.34	1.48	2.20	9.64
Connectors	86	2.00E-04	0.01	0.02	0.03	0.14
Press Relief	0	2.00E-03	0.00	0.00	0.00	0.00
Pump Seals	0	2.40E-03	0.00	0.00	0.00	0.00
Other	116	8.80E-03	0.30	1.30	1.93	8.47
Total			**0.65**	**2.83**	**4.20**	**18.38**

Emission factors obtained from the 1995 Protocol for Equipment Leak Emission Estimates Document EPA-453/R-95-017 Table 2-4: Oil and Gas Production

IEU GHG Emission Estimate
Samson Resources Company
South Ignacio Central Delivery Point

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor Source
CO_2	53.0200	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	40 CFR Part 98, Subpart C, Table C-2

Heaters and Burners <100 MMBtu/hr

Unit ID	Description	Heater Size (MMBtu/hr)	CO_2		Methane		N_2O	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU7	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
Heater/Burner Total				**306.54**		**0.01**		**0.00**

Smith, Claudia

From: Smith, Claudia
Sent: Tuesday, February 04, 2014 2:42 PM
To: 'Brad Rogers'
Cc: Paser, Kathleen; Wortman, Eric; 'Jarrell, Brenda'
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

We have still not received a response from you or anyone else at Samson regarding the questions we had on the Jaques and S. Ignacio SMNSR Part 71 transfer permit applications. If we do not hear from you by **Friday, February 21, 2014**, we are going to assume that you are no longer requesting these permits and will close out the files for these permit actions.

Please note that once the Southern Ute Air Quality Program issues the Part 70 permit, the Part 71 permit automatically expires and you will lose any federal, legal, and practical enforceability for the limits in the current Part 71 permits.

If you have any questions, please contact me.

Thank you,

Claudia

Claudia Young Smith
Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

****
US EPA Region 8
1595 Wynkoop Street
Mail Code 8P-AR
Denver, Colorado 80202
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From: Smith, Claudia
Sent: Friday, September 27, 2013 10:57 AM
To: Brad Rogers
Cc: Paser, Kathleen; Wortman, Eric
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Hi, Brad,

Just another friendly follow-up on the status of the requested additional information for both the Jaques and S. Ignacio SMNSR Part 71 transfer permit applications. The Southern Ute Air Quality Program has been asking us about the status of the Part 71 transfer permits. As a reminder, once the AQP issues the P70 permit the P71 permit automatically expires and you will lose enforceability on the synthetic limits established in those permits, unless we issue a synthetic minor NSR permit containing all of the enforceable limits you wish to maintain from the Part 71 permit before that time.

I will be going on maternity leave starting on October 7th, potentially sooner, so I am copying Kathleen Paser, who will be covering these permit actions while I am out.

Thanks,

Claudia

From: Smith, Claudia
Sent: Thursday, August 08, 2013 4:24 PM
To: 'Brad Rogers'
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Hi, Brad,

I am just following up on the status of the requested information for both the Jaques and S. Ignacio SMNSR permit applications.

Thanks,

Clauida

From: Brad Rogers [mailto:bradr@samson.com]
Sent: Tuesday, July 02, 2013 2:13 PM
To: Smith, Claudia
Cc: Wortman, Eric; Paser, Kathleen
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Thanks for the update Claudia. We are currently working on the information you have requested for the Jaques and will do the same for South Ignacio. I'll definitely let you know if we have any questions regarding the applications.

Thanks,

Brad M. Rogers
Sr. Environmental Specialist
Samson Resources
370 17th Street, Suite 3000
Denver, CO 80202
(o) 720.239.4406
(c) 303.229.1228
bradr@samson.com

From: Smith, Claudia [mailto:Smith.Claudia@epa.gov]
Sent: Tuesday, July 02, 2013 1:25 PM
To: Brad Rogers
Cc: Wortman, Eric; Paser, Kathleen
Subject: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

Based on my review of the South Ignacio CDP application, some of the information I previously (recently) asked for regarding the Jaques application also apply to the South Ignacio CDP application, particularly, the need for GHG calculations. I also had some additional questions on the applications

Eric Wortman originally corresponded with Scott Rose in an email dated September 13, 2011, determining the South Ignacio CDP application incomplete, asking several questions, and requesting additional information. Samson submitted a revised application in January 2012, but that application did not address all of Eric's questions/needs. At the time Katie Romero was the permit engineer assigned to the permit action. Katie is no longer employed at EPA, so if any further correspondence was made just with her, I apologize, but we have no accessible record of that and I am not sure that we could get access to her old email account very easily, if at all. I am currently the permit engineer assigned to both permits, but for safe measure in case anything happens to me, Eric Wortman and/or Kathleen Paser (both copied on this email) should be copied on all correspondence.

On to the questions/additional information needed – I am including the questions I already asked in previous correspondence, so that they are conveniently all in one place:

- **Both** the applications for Jaques Compressor Station and South Ignacio CDP will need an addendum that includes GHG calculations. Although the Tribal Minor NSR Rule does not require regulation of GHGs, when issuing synthetic minor NSR permits, we need to verify that we are not issuing a permit to a major source of GHGs.

- **South Ignacio CDP:** The engines at South Ignacio CDP currently have part 71 emission limits for CO (engine E1 also has a limit for NOx) and Samson's original and revised applications did not include requests for synthetic minor limits for those pollutants from the engines, only for total HAP and formaldehyde. I suspect you still want the enforceable CO and NO_X emission limits. If so, I will need an addendum to the application with the emission limits requested and all of the necessary supporting information for the additional limits.
- **Jaques Compressor Station:** Application has no mention of the backup TEG dehydration unit that is identified in the current Part 71 Operating Permit (#V-SU-0043-06.02). Has this unit been removed from the facility and you are no longer requesting the emission restrictions previously established in the Part 71 permit? If that dehy is still at the facility and connected and you still need limits for it, I will need an addendum to the application including the requested limits and an updated equipment list, emissions calculations, and any necessary supporting documentation.

Thanks, and if you have any questions, call me at (303) 312-6520, or email me.

Claudia Young Smith
Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

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US EPA Region 8
1595 Wynkoop Street
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From: Smith, Claudia
Sent: Wednesday, June 19, 2013 3:16 PM
To: 'bradr@samson.com'
Cc: Wortman, Eric
Subject: Question on Jaques Compressor Station SMNSR Permit Application

Brad,

I am working on drafting the proposed synthetic minor NSR permit for the Jaques Compressor Station and notice there is no mention in the November 2011 application of the backup TEG dehydration unit that is identified in the current Part 71 Operating Permit (#V-SU-0043-06.02). Has this unit been removed from

the facility and you are no longer requesting the emission restrictions previously established in the Part 71 permit?

Thank you,

Claudia Young Smith

Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

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********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

Samson Resources

SUITE 3000
370 17TH ST
DENVER CO 80202
USA
720/904-1391
Fax 720/904-1392

RECEIVED
MAR 20 2013
8P-AR

March 18, 2013

Ms. Kathleen Paser
Air and Radiation Program, 8P-AR
U.S. Environmental Protection Agency
Mail Code 8P-AR
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Like-Kind Engine Replacement
Jaques Compressor Station (V-SU-0043-06.02)
Samson Resources Company

Dear Ms. Paser:

The Samson Resources Company is herein submitting notification of a like-kind engine replacement for Unit E5 at the Jaques Compressor Station. The facility is located in the Section 26, Township 33 North, Range 8 West, in La Plata County, Colorado.

Unit E5, a 1400 hp Waukesha 5794LT lean burn reciprocating engine equipped with an oxidation catalyst with Serial Number C-15966/1 was taken out of service on February 20, 2013. The replacement engine is labeled with Serial Number C-15967/1. The replacement engine was installed and put into service on February 21, 2013.

If you have any questions regarding this replacement please feel free to contact me at 720.239.4406 or via email at bradr@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Brad M. Rogers
Senior Environmental Scientist

Cc: Jaques File

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791
Fax 918/591-1796

RECEIVED
OCT 18 2011
8P - AR

October 14, 2011

Ms. Kathleen Paser
Air and Radiation Program, 8P-AR
U.S. Environmental Protection Agency
Mail Code 8P-AR
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Like-Kind Engine Replacement
Jaques Compressor Station (V-SU-0043-06.01)
Samson Resources Company

Dear Ms. Paser:

The Samson Resources Company is herein submitting notification of a like-kind engine replacement for Unit E4 at the Jaques Compressor Station. The facility is located in Section 26, Township 33 North, Range 8 West, in La Plata County, Colorado.

Unit E4, a 1400 hp Waukesha 5794LT lean burn reciprocating engine (serial number C-15809/1) equipped with an oxidation catalyst was taken out of service on October 11, 2011. The engine was replaced with a like-kind replacement, another 1400 hp Waukesha 5794LT lean burn reciprocating engine (serial number C-16161/1) equipped with an oxidation catalyst on October 14, 2011. The replacement engine was originally manufactured in November 2005. The replacement engine will be tested for an initial performance test in the fourth quarter of 2011 as part of the regularly scheduled testing at this facility.

If you have any questions regarding this change please contact me at 918-591-1370 or at srose@samson.com.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Air Quality Specialist

Cc: Jaques Facility File

MEMO TO FILE

DATE: November 2, 2012

SUBJECT: Southern Ute Indian Reservation Natural Gas Production Facilities
National Historic Preservation Act

FROM: Victoria Parker-Christensen, EPA Region 8 Air Program

TO: Source Files:
205c AirTribal SU BP America Treating Site 6B
SMNSR-SU-000024-2011.001
FRED # 99977

205c AirTribal SU BP America Treating Site 7B
SMNSR-SU-000025-2012.001
FRED # 99976

205c AirTribal SU BP America Treating Site 8
SMNSR-SU-000026-2012.001
FRED # 99973

205c AirTribal SU BP America Miera Compressor Facility
SMNSR-SU-000039-2012.001
FRED # 99978

205c AirTribal SU BP America Salvador I/II Compressor Station
SMNSR-SU-000009-2012.001
FRED # 99974

205c AirTribal SU BP America Wolf Point Compressor Facility
SMNSR-SU-000034-2012.001
FRED # 99975

205c AirTribal SU Red Cedar Arkansas Loop & Simpson Treating Plants
SMNSR-SU-000010-2011.001
FRED # 97581

205c AirTribal SU Red Cedar Sambrito Compressor Station
SMNSR-SU-000049-2011.001
FRED # 84665

205c AirTribal SU Samson South Ignacio Central Delivery
SMNSR-SU-000031-2011.001

FRED #84627
205c AirTribal SU Samson Jacques Compressor Station
SMNSR-SU-000043-2011.001
FRED # 96630

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment with regard to such undertakings. Under the ACHP's implementing regulations at 36 C.F.R. Part 800, Section 106 consultation is generally with state and tribal historic preservation officials in the first instance, with opportunities for the ACHP to become directly involved in certain cases. An "undertaking" is "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval." 36 C.F.R. § 800.16(y).

If an undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the federal agency has no further obligations under 36 C.F.R. § 800.3(a)(1). Because this permit will authorize new construction and related activities at an existing site, this undertaking does have the potential to cause effects on historic properties.

Under the NHPA Section 106 implementing regulations, federal agencies consult with relevant historic preservation partners to determine the area of potential effect (APE) of the undertaking, to identify historic properties that may exist in that area, and to assess and address any adverse effects that may be caused on such properties by the undertaking. Specifically, 36 C.F.R. § 800.4(b)(1) of the regulations states that federal agency officials shall make a "reasonable and good faith effort" to identify historic properties.

This memorandum describes EPA's efforts to identify historic properties and assess potential effects in connection with issuing draft synthetic minor New Source Review (NSR) permits for existing oil and gas production facilities located within the exterior boundaries of the Southern Ute Indian Reservation in La Plata County, Colorado.

Region 8, Air Program Determination

The EPA has reviewed the proposed action for potential impacts on historic properties in the APE. These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. Because the EPA has determined that the federal action will have no effect, the agency is making the finding of "*No historic properties affected*" for the APE.

Area of Potential Effects (APE)

The APE for the existing facilities are the locations within the areas currently occupied by each facility.

Regulation 36 C.F.R. 800.16(d) defines "area of potential effects" - as:

> "… the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

Permit Request

The EPA has received CAA permit applications from BP America Production Company (BP), Red Cedar Gathering Company (Red Cedar), and Samson Resources Company (Samson) requesting approval to transfer enforceable emission restrictions previously established in their title V permits to synthetic minor NSR permits for existing natural gas production facilities on the Southern Ute Indian Reservation in La Plata County, Colorado. These permits are intended only to incorporate allowable and requested emission limits and provisions from the following documents:

1. Associated Part 71 Permit to Operate issued by the EPA to the applicant for the specified facility,
2. Associated application from the applicant requesting a synthetic minor NSR permit for the specified facility in accordance the requirements of the "Review of New Sources and Modifications in Indian Country; Final Rule," at 40 CFR Parts 49 and 51.

The net effect of the incorporation of these documents into a single synthetic minor NSR permit is a facility that is an area source with regard to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63, and a minor source with regard to the PSD permitting program. Approval of these actions will establish each permit as the source of the legally and practically enforceable requirements previously created in the associated Part 71 permit.

The creation of the limits in the Part 71 permits was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Upon promulgation of the minor new source review permitting program in Indian Country, this gap-filling measure is no longer needed. 40 CFR §49.153(a)(3)(iv) provides the EPA with the authority to transfer such limits to a synthetic minor NSR permit, effectively creating legally and practically enforceable requirements without the use of the Part 71 permit. These requirements would be similar to those requirements in New Source Performance Standards at 40 CFR Part 60, NESHAP at 40 CFR Part 63, and limits established in PSD permits. The following table lists the facility, associated Title V permit and location.

Applicant/Facility/Title V Permit	Location
BP America Production Company Treating Site 6B, SMNSR-SU-000024-2011.001	S5, T32N, R9W Lat. 37.0571028, Long. -107.8457361
BP America Production Company Treating Site 7B, SMNSR-SU-000025-2012.001	S3, T32N, R10W Lat. 37.0388778, Long. -107.9223722
BP America Production Company Treating Site 8, SMNSR-SU-000026-2012.001	S28, T33N, R10W Lat. 37.076025. Long. -107.9342472
BP America Production Company Miera Compressor Facility, SMNSR-SU-000039-2012.001	SE 1/4 S8, T34N, R8W Lat. 37.1988, Long. -107.739683
BP America Production Company Salvador I/II Compressor Station, SMNSR-SU-000009-2012.001	S28, T33N, R7W Lat. 37.07905247, Long. -107.6182899
BP America Production Company Wolf Point Compressor Facility, SMNSR-SU-000034-2012.001	NW¼ S16, T33N, R9W Lat. 37.10743378, Long. -107.8353513
Red Cedar Gathering Company Arkansas Loop & Simpson Treating Plants, SMNSR-SU-000010-2011.001	S1, T32N, R9W Lat. 37.052783, Long. -107.784875
Red Cedar Gathering Company Sambrito Compressor Station, SMNSR-SU-000049-2011.001	SW ¼ S3, T32N, R6W Lat. 37.043769, Long. -107.493169
Samson Resources Company Jacques Compressor Station, SMNSR-SU-000043-2011.001	NW¼ S26, T33N, R8W Lat. 37.077944, Long. -107.691
Samson Resources Company South Ignacio Central Delivery, SMNSR-SU-000031-2011.001	SE ¼ S32, T33N, R7W Lat. 37.0539167, Long. -107.6252222

Process and Construction Information

These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area.

Registered Historic Places

The National Park Service maintains an internet resource that can be used to determine whether any registered historic places are within the area of potential effect. The resource is:

1. National Register of Historic Places database, http://www.nps.gov/history/nr/research/index.htm

An additional site is available to provide additional information on these historic places. The resource is:

2. National Register of Historic Places, http://www.nationalregisterofhistoricplaces.com/
    a. County information, http://www.nationalregisterofhistoricplaces.com/ut/Uintah/state.html
    b. Historic Districts within a county, http://www.nationalregisterofhistoricplaces.com/ut/Uintah/districts.html

A search of registered historic places or districts was not undertaken because this is an administrative action with no physical changes to the existing facilities or surrounding area.

State and Tribal Consultation

To comply with our obligations under Section 106 of the NHPS, we consulted with the Colorado State Historic Preservation Officer (SHPO) and requested any information the SHPO had regarding any historic properties within the APE. The EPA sent a letter to the Colorado SHPO on November 2, 2012 requesting concurrence with our determination of "*No historic properties affected*". The Colorado SHPO concurred in writing with our determination in a letter dated November 9, 2012 and received on November 14, 2012.

We also consulted with the tribal government by sending a letter to the Tribal Chairman with cc: to the Environmental Programs Division Head and Air Quality Program Manager inviting them to consult with us and provide information concerning historic properties relating to these proposed permits and our determination of "*No historic properties affected*" for the APE. The EPA sent the letter on November 9, 2012 and is waiting for the Tribe's response.

Attachment:

Map of Facilities Located on the Southern Ute Indian Reservation
Letter to Colorado State Historic Preservation Officer dated November 2, 2012
Letter from Colorado State Historic Preservation Officer dated November 9, 2012
Letter to Chairman Newton Southern Ute Indian Tribe dated November 9, 2012

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Treating Site #8
Treating Site #6B
Treating Site #7B
Ute Compressor Station
Jaques Compressor Station
South Ignacio Central Delivery
Sambrito Compressor Station

Durango
Bayfield
Ignacio

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
City Boundary - NAVTEQ (2011);
County Boundary - U.S. Census Bureau (2010);
State Boundary - U.S. Census Bureau (2010);
Base - Microsoft Bing web service (2012).

0 1.5 3 6 9 Miles
0 3.25 6.5 13 Kilometers

Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

EPA United States Environmental Protection Agency
REGION 8
serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

N

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
City Boundary - NAVTEQ (2011);
County Boundary - U.S. Census Bureau (2010);
State Boundary - U.S. Census Bureau (2010);
Base - Microsoft Bing web service (2012).

0 1 2 4 6 Miles
0 2.25 4.5 9 Kilometers

Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

NOV 02 2012

Ref: P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Edward Nichols, President and CEO
History Colorado
1200 Broadway
Denver, CO 80203

RE: Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation

Dear Mr. Nichols:

The Environmental Protection Agency Region 8 (EPA) has received federal Clean Air Act (CAA) permit applications and is preparing draft synthetic minor New Source Review (NSR) air pollution control permits for several existing oil production facilities within the exterior boundary of the Southern Ute Indian Reservation in La Plata County, Colorado. To comply with our obligations under Section 106 of the National Historic Preservation Act and its implementing regulations at 36 C.F.R. Part 800, we are consulting with you concerning our finding as to the potential effects and we are seeking any information you may have as to whether there are any historic properties within the area of potential effects for these facilities.

The permit applications request approval to transfer previously issued CAA Part 71 permits to synthetic minor NSR permits. The synthetic minor NSR permits are intended only to incorporate allowable and requested emission limits and provisions from the associated Part 71 permit, Federal Compliance Agreement and Final Order (if applicable) and associated permit applications.

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. The proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area. A map showing the locations of the facilities is enclosed with this letter.

The following table lists the companies, facilities and locations affected by the proposed permit actions.

Company and Facility	Section, Township, Range	Latitude / Longitude
BP America Production Company		
Treating Site 6B	S5, T32N, R9W	37.0571028 / -107.8457361
Treating Site 7	S3, T32N, R10W	37.0388778 / -107.9223722
Treating Site 8	S28, T33N, R10W	37.076025 / -107.9342472
Miera Compressor Facility	SE S8, T34N, R8W	37.1988 / -107.739683
Salvador I/II Compressor Station	S28, T33N, R7W	37.07905247 / -107.6182899
Wolf Point Compressor Facility	NW S16, T33N, R9W	37.10743378 / -107.8353513
ConocoPhillips Company		
Sunnyside Compressor Station,	S9, T33N, R9W	37.1194 / -107.8372
Argenta CDP Compressor Facility,	SW, SE S4, T33N, R10W	37.1294 / -107.9372
Ute Compressor Station,	S14-15,T32N, R11W	37.0173 / -108.0201
Red Cedar Gathering Company		
Arkansas Loop & Simpson Treating Plants	S1, T32N, R9W	37.052783 / -107.784875
Sambrito Compressor Station	SW S3, T32N, R6W	37.043769 / -107.493169
Samson Resources Company		
Jacques Compressor Station	NWS26, T33N, R8W	37.077944 / -107.691
South Ignacio Central Delivery	SE S32, T33N, R7W	37.0539167 / -107.6252222

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. If you have any concerns regarding our determination, please notify me in writing within the 30 day time period described at 36 C.F.R. § 800.3(c)(4). If we haven't heard back from you within 30 days, we will assume you concur with our finding. In addition, please send any comments or information concerning historic properties within the project areas to me within 30 days, so as to ensure that we will have ample time to review them. You can reach me by phone at (303) 312-6441 or email at parker-christensen.victoria@epa.gov. Thank you for your assistance.

Sincerely,

Victoria Parker-Christensen
Environmental Engineer
Air Program

Enclosure

cc: Mark Tobias, Section 106 Compliance Manager

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Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Treating Site #8
Treating Site #6B
Treating Site #7B
Ute Compressor Station
Jaques Compressor Station
South Ignacio Central Delivery
Sambrito Compressor Station

Durango
Bayfield
Ignacio

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
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0 1.5 3 6 9 Miles
0 3.25 6.5 13 Kilometers

Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

EPA United States Environmental Protection Agency
REGION 8
serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
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Archuleta
San Juan

N

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EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

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0 2.25 4.5 9 Kilometers

Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

HISTORY Colorado

November 9, 2012

Victoria Parker-Christensen
Environmental Engineer
Air Program
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, Colorado 80202-1129

Re: Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation, La Plata County, Colorado (CHS #62996)

Dear Ms. Parker-Christensen:

Thank you for your correspondence dated November 2, 2012 (received by our office on November 6, 2012) regarding the subject project.

Following our review of the documentation provided, we concur that a finding of no historic properties affected is appropriate for the proposed undertaking pursuant to 36 CFR 800.4(d)(1). This finding assumes that "no physical changes to the existing [thirteen] facilities or surrounding areas" will result from the implementation of this program.

Please remember that the consultation process does involve other consulting parties such as local governments and Tribes, which as stipulated in 36 CFR 800.3 are required to be notified of the undertaking. Additional information provided by the local government, Tribes or other consulting parties may cause our office to re-evaluate our comments and recommendations.

Should unidentified archaeological resources be discovered in the course of the projects, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) in consultation with our office.

Thank you for the opportunity to comment. If we may be of further assistance please contact Mark Tobias, Section 106 Compliance Manager, at (303) 866-4674 or mark.tobias@state.co.us.

Sincerely,

for Edward C. Nichols
State Historic Preservation Officer
ECN/MAT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

NOV 0 9 2012

Ref: 8P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Honorable Jimmy Newton Jr., Chairman
Southern Ute Indian Tribe
P.O. Box 737
Ignacio, Colorado 84026

RE: Notice to Consult – Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation

Dear Chairman Newton:

The U.S. Environmental Protection Agency Region 8 (EPA) is initiating consultation and coordination with the Southern Ute Indian Tribe regarding potential impacts to historic, religious or cultural properties covered by section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations at 36 C.F.R. Part 800.

The EPA has received federal Clean Air Act (CAA) permit applications, as detailed in the enclosure, and is preparing draft synthetic minor New Source Review (NSR) air pollution control permits for 13 existing natural gas production facilities within the exterior boundary of the Southern Ute Indian Reservation in La Plata County, Colorado. As required by the NHPA, we are assessing whether approving the permits would cause any impacts on these properties. The EPA permit issuance process includes public notice of a draft permit, opportunity for public comment, as well as administrative and judicial review provisions. A copy of the draft permit document and technical support document will be available on the internet during the public comment period at www.epa.gov/region8/air/permitting/pubcomment.html.

The permit applications request approval to transfer previously issued CAA Part 71 permits to synthetic minor NSR permits. The synthetic minor NSR permits are intended only to incorporate allowable and requested emission limits and provisions from the associated Part 71 permit, Federal Compliance Agreement and Final Order (if applicable) and associated permit applications.

The EPA is proposing a finding of "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. The proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each

existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area. A map showing the locations of the facilities is enclosed with this letter.

We seek consultation with you concerning 1) how the Southern Ute Indian Tribe wishes us to address the NHPA consultation process, 2) the presence of historic properties within the areas of potential effects (APE) and 3) our proposed determination as to the potential effects of these proposed permit actions.

We want to ensure that we fulfill our obligations under the NHPA and that we are working with the appropriate representatives of the Tribe on air permitting matters. If a tribe does not have a federally designated Tribal Historic Preservation Officer (THPO), which is the case for the Southern Ute Indian Tribe, then federal agencies consult directly with the State Historic Preservation Officer (SHPO) concerning undertakings that may affect historic properties on tribal lands. The EPA initiated consultation with the Colorado SHPO on November 2, 2012. The enclosed letter to the Colorado SHPO describes the specific information for the facilities and seeks their concurrence with our proposed determination.

In addition, the NHPA and its implementing regulations require that the agencies consult with federally recognized tribes to ensure that tribes attaching religious or cultural significance to historic properties that may be affected by an undertaking have a reasonable opportunity to participate in the process. Therefore, please advise us as to the Tribe's preference for the process we should follow for the NHPA. Would you prefer that we communicate only with the SHPO, do you have a NHPA designated representative for the Tribe, or would you prefer that we communicate with the Tribal government as well as the SHPO and/or NHPA designated representative concerning any NHPA matters on the Reservation?

Also, to ensure that we are considering all relevant information, we would appreciate your assistance in identifying any historic properties of traditional religious or cultural importance to the Southern Ute Indian Tribe that may be located within the APE that may be directly or indirectly affected by these proposed permit actions. If the Tribe has any information concerning such properties, please contact us.

We understand that the Southern Ute Indian Tribe may not wish to divulge information about historic properties that have religious or cultural significance. The NHPA and its regulations provide a means to consider protecting information about a historic property if public disclosure might cause harm to the property, a significant invasion of privacy or impediments to traditional religious practices. We are open to working with the Tribe to seek to address any concerns that you may have regarding the sensitivity of information. If any properties are determined to be historic properties under the NHPA, the EPA would propose to consult with you on possible measures to avoid or minimize potential adverse effects.

As noted above, based on the administrative nature of the permit actions, we are proposing a finding of *"No historic properties affected"* as a result of issuing these permits. If you have any concerns regarding our determination or additional information about historic properties related to this permit, please notify me in writing within the 30 day time period described at 36 C.F.R. § 800.3(c)(4). If we haven't heard back from you within 30 days, we will assume you concur with our finding.

If you have questions or comments, please contact me directly at (303) 312-6308 or your staff can contact Victoria Parker-Christensen, Air Program, at (303) 312-6441 or parker-christensen.victoria@epa.gov. We are available to meet with you or your representatives to consult further regarding these permit actions.

Sincerely,

Howard M. Cantor, for
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

Enclosures

cc: Thomas Johnson, Southern Ute Indian Tribe, Environmental Programs Division Head
Brenda Jarrell, Southern Ute Indian Tribe, Air Quality Program Manager

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Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
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South Ignacio Central Delivery
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Durango
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Date: November 2, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

EPA United States Environmental Protection Agency
REGION 8
serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

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City Boundary
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

NOV 02 2012

Ref: P-AR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Edward Nichols, President and CEO
History Colorado
1200 Broadway
Denver, CO 80203

RE: Section 106 of the National Historic Preservation Act regarding Proposed Synthetic Minor New Source Review Permits on the Southern Ute Indian Reservation

Dear Mr. Nichols:

The Environmental Protection Agency Region 8 (EPA) has received federal Clean Air Act (CAA) permit applications and is preparing draft synthetic minor New Source Review (NSR) air pollution control permits for several existing oil production facilities within the exterior boundary of the Southern Ute Indian Reservation in La Plata County, Colorado. To comply with our obligations under Section 106 of the National Historic Preservation Act and its implementing regulations at 36 C.F.R. Part 800, we are consulting with you concerning our finding as to the potential effects and we are seeking any information you may have as to whether there are any historic properties within the area of potential effects for these facilities.

The permit applications request approval to transfer previously issued CAA Part 71 permits to synthetic minor NSR permits. The synthetic minor NSR permits are intended only to incorporate allowable and requested emission limits and provisions from the associated Part 71 permit, Federal Compliance Agreement and Final Order (if applicable) and associated permit applications.

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. The proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. This is an administrative action with no physical changes to the existing facilities or surrounding area. A map showing the locations of the facilities is enclosed with this letter.

The following table lists the companies, facilities and locations affected by the proposed permit actions.

Company and Facility	Section, Township, Range	Latitude / Longitude
BP America Production Company		
Treating Site 6B	S5, T32N, R9W	37.0571028 / -107.8457361
Treating Site 7	S3, T32N, R10W	37.0388778 / -107.9223722
Treating Site 8	S28, T33N, R10W	37.076025 / -107.9342472
Miera Compressor Facility	SE S8, T34N, R8W	37.1988 / -107.739683
Salvador I/II Compressor Station	S28, T33N, R7W	37.07905247 / -107.6182899
Wolf Point Compressor Facility	NW S16, T33N, R9W	37.10743378 / -107.8353513
ConocoPhillips Company		
Sunnyside Compressor Station,	S9, T33N, R9W	37.1194 / -107.8372
Argenta CDP Compressor Facility,	SW, SE S4, T33N, R10W	37.1294 / -107.9372
Ute Compressor Station,	S14-15,T32N, R11W	37.0173 / -108.0201
Red Cedar Gathering Company		
Arkansas Loop & Simpson Treating Plants	S1, T32N, R9W	37.052783 / -107.784875
Sambrito Compressor Station	SW S3, T32N, R6W	37.043769 / -107.493169
Samson Resources Company		
Jacques Compressor Station	NWS26, T33N, R8W	37.077944 / -107.691
South Ignacio Central Delivery	SE S32, T33N, R7W	37.0539167 / -107.6252222

The EPA has made the finding "*No historic properties affected*" for the proposed synthetic minor NSR permit actions. If you have any concerns regarding our determination, please notify me in writing within the 30 day time period described at 36 C.F.R. § 800.3(c)(4). If we haven't heard back from you within 30 days, we will assume you concur with our finding. In addition, please send any comments or information concerning historic properties within the project areas to me within 30 days, so as to ensure that we will have ample time to review them. You can reach me by phone at (303) 312-6441 or email at parker-christensen.victoria@epa.gov. Thank you for your assistance.

Sincerely,

Victoria Parker-Christensen
Environmental Engineer
Air Program

Enclosure

cc: Mark Tobias, Section 106 Compliance Manager

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Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

Miera Compressor Facility
Argenta CDP Compressor Facility
Sunnyside Compressor Station
Wolf Point Compressor Facility
Treating Site #8
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Synthetic Minor NSR PermitFacility
City Boundary
State Boundary
County Boundary

Area Enlarged

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Southern Ute Indian Reservation, Clean Air Act New Source Review (NSR) Permit Program

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EPA United States Environmental Protection Agency — REGION 8 serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

Date: November 2, 2012

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0 2.25 4.5 9 Kilometers

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City Boundary
State Boundary
County Boundary

Area Enlarged

MEMO TO FILE

DATE: November 12, 2013

SUBJECT: Southern Ute Indian Reservation Natural Gas Production Facilities
Endangered Species Act

FROM: Victoria Parker-Christensen, EPA Region 8 Air Program

TO: Source Files:
205c AirTribal SU BP America Treating Site 6B
SMNSR-SU-000024-2011.001
FRED # 99977

205c AirTribal SU BP America Treating Site 7B
SMNSR-SU-000025-2012.001
FRED # 99976

205c AirTribal SU BP America Treating Site 8
SMNSR-SU-000026-2012.001
FRED # 99973

205c AirTribal SU BP America Miera Compressor Facility
SMNSR-SU-000039-2012.001
FRED # 99978

205c AirTribal SU BP America Salvador I/II Compressor Station
SMNSR-SU-000009-2012.001
FRED # 99974

205c AirTribal SU BP America Wolf Point Compressor Facility
SMNSR-SU-000034-2012.001
FRED # 99975

205c AirTribal SU Red Cedar Arkansas Loop & Simpson Treating Plants
SMNSR-SU-000010-2011.001
FRED # 97581

205c AirTribal SU Red Cedar Sambrito Compressor Station
SMNSR-SU-000049-2011.001
FRED # 84665

205c AirTribal SU Samson South Ignacio Central Delivery
SMNSR-SU-000031-2011.001
FRED #84627

205c AirTribal SU Samson Jacques Compressor Station
SMNSR-SU-000043-2011.001
FRED # 96630

Pursuant to Section 7 of the Endangered Species Act (ESA), 16 U.S.C. §1536, and its implementing regulations at 50 CFR, part 402, the EPA is required to ensure that any action authorized, funded, or carried out by the Agency is not likely to jeopardize the continued existence of any Federally-listed endangered or threatened species or result in the destruction or adverse modification of such species' designated critical habitat. Under ESA, those agencies that authorize, fund, or carry out the federal action are commonly known as "action agencies." If an action agency determines that its federal action "may affect" listed species or critical habitat, it must consult with the U.S. Fish and Wildlife Service (FWS). If an action agency determines that the federal action will have no effect on listed species or critical habitat, the agency will make a "no effect" determination. In that case, the action agency does not initiate consultation with the FWS and its obligations under Section 7 are complete.

In complying with its duty under ESA, the EPA, as the action agency, examined the potential effects on listed species and designated critical habitat relating to issuing these Clean Air Act (CAA) synthetic minor New Source Review (NSR) permits.

Region 8 Air Program Determination

The EPA has concluded that the proposed synthetic minor NSR permit actions will have "*No effect"* on listed species or critical habitat. These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. Because the EPA has determined that the federal action will have no effect, the agency made a *"No effect"* determination, did not initiate consultation with the FWS and its obligations under Section 7 are complete.

Permit Request

The EPA has received CAA permit applications from BP America Production Company (BP), Red Cedar Gathering Company (Red Cedar), and Samson Resources Company (Samson) requesting approval to transfer enforceable emission restrictions previously established in their title V permits to synthetic minor NSR permits for existing natural gas production facilities on the Southern Ute Indian Reservation in La Plata County, Colorado. These permits are intended only to incorporate allowable and requested emission limits and provisions from the following documents:

1. Associated Part 71 Permit to Operate issued by the EPA to the applicant for the specified facility,
2. Associated application from the applicant requesting a synthetic minor NSR permit for the specified facility in accordance the requirements of the "Review of New Sources and Modifications in Indian Country; Final Rule," at 40 CFR Parts 49 and 51.

The net effect of the incorporation of these documents into a single synthetic minor NSR permit is a facility that is an area source with regard to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63, and a minor source with regard to the PSD permitting program. Approval of these actions will establish each permit as the source of the legally and practically enforceable requirements previously created in the associated Part 71 permit.

The creation of the emission limits in the Part 71 permits was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Upon promulgation of the minor new source review permitting program in Indian Country, this gap-filling measure is no longer needed. 40 CFR

§49.153(a)(3)(iv) provides the EPA with the authority to transfer such limits to a synthetic minor NSR permit, effectively creating legally and practically enforceable requirements without the use of the Part 71 permit. These requirements would be similar to those requirements in New Source Performance Standards at 40 CFR Part 60, NESHAP at 40 CFR Part 63, and limits established in PSD permits. The following table lists the facility, associated Title V permit and location.

Applicant/Facility/Title V Permit	**Location**
BP America Production Company Treating Site 6B, SMNSR-SU-000024-2011.001	S5, T32N, R9W Lat. 37.0571028, Long. -107.8457361
BP America Production Company Treating Site 7B, SMNSR-SU-000025-2012.001	S3, T32N, R10W Lat. 37.0388778, Long. -107.9223722
BP America Production Company Treating Site 8, SMNSR-SU-000026-2012.001	S28, T33N, R10W Lat. 37.076025. Long. -107.9342472
BP America Production Company Miera Compressor Facility, SMNSR-SU-000039-2012.001	SE 1/4 S8, T34N, R8W Lat. 37.1988, Long. -107.739683
BP America Production Company Salvador I/II Compressor Station, SMNSR-SU-000009-2012.001	S28, T33N, R7W Lat. 37.07905247, Long. -107.6182899
BP America Production Company Wolf Point Compressor Facility, SMNSR-SU-000034-2012.001	NW¼ S16, T33N, R9W Lat. 37.10743378, Long. -107.8353513
Red Cedar Gathering Company Arkansas Loop & Simpson Treating Plants, SMNSR-SU-000010-2011.001	S1, T32N, R9W Lat. 37.052783, Long. -107.784875
Red Cedar Gathering Company Sambrito Compressor Station, SMNSR-SU-000049-2011.001	SW ¼ S3, T32N, R6W Lat. 37.043769, Long. -107.493169
Samson Resources Company Jacques Compressor Station, SMNSR-SU-000043-2011.001	NW¼ S26, T33N, R8W Lat. 37.077944, Long. -107.691
Samson Resources Company South Ignacio Central Delivery, SMNSR-SU-000031-2011.001	SE ¼ S32, T33N, R7W Lat. 37.0539167, Long. -107.6252222

Process and Construction Information

These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times.

Threatened and Endangered Species

The EPA accessed U.S. Fish and Wildlife Service (FWS) websites for information on threatened and endangered species and designated critical habitat for those species. FWS maintains a website titled *Environmental Conservation Online System* (ECOS, http://ecos.fws.gov/ecos/indexPublic.do) that provides access to databases for threatened and endangered species that may be present within the proposed project area and designated critical habitat for threatened and endangered species.

The EPA accessed the FWS Information, Planning, and Conservation System (IPaC) database (http://ecos.fws.gov/ipac) to identify species listed as threatened and endangered that have been documented as being present in La Plata County, Colorado, and received an official species list from the FWS Western Colorado Ecological Services Field Office on November 12, 2013. Information on critical habitat is available on-line at http://criticalhabitat.fws.gov/crithab/. The following threatened or endangered species may be found in La Plata County:

Birds

Mexican Spotted owl (*Strix occidentalis lucida*)
Threatened
Final designated critical habitat

Southwestern Willow flycatcher (*Empidonax traillii extimus*)
Endangered

Yellow-Billed Cuckoo (Coccyzus americanus)
Proposed Threatened

Butterfly

Uncompahge Fritillary butterfly (*Boloria acronema*)
Endangered

Fishes

Bonytail chub (*Gila elegans*)
Endangered

Humpback chub (*Gila cypha*)
Endangered
Final designated critical habitat

Colorado pikeminnow (*Ptychocheilus lucius*)
Endangered
Final designated critical habitat

Razorback sucker (*Xyrauchen texanus*)
Endangered
Final designated critical habitat

Mammals

Black-Footed ferret (*Mustela nigripes*)
Experimental Population, Non-Essential

Canada Lynx (*Lynx canadensis*)
Threatened

New Mexican meadow jumping mouse (Zapus hudsonius luteus)
Proposed Endangered

North American Wolverine (Gulo gulo luscus)
Proposed Threatened

Plants

Knowlton's cactus (*Pediocactus knowltonii*)
Endangered

Conclusion

The EPA has concluded that the proposed synthetic minor NSR permit actions will have "*No effect"* on listed species or critical habitat. These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times. Because the EPA has determined that the federal action will have no effect, the agency will make a *"No effect"* determination. In that case, the EPA does not initiate consultation with the FWS and its obligations under Section 7 are complete.

Attachments:
Map of Facilities Located on the Southern Ute Indian Reservation and FWS Designated Critical Habitat
FWS Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WESTERN COLORADO ECOLOGICAL SERVICES FIELD OFFICE
764 HORIZON DRIVE, BUILDING B
GRAND JUNCTION, CO 81506
PHONE: (970)243-2778 FAX: (970)245-6933
URL: www.fws.gov/mountain-prairie/es/Colorado/;
www.fws.gov/platteriver/

Consultation Tracking Number: 06E24100-2014-SLI-0018 November 12, 2013
Project Name: SUIT Oil and Gas T% to SMNSR Permits

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: SUIT Oil and Gas T% to SMNSR Permits

Official Species List

Provided by:

WESTERN COLORADO ECOLOGICAL SERVICES FIELD OFFICE
764 HORIZON DRIVE, BUILDING B
GRAND JUNCTION, CO 81506
(970) 243-2778
http://www.fws.gov/mountain-prairie/es/Colorado/
http://www.fws.gov/platteriver/

Consultation Tracking Number: 06E24100-2014-SLI-0018
Project Type: Oil Or Gas
Project Description: US EPA syn minor NSR permits for previously T5 permits in La Plata County in the Soutern Ute Indian Reservation

Project Counties: La Plata, CO

Endangered Species Act Species List

Species lists are not entirely based upon the current range of a species but may also take into consideration actions that affect a species that exists in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Please contact the designated FWS office if you have questions.

Black-Footed ferret *(Mustela nigripes)*

Population: entire population, except where EXPN

Listing Status: Endangered

Bonytail chub *(Gila elegans)*

Population: Entire

Listing Status: Endangered

Canada Lynx *(Lynx canadensis)*

Population: (Contiguous U.S. DPS)

Listing Status: Threatened

Colorado pikeminnow *(Ptychocheilus lucius)*

Population: except Salt and Verde R. drainages, AZ

Listing Status: Endangered

Humpback chub *(Gila cypha)*

Population: Entire

Listing Status: Endangered

Knowlton's cactus *(Pediocactus knowltonii)*

Listing Status: Endangered

Mexican Spotted owl *(Strix occidentalis lucida)*

Population: Entire

Listing Status: Threatened

New Mexico meadow jumping mouse *(Zapus hudsonius luteus)*

Listing Status: Proposed Endangered

North American wolverine *(Gulo gulo luscus)*

Listing Status: Proposed Threatened

Razorback sucker *(Xyrauchen texanus)*

Population: Entire

Listing Status: Endangered

Schmoll milk-vetch *(Astragalus schmolliae)*

Listing Status: Candidate

Southwestern Willow flycatcher *(Empidonax traillii extimus)*

Population: Entire

Listing Status: Endangered

Critical Habitat: Final designated

Uncompahgre Fritillary butterfly *(Boloria acrocnema)*

Population: Entire

Listing Status: Endangered

Yellow-Billed Cuckoo *(Coccyzus americanus)*

Population: Western U.S. DPS

Listing Status: Proposed Threatened

Southern Ute Indian Reservation
Clean Air Act, New Source Review Permit Program

N

Disclaimer: EPA makes no claim regarding the accuracy or precision of these data. Questions concerning the data should be referred to the source agency. This map does not necessarily represent EPA's position on any Indian Country boundaries or the jurisdictional status of any specific location.

Date: October 22, 2012

Map Projection: UTM, Meters, Zone 13N,NAD83.

Data Sources:
Reservations - U.S. Census Bureau (2009);
Base - Microsoft Bing web service (2012).

EPA United States Environmental Protection Agency
REGION 8
serving the states & tribes of Colorado, Montana, Wyoming, Utah, North Dakota & South Dakota

0 3.5 7 14 21 Miles
0 5 10 20 Kilometers

- Synthetic Minor NSR Permit Applicants
- City Boundary
- Colorado Pikeminnow - FWS Critical Habitat
- Razorback Sucker- FWS Critical Habitat
- State Boundary
- County Boundary

Area Enlarged

MEMO TO FILE

DATE: October 26, 2012

SUBJECT: Southern Ute Indian Reservation Natural Gas Production Facilities
Environmental Justice

FROM: Victoria Parker-Christensen, EPA Region 8 Air Program

TO: Source Files:
205c AirTribal SU BP America Treating Site 6B
SMNSR-SU-000024-2011.001
FRED # 99977

205c AirTribal SU BP America Treating Site 7B
SMNSR-SU-000025-2012.001
FRED # 99976

205c AirTribal SU BP America Treating Site 8
SMNSR-SU-000026-2012.001
FRED # 99973

205c AirTribal SU BP America Miera Compressor Facility
SMNSR-SU-000039-2012.001
FRED # 99978

205c AirTribal SU BP America Salvador I/II Compressor Station
SMNSR-SU-000009-2012.001
FRED # 99974

205c AirTribal SU BP America Wolf Point Compressor Facility
SMNSR-SU-000034-2012.001
FRED # 99975

205c AirTribal SU Red Cedar Arkansas Loop & Simpson Treating Plants
SMNSR-SU-000010-2011.001
FRED # 97581

205c AirTribal SU Red Cedar Sambrito Compressor Station
SMNSR-SU-000049-2011.001
FRED # 84665

205c AirTribal SU Samson South Ignacio Central Delivery
SMNSR-SU-000031-2011.001
FRED #84627

205c AirTribal SU Samson Jacques Compressor Station
SMNSR-SU-000043-2011.001
FRED # 96630

On February 11, 1994, the President issued Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The Executive Order calls on each federal agency to make environmental justice a part of its mission by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations."

EPA defines "Environmental Justice" to include meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices.

On June 10, 2011, the EPA promulgated a final Clean Air Act (CAA) Federal Implementation Plan (FIP) that implements New Source Review (NSR) preconstruction air pollution control requirements in Indian country. The FIP includes two NSR rules for the protection of air quality in Indian country. One of those rules, known as the minor NSR Rule, applies to new industrial facilities or modifications at existing industrial facilities with the potential to emit (PTE) certain pollutants equal to or more than the minor NSR thresholds but less than the major NSR thresholds, generally 100 to 250 tons per year. The EPA permit issuance process includes public notice of a draft permit, opportunity for public comment, as well as administrative and judicial review provisions.

This memorandum describes EPA's efforts to identify environmental justice communities and assess potential effects in connection with issuing CAA synthetic minor NSR permits in La Plata County within the exterior boundaries of the Southern Ute Indian Reservation (SUIR).

Permit Request

The EPA has received CAA permit applications from BP America Production Company (BP), Red Cedar Gathering Company (Red Cedar), and Samson Resources Company (Samson) requesting approval to transfer enforceable emission restrictions previously established in their title V permits to synthetic minor NSR permits for existing natural gas production facilities on the Southern Ute Indian Reservation in La Plata County, Colorado. These permits are intended only to incorporate allowable and requested emission limits and provisions from the following documents:

1. Associated Part 71 Permit to Operate issued by the EPA to the applicant for the specified facility,
2. Associated application from the applicant requesting a synthetic minor NSR permit for the specified facility in accordance the requirements of the "Review of New Sources and Modifications in Indian Country; Final Rule," at 40 CFR Parts 49 and 51.

The net effect of the incorporation of these documents into a single synthetic minor NSR permit is a facility that is an area source with regard to the National Emission Standard for Hazardous Air Pollutants (NESHAP) for Source Categories at 40 CFR Part 63, and a minor source with regard to the

PSD permitting program. Approval of these actions will establish each permit as the source of the legally and practically enforceable requirements previously created in the associated Part 71 permit.

The creation of the emission limits in the Part 71 permits was a temporary, gap-filling measure for those sources operating in Indian country that did not have the ability to obtain these limits through other programs, such as exists in state jurisdictions. Upon promulgation of the minor new source review permitting program in Indian Country, this gap-filling measure is no longer needed. 40 CFR §49.153(a)(3)(iv) provides the EPA with the authority to transfer such limits to a synthetic minor NSR permit, effectively creating legally and practically enforceable requirements without the use of the Part 71 permit. These requirements would be similar to those requirements in New Source Performance Standards at 40 CFR Part 60, NESHAP at 40 CFR Part 63, and limits established in PSD permits. The following table lists the facility, associated Title V permit and location.

Applicant/Facility/Title V Permit	**Location**
BP America Production Company Treating Site 6B, SMNSR-SU-000024-2011.001	S5, T32N, R9W Lat. 37.0571028, Long. -107.8457361
BP America Production Company Treating Site 7B, SMNSR-SU-000025-2012.001	S3, T32N, R10W Lat. 37.0388778, Long. -107.9223722
BP America Production Company Treating Site 8, SMNSR-SU-000026-2012.001	S28, T33N, R10W Lat. 37.076025. Long. -107.9342472
BP America Production Company Miera Compressor Facility, SMNSR-SU-000039-2012.001	SE 1/4 S8, T34N, R8W Lat. 37.1988, Long. -107.739683
BP America Production Company Salvador I/II Compressor Station, SMNSR-SU-000009-2012.001	S28, T33N, R7W Lat. 37.07905247, Long. -107.6182899
BP America Production Company Wolf Point Compressor Facility, SMNSR-SU-000034-2012.001	NW¼ S16, T33N, R9W Lat. 37.10743378, Long. -107.8353513
Red Cedar Gathering Company Arkansas Loop & Simpson Treating Plants, SMNSR-SU-000010-2011.001	S1, T32N, R9W Lat. 37.052783, Long. -107.784875
Red Cedar Gathering Company Sambrito Compressor Station, SMNSR-SU-000049-2011.001	SW ¼ S3, T32N, R6W Lat. 37.043769, Long. -107.493169
Samson Resources Company Jacques Compressor Station, SMNSR-SU-000043-2011.001	NW¼ S26, T33N, R8W Lat. 37.077944, Long. -107.691
Samson Resources Company South Ignacio Central Delivery, SMNSR-SU-000031-2011.001	SE ¼ S32, T33N, R7W Lat. 37.0539167, Long. -107.6252222

Environmental Impacts to Potential Environmental Justice Communities

Air Emissions

These proposed permit actions do not authorize the construction of any new emission sources, or emission increases from existing units, nor do they otherwise authorize any other physical modifications to the associated facility or its operations. The emissions, approved at present, from each existing facility will not increase due to the associated permit action and the emissions will continue to be well controlled at all times.

Air Quality Review

The Federal Minor New Source Review Regulations at 40 CFR 49.154(d) require that an Air Quality Impact Assessment (AQIA) modeling analysis be performed if there is reason to be concerned that new construction would cause or contribute to a National Ambient Air Quality Standard (NAAQS) or PSD increment violation. If an AQIA reveals that the proposed construction could cause or contribute to a NAAQS or PSD increment violation, such impacts must be addressed before a pre-construction permit can be issued.

The emissions, approved at present, from these existing facilities will not be increasing due to these permit actions and the emissions will continue to be well controlled at all times. These permit actions will have no air quality impacts; therefore, the EPA has determined that an AQIA modeling analysis is not required for any of the proposed permits.

Furthermore, each permit contains a provision stating, "*The permitted source shall not cause or contribute to a NAAQS violation or, in an attainment area, shall not cause or contribute to a PSD increment violation.*" Noncompliance with this permit provision is a violation of the permit and is grounds for enforcement action and for permit termination or revocation. As a result, the EPA concludes that issuance of the aforementioned synthetic minor NSR permits will not have disproportionately high and adverse human health effects on communities in the vicinity of the SUIR.

Tribal Consultation and Public Participation

The EPA offers the Tribal Government Leaders an opportunity to consult on each proposed permit action. The Tribal Government Leaders are asked to respond to the EPA's offer to consult within 30 days and if no response is received within that time, the EPA notifies the Tribal Government Leaders that the consultation period has closed. The Chairman of the Southern Ute Tribe has been offered an opportunity to consult on this permit action via letter dated September 25, 2012. To date, the EPA has not received a response to our offer to consult on this permit action and the Chairman will be notified when the consultation period has closed.

All minor source applications (synthetic minor, modification to an existing facility, new true minor or general permit) are submitted to both the EPA and the Tribal Environmental Director per the application instructions (see http://epa.gov/region8/air/permitting/tmnsr.html). The Tribal Environmental Office has 10 business days to respond to the EPA with questions and comments on the application. In the event an

Air Quality Impact Assessment (AQIA) is triggered, a copy of that document is emailed to the tribe within 5 business days of receipt by the EPA.

Given the presence of potential environmental justice communities in the vicinity of the facilities, the EPA is providing an enhanced public participation process for this permit. Interested parties can subscribe to an EPA listserve that notifies them of public comment opportunities on the Southern Ute Indian Reservation for draft air pollution control permits via email at http://epa.gov/region8/air/permitting/pubcomment.html.

Additionally, the Tribe's Environmental Director is notified of the public comment period for the proposed permit and provided copies of the notice of public comment opportunity to post in various locations on the Reservation that they deem fit. The Tribe is also notified of the issuance of the final permit.

Smith, Claudia

From: Smith, Claudia
Sent: Tuesday, February 04, 2014 2:42 PM
To: 'Brad Rogers'
Cc: Paser, Kathleen; Wortman, Eric; 'Jarrell, Brenda'
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

We have still not received a response from you or anyone else at Samson regarding the questions we had on the Jaques and S. Ignacio SMNSR Part 71 transfer permit applications. If we do not hear from you by **Friday, February 21, 2014**, we are going to assume that you are no longer requesting these permits and will close out the files for these permit actions.

Please note that once the Southern Ute Air Quality Program issues the Part 70 permit, the Part 71 permit automatically expires and you will lose any federal, legal, and practical enforceability for the limits in the current Part 71 permits.

If you have any questions, please contact me.

Thank you,

Claudia

Claudia Young Smith
Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

****
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From: Smith, Claudia
Sent: Friday, September 27, 2013 10:57 AM
To: Brad Rogers
Cc: Paser, Kathleen; Wortman, Eric
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Hi, Brad,

Just another friendly follow-up on the status of the requested additional information for both the Jaques and S. Ignacio SMNSR Part 71 transfer permit applications. The Southern Ute Air Quality Program has been asking us about the status of the Part 71 transfer permits. As a reminder, once the AQP issues the P70 permit the P71 permit automatically expires and you will lose enforceability on the synthetic limits established in those permits, unless we issue a synthetic minor NSR permit containing all of the enforceable limits you wish to maintain from the Part 71 permit before that time.

I will be going on maternity leave starting on October 7th, potentially sooner, so I am copying Kathleen Paser, who will be covering these permit actions while I am out.

Thanks,

Claudia

From: Smith, Claudia
Sent: Thursday, August 08, 2013 4:24 PM
To: 'Brad Rogers'
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Hi, Brad,

I am just following up on the status of the requested information for both the Jaques and S. Ignacio SMNSR permit applications.

Thanks,

Clauida

From: Brad Rogers [mailto:bradr@samson.com]
Sent: Tuesday, July 02, 2013 2:13 PM
To: Smith, Claudia
Cc: Wortman, Eric; Paser, Kathleen
Subject: RE: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Thanks for the update Claudia. We are currently working on the information you have requested for the Jaques and will do the same for South Ignacio. I'll definitely let you know if we have any questions regarding the applications.

Thanks,

Brad M. Rogers
Sr. Environmental Specialist
Samson Resources
370 17th Street, Suite 3000
Denver, CO 80202
(o) 720.239.4406
(c) 303.229.1228
bradr@samson.com

From: Smith, Claudia [mailto:Smith.Claudia@epa.gov]
Sent: Tuesday, July 02, 2013 1:25 PM
To: Brad Rogers
Cc: Wortman, Eric; Paser, Kathleen
Subject: Questions on Jaques Compressor Station and South Ignacio CDP SMNSR Permit Applications

Brad,

Based on my review of the South Ignacio CDP application, some of the information I previously (recently) asked for regarding the Jaques application also apply to the South Ignacio CDP application, particularly, the need for GHG calculations. I also had some additional questions on the applications

Eric Wortman originally corresponded with Scott Rose in an email dated September 13, 2011, determining the South Ignacio CDP application incomplete, asking several questions, and requesting additional information. Samson submitted a revised application in January 2012, but that application did not address all of Eric's questions/needs. At the time Katie Romero was the permit engineer assigned to the permit action. Katie is no longer employed at EPA, so if any further correspondence was made just with her, I apologize, but we have no accessible record of that and I am not sure that we could get access to her old email account very easily, if at all. I am currently the permit engineer assigned to both permits, but for safe measure in case anything happens to me, Eric Wortman and/or Kathleen Paser (both copied on this email) should be copied on all correspondence.

On to the questions/additional information needed – I am including the questions I already asked in previous correspondence, so that they are conveniently all in one place:

- **Both** the applications for Jaques Compressor Station and South Ignacio CDP will need an addendum that includes GHG calculations. Although the Tribal Minor NSR Rule does not require regulation of GHGs, when issuing synthetic minor NSR permits, we need to verify that we are not issuing a permit to a major source of GHGs.

- **South Ignacio CDP:** The engines at South Ignacio CDP currently have part 71 emission limits for CO (engine E1 also has a limit for NOx) and Samson's original and revised applications did not include requests for synthetic minor limits for those pollutants from the engines, only for total HAP and formaldehyde. I suspect you still want the enforceable CO and NO_X emission limits. If so, I will need an addendum to the application with the emission limits requested and all of the necessary supporting information for the additional limits.
- **Jaques Compressor Station:** Application has no mention of the backup TEG dehydration unit that is identified in the current Part 71 Operating Permit (#V-SU-0043-06.02). Has this unit been removed from the facility and you are no longer requesting the emission restrictions previously established in the Part 71 permit? If that dehy is still at the facility and connected and you still need limits for it, I will need an addendum to the application including the requested limits and an updated equipment list, emissions calculations, and any necessary supporting documentation.

Thanks, and if you have any questions, call me at (303) 312-6520, or email me.

Claudia Young Smith
Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

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From: Smith, Claudia
Sent: Wednesday, June 19, 2013 3:16 PM
To: 'bradr@samson.com'
Cc: Wortman, Eric
Subject: Question on Jaques Compressor Station SMNSR Permit Application

Brad,

I am working on drafting the proposed synthetic minor NSR permit for the Jaques Compressor Station and notice there is no mention in the November 2011 application of the backup TEG dehydration unit that is identified in the current Part 71 Operating Permit (#V-SU-0043-06.02). Has this unit been removed from

the facility and you are no longer requesting the emission restrictions previously established in the Part 71 permit?

Thank you,

Claudia Young Smith

Environmental Scientist
US EPA Region 8 Air Program
Phone: (303) 312-6520
Fax: (303) 312-6064
http://www2.epa.gov/region8/air-permitting

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********** ATTACHMENT NOT DELIVERED **********

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at (866) 411-4EPA (4372). The TDD number is (866) 489-4900.

********** ATTACHMENT NOT DELIVERED **********

SMNSR-SV-000043-2011.001

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103-3103
USA
918/591-1791
Fax 918/591-1796

RECEIVED
NOV 09 2011
8P - AR

November 3, 2011

Ms. Kathleen Paser
Federal Minor NSR Permit Coordinator
1595 Wynkoop Street (8P-AR)
Denver, CO 80202-1129

Re: Synthetic Minor Limit Request
Jaques Compressor Station
Samson Resources

Dear Ms. Paser,

Samson Resources Company (Samson) is herein submitting a synthetic minor limit request for its Jaques Compressor Station facility. This facility is currently permitted under permit V-SU-0043-06.02 under Title V Part 71. This permit has several emissions limitations that Samson would like to operate under and will therefore need to establish under the Minor NSR program.

Enclosed you will find the attachments documenting the limits requested as well as the methods for demonstrating compliance with those limits. Since Samson currently operates with these limits there will be no pre and post emission changes and Samson has enclosed a copy of the 2010 Emission Inventory for the facility. This facility is an existing facility operated by Samson since 2006.

Please feel free to contact me at (918) 591-1379 or srose@samson.com if you have any questions regarding this application.

Sincerely,
SAMSON RESOURCES COMPANY

Scott Rose
Air Quality Specialist

Cc: File
Brenda Jarrell
Kyle Hunderman

SYNTHETIC MINOR PERMIT APPLICATION

JAQUES COMPRESSOR STATION

PART 71 OPERATING PERMIT: V-SU-0043-06.02

Prepared for:

Samson

Samson Plaza
Two West Second Street
Tulsa, Oklahoma 74103

Prepared by:

Compliance Partners Inc.

4038 Timberline Road, Suite 100
Fort Collins, CO 80525

NOVEMBER 2011

SYNTHETIC MINOR PERMIT APPLICATION
JAQUES COMPRESSOR STATION

CONTENTS

SYNTHETIC MINOR PERMIT APPLICATION
JAQUES COMPRESSOR STATION

CONTENTS CONTINUED

ADMINISTRATIVE AND PLANT-WIDE INFORMATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 8 Air Program
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Check List – Application for New Construction

(Form NEW)

Please check all that apply to show how you are using this form

- ○ **Proposed Construction of a New Facility**
- ○ **Proposed Construction of New Equipment at an Existing Facility**
- ○ **Proposed Modification of an Existing Facility**
- ✓ **Other – Please Explain** Synthetic Minor Permit Application

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Minor NSR Permitting Coordinator
U.S. EPA, Region 8
1595 Wynkoop Avenue, 8P-AR
Denver, CO 80202-1129

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact the EPA Region 8 Tribal Air Coordinator:

Alexis North, EPA Region 8 Tribal Air Coordinator
303-312-7005
north.alexis@epa.gov

A. GENERAL FACILITY INFORMATION

1. (a) **Company Name** Samson Resources Company (b) **Operator Name** Samson Resources Company		2. **Facility Name** Jaques Compressor Station	
3. Type of Operation Natural Gas Production		4. Portable Source? Yes (No) 5. Temporary Source? Yes (No)	
6. NAICS Code 211111		7. SIC Code 1311	
8. Physical Address (home base for portable sources) Jaques Road about five miles southwest of Ignacio, CO 81137			
9. Reservation* Southern Ute	10. County* La Plata	11a. Latitude* 37° 4' 40.6000" N 37.077944	11b. Longitude* -107° 41' 27.6000" W -107.691
12a. Quarter Quarter Section* NW 1/4	12b. Section* 26	12c. Township* 33 North	12d. Range* 8 West

DRAFT

*Provide all proposed locations of operation for portable sources

DRAFT

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this facility. Provide as an attachment if additional space is necessary)

Facility Name on the Permit Jaques Compressor Station
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0043-06.02
Date of the Permit Action March 2009

Facility Name on the Permit Jaques Compressor Station
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0043-06.01
Date of the Permit Action July 2008

Facility Name on the Permit Jaques Compressor Station
Permit Number (xx-xxx-xxxxx-xxxx.xx) V-SU-0043-06.00
Date of the Permit Action April 2007

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

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C. CONTACT INFORMATION

Company Contact Scott Rose	Title Air Quality Specialist
Mailing Address Two West Second Street Tulsa, Oklahoma 74103-3103	
Email Address srose@samson.com	
Telephone Number (918) 591-1370	Facsimile Number (918) 591-7370

Operator Contact (if different from company contact)	Title
Mailing Address	
Email Address	
Telephone Number	Facsimile Number

Facility Contact Lynn Davis	Title Superintendent
Mailing Address PO Box 9 Bayfield, Colorado 81122	
Email Address ldavis@samson.com	
Telephone Number (970) 884-5085	Facsimile Number

Compliance Contact Scott Rose	Title Air Quality Specialist
Mailing Address Two West Second Street Tulsa, Oklahoma 74103-3103	
Email Address srose@samson.com	
Telephone Number (918) 591-1370	Facsimile Number (918) 591-7370

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D. ATTACHMENTS

Include all of the following information (see the attached instructions)

- ✓ **FORM SYNMIN** - New Source Review Synthetic Minor Limit Request Form, if synthetic minor limits are being requested.
- ✓ Narrative description of the proposed production processes. This description should follow the flow of the process flow diagram to be submitted with this application.
- ✓ Process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment.
- ✓ A list and descriptions of all proposed emission units and air pollution-generating activities.
- ✓ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.
- ✓ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.
- ✓ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.
- ✓ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.
- ✓ **Criteria Pollutant Emissions** - Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.
- ✓ These estimates are to be made for each emission unit, emission generating activity, and the project/facility in total.
- ✓ **Modeling – Air Quality Impact Analysis (AQIA)**
- ✓ **ESA (Endangered Species Act)**
- ✓ **NHPA (National Historic Preservation Act)**

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E. TABLE OF ESTIMATED EMISSIONS

The following tables provide the total emissions in tons/year for all pollutants from the calculations required in Section D of this form, as appropriate for the use specified at the top of the form.

E(i) – Proposed New Facility

Pollutant	Potential Emissions (tpy)	Proposed Allowable Emissions (tpy)	
PM	0	0	PM - Particulate Matter PM_{10} - Particulate Matter less than 10 microns in size $PM_{2.5}$ - Particulate Matter less than 2.5 microns in size SOx - Sulfur Oxides NOx - Nitrogen Oxides CO - Carbon Monoxide VOC - Volatile Organic Compound Pb - Lead and lead compounds NH_3 - Ammonia Fluorides - Gaseous and particulates H_2SO_4 - Sulfuric Acid Mist H_2S - Hydrogen Sulfide TRS - Total Reduced Sulfur RSC - Reduced Sulfur Compounds
PM_{10}	0	0	
$PM_{2.5}$	0	0	
SO_x	0	0	
NO_x	208.2	208.2	
CO	150.7	150.7	
VOC	92.8	92.8	
Pb	0	0	
NH_3	0	0	
Fluorides	0	0	
H_2SO_4	0	0	
H_2S	0	0	
TRS	0	0	
RSC	0	0	

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

E(ii) – Proposed New Construction at an Existing Facility or Modification of an Existing Facility

Pollutant	Current Actual Emissions (tpy)	Current Allowable Emissions (tpy)	Post-Change Potential Emissions (tpy)	Post-Change Allowable Emissions (tpy)
PM	0	0	0	0
PM_{10}	0	0	0	0
$PM_{2.5}$	0	0	0	0
SO_x	0	0	0	0
NO_x	208.2	208.2	208.2	208.2
CO	150.7	150.7	150.7	150.7
VOC	92.8	92.8	92.8	92.8
Pb	0	0	0	0
NH_3	0	0	0	0
Fluorides	0	0	0	0
H_2SO_4	0	0	0	0
H_2S	0	0	0	0
TRS	0	0	0	0
RSC	0	0	0	0

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SOx - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
NH_3 - Ammonia
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 8 Air Program
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Checklist - Synthetic Minor Limit Request

(Form SYNMIN)

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 8 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 8
1595 Wynkoop Avenue, 8P-AR
Denver, CO 80202-1129

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact the EPA Region 8 Tribal Air Coordinator:

Alexis North, EPA Region 8 Tribal Air Coordinator
303-312-7005
north.alexis@epa.gov

A. GENERAL INFORMATION

Company Name Samson Resources Company	**Facility Name** Jaques Compressor Station	
Company Contact or Owner Name Scott Rose		Title Air Quality Specialist
Mailing Address Two West Second Street	Tulsa, Oklahoma 74103-3103	
Email Address srose@samson.com		
Telephone Number (918) 591-1370	Facsimile Number (918) 591-7370	

B. ATTACHMENTS

For each criteria air pollutant, hazardous air pollutant and for all emission units and air pollutant-generating activities to be covered by a limitation, include the following:

- ✓ **Item 1 -** The proposed limitation and a description of its effect on current actual, allowable and the potential to emit.
- ✓ **Item 2 -** The proposed testing, monitoring, recordkeeping, and reporting requirements to be used to demonstrate and assure compliance with the proposed limitation.
- ✓ **Item 3 -** A description of estimated efficiency of air pollution control equipment under present or anticipated operating conditions, including documentation of the manufacturer specifications and guarantees.
- ✓ **Item 4 -** Estimates of the Post-Change Allowable Emissions that would result from compliance with the proposed limitation, including all calculations for the estimates.
- ✓ **Item 5 –** Estimates of the potential emissions of Greenhouse Gas (GHG) pollutants before and after proposed emission controls.

Description of Operations
Jaques Compressor Station
Section 26, Township 33N, Range 8W
La Plata County, Colorado

The Jaques Compressor Station is owned and operated by Samson Resources. The facility is located within the exterior boundaries of the Southern Ute Indian Reservation in the NW ¼ of Section 26, Township 33 North, Range 8 West in La Plata County, Colorado. A facility location map is included as Figure 1.

The facility is comprised of equipment that dehydrates and compresses coal-bed methane gas from several wells to transmission pipeline specifications. Gas entering the facility from the field is first fed to an inlet separator that gravimetrically removes water that may have formed/condensed during transportation from the supplying gas wells. Separator overhead gas is fed to one the six compressor engines from a common suction header. The compressors discharge gas to a common discharge header that feeds to scrubbers. The scrubbers separate and collect liquids that may have formed during compression. The compressed gas is then fed to two dehydration units. Tri-ethylene glycol is circulated counter-currently and absorbs water from the saturated gas. Rich glycol is circulated to a reboiler, where moisture is driven to the atmosphere by heating the glycol. Dry gas exits the contactors and is directed to the sales line, where it is metered and exits the facility. The gas processing capacity of the facility is approximately 48 MMscfd with six compressor engines operating. Figure 2 contains a simplified facility plot plan. A process flow diagram is attached as Figure 3.

Process equipment installed at the facility consists of six natural gas fired 1400 hp Waukesha L5794LT lean burn compressor engines, two triethylene glycol dehydration units equipped with reboiler burners, and a flare. The facility emission units are listed in Table 1. There are several insignificant emission units at this facility including various storage tanks, heaters, and pump engines. These units are listed in Table 2.

Table 1: Jaques Compressor Station Emission Units

Emission Unit ID	Description	Control Equipment
E1	1400 hp Waukesha L5794LT Compressor Engine	None
E2	1400 hp Waukesha L5794LT Compressor Engine	None
E3	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
E4	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
E5	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
E6	1400 hp Waukesha L5794LT Compressor Engine	Oxidation Catalyst
D1	18 MMscfd PESCO Dehydration Unit Glycol Regenerator	PESCO Flare Stack
D2	30 MMscfd NATCO Dehydration Unit Glycol Regenerator	PESCO Flare Stack
FUG	Facility Fugitive Emissions	None
CRPV	Compressor Cylinder Rod Packing Vent Emissions	None

Table 2: Jaques Compressor Station Insignificant Emission Units

Emission Unit ID	Description
IEU1	6 – 500 gallon lubricating oil storage tanks
IEU2	6 – 300 gallon used oil storage tanks
IEU3	3 – 500 gallon ethylene glycol storage tanks
IEU4	10 – 500 bbl produced water storage tanks
IEU5	1 – 500 bbl slop tank, 1 – 400 bbl slop tank
IEU6	2 – 100 gallon run drums for methanol storage
IEU7	2 – 0.6 MMBtu/hr natural gas fired regenerator burners
IEU8	12 – 0.12 MMBtu/hr natural gas fired tank heaters
IEU9	1 – 34 hp Ford 460 pump engine
IEU10	1 – 300 gallon TEG storage tank
IEU11	1 – 500 gallon TEG storage tank
IEU12	1 – 21 hp Ford pump engine
IEU13	2 – 0.125 MMBtu/hr slug catcher burners
IEU14	1 – 0.5 MMBtu/hr production unit burner

Samson is requesting three emission limitations for the facility so that it may retain its status as a synthetic minor source of HAP emissions. The first limitation is a facility-wide formaldehyde emission limit of 9.5 tons during any consecutive twelve months. The second limitation is that benzene emissions from each of the glycol dehydration units shall be limited to 0.9 tons per any consecutive 12 months. The third and final limitation is a facility-wide HAP emission limit of 23 tons during any consecutive 12 months. Compliance with these annual limits will be determined on a rolling 12-month basis. Emission control equipment, control efficiencies, and emission monitoring is discussed in the attached individual equipment sections of the application.

The facility potential to emit is contained in Table 3. The PTE in this table reflects enforceable emission control for engine formaldehyde emissions and dehydration unit benzene emissions and total HAP emissions. The facility-wide emission limits for formaldehyde and total HAP emissions have been incorporated into the facility PTE. All CO and VOC emissions are represented on an uncontrolled basis.

The Jaques Compressor Station is an existing, constructed, and operating facility. There are no increases in emission rates or facility potential to emit with this application so an ambient impact analysis has not been included. In addition the facility will have no adverse effects with respect to the ESA or NHPA. ESA and NHPA reports are attached.

Table 3: Jaques Compressor Station Potential to Emit

Unit	Model	hp	NO_X			CO			VOC			Formaldehyde			Benzene	Total HAP
			g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	tpy	tpy
E1	Waukesha L5794LT	1400	2.5	7.71	33.8	1.8	5.55	24.3	0.5	1.54	6.8	0.16	0.49	2.2	0	2.2
E2	Waukesha L5794LT	1400	2.5	7.71	33.8	1.8	5.55	24.3	0.5	1.54	6.8	0.16	0.49	2.2	0	2.2
E3	Waukesha L5794LT	1400	2.5	7.71	33.8	1.8	5.55	24.3	0.5	1.54	6.8	0.064	0.20	0.9	0	0.9
E4	Waukesha L5794LT	1400	2.5	7.71	33.8	1.8	5.55	24.3	0.5	1.54	6.8	0.064	0.20	0.9	0	0.9
E5	Waukesha L5794LT	1400	2.5	7.71	33.8	1.8	5.55	24.3	0.5	1.54	6.8	0.064	0.20	0.9	0	0.9
E6	Waukesha L5794LT	1400	2.5	7.71	33.8	1.8	5.55	24.3	0.5	1.54	6.8	0.064	0.20	0.9	0	0.9
D1	TEG Dehydration Unit	18 MMscfd		0.04	0.2		0.03	0.1		3.90	16.9			0.0	0.9	14.0
D2	TEG Dehydration Unit	30 MMscfd		0.12	0.5		0.10	0.4		6.30	27.8			0.0	0.9	
FUG	Facility Fugitive Emissions				0.0			0.0			3.2			0.0	0.0	0.0
CRPV	Compressor Rod Packing Vents				0.0			0.0			1.8			0.0	0.0	0.0
IEUs	Insignificant Units				4.7			4.4			2.3			0.2	0.0	0.2
Total					208.2			150.7			92.8			9.5	1.8	23.0

Table 4: Jaques Compressor Station 2010 Emissions

Unit	Model	hp	NO_X			CO			VOC			Formaldehyde			Benzene	Total HAP
			g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	g/hphr	lb/hr	tpy	tpy	tpy
E1	Waukesha L5794LT	1400	2.5	7.71	32.8	1.8	5.55	23.6	0.5	1.54	6.6	0.16	0.49	0.6	0	0.6
E2	Waukesha L5794LT	1400	2.5	7.71	32.2	1.8	5.55	23.2	0.5	1.54	6.4	0.16	0.49	0.6	0	0.6
E3	Waukesha L5794LT	1400	2.5	7.71	20.5	1.8	5.55	3.7	0.5	1.54	1.6	0.064	0.20	0.2	0	0.2
E4	Waukesha L5794LT	1400	2.5	7.71	28.8	1.8	5.55	5.2	0.5	1.54	2.3	0.064	0.20	0.2	0	0.2
E5	Waukesha L5794LT	1400	2.5	7.71	33.1	1.8	5.55	6	0.5	1.54	2.7	0.064	0.20	0.3	0	0.3
E6	Waukesha L5794LT	1400	2.5	7.71	30.2	1.8	5.55	5.4	0.5	1.54	2.4	0.064	0.20	0.3	0	0.3
D1	TEG Dehydration Unit	18 MMscfd		0.04	0.2		0.03	0.1			0.06			0.0	0.03	0.05
D2	TEG Dehydration Unit	30 MMscfd		0.12	0.5		0.10	0.4			0.09			0.0	0.05	0.08
FUG	Facility Fugitive Emissions				0.0			0.0			3.2			0.0	0.0	0.0
CRPV	Compressor Rod Packing Vents				0.0			0.0			1.8			0.0	0.0	0.0
IEUs	Insignificant Units				0.0			0.0			0				0.0	0.0
Total					178.3			67.6			27.2			2.2	0.1	2.3

Directions to the Facility

Jaques Compressor Station
Section 26, Township 33N, Range 8W
La Plata County, Colorado

The Jaques Compressor Station is located southwest of Ignacio, Colorado. To get to the Jaques Compressor Station from Ignacio take Highway 172 south out of town and follow for approximately 0.75 miles. Turn west onto Indian Route 110. Follow Indian Route 110 for 2.75 miles. Turn south onto Jaques Road. Follow Jaques Road for 0.9 miles south curving around a hill to the east.

Regulatory Applicability Assessment
Jaques Compressor Station

40 CFR Part	Description	Applicable Requirement	Reason
Part 50	National Primary and Secondary Ambient Air Quality Standards	N	Ambient standards set forth by theses provisions are not directly enforceable upon a facility. The demonstration of the maintenance of an air quality standard is the responsibility of the Administrator and not that of a specific facility. It is recognized that the Administrator may incorporate requirements into a State or Federal Implementation Plan designed to mitigate an air quality violation which can apply to specific facilities, but the specific air quality standards are not direct applicable requirements to this facility.
Part 51	Requirements for Preparation, Adoption and submittal of Implementation Plans	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act.
Part 52	Approval of Promulgation of Implementation Plans		
52.21	Prevention of Significant Deterioration	N	The facility is not a major stationary source as defined at 40 CFR 52.21(b). The facility has a potential to emit criteria pollutants below the 250 tpy PSD threshold.
52.24	New Source Review	N	The facility is not located in a nonattainment area
Part 53	Ambient Air Monitoring Reference and Equivalent Methods	N	This part sets forth requirements for the monitoring of ambient air. The facility is not required and does not perform ambient air monitoring.
Part 54	Prior Notice of Citizen Suits	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act.
Part 55	Outer Continental Shelf Air Regulations	N	The facility is not located on the Outer Continental Shelf
Part 56	Regional Consistency	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act.
Part 57	Primary Nonferrous Smelter Orders	N	The facility is not a Nonferrous Smelter
Part 58	Ambient Air Quality Surveillance	N	This part sets forth requirements for the monitoring of ambient air. The facility is not required and does not perform ambient air monitoring.
Part 59	Not Promulgated--Reserved		
Part 60	Standards of Performance for New Stationary Sources	N	Most of the standards set forth by these regulations do not apply to the facility because no applicable units exist at the facility. Specific standards which may apply at the facility and may apply in general to natural gas transmission and/or processing facilities include:
Subpart K	VOL Storage Tanks	N	There are no storage tanks at this facility which were constructed prior to March 8, 1978
Subpart Ka	VOL Storage Tanks	N	There are no storage tanks at this facility which were constructed between May18, 1978 and July 23, 1984
Subpart Kb	VOL Storage Tanks	N	All tanks which contain VOL and which were constructed after July 23, 1984 either have capacities less than the applicability threshold of 40 m^3 (251.6 bbl) or have vapor pressures below the 15 kPa applicability threshold.
Subpart GG	Stationary Gas Turbines	N	There are no gas turbines located at this facility.
Subpart KKK	On-Shore Natural Gas Processing Facilities	N	This facility does not process natural gas to extract natural gas liquids.

Regulatory Applicability Assessment
Jaques Compressor Station

40 CFR Part	Description	Applicable Requirement	Reason
Subpart LLL	On-Shore Natural Gas Sweetening Plants	N	This facility does not process natural gas to remove sulfur compounds.
Subpart JJJJ	Standards of Performance for Ignition Internal Combustion Engines and National Emision Standrads for Hazardous Air Pollutants for Recipricating Internal Combustion Engines	Currently N/Possible Future Applicability	The existing units at this facility are not subject to this Subpart. Future Internal Combustion Engines installed at this facility may be subject to this Subpart and will be in compliance.
Subpart KKKK	Standards of Performance for Stationary Gas Turbines	N	There are no gas turbines located at this facility.
Part 61	National Emission Standards for Hazardous Air Pollutants	N	This facility is not part of any source category for which provisions set forth by these regulations apply.
Part 62	Approval and Promulgation of State Plans for Designated Facilities and Pollutants	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to this facility.
Part 63	National Emission Standards for Hazardous Air Pollutants for Source Categories	Y	Most of the standards set forth by these regulations do not apply to the facility because no applicable units exist at the facility. Specific standards which apply at the facility and may apply in general to natural gas transmission and/or processing facilities include:
Subpart HH	National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities	Y	This facility is is exempt from the general requirements for area sources. The monitoring and record keeping requirements for the benzene emission limits on each of the dehydration units meets the general recordkeeping requirements of this subpart.
Subpart HHH	National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities	N	Facility is not a natural gas transmission or storage facility.
Subpart ZZZZ	National Emission Standards for Hazardous Air Pollutants for Recipricating Internal Combustion Engines	Y	Unit E2 was constructed after June 12, 2006, triggering the area source MACT standards for RICE. However the engine was manufactured before the JJJJ trigger date in the rule, so while subject to this subpart, there are no specific requirements for Unit E2. Units E1, E3, E4, E5, and E6 are existing 4SLB and have until 10/19/13 to be incompliance with the emission limits of this subpart.
Part 64	Compliance Assurance Monitoring	N	No emission units at the facility are equipped with emission control technology or are limited by an applicable emission limitation.
Part 65	Not Promulgated--Reserved		
Part 66	Assessment and Collection of Noncompliance Penalties by EPA	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to this facility.
Part 67	EPA Approval of State Noncompliance Penalty Program	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to this facility.
Part 68	Chemical Accident Prevention Provisions	N	No substance listed by this regulations is stored on-site at the facility in quantities above applicable threshold values set forth by the regulation.
Part 69	Special Exemptions from the Requirements of the Clean Air Act	N	The facility is not located in an area covered by this regulation.
Part 70	State Operating Permit Programs	N	The facility is not located in an area under the jurisdiction of a regulatory authority which has an EPA-approved part 70 program.
Part 71	Federal Operating Permit Programs	Y	The facility is a major source subject to the provisions of this regulation.
Part 72	Permits Regulation	N	The facility is not an affected facility under the Acid Rain Program.
Part 73	Sulfur Dioxide Allowance System	N	The facility is not an affected facility under the Acid Rain Program.

Regulatory Applicability Assessment
Jaques Compressor Station

40 CFR Part	Description	Applicable Requirement	Reason
Part 73	Sulfur Dioxide Allowance System	N	The facility is not an affected facility under the Acid Rain Program.
Part 74	Sulfur Dioxide Opt-Ins	N	The facility has not elected to opt-in to the Acid Rain Program.
Part 75	Continuous Emissions Monitoring	N	The facility is not an affected facility under the Acid Rain Program.
Part 76	Acid Rain Nitrogen Oxides Emission Reduction Program	N	The facility is not an affected facility under the Acid Rain Program.
Part 77	Excess Emissions	N	The facility is not an affected facility under the Acid Rain Program.
Part 78	Appeal Procedures for Acid Rain Program	N	The facility is not an affected facility under the Acid Rain Program.
Part 79	Registration of Fuels and Fuel Additives	N	The facility does not sell fuels or additives which are designated by this provision.
Part 80	Regulation of Fuels and Fuel Additives	N	The facility does not sell fuels or additives which are designated by this provision.
Part 81	Designation of Areas for Air Quality Planning Purposes	N	Provision of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to his facility.
Part 82	Protection of Stratospheric Ozone	N	The Facility does not engage in the distribution or sale of controlled substances, and it does not produce, transform, destroy, import, or export products containing controlled substances.
Part 85	Control of Air Pollution from Mobile Sources	N	The facility does not engage in vehicle manufacturing activities.
Part 86	Control of Air Pollution from New and In-Use Motor Vehicles and New and In-use Motor Vehicle Engines: Certification and Test Procedures	N	The facility does not engage in the certification or testing of motor vehicle engines.
Part 87	Control of Air Pollution from Aircraft and Aircraft Engines	N	The facility does not engage in the use of aircraft or aircraft engines.
Part 88	Clean-fuel Vehicles	N	These provisions apply to vehicle fleets and not to stationary sources.
Part 89	Control of Emissions from new and in-use Nonroad Engines	N	The facility does not engage in the use of nonraod engines as define by these provisions.
Part 90	Control of Emissions from Nonroad Spark-ignition Engines	N	The facility does not engage in the use of nonroad spark-ignition engines as defined by these provisions.
Part 91	Control of Emissions from Marine Spark-ignition Engines	N	The facility does not engage in the use of marine spark-ignition engines.
Part 92	Control of Emissions from Locomotives and Locomotive Engine	N	The facility does not engage in the use of locomotives or locomotive engines.
Part 93	Determining Conformity of Federal Actions to State or Federal Implementation Plans	N	The facility operations are not federal actions.
Part 94	Not Promulgated--Reserved		
Part 95	Mandatory Patent Licenses	N	Provisions of this part are administrative in nature and implement mandates of the Clean Air Act. They do not directly apply to his facility.
Parts 96-99	Not Promulgated--Reserved		

ESA Report for the Jaques Compressor Station

Group	Name	Population	Status	Lead Office	Recovery Plan Name	Recovery Plan Stage
Birds	Yellow-billed Cuckoo (Coccyzus	Western U.S. DPS	Candidate	Sacramento Fish And Wildlife		
Birds	Mexican spotted owl (Strix		Threatened	Arizona Ecological Services	Draft Recovery Plan for the	Draft Revision 1
Birds	Southwestern willow flycatcher		Endangered	Arizona Ecological Services	Final Recovery Plan for the	Final
Flowering Plants	Knowlton's cactus (Pediocactus		Endangered	New Mexico Ecological Services	Knowlton's (=Hedgehog) Cactus	Final
Insects	Uncompahgre fritillary butterfly		Endangered	Western Colorado Ecological	Uncompahgre Fritillary Butterfly	Final
Mammals	Black-footed ferret (Mustela	U.S.A. (specific portions of AZ,	Experimental Population, Non-	Office Of The Regional Director		
Mammals	Canada Lynx (Lynx canadensis)	(Contiguous U.S. DPS)	Threatened	Montana Ecological Services	Recovery Outline for the	Outline
Mammals	New Mexico meadow jumping		Candidate			
Mammals	North American wolverine (Gulo		Candidate	Montana Ecological Services		

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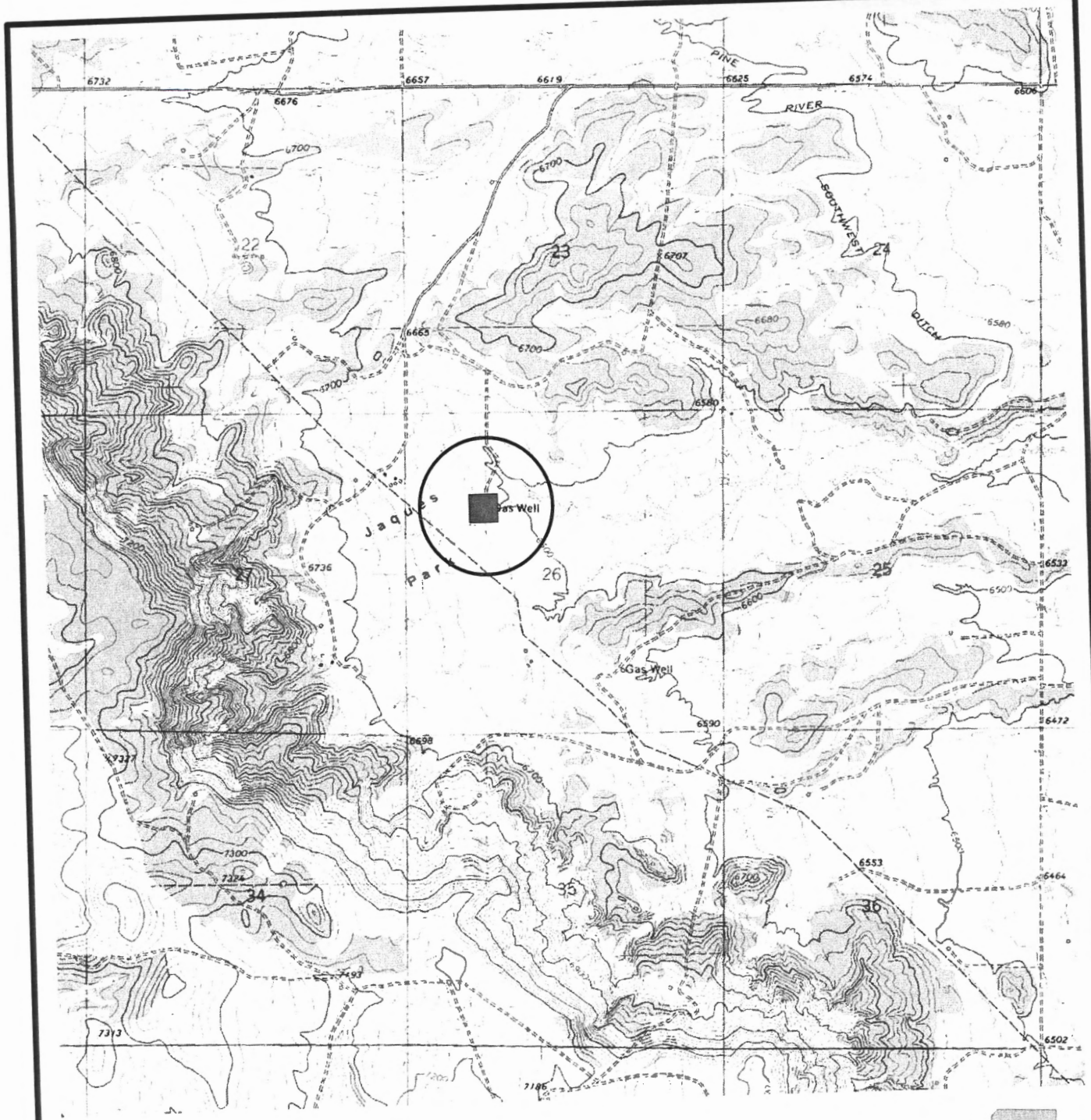
FIGURES



La Plata County, Colorado

Compliance Partners™

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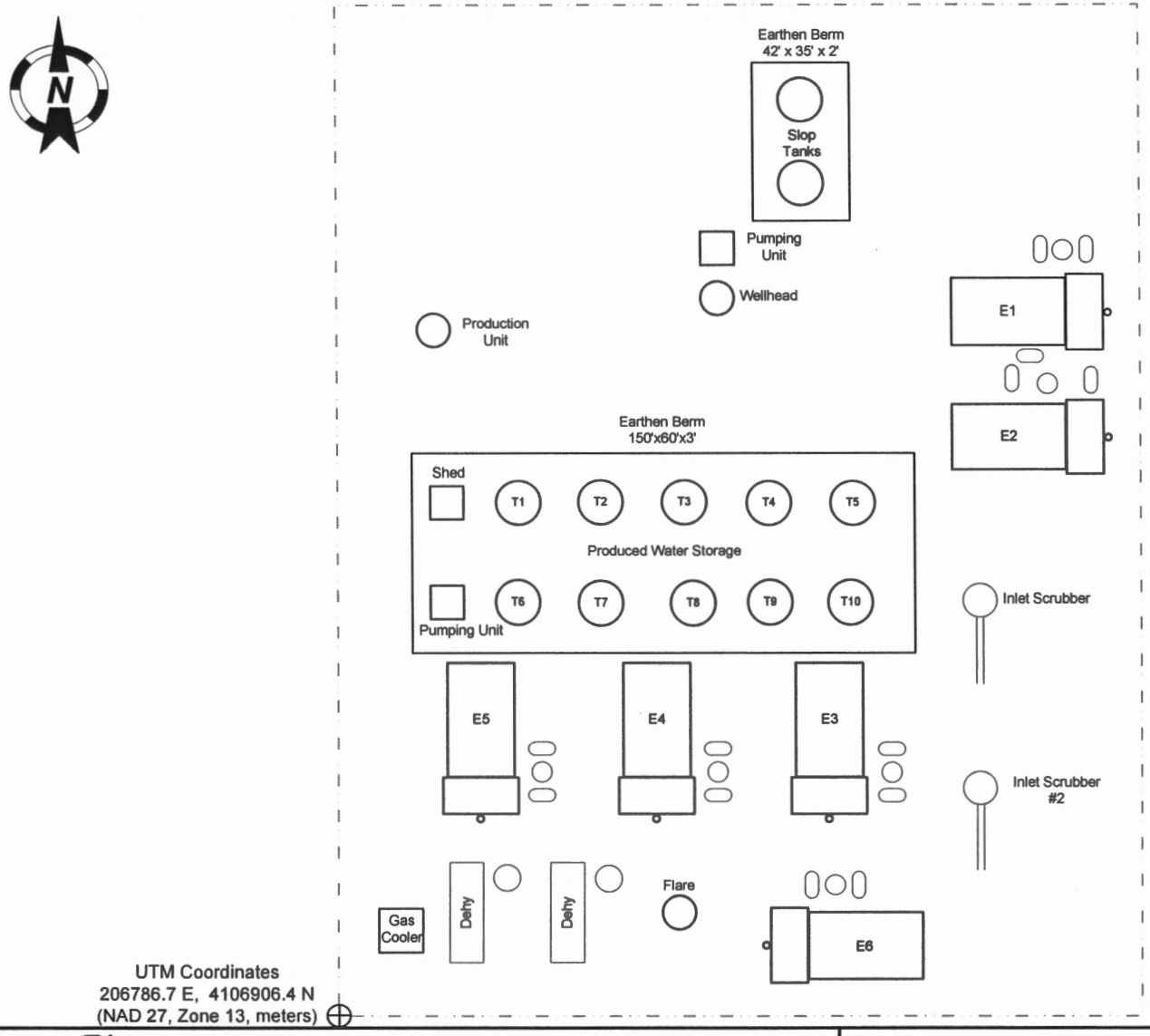
Samson

Jaques
Compressor Station

General Facility Location
Section 26, Township 33N, Range 8W
La Plata County, Colorado

PROJECT NAME	FILENAME	SCALE	REVISED	FIGURE NUMBER
Samson - Jaques Renewal	Location.srf	1 in = 850 m	4/19/06	1



UTM Coordinates
206786.7 E, 4106906.4 N
(NAD 27, Zone 13, meters)

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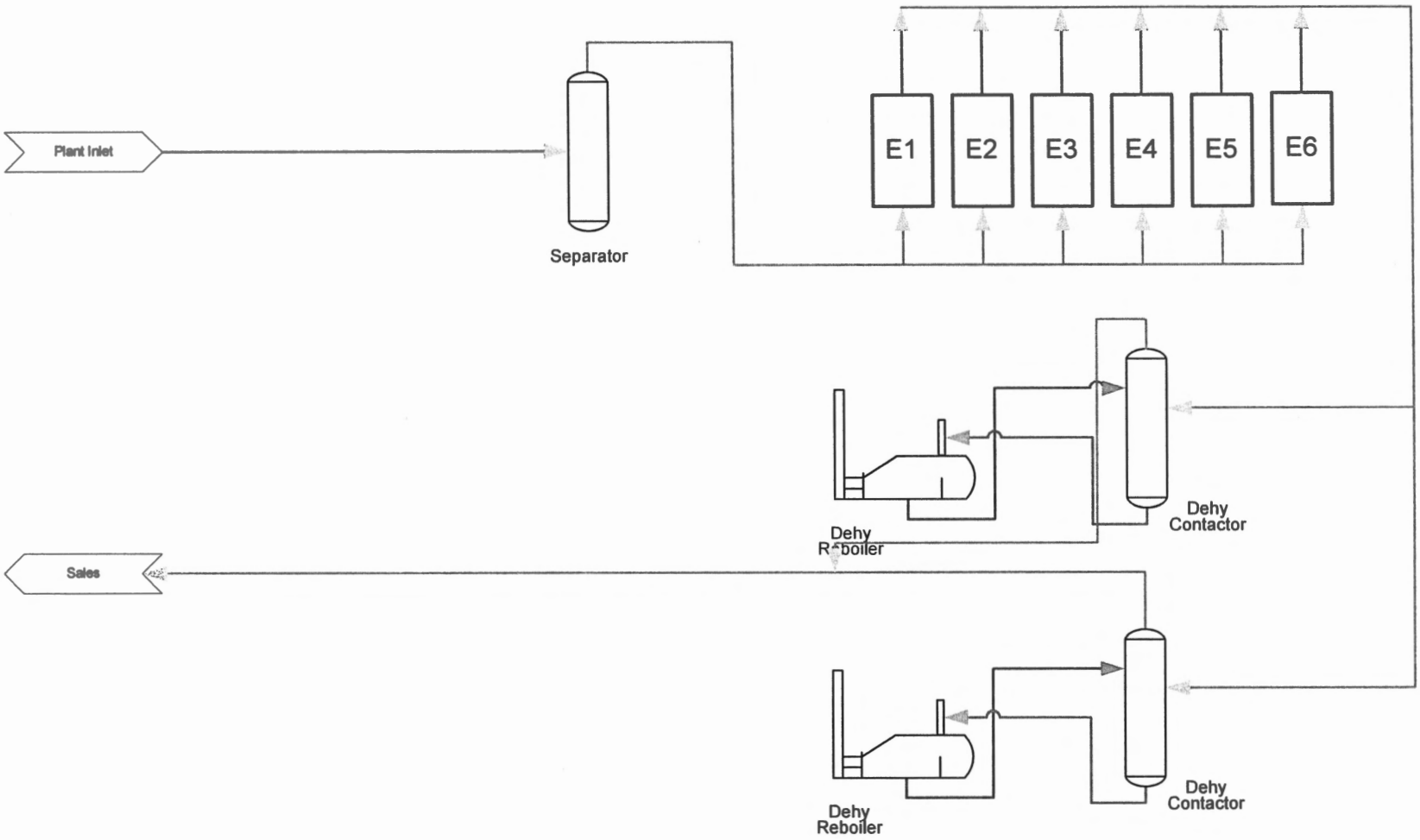
Samson

Jaques Compressor Station

TITLE

Simplified Plot Plan

PROJECT NAME	FILE NAME	SCALE	REVISED	FIGURE NUMBER
Samson - Jaques Compressor Station	SimplePlot.vsd	1 in = 50 ft	10/13/2011	2



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Samson

Jaques Compressor Station

TITLE

Simplified Process Flow Diagram

PROJECT NUMBER	FILENAME	SCALE	REVISED	FIGURE NUMBER
Samson - Jaques Compressor Station	pfd.vsd	None	9/20/2011	3

INSIGNIFICANT EMISSIONS

Insignificant Emission Justification
Jaques Compressor Station

Reciprocating Compressors

Reciprocating compressors are sources of VOC emissions from compressor blowdown, cylinder rod packing leaks and starter gas. Compressor blowdown and starter gas emissions for the compressors at this facility are insignificant.

Compressor Blowdown

Gas remaining in the compressor when shutdown will either remain pressurized in the compressor or it will be vented, usually to atmosphere. The total volume vented when the unit is blown down is a function of the compressor size and the size and pressure of the piping and vessels between the compressor suction and discharge isolation valves. The blowdown volume was based on equipment type and typical operating conditions, as well as the estimation of the VOC emissions from blowdown activities given the typical number of events per year. The facility's representative gas composition was used for these estimations. It should be noted that the number of blowdown events during a given year can change and Samson cannot commit to a limitation on the number of events that may occur. The blowdown emission calculation is illustrated below:

$$CBD = (40{,}927 scf)\left(\frac{mole}{385 scf}\right)\left(\frac{0.1922 moles_{VOC}}{100 moles}\right)\left(\frac{54.313 lb_{VOC}}{mole_{VOC}}\right)\left(\frac{20 events}{yr}\right)\left(\frac{ton}{2000 lb}\right) = 0.11\frac{ton_{VOC}}{yr}$$

Compressor blowdown VOC emissions are estimated to be 0.11 tpy for each compressor and 0.66 tpy VOC for all six compressors at the facility.

Starter Gas

Compressor starter emissions were estimated using the starter's fuel usage at 110 psi and facility's representative gas composition. The example calculation for short term VOC emissions is presented below.

$$\frac{lb_{VOC}}{hr} = \left(1{,}100\frac{scf}{\min}\right)\left(\frac{mole}{385\ scf}\right)\left(\frac{0.1922\ moles_{VOC}}{100\ moles}\right)\left(\frac{54.313\ lb_{VOC}}{mole_{VOC}}\right)\left(\frac{60\min}{hr}\right) = 17.9\frac{lb_{VOC}}{hr}$$

The starter was assumed to operate for 30 seconds per starting event resulting in 0.15 lbs of VOC emitted per starting event. It is estimated that there are 52 starting events per year for each engine. The VOC emissions are estimated at 0.004 tpy for each compressor and 0.02 tpy VOC for all six compressors.

Tanks

Emissions for the facility storage tanks were estimated using EPA Tanks 4.0.9d. Table 5 illustrates the emission units, the numbers of turnovers per year assumed when estimating emissions from the unit, and the emissions from each unit. The Tanks output for each unit is attached. The tanks at this facility are all insignificant emission units.

Table 5: Jaques Compressor Station Tank Emissions

Unit ID	Description	Turnovers per Year	VOC Emissions per Tank	VOC Emissions per Unit
			lb/yr	lb/yr
IEU1[1]	6 – 500 gallon lubricating oil storage tanks	12	0.11	0.66
IEU2[1]	6 – 300 gallon used oil storage tanks	12	0.08	0.48
IEU3[1]	3 – 500 gallon ethylene glycol storage tanks	18	1.44	4.32
IEU4[2]	10 – 500 bbl produced water storage tanks	6	<0.1	0.1
IEU5[1]	1 – 400 bbl, 1 – 500 bbl slop tanks	12	4.52	9.04
IEU6	2 – 100 gallon run drums for methanol storage	12	11.31	22.62
IEU10	1 – 300 gallon TEG storage tank	18	1.00	1.00
IEU11	1 – 500 gallon TEG storage tank	18	1.44	1.44

[1] Low vapor pressure.
[2] Low VOC content.

Heaters/Burners

Emissions for the heaters and burners were calculated using AP-42 emission factors. An example NO_X emission calculation for the 0.6 MMBtu/hr regenerator burner follows. The CO and VOC emissions were calculated the same way using their representative emission factors. Emissions from the other facility heaters and burners were calculated in the same manner. Table 6 lists the facility heater and burner emissions.

$$\frac{lb_{NO_X}}{hr} = \left(0.5\frac{MMBtu}{hr}\right)\left(\frac{scf}{1020\ Btu}\right)\left(\frac{1x10^6\ Btu}{MMBtu}\right)\left(\frac{100\ lb_{NO_X}}{MMscf}\right)\left(\frac{MMscf}{1x10^6\ scf}\right)\left(\frac{975\ LHV}{1020\ LHV}\right) = 0.06\frac{lb_{NO_X}}{hr}$$

Table 6: Jaques Compressor Station Heater/Burner Emissions

Unit ID	Rating (MMBtu/hr)	Number	Description	Emissions per Heater			Emissions per Unit		
				NO_X (tpy)	CO (tpy)	VOC (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)
IEU7	0.60	2	Regenerator Burners	0.25	0.21	0.01	0.50	0.42	0.02
IEU8	0.12	12	Tank Heaters	0.05	0.04	0.00	0.60	0.48	0.00
IEU13	0.125	2	Slug Catcher Burners	0.05	0.04	0.00	0.10	0.08	0.00
IEU15	0.50	1	Production Unit Burner	0.21	0.17	0.01	0.21	0.17	0.01

Pump Engines

Emissions for the facility pump unit engines were estimated using manufacturer's and API-42 emission factors. An example calculation for short term and annual NOx emissions is presented below. Emissions for the other pollutants and pump engines were calculated in the same manner. Table 7 lists the pump engine emissions.

$$\frac{lb_{NOX}}{hr} = \left(6.2\frac{g_{NO_X}}{hp-hr}\right)(21hp)\left(\frac{lb}{454\,g}\right) = 0.29\frac{lb_{NO_X}}{hr}$$

$$\frac{ton_{NOX}}{yr} = \left(0.29\frac{lb_{NO_X}}{hr}\right)\left(\frac{ton}{2000\,lb}\right)\left(\frac{8760\,hr}{yr}\right) = 1.3\,tpy\,NO_X$$

Table 7: Jaques Compressor Station Pump Engine Emissions

Unit ID	Description	NO_X (tpy)	CO (tpy)	VOC (tpy)	HAP (tpy)
IEU9	34 hp Ford 460 pump engine	2.0	2.0	1.0	0.1
IEU12	21 hp Ford pump engine	1.3	1.2	0.6	0.1

TANKS 4.0.9D OUTPUT
LUBRICATING OIL STORAGE TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Lubricating Oil Storage Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	IEU1 - Six 500 gallon lubricating oil tanks

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	12.00
Net Throughput(gal/yr):	6,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Lubricating Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Lube Oil	All	51.76	37.44	66.07	44.16	0.0004	0.0002	0.0006	700.0000			0.01	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Lubricating Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	0.0795
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.1066
Vented Vapor Saturation Factor:	1.0000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800

Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1066
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	0.0004
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0006
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	1.0000
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0004
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.0300
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Annual Net Throughput (gal/yr.):	6,000.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	0.7500
Total Losses (lb):	0.1095

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Lubricating Oil Storage Tanks - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Lube Oil	0.03	0.08	0.11

TANKS 4.0.9D OUTPUT
USED OIL TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Used Oil Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	IEU2 - Six 300 gallon used oil tanks

Tank Dimensions

Shell Length (ft):		5.00
Diameter (ft):		3.50
Volume (gallons):		300.00
Turnovers:		12.00
Net Throughput(gal/yr):		3,600.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Used Oil Tanks - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Used Oil	All	51.76	37.44	66.07	44.16	0.0004	0.0002	0.0006	700.0000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Used Oil Tanks - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	0.0608
Vapor Space Volume (cu ft):	30.6405
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.1066
Vented Vapor Saturation Factor:	1.0000
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	30.6405
Tank Diameter (ft):	3.5000
Effective Diameter (ft):	4.7215
Vapor Space Outage (ft):	1.7500
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800

Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1066
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	0.0004
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0006
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	1.0000
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0004
Vapor Space Outage (ft):	1.7500
Working Losses (lb):	0.0240
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Annual Net Throughput (gal/yr.):	3,600.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	0.0848

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Used Oil Tanks - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Used Oil	0.02	0.06	0.08

TANKS 4.0.9D OUTPUT
ETHYLENE GLYCOL STORAGE TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Ethylene Glycol Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	IEU3 - Three 500 gallon Ethylene Glycol Tanks

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	18.00
Net Throughput(gal/yr):	9,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Ethylene Glycol Tanks - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Triethylene Glycol	All	51.76	37.44	66.07	44.16	0.0193	0.0193	0.0193	150.2000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Ethylene Glycol Tanks - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	0.8208
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0005
Vapor Space Expansion Factor:	0.1066
Vented Vapor Saturation Factor:	0.9980
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0005
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800

Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1066
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9980
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0193
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.6212
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Annual Net Throughput (gal/yr.):	9,000.0000
Annual Turnovers:	18.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.4420

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Ethylene Glycol Tanks - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Triethylene Glycol	0.62	0.82	1.44

TANKS 4.0.9D OUTPUT
SLOP TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Slop Tanks
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Vertical Fixed Roof Tank
Description:	IEU5 - Two 500 bbl Slop Tanks

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	13.50
Liquid Height (ft) :	19.00
Avg. Liquid Height (ft):	10.00
Volume (gallons):	21,000.00
Turnovers:	12.00
Net Throughput(gal/yr):	262,551.19
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Slop Tanks - Vertical Fixed Roof Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Slop/Lube Oil	All	50.60	37.10	64.10	43.74	0.0004	0.0002	0.0006	700.0000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Slop Tanks - Vertical Fixed Roof Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	2.7735
Vapor Space Volume (cu ft):	1,479.1011
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0.1005
Vented Vapor Saturation Factor:	0.9998
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,479.1011
Tank Diameter (ft):	13.5000
Vapor Space Outage (ft):	10.3333
Tank Shell Height (ft):	20.0000
Average Liquid Height (ft):	10.0000
Roof Outage (ft):	0.3333

Roof Outage (Cone Roof)	
Roof Outage (ft):	0.3333
Roof Height (ft):	1.0000
Roof Slope (ft/ft):	0.0000
Shell Radius (ft):	6.7500
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Daily Avg. Liquid Surface Temp. (deg. R):	510.2702
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.4050
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1005
Daily Vapor Temperature Range (deg. R):	53.9928
Daily Vapor Pressure Range (psia):	0.0004
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0002
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0006
Daily Avg. Liquid Surface Temp. (deg R):	510.2702
Daily Min. Liquid Surface Temp. (deg R):	496.7721
Daily Max. Liquid Surface Temp. (deg R):	523.7684
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9998
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0004
Vapor Space Outage (ft):	10.3333
Working Losses (lb):	1.7503
Vapor Molecular Weight (lb/lb-mole):	700.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0004
Annual Net Throughput (gal/yr.):	262,551.1930
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	21,000.0000
Maximum Liquid Height (ft):	19.0000
Tank Diameter (ft):	13.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	4.5238

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Slop Tanks - Vertical Fixed Roof Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Slop/Lube Oil	1.75	2.77	4.52

TANKS 4.0.9D OUTPUT
METHANOL TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Methanol Run Drums
City:	Igancio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	IEU6 - Two 100 gallon run drums for methanol storage.

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	3.00
Volume (gallons):	100.00
Turnovers:	12.00
Net Throughput(gal/yr):	1,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Methanol Run Drums - Horizontal Tank
Igancio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	All	51.76	37.44	66.07	44.16	1.1069	0.6820	1.7416	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Methanol Run Drums - Horizontal Tank
Igancio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	10.3000
Vapor Space Volume (cu ft):	22.5114
Vapor Density (lb/cu ft):	0.0065
Vapor Space Expansion Factor:	0.2111
Vented Vapor Saturation Factor:	0.9191
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	22.5114
Tank Diameter (ft):	3.0000
Effective Diameter (ft):	4.3713
Vapor Space Outage (ft):	1.5000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0065
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.1069
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800

Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2111
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	1.0595
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.1069
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.6820
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.7416
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9191
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	1.1069
Vapor Space Outage (ft):	1.5000
Working Losses (lb):	1.0133
Vapor Molecular Weight (lb/lb-mole):	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.1069
Annual Net Throughput (gal/yr.):	1,200.0000
Annual Turnovers:	12.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	11.3133

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Methanol Run Drums - Horizontal Tank
Igancio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	1.01	10.30	11.31

TANKS 4.0.9D OUTPUT
TEG TANKS

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TEG Tank
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	IEU10 - 300 gallon TEG Tank

Tank Dimensions

Shell Length (ft):		5.00
Diameter (ft):		3.50
Volume (gallons):		300.00
Turnovers:		18.00
Net Throughput(gal/yr):		5,400.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TEG Tank - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Triethylene Glycol	All	51.76	37.44	66.07	44.16	0.0193	0.0193	0.0193	150.2000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TEG Tank - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	0.6286
Vapor Space Volume (cu ft):	30.6405
Vapor Density (lb/cu ft):	0.0005
Vapor Space Expansion Factor:	0.1066
Vented Vapor Saturation Factor:	0.9982
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	30.6405
Tank Diameter (ft):	3.5000
Effective Diameter (ft):	4.7215
Vapor Space Outage (ft):	1.7500
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0005
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800

Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1066
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9982
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0193
Vapor Space Outage (ft):	1.7500
Working Losses (lb):	0.3727
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Annual Net Throughput (gal/yr.):	5,400.0000
Annual Turnovers:	18.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.0013

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TEG Tank - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Triethylene Glycol	0.37	0.63	1.00

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	TEG Tank
City:	Ignacio
State:	Colorado
Company:	Samson Resources
Type of Tank:	Horizontal Tank
Description:	IEU11 - 500 gallon TEG Tank

Tank Dimensions

Shell Length (ft):	5.00
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	18.00
Net Throughput(gal/yr):	9,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

TEG Tank - Horizontal Tank
Ignacio, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Triethylene Glycol	All	51.76	37.44	66.07	44.16	0.0193	0.0193	0.0193	150.2000			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

TEG Tank - Horizontal Tank
Ignacio, Colorado

Annual Emission Calcaulations	
Standing Losses (lb):	0.8208
Vapor Space Volume (cu ft):	40.0203
Vapor Density (lb/cu ft):	0.0005
Vapor Space Expansion Factor:	0.1066
Vented Vapor Saturation Factor:	0.9980
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	40.0203
Tank Diameter (ft):	4.0000
Effective Diameter (ft):	5.0475
Vapor Space Outage (ft):	2.0000
Tank Shell Length (ft):	5.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0005
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg. R):	511.4276
Daily Average Ambient Temp. (deg. F):	41.0750
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	503.8250
Tank Paint Solar Absorptance (Shell):	0.6800

Daily Total Solar Insulation Factor (Btu/sqft day):	1,667.4918
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1066
Daily Vapor Temperature Range (deg. R):	57.2610
Daily Vapor Pressure Range (psia):	0.0000
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0193
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0193
Daily Avg. Liquid Surface Temp. (deg R):	511.4276
Daily Min. Liquid Surface Temp. (deg R):	497.1123
Daily Max. Liquid Surface Temp. (deg R):	525.7428
Daily Ambient Temp. Range (deg. R):	35.4333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9980
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0193
Vapor Space Outage (ft):	2.0000
Working Losses (lb):	0.6212
Vapor Molecular Weight (lb/lb-mole):	150.2000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0193
Annual Net Throughput (gal/yr.):	9,000.0000
Annual Turnovers:	18.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	4.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1.4420

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

TEG Tank - Horizontal Tank
Ignacio, Colorado

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Triethylene Glycol	0.62	0.82	1.44

EMISSIONS UNITS

WAUKESHA L5794LT COMPRESSOR ENGINES

Emission Unit Description
Waukesha L5794LT Compressor Engines
Jaques Compressor Station

There are six 1400 horsepower Waukesha L5794LT compressor engines installed at the Jaques Compressor Station. These engines are natural gas fired 4-stroke lean burn internal combustion engines. The fuel for the engines is pipeline quality natural gas. Units E1 and E2 have no control equipment and units E3, E4, E5, and E6 are equipped with air fuel ratio controllers and oxidation catalysts. Detailed emission calculations are attached for each unit. The manufacturer's specification sheet and catalyst specification sheets are also attached. Table 8 lists the serial number, manufacture date and installation/startup date for each of the engines at the Jaques Compressor Station.

Table 8: Jaques Compressor Station Engine Information

Unit ID	Serial Number	Manufacture Date	Installation/Startup Date
E1	C-14600/1	June 2003	09/17/2009
E2	C-17235/1	January 2007	08/30/2007
E3	C-15810/1	August 2005	12/09/2005
E4	C-15809/1	August 2005	12/09/2005
E5	C-15866/1	April 2006	06/28/2007
E6	C-15965/1	March 2006	02/01/2008

Formaldehyde performance tests are conducted on the engines at the Jaques Compressor Station to demonstrate compliance with the facility-wide formaldehyde limit. Units E1 and E2 are tested annually to demonstrate compliance with the facility-wide formaldehyde emission limit. Units E3, E4, E5, and E6 are tested quarterly to assess formaldehyde emissions. These units may be tested semi-annual if two consecutive quarterly test results show a sixty percent formaldehyde reduction. Reference method performance tests will be conducted for all replacement catalysts and engines to measure formaldehyde emissions to demonstrate compliance with the facility-wide formaldehyde emission limit. The performance tests will be conducted within 90 calendar days of catalyst change out or startup of the replacement engine.

The formaldehyde performance tests are performed in accordance with EPA Reference Method 320 or 323 of 40 CFR part 63, Appendix A or Method CARB 430. All tests are performed at a maximum operating rate, 90% to 110% of engine design capacity. Each source test consists of at least three 1-hour or longer valid test runs. Emission results are reported as the arithmetic average of all valid test runs. During each test run data is collected on all parameters necessary to document how formaldehyde emissions were measured or calculated.

In addition to the performance tests, the catalysts are monitored to ensure correct operation so that the facility-wide formaldehyde limit is met. Units E3, E4, E5, and E6 are required to operate with an engine exhaust temperature/catalyst inlet temperature between 450°F and 1350°F at all times the engine operates. Measurements of the engine exhaust/catalyst inlet temperatures are taken on a daily basis. Weekly measurements of the pressure drop across each catalyst are performed and recorded. The pressure drop across each catalyst shall not deviate by more than two inches of water at maximum operating rate from the baseline pressure drop across the catalyst measured during the latest performance test. Corrective actions are taken if any measurement is not within the acceptable range.

Facility-wide emissions of formaldehyde are calculated at the end of each calendar month from the results of the most recent performance test. The facility-wide emissions are calculated by taking the emission factor in pounds per hour for each engine and multiplying by the number of operating hours for that month. If no hours are recorded emissions from the unit will be calculated as if it ran continuously during that month. The facility-wide emissions include formaldehyde emissions from the engines and all other units including insignificant emissions units. The facility emissions for the current month as described above are added to the preceding 11 months to record a new rolling 12-month total.

Waukesha® SERIES FOUR® VHP

L5794LT

VHP™ Series Four
1205 - 1515 BHP

STANDARD EQUIPMENT

AIR CLEANER - Two, dry type with rain shield and service indicator.

BARRING DEVICE - Manual.

BEARINGS - Heavy duty, replaceable, precision type.

BREATHER - Closed system.

CONNECTING RODS - Drop forged steel, rifle drilled.

CONTROL SYSTEM - Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.

CRANKCASE - Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT - Forged steel, seven main bearings, counterweighted and dynamically balanced.

CYLINDERS - Removable wet type cylinder liners.

CYLINDER HEADS - Twelve interchangeable. Four valves per cylinder, with water cooled exhaust valve seats. Roller valve lifters and hydraulic push rods. Flange mounted ignition coils.

DETONATION SENSING MODULE (DSM) - Waukesha Custom Engine Control Detonation Sensing Module includes individual cylinder sensors, Detonation Sensing Module, filter and cables. Compatible with Waukesha CEC Ignition Module only. Detonation Sensing Module and filter are mounted and wired. Packager is responsible for 24V DC power supply and ground to the DSM. The DSM meets Canadian Standards Association Class 1, Division 2, Group D hazardous location requirements.

ENGINE MONITOR DEVICES - Thermocouples, K-type, are wired to a bulk head connector for jacket water temperature, lube oil temperature, intake manifold temperature, individual cylinder exhaust temperature and common pre-turbine temperatures, one on each bank. 25 foot (7.6 m) customer interface and standard thermocouple harnesses are provided for making connections to a customer supplied panel. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.

ENGINE ROTATION - Counterclockwise when facing flywheel.

FLYWHEEL - Approx. WR^2 = 155000 lb-in^2; with ring gear (208 teeth), machined to accept two drive adapters: 31.88″ (810 mm) pilot bore, 30.25″ (768 mm) bolt circle, (12) 0.75″ 10 tapped holes; or 28.88″ (734 mm) pilot bore, 27.25″ (692 mm) bolt circle, (12) 0.625″-11 tapped holes and (12) 0.75″-10 tapped holes.

FLYWHEEL HOUSING - No. 00 SAE.

FUEL SYSTEM - Two natural gas, 4″ (102 mm) updraft carburetors and two Fisher Model 99, 2″ (51 mm) gas regulators, mounted. 30 - 50 psi (241 - 345 kPa) fuel inlet pressure required.

GOVERNOR - Woodward UG-8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION SYSTEM - Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INTERCOOLER - Air-to-water.

LEVELING BOLTS

LIFTING EYES - Requires 9.5 ton Working Load Limit (W.L.L.) anchor shackles.

LUBRICATION - Full pressure, gear type pump. Full flow lube oil filter, 36 gallon (136 litres) capacity, with replaceable depth-type elements and flexible connections, shipped loose. MICROSPIN® bypass filter, engine mounted. Lube oil strainer, mounted. Air/gas motor driven prelube pump, requires final piping.

MANIFOLDS - Exhaust (2) water cooled.

OIL COOLER - Shell and tube type, with thermostatic temperature controller and pressure regulating valve. Factory mounted.

OIL PAN - Base type. 90 gallon (340 L) capacity, including filter and cooler.

PAINT - Oilfield orange primer.

PISTONS - Aluminum with floating pin. Oil cooled. 10.2:1 compression ratio.

SHIPPING SKID - Steel for domestic truck or rail.

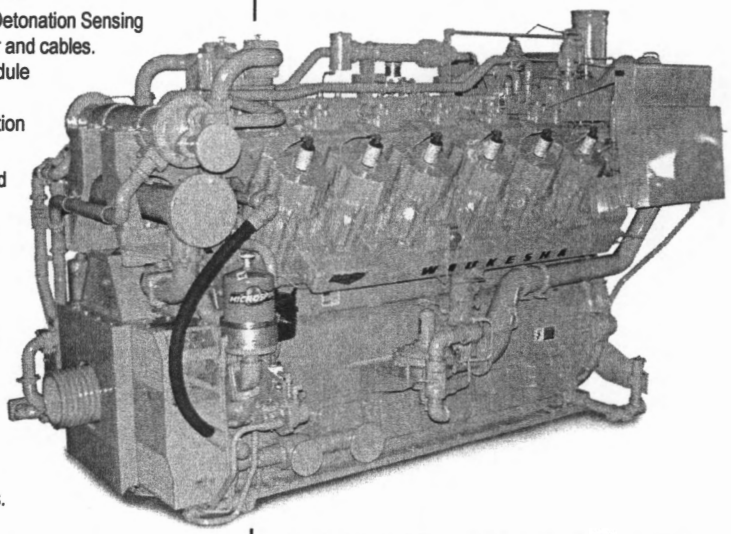
TURBOCHARGERS - (2) water-cooled bearing housing and differential wastegates. Single vertical exhaust outlet at rear. Flexible stainless steel exhaust connection with 8″ (203 mm) pipe flange.

VIBRATION DAMPER - Viscous type.

WATER CIRCULATING SYSTEM

Auxiliary Circuit - Belt driven water circulating pump for intercooler and lube oil cooler. Includes thermostatic valve.

Engine Jacket - Belt driven water circulating pump. Cluster type thermostatic temperature regulating valve, full flow bypass type with 165° - 170° F (74° - 77° C) start to open thermostats. Flange connections and mating flanges for (2) 4″ (102 mm) inlets and (1) 5″ (127 mm) outlet.



Model L5794LT Turbocharged and Intercooled, Twelve Cylinder, Lean Combustion, Four-Cycle Gas Engine

SPECIFICATIONS

Cylinders
V 12

Piston Displacement
5788 cu. in.
(95 L)

Bore & Stroke
8.5″ x 8.5″
(216 x 216 mm)

Compression Ratio
10.2:1

Jacket Water System Capacity
107 gal.
(405 L)

Lube Oil Capacity
90 gal.
(340 L)

Starting System
125 - 150 psi air/gas
24/32 V electric

Dry Weight
22,750 lb.
(10,320 kg)

Waukesha Engine ISO 9001 CERTIFIED

POWER RATINGS: L5794LT VHP SERIES FOUR

Model	I.C. Water Inlet Temp. °F (°C) (Tcra)	C.R.	Brake Horsepower (kWb Output) 1000 rpm	1100 rpm	1200 rpm
L5794LT	130° (54°)	10.2:1	1205 (899)	1325 (988)	1445 (1078)
L5794LT	85° (29°)	10.2:1	1260 (940)	1390 (1037)	1515 (1130)

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature Tcra (clause 10.1) as specified above limited to ± 10° F (± 5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/nm³) SLHV value, with a 91 Waukesha Knock Index®.

For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

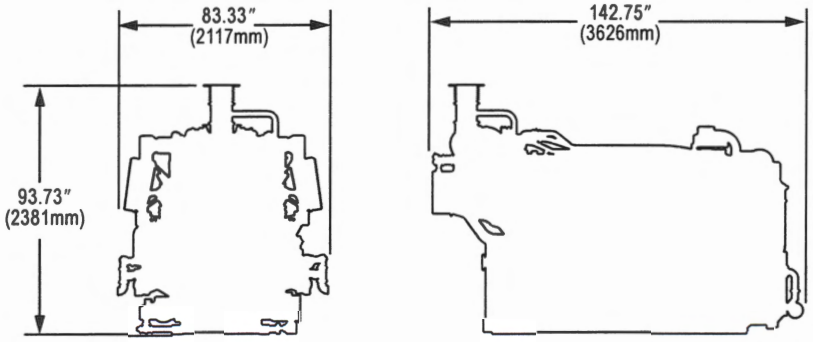
FUEL CONSUMPTION: L5794LT VHP SERIES FOUR

	English	130°F ICW		85°F ICW			Metric	54°C ICW		29° ICW	
Low NO_x Settings	RPM	1200	1000	1200	1000	Low NO_x Settings	RPM	1200	1000	1200	1000
	Power (Bhp)	1445	1205	1515*	1260*		Power (kWb)	1078	899	1130*	940*
	BSFC (Btu/bhp-hr)	7385	7395	7550	7490		BSFC (kJ/kW-hr)	10450	10465	10685	10600
	NOx (grams/bhp-hr)	1.60	1.70	1.00	1.15		NOx (g/nm³)	0.65	0.69	0.40	0.47
	CO (grams/bhp-hr)	1.70	1.65	1.60	1.60		CO (g/nm³)	0.69	0.67	0.65	0.65
	NMHC (grams/bhp–hr)	0.55	0.55	0.55	0.55		NMHC (g/nm³)	0.22	0.22	0.22	0.22
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	7080	6950	6955	6940	Low Fuel Consumption Settings	BSFC (kJ/kW-hr)	10020	9835	9840	9820
	NOx (grams/bhp-hr)	2.45	2.75	2.55	2.65		NOx (g/nm³)	0.99	1.11	1.03	1.07
	CO (grams/bhp-hr)	1.80	1.80	1.75	1.75		CO (g/nm³)	0.73	0.73	0.71	0.71
	NMHC (grams/bhp–hr)	0.50	0.50	0.50	0.50		NMHC (g/nm³)	0.20	0.20	0.20	0.20

*No overload is available at these settings.

NOTES:

1) Fuel consumption and exhaust emissions are based on ISO 3046/1-1995 standard reference conditions and commercial quality natural gas of 900 Btu/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) saturated lower heat value, Waukesha Knock Index® of 91 and 93% methane content by volume. ISO 3046/1-1995 standard reference conditions are 77°F (25°C) ambient temperature, 29.54 inches Hg (100 kPa) barometric pressure, 30% relative humidity (1kPa/0.3 inches Hg water vapor pressure).
2) S.I. exhaust emissions are corrected to 5% O_2 (0°C and 101.325 kPa).
3) Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



DRESSER
Waukesha

WAUKESHA ENGINE
DRESSER, INC.
1000 West St. Paul Avenue
Waukesha, WI 53188-4999
Phone: (262) 547-3311 Fax: (262) 549-2795
waukeshaengine.dresser.com

WAUKESHA ENGINE
DRESSER INDUSTRIAL PRODUCTS, B.V.
Farmsumerweg 43, Postbus 330
9900 AH Appingedam, The Netherlands
Phone: (31) 596-652222 Fax: (31) 596-628111

Bulletin 8023 0102

Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

Waukesha, VHP, Series Four, Microspin, and Waukesha Knock Index are trademarks/registered trademarks of Waukesha Engine, Dresser, Inc.

JOHNSON MATTHEY

EMISSION CONTROL EQUIPMENT SPECIFICATION
434 Devon Park Drive, Wayne, PA 19087
Tel: 610.971.3100 Fax: 610.971.3116

UE Compression	**Date**	**3/28/2005**
Greenwood Village, CO.	**Quote No.**	**463-4-175**
	Email:	lpullig@uec.unitedengines.com
	Phone:	**720-488-3523**
Les Pullig	**Fax:**	**720-488-3530**

ENGINE DATA	***Rich Burn***
Engine Mfg:	Waukesha
Engine Model:	5794LT
Bhp:	1445
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	891
Operating Hours, hrs/yr:	8760

ENGINE PREFORMANCE	
Exhaust Flow, acfm:	7900
Exhaust Flow, scfm:	3041
Exhaust Flow, scfh:	182443
Exhaust Flow, lb/hr:	13897
Exhaust MW:	28.9

TYPICAL (Rich Burn)	***MW***		
Ar, vol %:	39.9		-
N2, vol %:	28.0		72.20
O2, vol %:	32.0		7.80
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	***PRE***	***POST***	***% Reduction***
NOx, g/Bhp-hr:	1.55	1.55	0.0%
NOx, lb/hr:	4.94	4.94	
NOx, tons/yr:	21.63	21.63	
NOx, ppmv:	367.00	367.00	
NOx, ppmvd @ 15% O2:	196.67	196.67	
CO, g/Bhp-hr:	1.84	0.25	86.4%
CO, lb/hr:	5.86	0.80	
CO, tons/yr:	25.68	3.49	
CO, ppmv:	762.42	103.59	
CO, ppmvd @ 15% O2:	408.56	55.51	
NMHC as CH4, g/Bhp-hr:	0.17	0.17	0.0%
NMHC as CH4, lb/hr:	0.54	0.54	
NMHC as CH4, tons.yr.:	2.37	2.37	
NMHC as CH4, ppm:	70.44	70.44	
NMHC as CH4, ppm @ 15% o2:	37.75	37.75	
CH2O as CH4, g/Bhp-hr:	0.16	0.06	62.5%
CH2O as CH4, lb/hr:	0.51	0.19	
CH2O as CH4, tons.yr.:	2.23	0.84	
CH2O as CH4, ppm:	66.30	24.86	
CH2O as CH4, ppm @ 15% o2:	35.53	13.32	

SCOPE OF SUPPLY	**BXO70-14**	***QXC70-14**
Exhaust Line Size, (inches)	**14**	**14**
Attenuation type	**None**	**Critical**
Drawing reference:	**10-OD4070-3**	**8200-1**
Housing:	**Stainless**	**Carbon**
Element(s)(Oxidation)	**1**	**1**
Back Pressure: estimated (inches H2O)	**5**	**7**
Net Price:	**$6,535.00**	**$6,765.00**
Delivery: ARO	**2-3 Weeks**	**6-8 Weeks**

***Integrated Converter/Silencer**
End in....End out
OXIDATION CATALYST

G. W. Kammerer, Engine Industries Sales Manag 281.353.2500 fax : 928-222-4111 email: kammew@jmusa.com

Price firm and valid for 30 days from date of quote, FOB point of Manufacture, excludes any applicable duties and taxes. Terms, net 30 days from date of invoice as offered under Jm's General Terms and Conditions. Warranty 13 months from date of shipment or 12 months from date of start-up. Written notice required.
Maximum service temperature 1350 degree F. Minimum operating temperature 750 degrees F.

Data above calculated from engine manufactures data corresponding to catalyst converter settings. A slightly rich to stoichiometric air fuel ratio is required (Oxygen content in exhaust of 0.2% - 0.7%) oxygen sensor millivolts approximately 700 to 800, or lambda of 0.97 to 0.99)

Table I Engine Rich burn

JM
Johnson Matthey

JOHNSON MATTHEY

EMISSION CONTROL EQUIPMENT SPECIFICATION

434 Devon Park Drive, Wayne, PA 19087
Tel: 610.971.3100 Fax: 610.971.3116

Samson Investment Co.	**Date:** 09/10/2007
Samson Plaza	**Quote No.** N/A
Two West Second St.	**Email:** mbutler@samson.com
Tulsa, OK 74103-3103	**Phone:** 918-591-1619
Attn: Mr. Mike Butler	**Fax:**

ENGINE DATA	
Engine Mfg:	Waukesha
Engine Model:	5794LT
Bhp:	1445
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	600
Operating Hours, hrs/yr:	8760

ENGINE PREFORMANCE	
Exhaust Flow, acfm:	7900
Exhaust Flow, scfm:	3875
Exhaust Flow, scfh:	232528
Exhaust Flow, lb/hr:	17712
Exhaust MW:	28.9

TYPICAL (Rich Burn)	***MW***		
Ar, vol %:	39.9		-
N2, vol %:	28.0		72.20
O2, vol %:	32.0		7.80
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	***PRE***	***POST***	***% Reduction***
NOx, g/Bhp-hr:	1.55	1.55	0.0%
NOx, lb/hr:	4.94	4.94	
NOx, tons/yr:	21.63	21.63	
NOx, ppmv:	287.95	287.95	
NOx, ppmvd @ 15% O2:	154.31	154.31	
CO, g/Bhp-hr:	1.84	0.33	82.1%
CO, lb/hr:	5.86	1.05	
CO, tons/yr:	25.68	4.61	
CO, ppmv:	598.20	107.29	
CO, ppmvd @ 15% O2:	320.56	57.49	
NMHC as CH4, g/Bhp-hr:	0.17	0.17	0.0%
NMHC as CH4, lb/hr:	0.54	0.54	
NMHC as CH4, tons.yr.:	2.37	2.37	
NMHC as CH4, ppm:	55.27	55.27	
NMHC as CH4, ppm @ 15% o2:	29.62	29.62	
CH2O as CH4, g/Bhp-hr:	0.22	0.07	69.1%
CH2O as CH4, lb/hr:	0.70	0.22	
CH2O as CH4, tons.yr.:	3.07	0.95	
CH2O as CH4, ppm:	71.52	22.11	
CH2O as CH4, ppm @ 15% o2:	38.33	11.85	

SCOPE OF SUPPLY	**BXO70-14**	***QXC70-14**
Exhaust Line Size, (inches)	**14**	**14**
Attenuation type	**None**	**Critical**
Drawing reference:	**10-OD4070-3**	**8200-1**
Housing:		
Element(s)(Oxidation)		
Back Pressure: estimated (inches H2O)		
Net Price:		
Delivery: ARO		

***Integrated Converter/Silencer**
End in....End out
OXIDATION CATALYST

Jack Carroll Sr. Sales Engineer **ph: 484-320-2** **fax : 484-320-2152928-222-** **email: carrojj@jmusa.com**

Johnson Matthey

JOHNSON MATTHEY

EMISSION CONTROL EQUIPMENT SPECIFICATION

434 Devon Park Drive, Wayne, PA 19087
Tel: 610.971.3100 Fax: 610.971.3116

Samson Investment Co.	**Date:** 09/10/2007
Samson Plaza	**Quote No.** N/A
Two West Second St.	**Email:** mbutler@samson.com
Tulsa, OK 74103-3103	**Phone:** 918-591-1619
Attn: Mr. Mike Butler	**Fax:**

ENGINE DATA	
Engine Mfg:	Waukesha
Engine Model:	5794LT
Bhp:	1445
RPM:	1200
Load:	100%
Fuel:	Natural Gas
Temp into Catalyst, °F:	500
Operating Hours, hrs/yr:	8760

ENGINE PREFORMANCE	
Exhaust Flow, acfm:	7900
Exhaust Flow, scfm:	4279
Exhaust Flow, scfh:	256750
Exhaust Flow, lb/hr:	19557
Exhaust MW:	28.9

TYPICAL (Rich Burn)	***MW***		
Ar, vol %:	39.9		-
N2, vol %:	28.0		72.20
O2, vol %:	32.0		7.80
H2O, vol%:	18.0		10.00
CO2, vol %:	44.0		10.00

EMISSIONS DATA	***PRE***	***POST***	***% Reduction***
NOx, g/Bhp-hr:	1.55	1.55	0.0%
NOx, lb/hr:	4.94	4.94	
NOx, tons/yr:	21.63	21.63	
NOx, ppmv:	260.79	260.79	
NOx, ppmvd @ 15% O2:	139.75	139.75	
CO, g/Bhp-hr:	1.84	0.40	78.3%
CO, lb/hr:	5.86	1.27	
CO, tons/yr:	25.68	5.58	
CO, ppmv:	541.76	117.77	
CO, ppmvd @ 15% O2:	290.32	63.11	
NMHC as CH4, g/Bhp-hr:	0.17	0.17	0.0%
NMHC as CH4, lb/hr:	0.54	0.54	
NMHC as CH4, tons.yr.:	2.37	2.37	
NMHC as CH4, ppm:	50.05	50.05	
NMHC as CH4, ppm @ 15% o2:	26.82	26.82	
CH2O as CH4, g/Bhp-hr:	0.22	0.08	65.9%
CH2O as CH4, lb/hr:	0.70	0.24	
CH2O as CH4, tons.yr.:	3.07	1.05	
CH2O as CH4, ppm:	64.78	22.08	
CH2O as CH4, ppm @ 15% o2:	34.71	11.83	

SCOPE OF SUPPLY	**BXO70-14**	***QXC70-14**
Exhaust Line Size, (inches)	**14**	**14**
Attenuation type	**None**	**Critical**
Drawing reference:	**10-OD4070-3**	**8200-1**
Housing:		
Element(s)(Oxidation)		
Back Pressure: estimated (inches H2O)		
Net Price:		
Delivery: ARO		

***Integrated Converter/Silencer**
End in....End out
OXIDATION CATALYST

Jack Carroll Sr. Sales Engineer **ph: 484-320-2** **fax : 484-320-2152928-222-** **email: carrojj@jmusa.com**

JM
Johnson Matthey

Jaques Compressor Station
Engine Emission Calculations

Basis

Unit(s)	E1-E2	
Type	Waukesha L5794LT	
Control	None	
Horsepower	1400	hp
Hours of Operation	8760	hrs
Fuel Usage	7155	BTU/hp-hr
Fuel Heat Content	975.0	BTU/SCF
Fuel Use Rate	10.27	Mscf/hr
	246.57	Mscf/day
Annual Fuel Consumption	90.00	MMscf

Emissions Estimate (per engine)

	Uncontrolled				
	Emissions Factor		Emissions		
Pollutant	(lb/MMbtu)	(g/hp-hr)	(lb/hr)	(lb/yr)	(tpy)
NO_X	0.7696	2.500	7.71	---	33.77
CO	0.5541	1.800	5.55	---	24.31
VOC	0.1539	0.500	1.54	---	6.75
Formaldehyde	0.0493	0.160	0.49	4322	2.16
SO_2	0.0006	0.002	0.01	---	0.03
TSP	0.0100	0.032	0.10	---	0.44
PM_{10}	0.0001	0.000	0.00	---	0.00
$PM_{2.5}$	0.0001	0.000	0.00	---	0.00
Acetaldehyde	0.0084	0.027	0.08	734	0.37
Acrolein	0.0051	0.017	0.05	451	0.23
Benzene	0.0004	0.001	0.00	39	0.02
Toluene	0.0004	0.001	0.00	36	0.02
Xylene	0.0002	0.001	0.00	16	0.01
n-Hexane	0.0011	0.004	0.01	97	0.05
Methanol	0.0025	0.008	0.03	219	0.11

Emission Factors from Manufacturer's Specifications or
AP-42 Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean Burn Engines

Jaques Compressor Station
Engine Emission Calculations

Basis

Unit(s)	E3-E6	
Type	Waukesha L5794LT	
Control	Oxidation Catalyst	
Horsepower	1400	hp
Hours of Operation	8760	hrs
Fuel Usage	7155	BTU/hp-hr
Fuel Heat Content	975.0	BTU/SCF
Fuel Use Rate	10.27	Mscf/hr
	246.6	Mscf/day
Annual Fuel Consumption	90.00	MMscf

Emissions Estimate (per engine)

	Uncontrolled					Controlled					Reduction Efficiency
	Emissions Factor		Emissions			Emissions Factor		Emissions			
Pollutant	(lb/MMbtu)	(g/hp-hr)	(lb/hr)	(lb/yr)	(tpy)	(lb/MMbtu)	(g/hp-hr)	(lb/hr)	(lb/yr)	(tpy)	
NO_X	0.7696	2.500	7.71	---	33.77	0.7696	2.500	7.71	---	33.77	0%
CO	0.5541	1.800	5.55	---	24.31	0.1385	0.450	1.39	---	6.08	75%
VOC	0.1539	0.500	1.54	---	6.75	0.0616	0.200	0.62	---	2.70	60%
Formaldehyde	0.0493	0.160	0.49	4322	2.16	0.0197	0.064	0.20	1729	0.86	60%
SO_2	0.0006	0.002	0.01	---	0.03	0.0006	0.002	0.01	---	0.03	0%
TSP	0.0100	0.032	0.10	---	0.44	0.0100	0.032	0.10	---	0.44	0%
PM_{10}	0.0001	0.000	0.00	---	0.00	0.0001	0.000	0.00	---	0.00	0%
$PM_{2.5}$	0.0001	0.000	0.00	---	0.00	0.0001	0.000	0.00	---	0.00	0%
Acetaldehyde	0.0084	0.027	0.08	734	0.37	0.0017	0.005	0.02	147	0.07	80%
Acrolein	0.0051	0.017	0.05	451	0.23	0.0010	0.003	0.01	90	0.05	80%
Benzene	0.0004	0.001	0.00	39	0.02	0.0001	0.000	0.00	8	0.00	80%
Toluene	0.0004	0.001	0.00	36	0.02	0.0001	0.000	0.00	7	0.00	80%
Xylene	0.0002	0.001	0.00	16	0.01	0.0000	0.000	0.00	3	0.00	80%
n-Hexane	0.0011	0.004	0.01	97	0.05	0.0002	0.001	0.00	19	0.01	80%
Methanol	0.0025	0.008	0.03	219	0.11	0.0005	0.002	0.01	44	0.02	80%

Emission Factors from Manufacturer's Specifications or
AP-42 Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean Burn Engines

Emission Estimates
Emission Unit E1
Jaques Compressor Station

Unit E1 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. Potential to emit calculations are presented below.

Potential to Emit: Uncontrolled Configuration

Estimated Emission Factors

NO_X	2.5	g/hp-hr	(Manufacturer Quotation)
CO	1.8	g/hp-hr	(Manufacturer Quotation)
VOC	0.5	g/hp-hr	(Manufacturer Quotation)
Formaldehyde	0.16	g/hp-hr	(Emission Test Results on Similar Engines, Manufacturer Discussions)

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.8\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 24.3\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.16\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 2.2\ tpy$$

Emission Estimates
Emission Unit E2
Jaques Compressor Station

Unit E2 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. Potential to emit calculations are presented below.

Potential to Emit: Uncontrolled Configuration

Estimated Emission Factors

NO_X	2.5	g/hp-hr	(Manufacturer Quotation)
CO	1.8	g/hp-hr	(Manufacturer Quotation)
VOC	0.5	g/hp-hr	(Manufacturer Quotation)
Formaldehyde	0.16	g/hp-hr	(Emission Test Results on Similar Engines, Manufacturer Discussions)

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.8\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 24.3\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.16\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 2.2\ tpy$$

Emission Estimates
Emission Unit E3
Jaques Compressor Station

Unit E3 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst for the control of formaldehyde. Potential to emit calculations are presented below.

Potential to Emit: Uncontrolled Configuration
Lean-burn Engine with Oxidation Catalyst for formaldehyde control

Estimated Emission Factors

NO_X	2.5	g/hp-hr	(Manufacturer Quotation)
CO	1.8	g/hp-hr	(Manufacturer Quotation)
VOC	0.5	g/hp-hr	(Manufacturer Quotation)
Formaldehyde	0.064	g/hp-hr	(Manufacturer Quotation)

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.8\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 24.3\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.064\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 0.9\ tpy$$

Emission Estimates
Emission Unit E4
Jaques Compressor Station

Unit E4 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst for the control of formaldehyde. Potential to emit calculations are presented below.

Potential to Emit: Uncontrolled Configuration
Lean-burn Engine with Oxidation Catalyst for formaldehyde control

Estimated Emission Factors

NO_X	2.5	g/hp-hr	(Manufacturer Quotation)
CO	1.8	g/hp-hr	(Manufacturer Quotation)
VOC	0.5	g/hp-hr	(Manufacturer Quotation)
Formaldehyde	0.064	g/hp-hr	(Manufacturer Quotation)

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 33.8\ tpy$$

$$CO = \frac{(1.8\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 24.3\ tpy$$

$$VOC = \frac{(0.5\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 6.8\ tpy$$

$$CH_2O = \frac{(0.064\ g/hp\text{-}hr)(1{,}400\ hp)(8{,}760\ hr/yr)}{(454\ g/lb)(2{,}000\ lb/ton)} = 0.9\ tpy$$

Emission Estimates
Emission Unit E5
Jaques Compressor Station

Unit E5 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst for the control of formaldehyde. Potential to emit calculations are presented below.

Potential to Emit: Uncontrolled Configuration
Lean-burn Engine with Oxidation Catalyst for formaldehyde control

Estimated Emission Factors

NO_X	2.5	g/hp-hr	(Manufacturer Quotation)
CO	1.8	g/hp-hr	(Manufacturer Quotation)
VOC	0.5	g/hp-hr	(Manufacturer Quotation)
Formaldehyde	0.064	g/hp-hr	(Manufacturer Quotation)

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 33.8\ \text{tpy}$$

$$CO = \frac{(1.8\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 24.3\ \text{tpy}$$

$$VOC = \frac{(0.5\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 6.8\ \text{tpy}$$

$$CH_2O = \frac{(0.064\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 0.9\ \text{tpy}$$

Emission Estimates
Emission Unit E6
Jaques Compressor Station

Unit E6 is a 1,400 horsepower Waukesha L5794LT, a 4-stroke lean burn internal combustion engine. The engine is equipped with an oxidation catalyst for the control of formaldehyde. Potential to emit calculations are presented below.

Potential to Emit: Uncontrolled Configuration
Lean-burn Engine with Oxidation Catalyst for formaldehyde control

Estimated Emission Factors

NO_X	2.5	g/hp-hr	(Manufacturer Quotation)
CO	1.8	g/hp-hr	(Manufacturer Quotation)
VOC	0.5	g/hp-hr	(Manufacturer Quotation)
Formaldehyde	0.064	g/hp-hr	(Manufacturer Quotation)

Site-Rated Horsepower: 1,400 hp

$$NO_X = \frac{(2.5\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 33.8\ \text{tpy}$$

$$CO = \frac{(1.8\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 24.3\ \text{tpy}$$

$$VOC = \frac{(0.5\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 6.8\ \text{tpy}$$

$$CH_2O = \frac{(0.064\ \text{g/hp - hr})(1{,}400\ \text{hp})(8{,}760\ \text{hr/yr})}{(454\ \text{g/lb})(2{,}000\ \text{lb/ton})} = 0.9\ \text{tpy}$$

Dehydration Units

Emission Unit Description
Dehydration Units
Jaques Compressor Station

There are two tri-ethylene glycol dehydration units installed at the Jaques Compressor Station. The dehydration units, Units D1 and D2, are equipped with flash gas separators that route the flash gas back into the sales line. Units D1 and D2 are each equipped with condensers and emissions from both units are routed to a PESCO BTEX combustor control unit which has a manufacturer guaranteed 98-percent control efficiency. Detailed emission calculations are attached for each unit. The PESCO BTEX unit manufacturer's specification sheet is also attached. Table 9 lists the serial number and installation/startup date for each of the dehydration units at the Jaques Compressor Station.

Table 9: Jaques Dehydration Unit Information

Unit ID	Description	Serial Number	Installation/Startup Date
D1	18 MMscfd PESCO Dehydration Unit with 0.375 MMBtu/hr reboiler burner	102018	2003
D2	30 MMscfd NATCO Dehydration Unit with 1.25 MMBtu/hr reboiler burner	T-1A8780101	2009

Benzene emissions from each dehydration unit are limited to 0.9 tons per consecutive twelve months. There is also a facility-wide HAP emission limit of 23 tons per consecutive twelve month period. To ensure compliance with these limits monthly gas analysis testing is conducted to use for monthly dehydration unit emission calculations. This testing includes the temperature and pressure of the inlet gas. Monthly determination of benzene and HAP emissions from the dehydrators is calculated using GRI GlyCalc using the current month's wet gas analysis, the temperature and pressure of the gas, the enclosed flare destruction efficiency of 98%, and the maximum gas throughput and glycol pump recirculation rate for each dehydrator. Unit D1 has a maximum throughput of 18 MMscfd and a glycol recirculation rate of 8 gallons per minute and D2has a maximum throughput of 30 MMscfd and glycol recirculation rate of 13 gallons per minute.

Benzene emissions are calculated from each dehydration unit each month. The benzene emissions for the current month are added to the preceding eleven months to record a new 12-month rolling total. Total HAP emissions are calculated from each dehydrator each month. The HAP emissions from the current month are added to those from the engines and insignificant emissions units listed in the air permit to determine the monthly total. This monthly total will be added to the preceding eleven months to record a new 12-month rolling total.

Records are kept of the gas analysis testing, GRI Glycalc modeling, and the rolling 12 month emissions totals for benzene and HAPs.

PESCO
process equipment & service company inc

OPERATIONAL GUARANTEE - PESCO FLARE STACK
U.S. PATENT 6485292 (Other Patents Pending)

The PESCO Flare Stack (enclosed flare) is guaranteed to achieve total destruction of 98% or greater of all hydrocarbons present in the overhead stream from the still column of a glycol dehydrator. This assumes that the operating parameters do not exceed those to which the flare stack was initially designed. The PESCO Flare Stack is also guaranteed to meet the environmental requirements as set forth in 40 CFR 60.18.

James Rhodes
Engineering Manager
Process Equipment & Service Co., Inc.

5680 U.S. HIGHWAY 64 • 87401 / P.O. BOX 828 • 87499 • FARMINGTON, NEW MEXICO • PHONE: (505) 327-2222 • FAX: (505) 327-7550

Emission Estimates
Emission Unit D1 - 18 MMscfd PESCO Dehydration Unit
Emission Unit D2 - 30 MMscfd NATCO Dehydration Unit
Jaques Compressor Station

VOC and HAP emissions may occur when triethylene glycol is regenerated. The emission model GRI-GLYCalc, a thermodynamic-based process simulator for dehydration units, was utilized to estimate emissions from this unit. A worse-case inlet gas analysis was developed based on highest sampled VOC content and maximum anticipated benzene concentration and input to the model. Following is a summary of other worse-case operating parameter model input values:

Parameter	Value	
Inlet Gas Temperature	70	°F
Inlet Gas Pressure	500	psig
Inlet Benzene Concentration	20	ppm
D1 Inlet Gas Throughput	18	MMscfd
D1 Glycol Circulation	8	gpm
D2 Inlet Gas Throughput	30	MMscfd
D2 Glycol Circulation	13	gpm
Flash Vessel Temperature	100	°F
Flash Vessel Pressure	30	psig
Condenser Temperature	120	°F
Condenser Pressure	23	psia (Atmospheric)

Units D1 and D2 will each be equipped with flash gas separators that route the flash gas back into the sales line. The dehydration units are also equipped with condensers and emissions from both units will be routed to a PESCO BTEX combustor unit which has a manufacturer guaranteed 98-percent control efficiency.

D1 - 18 MMscfd Model Results (Output Follows)

VOC Emissions	0.12 tpy (16.9 tpy Uncontrolled)
Benzene Emissions	0.06 tpy (Controlled)

D2 - 30 MMscfd Model Results (Output Follows)

VOC Emissions	0.19 tpy (27.8 tpy Uncontrolled)
Benzene Emissions	0.10 tpy (Controlled)

Emission Limits

Benzene Emissions	0.9 tpy (for each unit)
Facility-wide HAP	23.0 tpy

EMISSION UNIT D1
TEG DEHYDRATION UNIT

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Samson Jaques
File Name: C:\Work\Projects\Samson\Jacques\Permit Work\September 2011\dehys\D1 PTE.ddf
Date: October 13, 2011

DESCRIPTION:

Description: D1 PTE Model
18 MMSCFD PESCO Dehydration Unit
April 2011 Analysis

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0129	0.310	0.0566
Ethane	0.0009	0.021	0.0039
Propane	0.0006	0.015	0.0028
Isobutane	0.0004	0.009	0.0016
n-Butane	0.0006	0.014	0.0026
Isopentane	0.0004	0.009	0.0017
n-Pentane	0.0003	0.008	0.0015
n-Hexane	0.0004	0.009	0.0016
Cyclohexane	0.0012	0.030	0.0054
Other Hexanes	0.0005	0.013	0.0023
Heptanes	0.0011	0.026	0.0047
Methylcyclohexane	0.0016	0.039	0.0072
2,2,4-Trimethylpentane	<0.0001	0.001	0.0001
Benzene	0.0140	0.336	0.0614
Toluene	0.0038	0.091	0.0166
Xylenes	0.0023	0.055	0.0101
C8+ Heavies	<0.0001	0.001	0.0001
Total Emissions	0.0411	0.986	0.1800
Total Hydrocarbon Emissions	0.0411	0.986	0.1800
Total VOC Emissions	0.0273	0.655	0.1195
Total HAP Emissions	0.0205	0.492	0.0897
Total BTEX Emissions	0.0201	0.483	0.0881

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.6467	15.520	2.8325
Ethane	0.0443	1.063	0.1940
Propane	0.0322	0.773	0.1412
Isobutane	0.0185	0.443	0.0809
n-Butane	0.0307	0.736	0.1343
Isopentane	0.0220	0.527	0.0962
n-Pentane	0.0192	0.460	0.0840
n-Hexane	0.0246	0.591	0.1078
Cyclohexane	0.0948	2.276	0.4153
Other Hexanes	0.0333	0.800	0.1460

Heptanes	0.1091	2.618	0.4777
Methylcyclohexane	0.1721	4.131	0.7538
2,2,4-Trimethylpentane	0.0026	0.063	0.0116
Benzene	1.2154	29.168	5.3232
Toluene	0.5966	14.319	2.6132
Xylenes	0.9676	23.223	4.2382
C8+ Heavies	0.5254	12.611	2.3015
Total Emissions	4.5551	109.323	19.9515
Total Hydrocarbon Emissions	4.5551	109.323	19.9515
Total VOC Emissions	3.8641	92.740	16.9250
Total HAP Emissions	2.8069	67.365	12.2941
Total BTEX Emissions	2.7796	66.711	12.1747

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	61.9732	1487.358	271.4427
Ethane	1.0492	25.180	4.5954
Propane	0.3416	8.198	1.4962
Isobutane	0.1184	2.842	0.5186
n-Butane	0.1450	3.480	0.6352
Isopentane	0.0857	2.057	0.3753
n-Pentane	0.0579	1.389	0.2535
n-Hexane	0.0372	0.892	0.1627
Cyclohexane	0.0344	0.825	0.1506
Other Hexanes	0.0689	1.653	0.3016
Heptanes	0.0721	1.730	0.3157
Methylcyclohexane	0.0453	1.087	0.1984
2,2,4-Trimethylpentane	0.0037	0.088	0.0161
Benzene	0.0551	1.322	0.2413
Toluene	0.0157	0.378	0.0689
Xylenes	0.0092	0.220	0.0402
C8+ Heavies	0.0298	0.716	0.1306
Total Emissions	64.1423	1539.415	280.9432
Total Hydrocarbon Emissions	64.1423	1539.415	280.9432
Total VOC Emissions	1.1199	26.877	4.9051
Total HAP Emissions	0.1208	2.900	0.5292
Total BTEX Emissions	0.0800	1.920	0.3504

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature:	120.00	deg. F
Condenser Pressure:	23.00	psia
Condenser Duty:	9.12e-003	MM BTU/hr
Hydrocarbon Recovery:	0.20	bbls/day
Produced Water:	1.95	bbls/day
Ambient Temperature:	60.00	deg. F
Excess Oxygen:	2.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	9.12e-003	MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	1.99%	98.01%
Propane	1.96%	98.04%
Isobutane	1.93%	98.07%
n-Butane	1.90%	98.10%
Isopentane	1.78%	98.22%
n-Pentane	1.73%	98.27%
n-Hexane	1.45%	98.55%
Cyclohexane	1.30%	98.70%
Other Hexanes	1.57%	98.43%
Heptanes	0.99%	99.01%
Methylcyclohexane	0.95%	99.05%
2,2,4-Trimethylpentane	1.00%	99.00%
Benzene	1.15%	98.85%
Toluene	0.63%	99.37%
Xylenes	0.24%	99.76%
C8+ Heavies	0.01%	99.99%

ABSORBER

Specified Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	1.37	lbs. H2O/MMSCF
Temperature:	70.0	deg. F
Pressure:	500.0	psig
Dry Gas Flow Rate:	18.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0223	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	39.42	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	16.82	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.48%	96.52%
Carbon Dioxide	99.54%	0.46%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.90%	0.10%
Propane	99.80%	0.20%
Isobutane	99.67%	0.33%
n-Butane	99.55%	0.45%
Isopentane	99.49%	0.51%
n-Pentane	99.31%	0.69%
n-Hexane	98.67%	1.33%
Cyclohexane	94.21%	5.79%
Other Hexanes	99.03%	0.97%
Heptanes	97.14%	2.86%
Methylcyclohexane	92.72%	7.28%
2,2,4-Trimethylpentane	98.79%	1.21%

Benzene	59.06%	40.94%
Toluene	44.17%	55.83%
Xylenes	22.64%	77.36%
C8+ Heavies	91.02%	8.98%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 100.0 deg. F
Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.92%	0.08%
Carbon Dioxide	13.29%	86.71%
Nitrogen	1.01%	98.99%
Methane	1.03%	98.97%
Ethane	4.05%	95.95%
Propane	8.62%	91.38%
Isobutane	13.50%	86.50%
n-Butane	17.45%	82.55%
Isopentane	20.70%	79.30%
n-Pentane	25.18%	74.82%
n-Hexane	40.10%	59.90%
Cyclohexane	74.21%	25.79%
Other Hexanes	33.19%	66.81%
Heptanes	60.40%	39.60%
Methylcyclohexane	79.98%	20.02%
2,2,4-Trimethylpentane	42.63%	57.37%
Benzene	95.88%	4.12%
Toluene	97.63%	2.37%
Xylenes	99.18%	0.82%
C8+ Heavies	95.26%	4.74%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	70.30%	29.70%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	1.78%	98.22%
n-Pentane	1.57%	98.43%
n-Hexane	1.10%	98.90%
Cyclohexane	4.18%	95.82%
Other Hexanes	2.54%	97.46%
Heptanes	0.78%	99.22%
Methylcyclohexane	4.88%	95.12%
2,2,4-Trimethylpentane	3.06%	96.94%

Benzene	5.19%	94.81%
Toluene	8.07%	91.93%
Xylenes	12.98%	87.02%
C8+ Heavies	12.40%	87.60%

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 7.51e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.30e-002	2.96e+001
Carbon Dioxide	5.15e+000	4.49e+003
Nitrogen	2.56e-002	1.42e+001
Methane	9.39e+001	2.98e+004
Ethane	6.41e-001	3.82e+002
Propane	1.11e-001	9.66e+001
Isobutane	2.33e-002	2.68e+001
n-Butane	2.41e-002	2.77e+001
Isopentane	1.08e-002	1.54e+001
n-Pentane	6.19e-003	8.85e+000
n-Hexane	2.40e-003	4.09e+000
Cyclohexane	1.30e-003	2.16e+000
Other Hexanes	5.20e-003	8.86e+000
Heptanes	3.00e-003	5.95e+000
Methylcyclohexane	1.50e-003	2.91e+000
2,2,4-Trimethylpentane	2.00e-004	4.52e-001
Benzene	2.00e-003	3.09e+000
Toluene	5.99e-004	1.09e+000
Xylenes	5.99e-004	1.26e+000
C8+ Heavies	1.80e-003	6.06e+000
Total Components	100.00	3.49e+004

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 7.50e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.89e-003	1.03e+000
Carbon Dioxide	5.13e+000	4.47e+003
Nitrogen	2.56e-002	1.42e+001
Methane	9.40e+001	2.98e+004
Ethane	6.42e-001	3.81e+002
Propane	1.11e-001	9.64e+001
Isobutane	2.32e-002	2.67e+001
n-Butane	2.40e-002	2.76e+001
Isopentane	1.07e-002	1.53e+001
n-Pentane	6.16e-003	8.79e+000

n-Hexane	2.37e-003	4.04e+000
Cyclohexane	1.23e-003	2.04e+000
Other Hexanes	5.15e-003	8.78e+000
Heptanes	2.92e-003	5.77e+000
Methylcyclohexane	1.39e-003	2.70e+000
2,2,4-Trimethylpentane	1.98e-004	4.46e-001
Benzene	1.18e-003	1.82e+000
Toluene	2.65e-004	4.83e-001
Xylenes	1.36e-004	2.85e-001
C8+ Heavies	1.64e-003	5.52e+000
Total Components	100.00	3.49e+004

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 8.00e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	4.44e+003
Water	1.50e+000	6.76e+001
Carbon Dioxide	4.56e-011	2.05e-009
Nitrogen	8.64e-015	3.89e-013
Methane	5.75e-018	2.59e-016
Ethane	4.09e-009	1.84e-007
Propane	1.77e-010	7.97e-009
Isobutane	5.83e-011	2.63e-009
n-Butane	6.86e-011	3.09e-009
Isopentane	8.85e-006	3.98e-004
n-Pentane	6.78e-006	3.05e-004
n-Hexane	6.05e-006	2.73e-004
Cyclohexane	9.19e-005	4.14e-003
Other Hexanes	1.93e-005	8.67e-004
Heptanes	1.90e-005	8.55e-004
Methylcyclohexane	1.96e-004	8.84e-003
2,2,4-Trimethylpentane	1.85e-006	8.35e-005
Benzene	1.48e-003	6.66e-002
Toluene	1.16e-003	5.24e-002
Xylenes	3.20e-003	1.44e-001
C8+ Heavies	1.65e-003	7.44e-002
Total Components	100.00	4.50e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 8.27e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.58e+001	4.44e+003
Water	2.08e+000	9.62e+001
Carbon Dioxide	6.22e-001	2.88e+001
Nitrogen	6.48e-004	3.00e-002
Methane	1.35e+000	6.26e+001

Ethane	2.36e-002	1.09e+000
Propane	8.07e-003	3.74e-001
Isobutane	2.96e-003	1.37e-001
n-Butane	3.79e-003	1.76e-001
Isopentane	2.33e-003	1.08e-001
n-Pentane	1.67e-003	7.74e-002
n-Hexane	1.34e-003	6.20e-002
Cyclohexane	2.88e-003	1.33e-001
Other Hexanes	2.23e-003	1.03e-001
Heptanes	3.93e-003	1.82e-001
Methylcyclohexane	4.89e-003	2.26e-001
2,2,4-Trimethylpentane	1.38e-004	6.40e-003
Benzene	2.89e-002	1.34e+000
Toluene	1.44e-002	6.65e-001
Xylenes	2.42e-002	1.12e+000
C8+ Heavies	1.36e-002	6.30e-001
Total Components	100.00	4.63e+003

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 44.70 psia
Flow Rate: 1.70e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.00e-001	8.10e-002
Carbon Dioxide	1.26e+001	2.50e+001
Nitrogen	2.36e-002	2.97e-002
Methane	8.61e+001	6.20e+001
Ethane	7.77e-001	1.05e+000
Propane	1.73e-001	3.42e-001
Isobutane	4.54e-002	1.18e-001
n-Butane	5.56e-002	1.45e-001
Isopentane	2.65e-002	8.57e-002
n-Pentane	1.79e-002	5.79e-002
n-Hexane	9.60e-003	3.72e-002
Cyclohexane	9.10e-003	3.44e-002
Other Hexanes	1.78e-002	6.89e-002
Heptanes	1.60e-002	7.21e-002
Methylcyclohexane	1.03e-002	4.53e-002
2,2,4-Trimethylpentane	7.16e-004	3.67e-003
Benzene	1.57e-002	5.51e-002
Toluene	3.80e-003	1.57e-002
Xylenes	1.92e-003	9.18e-003
C8+ Heavies	3.90e-003	2.98e-002
Total Components	100.00	8.92e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 8.07e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.77e+001	4.44e+003
Water	2.12e+000	9.61e+001
Carbon Dioxide	8.43e-002	3.83e+000
Nitrogen	6.67e-006	3.03e-004
Methane	1.42e-002	6.47e-001
Ethane	9.76e-004	4.43e-002
Propane	7.10e-004	3.22e-002
Isobutane	4.07e-004	1.85e-002
n-Butane	6.75e-004	3.07e-002
Isopentane	4.93e-004	2.24e-002
n-Pentane	4.29e-004	1.95e-002
n-Hexane	5.48e-004	2.49e-002
Cyclohexane	2.18e-003	9.90e-002
Other Hexanes	7.53e-004	3.42e-002
Heptanes	2.42e-003	1.10e-001
Methylcyclohexane	3.99e-003	1.81e-001
2,2,4-Trimethylpentane	6.01e-005	2.73e-003
Benzene	2.82e-002	1.28e+000
Toluene	1.43e-002	6.49e-001
Xylenes	2.45e-002	1.11e+000
C8+ Heavies	1.32e-002	6.00e-001
Total Components	100.00	4.54e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 6.66e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.03e+001	2.85e+001
Carbon Dioxide	4.95e+000	3.83e+000
Nitrogen	6.16e-004	3.03e-004
Methane	2.30e+000	6.47e-001
Ethane	8.40e-002	4.43e-002
Propane	4.16e-002	3.22e-002
Isobutane	1.81e-002	1.85e-002
n-Butane	3.01e-002	3.07e-002
Isopentane	1.74e-002	2.20e-002
n-Pentane	1.51e-002	1.92e-002
n-Hexane	1.63e-002	2.46e-002
Cyclohexane	6.42e-002	9.48e-002
Other Hexanes	2.20e-002	3.33e-002
Heptanes	6.20e-002	1.09e-001
Methylcyclohexane	9.99e-002	1.72e-001
2,2,4-Trimethylpentane	1.32e-003	2.64e-003
Benzene	8.87e-001	1.22e+000
Toluene	3.69e-001	5.97e-001

Xylenes	5.19e-001	9.68e-001
C8+ Heavies	1.76e-001	5.25e-001
Total Components	100.00	3.69e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 5.67e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.98e+001	2.83e+001	998428.
Carbon Dioxide	7.53e-002	2.14e-002	753.
Nitrogen	1.57e-007	4.45e-008	0.
Methane	6.46e-004	1.83e-004	6.
Ethane	5.02e-005	1.43e-005	1.
Propane	3.73e-005	1.06e-005	0.
Isobutane	1.14e-005	3.24e-006	0.
n-Butane	2.49e-005	7.06e-006	0.
Isopentane	1.17e-005	3.32e-006	0.
n-Pentane	1.07e-005	3.03e-006	0.
n-Hexane	9.54e-006	2.71e-006	0.
Cyclohexane	1.85e-004	5.26e-005	2.
Other Hexanes	1.13e-005	3.20e-006	0.
Heptanes	1.60e-005	4.54e-006	0.
Methylcyclohexane	1.18e-004	3.34e-005	1.
2,2,4-Trimethylpentane	2.61e-007	7.41e-008	0.
Benzene	5.92e-002	1.68e-002	592.
Toluene	1.32e-002	3.74e-003	132.
Xylenes	8.34e-003	2.37e-003	83.
C8+ Heavies	2.84e-007	8.05e-008	0.
Total Components	100.00	2.84e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 5.84e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	5.10e-002	1.27e-003
Carbon Dioxide	3.10e-001	7.70e-003
Nitrogen	1.49e-005	3.69e-007
Methane	1.80e-002	4.48e-004
Ethane	6.39e-003	1.59e-004
Propane	2.38e-002	5.90e-004
Isobutane	2.65e-002	6.59e-004
n-Butane	5.96e-002	1.48e-003
Isopentane	9.80e-002	2.44e-003
n-Pentane	1.04e-001	2.59e-003
n-Hexane	2.71e-001	6.74e-003
Cyclohexane	1.33e+000	3.32e-002
Other Hexanes	2.85e-001	7.09e-003
Heptanes	2.21e+000	5.51e-002
Methylcyclohexane	3.62e+000	8.99e-002
2,2,4-Trimethylpentane	5.30e-002	1.32e-003

Benzene	2.00e+001	4.98e-001
Toluene	1.62e+001	4.04e-001
Xylenes	3.42e+001	8.50e-001
C8+ Heavies	2.11e+001	5.24e-001
Total Components	100.00	2.49e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 23.00 psia
Flow Rate: 5.94e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.46e+000	2.10e-001
Carbon Dioxide	5.51e+001	3.80e+000
Nitrogen	6.90e-003	3.02e-004
Methane	2.57e+001	6.46e-001
Ethane	9.38e-001	4.41e-002
Propane	4.58e-001	3.16e-002
Isobutane	1.96e-001	1.78e-002
n-Butane	3.21e-001	2.92e-002
Isopentane	1.73e-001	1.95e-002
n-Pentane	1.47e-001	1.66e-002
n-Hexane	1.32e-001	1.79e-002
Cyclohexane	4.68e-001	6.16e-002
Other Hexanes	1.95e-001	2.62e-002
Heptanes	3.44e-001	5.40e-002
Methylcyclohexane	5.35e-001	8.21e-002
2,2,4-Trimethylpentane	7.42e-003	1.33e-003
Benzene	5.73e+000	7.01e-001
Toluene	1.31e+000	1.89e-001
Xylenes	6.93e-001	1.15e-001
C8+ Heavies	5.72e-003	1.53e-003
Total Components	100.00	6.06e+000

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 4.44e-001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.88e+001	1.29e-002
Ethane	2.51e+000	8.83e-004
Propane	1.23e+000	6.33e-004
Isobutane	5.24e-001	3.56e-004
n-Butane	8.58e-001	5.83e-004
Isopentane	4.63e-001	3.91e-004
n-Pentane	3.93e-001	3.32e-004
n-Hexane	3.54e-001	3.57e-004
Cyclohexane	1.25e+000	1.23e-003
Other Hexanes	5.20e-001	5.25e-004
Heptanes	9.21e-001	1.08e-003
Methylcyclohexane	1.43e+000	1.64e-003
2,2,4-Trimethylpentane	1.98e-002	2.65e-005

Benzene	1.53e+001	1.40e-002
Toluene	3.51e+000	3.79e-003
Xylenes	1.85e+000	2.30e-003
C8+ Heavies	1.53e-002	3.05e-005
Total Components	100.00	4.11e-002

EMISSION UNIT D2
TEG DEHYDRATION UNIT

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Samson Jaques
File Name: C:\Work\Projects\Samson\Jacques\Permit Work\September 2011\dehys\D2 PTE.ddf
Date: October 13, 2011

DESCRIPTION:

Description: D2 PTE Model
30 MMSCFD Natco Dehydration Unit

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0210	0.504	0.0919
Ethane	0.0014	0.034	0.0063
Propane	0.0010	0.025	0.0045
Isobutane	0.0006	0.014	0.0025
n-Butane	0.0009	0.023	0.0041
Isopentane	0.0006	0.015	0.0028
n-Pentane	0.0005	0.013	0.0024
n-Hexane	0.0006	0.014	0.0025
Cyclohexane	0.0020	0.048	0.0087
Other Hexanes	0.0008	0.020	0.0037
Heptanes	0.0017	0.042	0.0076
Methylcyclohexane	0.0027	0.064	0.0116
2,2,4-Trimethylpentane	<0.0001	0.001	0.0002
Benzene	0.0228	0.547	0.0999
Toluene	0.0062	0.148	0.0270
Xylenes	0.0038	0.090	0.0165
C8+ Heavies	<0.0001	0.001	0.0002
Total Emissions	0.0668	1.603	0.2925
Total Hydrocarbon Emissions	0.0668	1.603	0.2925
Total VOC Emissions	0.0444	1.065	0.1943
Total HAP Emissions	0.0334	0.801	0.1461
Total BTEX Emissions	0.0327	0.786	0.1434

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.0505	25.213	4.6013
Ethane	0.0719	1.726	0.3150
Propane	0.0524	1.257	0.2293
Isobutane	0.0300	0.720	0.1314
n-Butane	0.0498	1.196	0.2182
Isopentane	0.0357	0.856	0.1563
n-Pentane	0.0311	0.748	0.1364
n-Hexane	0.0400	0.959	0.1750
Cyclohexane	0.1541	3.698	0.6749
Other Hexanes	0.0541	1.299	0.2371

Heptanes	0.1772	4.252	0.7760
Methylcyclohexane	0.2798	6.715	1.2254
2,2,4-Trimethylpentane	0.0043	0.103	0.0188
Benzene	1.9921	47.810	8.7253
Toluene	0.9817	23.562	4.3000
Xylenes	1.6019	38.446	7.0164
C8+ Heavies	0.8546	20.510	3.7430
Total Emissions	7.4612	179.069	32.6800
Total Hydrocarbon Emissions	7.4612	179.069	32.6800
Total VOC Emissions	6.3387	152.130	27.7637
Total HAP Emissions	4.6200	110.880	20.2355
Total BTEX Emissions	4.5757	109.817	20.0417

FLASH GAS EMISSIONS

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	100.7201	2417.282	441.1539
Ethane	1.7050	40.919	7.4677
Propane	0.5551	13.323	2.4315
Isobutane	0.1924	4.618	0.8428
n-Butane	0.2357	5.656	1.0322
Isopentane	0.1393	3.342	0.6099
n-Pentane	0.0941	2.257	0.4120
n-Hexane	0.0604	1.449	0.2645
Cyclohexane	0.0560	1.343	0.2451
Other Hexanes	0.1119	2.686	0.4901
Heptanes	0.1172	2.813	0.5133
Methylcyclohexane	0.0737	1.770	0.3229
2,2,4-Trimethylpentane	0.0060	0.143	0.0261
Benzene	0.0903	2.168	0.3957
Toluene	0.0259	0.622	0.1135
Xylenes	0.0152	0.365	0.0666
C8+ Heavies	0.0486	1.166	0.2128
Total Emissions	104.2467	2501.921	456.6006
Total Hydrocarbon Emissions	104.2467	2501.921	456.6006
Total VOC Emissions	1.8217	43.721	7.9790
Total HAP Emissions	0.1978	4.747	0.8664
Total BTEX Emissions	0.1315	3.155	0.5758

EQUIPMENT REPORTS:

CONDENSER AND COMBUSTION DEVICE

Condenser Outlet Temperature: 120.00 deg. F

Condenser Pressure:	23.00	psia
Condenser Duty:	1.48e-002	MM BTU/hr
Hydrocarbon Recovery:	0.33	bbls/day
Produced Water:	3.24	bbls/day
Ambient Temperature:	60.00	deg. F
Excess Oxygen:	2.00	%
Combustion Efficiency:	98.00	%
Supplemental Fuel Requirement:	1.48e-002	MM BTU/hr

Component	Emitted	Destroyed
Methane	2.00%	98.00%
Ethane	1.99%	98.01%
Propane	1.96%	98.04%
Isobutane	1.93%	98.07%
n-Butane	1.90%	98.10%
Isopentane	1.78%	98.22%
n-Pentane	1.73%	98.27%
n-Hexane	1.45%	98.55%
Cyclohexane	1.29%	98.71%
Other Hexanes	1.57%	98.43%
Heptanes	0.98%	99.02%
Methylcyclohexane	0.95%	99.05%
2,2,4-Trimethylpentane	1.00%	99.00%
Benzene	1.15%	98.85%
Toluene	0.63%	99.37%
Xylenes	0.23%	99.77%
C8+ Heavies	0.01%	99.99%

ABSORBER

Specified Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	1.38	lbs. H2O/MMSCF
Temperature:	70.0	deg. F
Pressure:	500.0	psig
Dry Gas Flow Rate:	30.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0372	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	39.42	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	16.40	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.49%	96.51%
Carbon Dioxide	99.55%	0.45%
Nitrogen	99.97%	0.03%
Methane	99.97%	0.03%
Ethane	99.90%	0.10%
Propane	99.80%	0.20%
Isobutane	99.68%	0.32%
n-Butane	99.56%	0.44%
Isopentane	99.50%	0.50%
n-Pentane	99.33%	0.67%
n-Hexane	98.71%	1.29%
Cyclohexane	94.36%	5.64%
Other Hexanes	99.06%	0.94%
Heptanes	97.21%	2.79%
Methylcyclohexane	92.90%	7.10%
2,2,4-Trimethylpentane	98.82%	1.18%
Benzene	59.74%	40.26%

Toluene	44.88%	55.12%
Xylenes	23.16%	76.84%
C8+ Heavies	91.24%	8.76%

FLASH TANK

Flash Control: Recycle/recompression
Flash Temperature: 100.0 deg. F
Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.92%	0.08%
Carbon Dioxide	13.29%	86.71%
Nitrogen	1.01%	98.99%
Methane	1.03%	98.97%
Ethane	4.05%	95.95%
Propane	8.62%	91.38%
Isobutane	13.49%	86.51%
n-Butane	17.45%	82.55%
Isopentane	20.69%	79.31%
n-Pentane	25.18%	74.82%
n-Hexane	40.09%	59.91%
Cyclohexane	74.19%	25.81%
Other Hexanes	33.17%	66.83%
Heptanes	60.37%	39.63%
Methylcyclohexane	79.96%	20.04%
2,2,4-Trimethylpentane	42.60%	57.40%
Benzene	95.88%	4.12%
Toluene	97.63%	2.37%
Xylenes	99.18%	0.82%
C8+ Heavies	95.26%	4.74%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	69.77%	30.23%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	1.78%	98.22%
n-Pentane	1.57%	98.43%
n-Hexane	1.10%	98.90%
Cyclohexane	4.18%	95.82%
Other Hexanes	2.54%	97.46%
Heptanes	0.78%	99.22%
Methylcyclohexane	4.88%	95.12%
2,2,4-Trimethylpentane	3.06%	96.94%
Benzene	5.19%	94.81%

Toluene	8.07%	91.93%
Xylenes	12.98%	87.02%
C8+ Heavies	12.40%	87.60%

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.30e-002	4.93e+001
Carbon Dioxide	5.15e+000	7.48e+003
Nitrogen	2.56e-002	2.36e+001
Methane	9.39e+001	4.97e+004
Ethane	6.41e-001	6.36e+002
Propane	1.11e-001	1.61e+002
Isobutane	2.33e-002	4.46e+001
n-Butane	2.41e-002	4.62e+001
Isopentane	1.08e-002	2.57e+001
n-Pentane	6.19e-003	1.47e+001
n-Hexane	2.40e-003	6.82e+000
Cyclohexane	1.30e-003	3.61e+000
Other Hexanes	5.20e-003	1.48e+001
Heptanes	3.00e-003	9.91e+000
Methylcyclohexane	1.50e-003	4.85e+000
2,2,4-Trimethylpentane	2.00e-004	7.53e-001
Benzene	2.00e-003	5.15e+000
Toluene	5.99e-004	1.82e+000
Xylenes	5.99e-004	2.10e+000
C8+ Heavies	1.80e-003	1.01e+001
Total Components	100.00	5.82e+004

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.90e-003	1.72e+000
Carbon Dioxide	5.13e+000	7.44e+003
Nitrogen	2.56e-002	2.36e+001
Methane	9.40e+001	4.97e+004
Ethane	6.42e-001	6.36e+002
Propane	1.11e-001	1.61e+002
Isobutane	2.32e-002	4.45e+001
n-Butane	2.40e-002	4.60e+001
Isopentane	1.08e-002	2.56e+001
n-Pentane	6.16e-003	1.46e+001

n-Hexane	2.37e-003	6.73e+000
Cyclohexane	1.23e-003	3.40e+000
Other Hexanes	5.15e-003	1.46e+001
Heptanes	2.92e-003	9.63e+000
Methylcyclohexane	1.39e-003	4.51e+000
2,2,4-Trimethylpentane	1.98e-004	7.44e-001
Benzene	1.20e-003	3.08e+000
Toluene	2.69e-004	8.18e-001
Xylenes	1.39e-004	4.86e-001
C8+ Heavies	1.64e-003	9.22e+000
Total Components	100.00	5.81e+004

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.30e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	7.21e+003
Water	1.50e+000	1.10e+002
Carbon Dioxide	4.55e-011	3.33e-009
Nitrogen	8.64e-015	6.32e-013
Methane	5.75e-018	4.21e-016
Ethane	4.09e-009	2.99e-007
Propane	1.77e-010	1.30e-008
Isobutane	5.83e-011	4.27e-009
n-Butane	6.86e-011	5.02e-009
Isopentane	8.84e-006	6.47e-004
n-Pentane	6.78e-006	4.96e-004
n-Hexane	6.05e-006	4.43e-004
Cyclohexane	9.19e-005	6.73e-003
Other Hexanes	1.93e-005	1.41e-003
Heptanes	1.90e-005	1.39e-003
Methylcyclohexane	1.96e-004	1.44e-002
2,2,4-Trimethylpentane	1.85e-006	1.36e-004
Benzene	1.49e-003	1.09e-001
Toluene	1.18e-003	8.62e-002
Xylenes	3.27e-003	2.39e-001
C8+ Heavies	1.65e-003	1.21e-001
Total Components	100.00	7.32e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 70.00 deg. F
Pressure: 514.70 psia
Flow Rate: 1.34e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.58e+001	7.21e+003
Water	2.09e+000	1.57e+002
Carbon Dioxide	6.22e-001	4.68e+001
Nitrogen	6.48e-004	4.88e-002
Methane	1.35e+000	1.02e+002

Ethane	2.36e-002	1.78e+000
Propane	8.07e-003	6.08e-001
Isobutane	2.96e-003	2.22e-001
n-Butane	3.79e-003	2.85e-001
Isopentane	2.33e-003	1.76e-001
n-Pentane	1.67e-003	1.26e-001
n-Hexane	1.34e-003	1.01e-001
Cyclohexane	2.88e-003	2.17e-001
Other Hexanes	2.23e-003	1.67e-001
Heptanes	3.93e-003	2.96e-001
Methylcyclohexane	4.89e-003	3.68e-001
2,2,4-Trimethylpentane	1.38e-004	1.04e-002
Benzene	2.91e-002	2.19e+000
Toluene	1.45e-002	1.09e+000
Xylenes	2.47e-002	1.86e+000
C8+ Heavies	1.36e-002	1.02e+000
Total Components	100.00	7.52e+003

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 44.70 psia
Flow Rate: 2.77e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.01e-001	1.33e-001
Carbon Dioxide	1.26e+001	4.06e+001
Nitrogen	2.36e-002	4.83e-002
Methane	8.61e+001	1.01e+002
Ethane	7.77e-001	1.70e+000
Propane	1.73e-001	5.55e-001
Isobutane	4.54e-002	1.92e-001
n-Butane	5.56e-002	2.36e-001
Isopentane	2.65e-002	1.39e-001
n-Pentane	1.79e-002	9.41e-002
n-Hexane	9.60e-003	6.04e-002
Cyclohexane	9.11e-003	5.60e-002
Other Hexanes	1.78e-002	1.12e-001
Heptanes	1.60e-002	1.17e-001
Methylcyclohexane	1.03e-002	7.37e-002
2,2,4-Trimethylpentane	7.16e-004	5.96e-003
Benzene	1.59e-002	9.03e-002
Toluene	3.85e-003	2.59e-002
Xylenes	1.96e-003	1.52e-002
C8+ Heavies	3.91e-003	4.86e-002
Total Components	100.00	1.45e+002

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 1.31e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.77e+001	7.21e+003

Water	2.13e+000	1.57e+002
Carbon Dioxide	8.42e-002	6.21e+000
Nitrogen	6.67e-006	4.92e-004
Methane	1.42e-002	1.05e+000
Ethane	9.75e-004	7.19e-002
Propane	7.10e-004	5.24e-002
Isobutane	4.07e-004	3.00e-002
n-Butane	6.75e-004	4.98e-002
Isopentane	4.92e-004	3.63e-002
n-Pentane	4.29e-004	3.16e-002
n-Hexane	5.48e-004	4.04e-002
Cyclohexane	2.18e-003	1.61e-001
Other Hexanes	7.53e-004	5.55e-002
Heptanes	2.42e-003	1.79e-001
Methylcyclohexane	3.99e-003	2.94e-001
2,2,4-Trimethylpentane	6.00e-005	4.43e-003
Benzene	2.85e-002	2.10e+000
Toluene	1.45e-002	1.07e+000
Xylenes	2.49e-002	1.84e+000
C8+ Heavies	1.32e-002	9.76e-001
Total Components	100.00	7.38e+003

FLASH GAS EMISSIONS

Control Method: Recycle/recompression
Control Efficiency: 100.00

Note: Flash Gas Emissions are zero with the Recycle/recompression control option.

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.11e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.05e+001	4.76e+001
Carbon Dioxide	4.84e+000	6.21e+000
Nitrogen	6.02e-004	4.92e-004
Methane	2.24e+000	1.05e+000
Ethane	8.20e-002	7.19e-002
Propane	4.07e-002	5.24e-002
Isobutane	1.77e-002	3.00e-002
n-Butane	2.94e-002	4.98e-002
Isopentane	1.70e-002	3.57e-002
n-Pentane	1.48e-002	3.11e-002
n-Hexane	1.59e-002	4.00e-002
Cyclohexane	6.27e-002	1.54e-001
Other Hexanes	2.15e-002	5.41e-002
Heptanes	6.06e-002	1.77e-001
Methylcyclohexane	9.77e-002	2.80e-001
2,2,4-Trimethylpentane	1.29e-003	4.29e-003
Benzene	8.74e-001	1.99e+000
Toluene	3.65e-001	9.82e-001
Xylenes	5.17e-001	1.60e+000

C8+ Heavies	1.72e-001	8.55e-001
Total Components	100.00	6.12e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 120.00 deg. F
Flow Rate: 9.46e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.98e+001	4.72e+001	998427.
Carbon Dioxide	7.53e-002	3.56e-002	753.
Nitrogen	1.57e-007	7.42e-008	0.
Methane	6.46e-004	3.06e-004	6.
Ethane	5.02e-005	2.37e-005	1.
Propane	3.73e-005	1.76e-005	0.
Isobutane	1.14e-005	5.40e-006	0.
n-Butane	2.49e-005	1.18e-005	0.
Isopentane	1.17e-005	5.53e-006	0.
n-Pentane	1.07e-005	5.04e-006	0.
n-Hexane	9.50e-006	4.49e-006	0.
Cyclohexane	1.84e-004	8.73e-005	2.
Other Hexanes	1.13e-005	5.32e-006	0.
Heptanes	1.59e-005	7.51e-006	0.
Methylcyclohexane	1.17e-004	5.54e-005	1.
2,2,4-Trimethylpentane	2.59e-007	1.23e-007	0.
Benzene	5.93e-002	2.81e-002	593.
Toluene	1.32e-002	6.24e-003	132.
Xylenes	8.38e-003	3.97e-003	84.
C8+ Heavies	2.80e-007	1.32e-007	0.
Total Components	100.00	4.73e+001	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 120.00 deg. F
Flow Rate: 9.63e-003 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	5.11e-002	2.09e-003
Carbon Dioxide	3.10e-001	1.27e-002
Nitrogen	1.50e-005	6.14e-007
Methane	1.80e-002	7.38e-004
Ethane	6.38e-003	2.61e-004
Propane	2.37e-002	9.72e-004
Isobutane	2.65e-002	1.09e-003
n-Butane	5.95e-002	2.44e-003
Isopentane	9.78e-002	4.01e-003
n-Pentane	1.04e-001	4.27e-003
n-Hexane	2.70e-001	1.11e-002
Cyclohexane	1.33e+000	5.44e-002
Other Hexanes	2.84e-001	1.16e-002
Heptanes	2.20e+000	9.01e-002
Methylcyclohexane	3.59e+000	1.47e-001
2,2,4-Trimethylpentane	5.26e-002	2.15e-003
Benzene	2.01e+001	8.24e-001

Toluene	1.63e+001	6.67e-001
Xylenes	3.44e+001	1.41e+000
C8+ Heavies	2.08e+001	8.52e-001
Total Components	100.00	4.10e+000

CONDENSER VENT STREAM

Temperature: 120.00 deg. F
Pressure: 23.00 psia
Flow Rate: 9.64e+001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.46e+000	3.41e-001
Carbon Dioxide	5.51e+001	6.17e+000
Nitrogen	6.90e-003	4.91e-004
Methane	2.57e+001	1.05e+000
Ethane	9.37e-001	7.16e-002
Propane	4.58e-001	5.14e-002
Isobutane	1.96e-001	2.89e-002
n-Butane	3.21e-001	4.74e-002
Isopentane	1.73e-001	3.17e-002
n-Pentane	1.47e-001	2.69e-002
n-Hexane	1.32e-001	2.89e-002
Cyclohexane	4.66e-001	9.96e-002
Other Hexanes	1.94e-001	4.25e-002
Heptanes	3.42e-001	8.71e-002
Methylcyclohexane	5.31e-001	1.33e-001
2,2,4-Trimethylpentane	7.36e-003	2.14e-003
Benzene	5.74e+000	1.14e+000
Toluene	1.32e+000	3.08e-001
Xylenes	6.97e-001	1.88e-001
C8+ Heavies	5.64e-003	2.44e-003
Total Components	100.00	9.85e+000

COMBUSTION DEVICE OFF GAS STREAM

Temperature: 1000.00 deg. F
Pressure: 14.70 psia
Flow Rate: 7.22e-001 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Methane	6.88e+001	2.10e-002
Ethane	2.51e+000	1.43e-003
Propane	1.23e+000	1.03e-003
Isobutane	5.23e-001	5.78e-004
n-Butane	8.57e-001	9.47e-004
Isopentane	4.62e-001	6.33e-004
n-Pentane	3.92e-001	5.38e-004
n-Hexane	3.53e-001	5.78e-004
Cyclohexane	1.24e+000	1.99e-003
Other Hexanes	5.19e-001	8.50e-004
Heptanes	9.14e-001	1.74e-003
Methylcyclohexane	1.42e+000	2.65e-003
2,2,4-Trimethylpentane	1.97e-002	4.28e-005
Benzene	1.54e+001	2.28e-002

Toluene	3.52e+000	6.16e-003
Xylenes	1.86e+000	3.76e-003
C8+ Heavies	1.51e-002	4.88e-005
Total Components	100.00	6.68e-002

Gas Analysis

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

LIMS ID:	N/A		Description:	Jaquez CDP Suction Header
Analysis Date/Time:	4/12/2011	12:29 PM	Field:	La Plata Co
Analyst Initials:	PRP		ML#:	Samson
Instrument ID:	Instrument 1		GC Method:	Quesbtex
Data File:	QPC69.D			
Date Sampled:	4/1/2011			

Component	Mol%	Wt%	LV%
Methane	93.9848	85.4189	93.4685
Ethane	0.6419	1.0935	1.0100
Propane	0.1108	0.2769	0.1793
Isobutane	0.0233	0.0768	0.0448
n-Butane	0.0241	0.0793	0.0446
Neopentane	0.0003	0.0011	0.0006
Isopentane	0.0105	0.0430	0.0226
n-Pentane	0.0062	0.0254	0.0132
2,2-Dimethylbutane	0.0005	0.0023	0.0012
2,3-Dimethylbutane	0.0009	0.0044	0.0022
2-Methylpentane	0.0024	0.0116	0.0058
3-Methylpentane	0.0014	0.0067	0.0033
n-Hexane	0.0024	0.0116	0.0057
Heptanes	0.0070	0.0369	0.0160
Octanes	0.0010	0.0069	0.0031
Nonanes	0.0009	0.0060	0.0024
Decanes plus	0.0005	0.0042	0.0019
Nitrogen	0.0256	0.0406	0.0165
Carbon Dioxide	5.1555	12.8539	5.1583
Oxygen	0.0000	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

Global Properties		Units
Gross BTU/Real CF	970.9	BTU/SCF at 60°F and14.73 psia
Sat.Gross BTU/Real CF	955.1	BTU/SCF at 60°F and14.73 psia
Gas Compressibility (Z)	0.9978	
Specific Gravity	0.6108	air=1
Avg Molecular Weight	17.652	gm/mole
Propane GPM	0.030366	gal/MCF
Butane GPM	0.015184	gal/MCF
Gasoline GPM	0.012068	gal/MCF
26# Gasoline GPM	0.019810	gal/MCF
Total GPM	0.057781	gal/MCF
Base Mol%	99.109	%v/v

Sample Temperature:	56	°F
Sample Pressure:	33	psig
H2SLength of Stain Tube	N/A	ppm

Component	Mol%	Wt%	LV%
Benzene	0.0004	0.0017	0.0006
Toluene	0.0006	0.0032	0.0012
Ethylbenzene	0.0000	0.0003	0.0001
M&P Xylene	0.0005	0.0029	0.0011
O-Xylene	0.0001	0.0007	0.0002
2,2,4-Trimethylpentane	0.0002	0.0013	0.0006
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0013	0.0063	0.0027
Methylcyclohexane	0.0015	0.0085	0.0036
Description:	Jaquez CDP Suction Header		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	5.1555	12.8539	5.1583
Hydrogen Sulfide	0.0000	0.0000	0.0000
Nitrogen	0.0256	0.0406	0.0165
Methane	93.9848	85.4189	93.4685
Ethane	0.6419	1.0935	1.0100
Propane	0.1108	0.2769	0.1793
Isobutane	0.0233	0.0768	0.0448
n-Butane	0.0241	0.0793	0.0446
Isopentane	0.0108	0.0441	0.0232
n-Pentane	0.0062	0.0254	0.0132
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.0024	0.0116	0.0057
Cyclohexane	0.0013	0.0063	0.0027
Other Hexanes	0.0052	0.0250	0.0125
Heptanes	0.0030	0.0159	0.0073
Methylcyclohexane	0.0015	0.0085	0.0036
2,2,4 Trimethylpentane	0.0002	0.0013	0.0006
Benzene	0.0004	0.0017	0.0006
Toluene	0.0006	0.0032	0.0012
Ethylbenzene	0.0000	0.0003	0.0001
Xylenes	0.0006	0.0036	0.0013
C8+ Heavies	0.0018	0.0132	0.0060
Subtotal	100.0000	100.0000	100.0000
Oxygen	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

EMISSION UNIT FUG
FUGITIVE EMISSIONS

Emission Estimates
Emission Unit FUG
Jaques Compressor Station

Service	Component	Count	Emission factor (lb/component/hr)	VOC	
				(lb/hr)	(tpy)
VOC Wt. % = 0.593					
Gas	Valves	258	0.00992	0.02	0.07
	Connectors	86	0.00044	0.00	0.00
	Flanges	40	0.00086	0.00	0.00
	Other	116	0.01940	0.01	0.06
	Open End	0	0.00441	0.00	0.00
	Pump Seals	0	0.00529	0.00	0.00
VOC Wt. % = 100.00					
Slop/Oil	Valves	76	0.00551	0.42	1.83
	Connectors	14	0.00046	0.01	0.03
	Flanges	2	0.00024	0.00	0.00
	Other	2	0.01653	0.03	0.14
	Open End	0	0.00309	0.00	0.00
	Pump Seals	0	0.02866	0.00	0.00
VOC Wt. % = 100.00					
Glycol	Valves	32	0.00551	0.18	0.77
	Connectors	10	0.00046	0.00	0.02
	Flanges	0	0.00024	0.00	0.00
	Other	2	0.01653	0.00	0.00
	Open End	0	0.00309	0.00	0.00
	Pump Seals	2	0.02866	0.06	0.25
VOC Wt. % = 50.00					
Water	Valves	65	0.000216	0.01	0.03
	Connectors	40	0.000243	0.00	0.02
	Flanges	2	0.000006	0.00	0.00
	Other	19	0.000053	0.00	0.00
	Open End	0	0.030865	0.00	0.00
	Pump Seals	1	0.000551	0.00	0.00
		767		**0.74**	**3.24**

EMISSION UNIT CRPV
COMPRESSOR CYLINDER ROD PACKING VENTS

Emission Estimates
Emission Unit CRPV
Jaques Compressor Station

Compressor cylinder rod packing gas leakage is a continuous source of compressor emissions. Gas will leak from the packing and within the distance piece, and a vent is typically provided either at both the packing flange and distance piece, or just at the distance piece to direct this gas outside of any building the compressor may be housed within. EPA GasStar reports indicated vent rates of about 12 scfh for new state of the art best performing seals, and these rates can be as high as 900 scfh depending upon seal wear. Canadian/GRI research reports typical rod packing vent rates for standard seals of between 60 and 120 scfh. Vent rates are typically 30 percent higher when the compressor is idle and pressurized. The 60 scfh leakage rate along with a typical facility gas analysis was applied to determine VOC emissions from the facility gas compressor packing.

Assumptions:		
Gas VOC MW	54.313	lb/mole
Gas Molar Volume	385	scf/mole
Gas VOC Mole %	0.192	%
Number of Cylinders	4	
Vent Volume	60	scf/cylinder
Vent Rate	240	scf/hr
Total Vent Volume	6307	Mscf/yr

$$\text{Compressor Packing Vent Emissions} = \frac{\left(60\frac{scf}{hr-cyl}\right)\left(4\frac{cyl}{comp}\right)\left(\frac{0.192\,mole_{VOC}}{100\,mole}\right)\left(54.313\frac{lb_{VOC}}{mole_{VOC}}\right)\left(8{,}760\frac{hr}{yr}\right)}{\left(\frac{385\,scf}{mole}\right)\left(2{,}000\frac{lb}{ton}\right)} = 0.3\frac{ton}{yr-comp}$$

Annual VOC Emissions		
	0.3	ton VOC/year per compressor
	1.8	ton VOC/year for all compressors

GREENHOUSE GAS EMISSIONS

Total Greenhouse Gas PTE
Samson Resources Company
Jaques Compressor Station

Source ID	Description	Green House Gases Emissions		
		CO_2	Methane	N_2O
		tpy	tpy	tpy
E1	Waukesha L5794LT	5137.13	112.45	0.01
E2	Waukesha L5794LT	5137.13	112.45	0.01
E3	Waukesha L5794LT	5137.13	112.45	0.01
E4	Waukesha L5794LT	5137.13	112.45	0.01
E5	Waukesha L5794LT	5137.13	112.45	0.01
E6	Waukesha L5794LT	5137.13	112.45	0.01
D1	0.375 MMBtu/hr Reboiler	191.59	0.00	0.00
	Glycol Process Vents	16.78	2.83	0.00
D2	1.25 MMBtu/hr Reboiler	638.63	0.01	0.00
	Glycol Process Vents	27.20	4.60	0.00
FUG	Fugitive Leaks	2.75	18.24	0.00
IEUs	Insignificant Units	1982.04	0.03	0.00
Total		33681.77	700.40	0.06
CO_2e		33681.77	14708.32	19.62

Total GHG PTE **34,382 tpy**
Total CO_2e **48,410 tpy**

Compressor Engine GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Waukesha L5794LT Compressor Engines	
Combustion	4 Stroke Lean Burn	
Rating	1400	hp
Operating Hours	8760	hours/year
Fuel Consuption	7155	Btu/hp-hr
Fuel Heat Content	975	Btu/scf
Blowdown Volume	40927	scf
Blowdown Events	20	per year
Packing Vent Volume	60	scf/cylinder
Number of cylinders	4	cylinders/engine
Starter Gas Usage	1100	scfm
Start Time	0.5	min
Starting Events	52	per year

Emissions Estimate (per engine)

Pollutant	Exhaust			Rod Packing Vents Emissions		Blowdowns Emissions		Starter Emissions		Totals	Emission Factor Source
	Emission Factor	Emissions									
	(lb/MMBtu)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/event)	(tpy)	(lb/event)	(tpy)	(tpy)	
CO_2	116.889	1,171	5,128	1.41	6.19	241.14	2.41	3.24	0.08	5,137.13	40 CFR Part 98, Subpart C, Table C-1
Methane	1.250	12.521	54.843	9.37	41.06	1598.55	15.99	21.48	0.56	112.45	AP-42 Table 3.2-2
N_2O	0.0002	0.002	0.010	0	0	0	0	0	0	0.01	40 CFR Part 98, Subpart C, Table C-2

Glycol Dehydration Process Vents GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Unit	Dehydration Units D1 & D2	
D1 Annual Throughput	18	MMscfd
D2 Annual Throughput	30	MMscfd
Hours of Operation	8760	hrs

Emissions Based on GLYCalc 3.0 Model

D1 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	3.83	16.78	3.83	16.78
Methane	0.647	2.83	0.647	2.83
N_2O	0.0	0	0.0	0.0

D2 Emissions Estimate

Pollutant	Regenerator Overheads Vent		Total	
	lb/hr	tpy	lb/hr	tpy
CO_2	6.21	27.20	6.21	27.20
Methane	1.05	4.60	1.05	4.60
N_2O	0.0	0	0.0	0.0

Natural Gas Fired Burner GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Dehydration Unit Reboilers	
Hours of Operation	8760	hrs
D1 Rating	0.375	MMBtu/hr
D2 Rating	1.25	MMBtu/hr

D1 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D1 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	43.74	191.59	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

D2 Emissions

Pollutant	Emission Factor (kg/MMBtu)	D2 Emissions		Emission Factor Source
		(lb/hr)	(tpy)	
CO_2	53.0200	145.81	638.63	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	0.003	0.01	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	0.00	0.00	40 CFR Part 98, Subpart C, Table C-2

Fugitive GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Basis

Units	Fugitive Emissions
CO_2	12.881 wt%
CH_4	85.392 wt%

Emissions Estimate

Component	Count	Emission Factor (kg/component-hr)	CO2		Methane	
			(lb/hr)	(tpy)	(lb/hr)	(tpy)
Flanges	40	3.90E-04	0.00	0.02	0.03	0.13
Valves	258	4.50E-03	0.33	1.44	2.18	9.56
Connectors	86	2.00E-04	0.00	0.02	0.03	0.14
Press Relief	0	2.00E-03	0.00	0.00	0.00	0.00
Pump Seals	0	2.40E-03	0.00	0.00	0.00	0.00
Other	116	8.80E-03	0.29	1.27	1.92	8.41
Total			**0.63**	**2.75**	**4.17**	**18.24**

Emission factors obtained from the 1995 Protocol for Equipment Leak Emission Estimates Document EPA-453/R-95-017 Table 2-4: Oil and Gas Production

IEU GHG Emission Estimate
Samson Resources Company
Jaques Compressor Station

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor Source
CO_2	53.0200	40 CFR Part 98, Subpart C, Table C-1
Methane	0.0010	40 CFR Part 98, Subpart C, Table C-2
N_2O	0.0001	40 CFR Part 98, Subpart C, Table C-2

Heaters and Burners <100 MMBtu/hr

Unit ID	Description	Heater Size	CO_2		Methane		N_2O	
		(MMBtu/hr)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU7	Regenerator Heaters	0.60	69.99	306.54	0.00	0.01	0.000	0.00
	Regenerator Heaters	0.60	69.99	306.54	0.00	0.01	0.000	0.00
IEU8	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
	Tank Heater	0.12	14.00	61.31	0.00	0.00	0.000	0.00
IEU13	Slug Catcher Burner	0.125	14.58	63.86	0.00	0.00	0.000	0.00
	Slug Catcher Burner	0.125	14.58	63.86	0.00	0.00	0.000	0.00
IEU15	Production Unit Burner	0.50	58.32	255.45	0.00	0.00	0.000	0.00
Heater/Burner Total				**1731.95**		**0.03**		**0.00**

Pump Engines

Unit ID	Description	Rating	CO_2		Methane		N_2O	
		(hp)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
IEU9	Ford 460 Pump Engine	34	35.30	154.60	0.00	0.00	0.00	0.00
IEU12	Ford Pump Engine	21	21.80	95.49	0.00	0.00	0.00	0.00
Pump Engine Total				**250.09**		**0.00**		**0.00**

IEU Total				**1982.04**		**0.03**		**0.00**

Example GHG Emission Calculations
Jaques Compressor Station

Cylinder Rod Packing Vents

$$\frac{60\ scf}{hr * cylinder} * \frac{4\ cylinder}{compressor} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} = 1.41\ \frac{lb\ CO_2}{hr}$$

$$1.41\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 2.41\ tpy\ CO_2$$

$$\frac{60\ scf}{hr * cylinder} * \frac{4\ cylinder}{compressor} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} = 9.37\ \frac{lb\ CH_4}{hr}$$

$$9.37\ \frac{lb\ CH_4}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 41.06\ tpy\ CH_4$$

Blowdown Emissions

$$\frac{40{,}927\ scf}{event} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} = 241.14\ \frac{lb\ CO_2}{event}$$

$$241.14\ \frac{lb\ CO_2}{event} * \frac{20\ events}{yr} * \frac{ton}{2000\ lb} = 2.41\ tpy\ CO_2$$

$$\frac{40{,}927\ scf}{event} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} = 1598.55\ \frac{lb\ CH_4}{event}$$

$$1598.55\ \frac{lb\ CH_4}{event} * \frac{20\ events}{yr} * \frac{ton}{2000\ lb} = 15.99\ tpy\ CH_4$$

Starter Emissions

$$\frac{1100\ scf}{min} * \frac{mole}{385\ scf} * \frac{5.1555\ mole\ CO_2}{100\ mole} * \frac{44\ lb\ CO_2}{mole\ CO_2} * \frac{0.5\ min}{event} = 3.24\ \frac{lb\ CO_2}{event}$$

$$3.24\ \frac{lb\ CO_2}{event} * \frac{52\ events}{yr} * \frac{ton}{2000\ lb} = 0.08\ tpy\ CO_2$$

$$\frac{1100\ scf}{min} * \frac{mole}{385\ scf} * \frac{93.9848\ mole\ CH_4}{100\ mole} * \frac{16\ lb\ CH_4}{mole\ CH_4} * \frac{0.5\ min}{event} = 21.48\ \frac{lb\ CH_4}{event}$$

$$21.48\ \frac{lb\ CH_4}{event} * \frac{52\ events}{yr} * \frac{ton}{2000\ lb} = 0.56\ tpy\ CH_4$$

Reboilers/Heaters/Burners

$$\frac{1.25\ MMBtu}{hr} * \frac{53.02\ kg\ CO_2}{MMBtu} * \frac{2.2\ lb\ CO_2}{kg\ CO_2} = 145.81\ \frac{lb\ CO_2}{hr}$$

$$145.81\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 638.63\ tpy\ CO_2$$

Pump Engines

$$21\ hp * \frac{8900\ Btu}{hp - hr} * \frac{MMBtu}{1{,}000{,}000\ Btu} * \frac{53.02\ kg\ CO_2}{MMBtu} * \frac{2.2\ lb\ CO_2}{kg\ CO_2} = 21.80\ \frac{lb\ CO_2}{hr}$$

$$21.80\ \frac{lb\ CO_2}{hr} * \frac{ton}{2000\ lb} * \frac{8760\ hr}{yr} = 95.49\ tpy\ CO_2$$