EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201409145	ANALYSIS NO. :	04
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	SEPTEMBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 23, 2014
PRODUCER :	ARIKAREE	CYLINDER NO. :	0405
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 12:45 BIG SKY 12-11		
FIELD DATA		SAMPLE TEMP. :	110
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7PPM) 12:50		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0024	0.0055		
GLYCOLS	0.0025	0.0124		
HELIUM	0.48	0.06	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.38	0.40	---	---
NITROGEN	48.29	44.52	---	---
CARBON DIOXIDE	2.48	3.59	---	---
METHANE	26.93770	14.22900	---	---
ETHANE	4.2942	4.2503	1.1447	1.1509
PROPANE	6.6367	9.6331	1.8235	1.8334
I-BUTANE	1.4350	2.7454	0.4679	0.4704
N-BUTANE	4.6213	8.8415	1.4526	1.4605
I-PENTANE	1.1437	2.7136	0.4139	0.4162
N-PENTANE	1.5646	3.7158	0.5648	0.5679
HEXANES PLUS	1.7219	5.2834	0.7190	0.7223
TOTALS	100.00000	100.00000	6.5864	6.6216

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0030	0.0077
TOLUENE	0.0025	0.0076
ETHYLBENZENE	0.0009	0.0032
XYLENES	0.0026	0.0092
TOTAL BTEX	0.0090	0.0277

BTU @		14.650	14.730
LOW	NET DRY REAL :	830.5 /scf	835.0 /scf
	NET WET REAL :	816.0 /scf	820.5 /scf
HIGH	GROSS DRY REAL :	907.2 /scf	912.2 /scf
	GROSS WET REAL :	891.3 /scf	896.3 /scf
	NET DRY REAL :	10403.8 /lb	10460.6 /lb
	GROSS DRY REAL :	11362.7 /lb	11424.8 /lb
	RELATIVE DENSITY (AIR=1):		1.0477
	COMPRESSIBILITY FACTOR :		0.99715

(CALC: GPA STD 2145 & TP-17 @14.696 & 60 F)

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

EMPACT ANALYTICAL SYSTEMS INC.
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GLYCALC INFORMATION

PROJECT NO. :	201409145	ANALYSIS NO. :	04
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	SEPTEMBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 23, 2014
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LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 12:45 BIG SKY 12-11		
FIELD DATA		SAMPLE TEMP. :	110
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7PPM) 12:50		

Componet	Mole %	Wt %
Helium	0.48	0.06
Hydrogen	0.01	0.00
Carbon Dioxide	2.48	3.59
Nitrogen	48.29	44.52
Methane	26.93770	14.22900
Ethane	4.2942	4.2503
Propane	6.6367	9.6331
Isobutane	1.4350	2.7454
n-Butane	4.6213	8.8415
Isopentane	1.1050	2.6243
n-Pentane	1.5646	3.7158
Cyclopentane	0.0387	0.0893
n-Hexane	0.4110	1.1659
Cyclohexane	0.0951	0.2635
Other Hexanes	0.5820	1.6434
Heptanes	0.3311	1.0863
Methycyclohexane	0.0888	0.2870
2,2,4 Trimethylpentane	0.0005	0.0019
Benzene	0.0030	0.0077
Toluene	0.0025	0.0076
Ethylbenzene	0.0009	0.0032
Xylenes	0.0026	0.0092
C8+ Heavies	0.2044	0.8077
Subtotal	99.61510	99.58210
Oxygen/Argon	0.38	0.40
Alcohols	0.0024	0.0055
Glycols	0.0025	0.0124
Total	100.00000	100.00000

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201409145	ANALYSIS NO. :	04
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	SEPTEMBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 23, 2014
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LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 12:45 BIG SKY 12-11		
FIELD DATA		SAMPLE TEMP. :	110
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7PPM) 12:50		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.48	0.06	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.38	0.40	---	---
Nitrogen	---	48.29	44.52	---	---
Carbon Dioxide	---	2.48	3.59	---	---
Methane	P1	26.93770	14.22900	---	---
Ethane	P2	4.2942	4.2503	1.145	1.151
Propane	P3	6.6367	9.6331	1.824	1.833
i-Butane	I4	1.4350	2.7454	0.468	0.470
n-Butane	P4	4.6213	8.8415	1.453	1.461
2,2-Dimethylpropane	I5	0.0090	0.0214	0.003	0.003
Ethanol	X2	0.0004	0.0006	0.000	0.000
i-Pentane	I5	1.0960	2.6029	0.400	0.402
n-Pentane	P5	1.5627	3.7113	0.565	0.568
t-Butanol	X4	0.0020	0.0049	0.001	0.001
2,2-Dimethylbutane	I6	0.0074	0.0210	0.003	0.003
Cyclopentane	N5	0.0387	0.0893	0.011	0.011
2,3-Dimethylbutane	I6	0.0314	0.0891	0.013	0.013
2-Methylpentane	I6	0.2846	0.8073	0.118	0.119
3-Methylpentane	I6	0.1435	0.4071	0.058	0.058
UnknownC5s	U5	0.0019	0.0045	0.001	0.001
n-Hexane	P6	0.4110	1.1659	0.169	0.170
2,2-Dimethylpentane	I7	0.0001	0.0003	0.000	0.000
Methylcyclopentane	N6	0.1151	0.3189	0.041	0.041
2,4-Dimethylpentane	I7	0.0080	0.0264	0.004	0.004
2,2,3-Trimethylbutane	I7	0.0005	0.0017	0.000	0.000
Benzene	A6	0.0030	0.0077	0.001	0.001
3,3-Dimethylpentane	I7	0.0002	0.0007	0.000	0.000
Cyclohexane	N6	0.0951	0.2635	0.032	0.032
2-Methylhexane	I7	0.0422	0.1392	0.020	0.020
2,3-Dimethylpentane	I7	0.0120	0.0396	0.005	0.005
1,1-Dimethylcyclopentane	N7	0.0129	0.0417	0.005	0.005
3-Methylhexane	I7	0.0535	0.1765	0.024	0.024
1c,3-Dimethylcyclopentane	N7	0.0202	0.0653	0.009	0.009
1t,3-Dimethylcyclopentane	N7	0.0167	0.0540	0.008	0.008
3-Ethylpentane	I7	0.0021	0.0069	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0341	0.1102	0.016	0.016
2,2,4-Trimethylpentane	I8	0.0005	0.0019	0.000	0.000
n-Heptane	P7	0.1183	0.3902	0.054	0.054
1c,2-Dimethylcyclopentane	N7	0.0025	0.0081	0.001	0.001
Methylcyclohexane	N7	0.0888	0.2870	0.036	0.036

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2,2-Dimethylhexane	I8	0.0103	0.0387	0.005	0.005
Ethylcyclopentane	N7	0.0046	0.0149	0.002	0.002
2,5-Dimethylhexane	I8	0.0008	0.0030	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0013	0.0049	0.001	0.001
2,4-Dimethylhexane	I8	0.0035	0.0132	0.002	0.002
1c,2t,4-Trimethylcyclopentane	N8	0.0066	0.0244	0.003	0.003
3,3-Dimethylhexane	I8	0.0009	0.0034	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0094	0.0347	0.004	0.004
2,3,4-Trimethylpentane	I8	0.0002	0.0008	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0025	0.0076	0.001	0.001
2,3-Dimethylhexane	I8	0.0027	0.0101	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0011	0.0042	0.001	0.001
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0188	0.0707	0.010	0.010
4-Methylheptane	I8	0.0051	0.0192	0.003	0.003
3-Methyl-3-ethylpentane	I8	0.0011	0.0042	0.001	0.001
3,4-Dimethylhexane	I8	0.0007	0.0026	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0004	0.0015	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0003	0.0011	0.000	0.000
3-Methylheptane	I8	0.0062	0.0233	0.003	0.003
1c,2t,3-Trimethylcyclopentane	N8	0.0144	0.0532	0.007	0.007
3-Ethylhexane	I8	0.0028	0.0105	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0044	0.0163	0.002	0.002
1,1-Dimethylcyclohexane	N8	0.0013	0.0048	0.001	0.001
3t-Ethylmethylcyclopentane	N8	0.0013	0.0048	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0010	0.0037	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0027	0.0100	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0003	0.0013	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0045	0.0166	0.002	0.002
UnknownC7s	U7	0.0032	0.0106	0.001	0.001
n-Octane	P8	0.0187	0.0703	0.010	0.010
1c,4-Dimethylcyclohexane	N8	0.0116	0.0429	0.006	0.006
i-Propylcyclopentane	I8	0.0004	0.0015	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0003	0.0013	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0005	0.0021	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0010	0.0037	0.001	0.001
2,2-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0046	0.0191	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0028	0.0118	0.001	0.001
2,4-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
4,4-Dimethylheptane	I9	0.0007	0.0030	0.000	0.000
Ethylcyclohexane	N8	0.0021	0.0078	0.001	0.001
n-Propylcyclopentane	N8	0.0013	0.0048	0.001	0.001
1c,3c,5-Trimethylcyclohexane	N9	0.0004	0.0017	0.000	0.000
2,5-Dimethylheptane	I9	0.0005	0.0021	0.000	0.000
3,3-Dimethylheptane	I9	0.0005	0.0021	0.000	0.000
3,5-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
2,6-Dimethylheptane	I9	0.0004	0.0017	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0007	0.0029	0.000	0.000
Ethylbenzene	I8	0.0009	0.0032	0.000	0.000
1c,2t,4t-Trimethylcyclohexane	N9	0.0009	0.0038	0.001	0.001
2,3-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0011	0.0039	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0009	0.0032	0.000	0.000
3,4-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0004	0.0017	0.000	0.000
4-Ethylheptane	I9	0.0002	0.0009	0.000	0.000
4-Methyloctane	I9	0.0016	0.0068	0.001	0.001
2-Methyloctane	I9	0.0017	0.0072	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0005	0.0021	0.000	0.000
3-Ethylheptane	I9	0.0006	0.0025	0.000	0.000

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3-Methyloctane	I9	0.0026	0.0110	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0004	0.0017	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0004	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0006	0.0021	0.000	0.000
i-Butylcyclopentane	N9	0.0011	0.0046	0.001	0.001
UnknownC8s	U8	0.0007	0.0026	0.000	0.000
n-Nonane	P9	0.0066	0.0278	0.004	0.004
1,1-Methylethylcyclohexane	N9	0.0023	0.0095	0.001	0.001
i-Propylbenzene	A9	0.0004	0.0016	0.000	0.000
i-Propylcyclohexane	N9	0.0004	0.0017	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
2,4-Dimethyloctane	I10	0.0002	0.0009	0.000	0.000
2,6-Dimethyloctane	I10	0.0002	0.0009	0.000	0.000
n-Butylcyclopentane	N9	0.0010	0.0042	0.001	0.001
3,3-Dimethyloctane	I10	0.0002	0.0009	0.000	0.000
n-Propylbenzene	A9	0.0014	0.0055	0.001	0.001
3,6-Dimethyloctane	I10	0.0003	0.0014	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0005	0.0023	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0012	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0004	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0004	0.0016	0.000	0.000
2,3-Dimethyloctane	I10	0.0003	0.0014	0.000	0.000
5-Methylnonane	I10	0.0009	0.0042	0.001	0.001
1,2-Methylethylbenzene	A9	0.0006	0.0024	0.000	0.000
2-Methylnonane	I10	0.0001	0.0005	0.000	0.000
3-Ethyloctane	I10	0.0002	0.0009	0.000	0.000
3-Methylnonane	I10	0.0006	0.0028	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
t-Butylbenzene	A10	0.0005	0.0022	0.000	0.000
i-Butylcyclohexane	N10	0.0003	0.0014	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0005	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
UnknownC9s	U9	0.0059	0.0249	0.003	0.003
n-Decane	P10	0.0030	0.0141	0.002	0.002
1,2,3-Trimethylbenzene	A9	0.0002	0.0008	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
Sec-Butylcyclohexane	A10	0.0009	0.0042	0.001	0.001
1,2-Methyl-i-propylbenzene	A10	0.0003	0.0013	0.000	0.000
3-Ethylnonane	I10	0.0001	0.0005	0.000	0.000
1,3-Diethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Diethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0003	0.0013	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Diethylbenzene	A10	0.0002	0.0009	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0005	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0002	0.0009	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Ethyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0002	0.0010	0.000	0.000
UnknownC10s	U10	0.0051	0.0239	0.003	0.003
n-Undecane	P11	0.0013	0.0067	0.001	0.001
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0004	0.000	0.000
1,2-Methyl-n-butylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0004	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0002	0.0010	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0002	0.0010	0.000	0.000

2-Methylindan	A11	0.0001	0.0004	0.000	0.000
sec-Pentylbenzene	A11	0.0001	0.0005	0.000	0.000
n-Pentylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2-Di-n-propylbenzene	A11	0.0001	0.0005	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0002	0.0011	0.000	0.000
Tetrahydronaphthalene	A10	0.0001	0.0004	0.000	0.000
Naphthalene	A10	0.0001	0.0004	0.000	0.000
Triethylene Glycol	GL6	0.0025	0.0124	0.002	0.002
UnknownC11s	U11	0.0017	0.0088	0.001	0.001
n-Dodecane	P12	0.0007	0.0039	0.001	0.001
1,2,4-Triethylbenzene	A12	0.0002	0.0011	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0001	0.0005	0.000	0.000
UnknownC12s	U12	0.0006	0.0031	0.000	0.000
n-Tridecane	P13	0.0002	0.0012	0.000	0.000
UnknownC13s	U13	0.0002	0.0012	0.000	0.000
n-Tetradecane	P14	0.0001	0.0007	0.000	0.000
UnknownC14s	U14	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	6.5904	6.6256

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0030	0.0077
TOLUENE	0.0025	0.0076
ETHYLBENZENE	0.0009	0.0032
XYLENES	0.0026	0.0092
TOTAL BTEX	0.0090	0.0277

	BTU @	14.650	14.730
LOW	NET DRY REAL :	830.5 /scf	835.0 /scf
	NET WET REAL :	816.0 /scf	820.5 /scf
HIGH	GROSS DRY REAL :	907.2 /scf	912.2 /scf
	GROSS WET REAL :	891.3 /scf	896.3 /scf
	NET DRY REAL :	10403.8 /lb	10460.6 /lb
	GROSS DRY REAL :	11362.7 /lb	11424.8 /lb
	RELATIVE DENSITY (AIR=1):		1.0477
	COMPRESSIBILITY FACTOR :		0.99715

(CALC: GPA STD 2145 & TP-17 @14.696 & 60 F)

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

THIS DATA HAS BEEN ACQUIRED THROUGH APPLICATION OF CURRENT STATE-OF-THE-ART ANALYTICAL TECHNIQUES. THE USE OF THIS INFORMATION IS THE RESPONSIBLITY OF THE USER. EMPACT ANALYTICAL SYSTEMS, ASSUMES NO RESPONSIBLITY FOR ACCURACY OF THE REPORTED INFORMATION NOR ANY CONSEQUENCES OF IT'S APPLICATION.

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