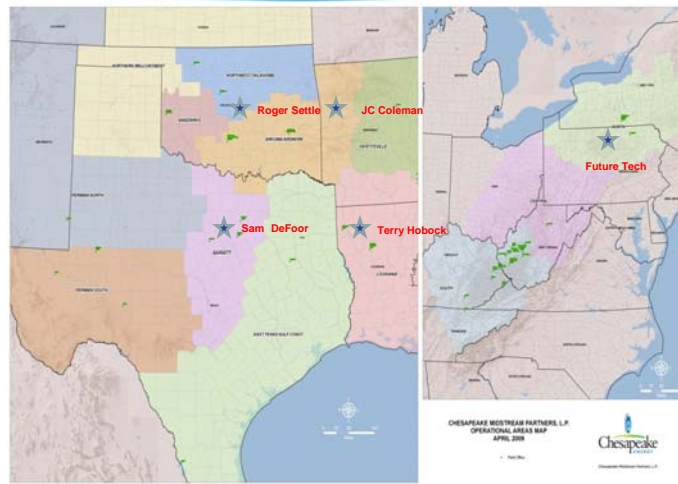




## Midstream Dehydrator Emission Reductions and BMP's



## CMP Operations



# Emission Reductions



CMP STAR Reductions For 2008 Mid-Continent	
BMP	Reduction (MCF)
Blow Down to Sales	282
Install Elec Glycol Pump	39,288
Flir Camera Leak Repair	596
Pipeline Hot Tap	1,121
Low Bleed Pressure Controllers	7,851
No-Bleed Chem Pump	19,195
Optimize Glycol Circ Rate	238,694
Low Bleed Pneumatic Level Controllers	42,496
Recover Dehy Flash Gas	761,071
Recover Dehy FG to Suction	7,226
<b>TOTAL</b>	<b>1,117,820</b>

# New Reductions Technology



- Flash Tanks/Separators
- BTEX Destruction
- Pneumatic Thermostat Elimination



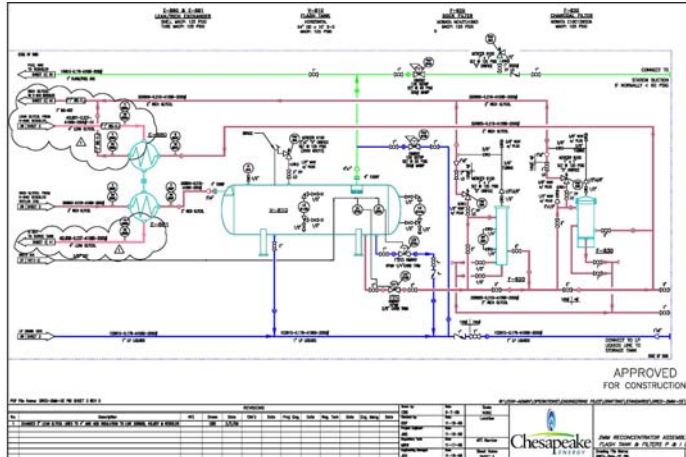
## Flash Tanks/Separators (a.k.a. Pump Gas Separators)



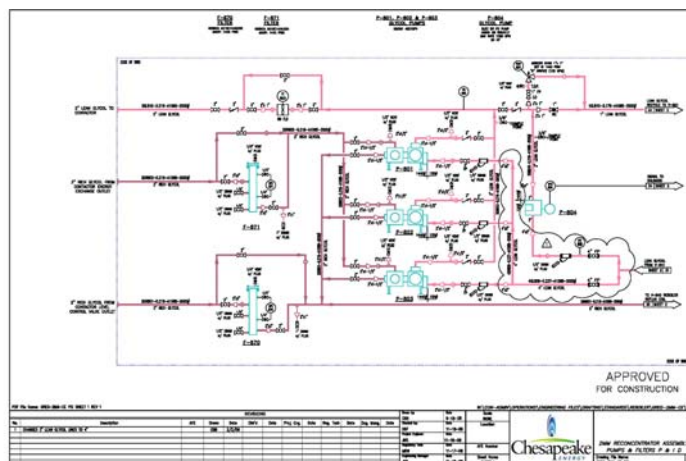
## Flash Separator



# P&ID - Flash Separator

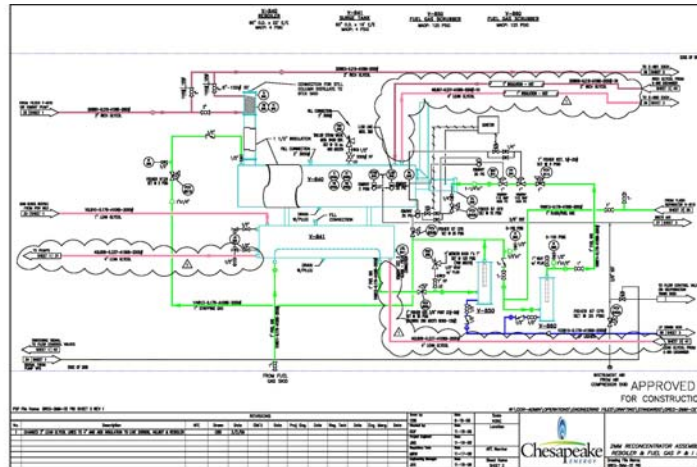


# P&ID - Glycol Pumps





# P&ID - Fuel Gas System



# Electric/Energy Exchange Pumps



# BTEX Destruction



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# Eclipse Compound Injected Burner



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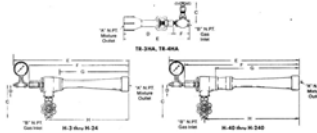


**HIGH PRESSURE INJECTORS**  
CAPACITIES - GPM

Single Stage Injectors				Compound Injectors			
Capacity	Model	Stroke Length (in)	Max. Press. (psi)	Capacity	Model	Stroke Length (in)	Max. Press. (psi)
1.0	100	1.0	100	1.0	100	1.0	100
1.5	150	1.5	150	1.5	150	1.5	150
2.0	200	2.0	200	2.0	200	2.0	200
2.5	250	2.5	250	2.5	250	2.5	250
3.0	300	3.0	300	3.0	300	3.0	300
3.5	350	3.5	350	3.5	350	3.5	350
4.0	400	4.0	400	4.0	400	4.0	400
4.5	450	4.5	450	4.5	450	4.5	450
5.0	500	5.0	500	5.0	500	5.0	500

Model No. SB16-8, O-Type, Burner Assembly  
One piece design (no hinge), aluminum construction  
Includes: (1) 2" HO-6 Air/Gas Mixer  
w/ HO rod assembly (external primary air adjustment)  
w/ MTD 26 orifice @ 8 psi (469 scfh)

**DIMENSIONS**



Single Stage Injectors				Compound Injectors			
Capacity	Model	Stroke Length (in)	Max. Press. (psi)	Capacity	Model	Stroke Length (in)	Max. Press. (psi)
1.0	100	1.0	100	1.0	100	1.0	100
1.5	150	1.5	150	1.5	150	1.5	150
2.0	200	2.0	200	2.0	200	2.0	200
2.5	250	2.5	250	2.5	250	2.5	250
3.0	300	3.0	300	3.0	300	3.0	300
3.5	350	3.5	350	3.5	350	3.5	350
4.0	400	4.0	400	4.0	400	4.0	400
4.5	450	4.5	450	4.5	450	4.5	450
5.0	500	5.0	500	5.0	500	5.0	500

# Burner Standards



**FLAMECO**

FLAMECO INDUSTRIES, INCORPORATED  
P.O. BOX 4333 TULSA, OKLAHOMA 74116  
(918) 832-1100 Fax (918) 832-8130

October 3, 2008

Chesapeake Energy  
OK City, OK  
Attn: Danny Ford

Reference: Burner Assembly Standards

- 350,000 btu/hr net duty (500,000 gross release)  
For a 8" firetube x approximately 20' overall length (8,000 flux)  
Model No. SB16-8, O-Type, Burner Assembly  
One piece design (no hinge), aluminum construction  
Includes: (1) 2" HO-6 Compound Injector,  
w/ 1-1/2" HO-6 Air/Gas Mixer  
w/ HO rod assembly (external primary air adjustment)  
w/ MTD 26 orifice @ 8 psi (469 scfh)  
(1) 2" Bell Nozzle (this assembly extends 13" past the mating flange using a 2" x close nipple)  
(1) 16" OD x 4" thick, Aluminum Flame Cell w/ 6" hand hole, cover plate with a 1" peep sight & CGB194 fitting for the external primary air adjusting rod  
Couplings:  
(1) 1/4" @ 90 (1-1/4" from flange)  
(1) 1" @ 90 (4" from flange)  
(1) 3/4" @ 115.3" flat (2-1/2" from flange)  
(2) 1" @ 0 (2-1/2" & 5" from flange)
- 500,000 - 550,000 btu/hr net duty (714,000 - 785,000 gross release)  
For a 12" firetube x approximately 20' overall length (8,000 flux)  
Model No. SB18-12, O-Type, Burner Assembly  
One piece design (no hinge), aluminum construction  
Includes: (1) 2-1/2" HO-10 Compound Injector,  
w/ 2" HO-8 Air/Gas Mixer  
w/ HO rod assembly (external primary air adjustment)  
w/ MTD 14 orifice @ 8 psi (749 scfh)

# 500 MBTU Orifice Chart



Standard 500k BTU Reboiler will have a MTD 14 Orifice that will consume about 526 cfh at 4psi Constant. Normal Run operation of Our burners is Constant at about 60-70%.

D.S. No. 503

ORIFICE SIZE	CAPACITY IN CFH AT VARIOUS GAS PRESSURES (PSIG)													
	1	2	3	4	5	6	7	8	9	10	12	14	16	18
1/8"	134	224	295	351	394	430	461	488	511	530	547	561	573	584
1/4"	214	374	495	591	664	725	775	817	853	884	911	934	953	969
3/8"	324	564	745	891	1004	1104	1191	1267	1334	1394	1449	1499	1545	1587
1/2"	434	764	1015	1215	1384	1534	1674	1794	1904	1994	2074	2144	2204	2254
5/8"	544	964	1295	1555	1784	1984	2164	2324	2464	2584	2694	2784	2864	2934
3/4"	654	1174	1585	1915	2194	2444	2674	2884	3074	3244	3394	3524	3644	3754
7/8"	764	1394	1895	2295	2634	2934	3204	3454	3684	3894	4084	4254	4404	4544
1"	874	1614	2205	2755	3144	3504	3834	4144	4434	4704	4954	5184	5394	5584
1 1/8"	984	1844	2545	3195	3644	4034	4394	4734	5054	5354	5634	5894	6134	6354
1 1/4"	1094	2064	2865	3615	4144	4634	5034	5414	5774	6114	6434	6734	7014	7274
1 3/8"	1204	2294	3205	4055	4644	5194	5694	6194	6674	7134	7574	8004	8414	8804
1 1/2"	1314	2514	3445	4405	5044	5644	6204	6774	7334	7894	8444	8994	9534	10054
1 5/8"	1424	2744	3705	4775	5464	6124	6754	7394	8054	8714	9374	10034	10694	11334
1 3/4"	1534	2974	4065	5245	6004	6734	7434	8154	8914	9674	10434	11194	11954	12714
1 7/8"	1644	3224	4365	5655	6484	7284	8054	8854	9694	10534	11374	12214	13054	13894
2"	1754	3494	4705	6105	7004	7874	8714	9594	10514	11434	12354	13274	14194	15114
2 1/8"	1864	3774	5045	6575	7544	8484	9394	10334	11314	12294	13274	14254	15234	16214
2 1/4"	1974	4064	5405	7065	8104	9034	9934	10914	11934	12954	13974	14994	16014	17034
2 3/8"	2084	4364	5765	7555	8664	9594	10554	11614	12714	13814	14914	16014	17114	18214
2 1/2"	2194	4674	6135	8045	9244	10274	11334	12434	13574	14714	15854	17014	18174	19334
2 5/8"	2304	4994	6525	8565	9844	10974	12134	13334	14574	15814	17054	18314	19574	20834
2 3/4"	2414	5324	6935	9095	10464	11694	12974	14314	15654	17054	18454	19854	21254	22654
2 7/8"	2524	5674	7365	9635	11104	12434	13834	15314	16754	18254	19754	21254	22754	24254
3"	2634	6034	7825	10295	11864	13304	14814	16394	18034	19734	21434	23134	24834	26534
3 1/8"	2744	6414	8305	10945	12614	14164	15794	17514	19314	21174	23034	24934	26834	28734
3 1/4"	2854	6814	8805	11715	13484	15144	16874	18714	20674	22714	24814	26914	29014	31114
3 3/8"	2964	7234	9325	12615	14594	16374	18234	20214	22314	24514	26814	29114	31514	33914
3 1/2"	3074	7674	9865	13455	15844	17744	19794	21974	24294	26714	29214	31814	34514	37314
3 5/8"	3184	8134	10435	14445	16814	18844	21034	23394	25914	28514	31214	34014	36914	39914
3 3/4"	3294	8614	11045	15595	18164	20344	22714	25294	28014	30814	33714	36714	39814	43014
3 7/8"	3404	9114	11705	16815	19614	21944	24514	27314	30314	33414	36614	39914	43314	46814
4"	3514	9634	12435	18195	21314	23844	26614	29614	32814	36214	39714	43314	47014	50814
4 1/8"	3624	10174	13205	19745	22814	25544	28514	31714	35114	38714	42414	46214	50114	54114
4 1/4"	3734	10734	14045	21475	24514	27444	30614	34114	37814	41714	45714	49814	54014	58314
4 3/8"	3844	11314	14965	23415	26414	29644	33014	36714	40714	44914	49314	53814	58414	63114
4 1/2"	3954	11914	15965	25575	28814	32344	36014	40114	44514	49114	53814	58614	63514	68514
4 5/8"	4064	12534	17045	27975	31514	35344	39314	43714	48414	53314	58314	63514	68814	74314
4 3/4"	4174	13174	18205	30315	34514	38644	42914	47714	52714	57914	63314	68814	74514	80314
4 7/8"	4284	13834	19445	32815	37214	41744	46314	51314	56514	61914	67514	73314	79314	85514
5"	4394	14514	20765	35515	40314	45244	50114	55314	60714	66314	72114	78114	84314	90714

Kimray 210-15 Glycol Pump will exhaust 1050cf / Hr of gas Maximum.



# 12V DC Control Valve





# BTEX to Burner Analysis



**SHARROCK GAS ANALYSIS**  
1102 South Boston  
Houston, Texas 77079  
09/07/09

**TUBES FROM STACK WITH TUBING DAMAGED (W/IDE T% BALANCE)**

GAS ANALYSIS REPORT NO: 0149000X      DATE: 08-Mar-09

FOR: Chesapeake      ASB: Chickasha Area      SAMPLE IDENTIFICATION

COMP: Chesapeake      FIELD: Chickasha Area      LEASE: Kula-CF-BTEX-GHE      STA. #: NoRec

**SAMPLE DATA**

DATE: 02-Mar-09      BY: M. Brennan      FIELD GRAVITY: NoRec  
 PRESS: 30      MPa      TEMP: 393      Deg. F.      DEW POINT: NoRec  
 FLOW: NoRec      MCFD      DIFF: NoRec      In. Hg      LBS H2O

REMARKS: Temp. At Receiver      Estimated Analysis

CYL #1: 0001      LAB #1: 0149000X

COMPONENT ANALYSIS		
COMPONENTS	MOL PERCENT	GPW @ 14.730 psia
CARBON DIOXIDE (CO2)	3.70	
NITROGEN (N2)	43.73	
METHANE (C1)	7.90	3.987
ETHANE (C2)	10.80	4.008
PROPANE (C3)	14.88	0.901
ISOBUTANE (IC4)	2.76	2.300
N-BUTANE (NC4)	7.55	0.173
ISOPENTANE (IC5)	2.11	0.788
N-PENTANE (NC5)	2.18	1.201
HEXANES PLUS (C6+)	0.38	
TOTALS	100.00	
ETHANE - GPM:		13.088
PROPANE - GPM:		10.201
ISO-PENTANE - GPM:		2.622
Compressibility Factor (Z):		0.9932
Specific Gravity @ 60 Deg. F. (real):		1.285
BTU / CU. FT. @ 60 Deg. F., 14.730 PSIA (REAL):		1207.7
		DRY 1207.7
		WET 1207.7

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# FLUE GAS ANALYSIS ON HIGH BURNER



**SHARROCK GAS ANALYSIS**  
1102 South Boston  
Houston, Texas 77079  
09/07/09

**TUBES FROM STACK WITH TUBING DAMAGED (W/IDE T% BALANCE)**

GAS ANALYSIS REPORT NO: 0149000X      DATE: 08-Mar-09

FOR: Chesapeake      ASB: Chickasha Area      SAMPLE IDENTIFICATION

COMP: Chesapeake      FIELD: Chickasha Area      LEASE: Kula-CF-Stack High Burner      STA. #: NoRec

**SAMPLE DATA**

DATE: 02-Mar-09      BY: M. Brennan      FIELD GRAVITY: NoRec  
 PRESS: 30      MPa      TEMP: 384      Deg. F.      DEW POINT: NoRec  
 FLOW: NoRec      MCFD      DIFF: NoRec      In. Hg      LBS H2O

REMARKS: Estimated Analysis

CYL #1: 0009      LAB #1: 0149000X

COMPONENT ANALYSIS		
COMPONENTS	MOL PERCENT	GPW @ 14.730 psia
CARBON DIOXIDE (CO2)	11.13	
NITROGEN (N2)	89.83	
METHANE (C1)	0.02	0.000
ETHANE (C2)	0.02	0.000
PROPANE (C3)	0.00	0.000
ISOBUTANE (IC4)	0.00	0.000
N-BUTANE (NC4)	0.01	0.004
ISOPENTANE (IC5)	0.00	0.000
N-PENTANE (NC5)	0.00	0.000
HEXANES PLUS (C6+)	0.02	0.000
TOTALS	100.00	
ETHANE - GPM:		0.010
PROPANE - GPM:		0.000
ISO-PENTANE - GPM:		0.006
Compressibility Factor (Z):		0.9995
Specific Gravity @ 60 Deg. F. (real):		1.024
BTU / CU. FT. @ 60 Deg. F., 14.730 PSIA (REAL):		1.2
		DRY 1.2
		WET 1.2

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# CMP Standard



## Patton Burner Management System

Unique combination of Flame Ignition, Valve Acquisition and Control

U.S. Patent Pending



The Patton Burner Management System (PBMS) is a unique combination of Flame Ignition, Valve Acquisition, and Control.

### Ignition

The PBMS is designed to serve to ignite and maintain the ignition system. The number of ignition attempts, delay to next flame, time for ignition delay to open the fuel valve, and flame status, including any self-diagnostic tests for any flame out or on the available, are all monitored.

NOTE: Pilot on Demand allows the pilot to remain off until it is needed based on gas or pressure or pressure release allowing you to save money and fuel use.



PBMS

### POWER

The control unit is powered by 12 Vdc, which can be obtained in many ways. In some cases, an auxiliary power source may be required. Other power configurations are also readily available.

### CONTROL

With its broad range and variety, the PBMS can be easily configured for a variety of burner systems and conditions. Examples of burner conditions would be high stack or sub-atmospheric pressure, variable and fixed tank levels, and remote gas shut-down. Control is available via standard protocols, or custom protocols. Control is available via standard protocols or custom protocols.

12 Volts 24 Volts Uses Solar Power	Modbus	Control and Logging	Call 806-398-7993
--	--------	---------------------	----------------------

- 12V Low Draw DC
- Solar Panel
- Multi language Modbus
- 4 Gig SD Card
- Flexible Data Graphs

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# 12V DC Control Valve



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## Flash Tank Installations



Year	Number
2004	3
2005	17
2006	24
2007	24
2008	38

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## Opportunities & Challenges – STAR



### Adopted BMPs

- Dehy BMPs (as discussed)
- Low-Bleed Pneumatics on all New Equipment
- Solar/Electric/Zero-Exhaust Chemical Injection Pumps
- Instrument Air
- Pipeline Hot Taps
- Leak Repairs
- VRU on Tanks

### Opportunities

- Documenting what is already being done!
- Pipeline blow-downs using compressors
- Replacing/ Retrofitting/ Upgrading older equipment

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