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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201410050	ANALYSIS NO. :	08
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	OCTOBER 10, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 7, 2014
PRODUCER :		CYLINDER NO. :	0799
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 14:10 JOHN CRAIG 1-2		
FIELD DATA		SAMPLE TEMP. :	128
SAMPLE PRES. :	29	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 3.0 PPM (1-7PPM) 14:15		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0002	0.0005		
HELIUM	0.15	0.02	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.05	0.06	---	---
NITROGEN	14.44	14.50	---	---
CARBON DIOXIDE	0.63	0.99	---	---
METHANE	48.00810	27.59950	---	---
ETHANE	14.9402	16.0985	3.9924	4.0142
PROPANE	13.3973	21.1701	3.6878	3.7079
I-BUTANE	1.6356	3.4067	0.5350	0.5379
N-BUTANE	3.9959	8.3227	1.2583	1.2652
I-PENTANE	0.9082	2.3439	0.3286	0.3303
N-PENTANE	0.8501	2.1979	0.3076	0.3092
HEXANES PLUS	0.9944	3.2902	0.3984	0.4006
TOTALS	100.00000	100.00000	10.5081	10.5653

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0424	0.1187
TOLUENE	0.0267	0.0882
ETHYLBENZENE	0.0047	0.0179
XYLENES	0.0056	0.0213
TOTAL BTEX	0.0794	0.2461

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1270.1 /scf	1277.1 /scf
	NET WET REAL :	1247.9 /scf	1254.9 /scf
HIGH	GROSS DRY REAL :	1390.7 /scf	1398.3 /scf
	GROSS WET REAL :	1366.4 /scf	1374.0 /scf
	NET DRY REAL :	17299.1 /lb	17393.6 /lb
	GROSS DRY REAL :	18943.5 /lb	19046.9 /lb

RELATIVE DENSITY (AIR=1):	0.9622
COMPRESSIBILITY FACTOR :	0.99503

(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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GLYCALC INFORMATION

PROJECT NO. :	201410050	ANALYSIS NO. :	08
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	OCTOBER 10, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 7, 2014
PRODUCER :		CYLINDER NO. :	0799
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NAME/DESCRIP :	SALES GAS 14:10 JOHN CRAIG 1-2		
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SAMPLE PRES. :	29	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 3.0 PPM (1-7PPM) 14:15		

Componet	Mole %	Wt %
Helium	0.15	0.02
Hydrogen	0.00	0.00
Carbon Dioxide	0.63	0.99
Nitrogen	14.44	14.50
Methane	48.00810	27.59950
Ethane	14.9402	16.0985
Propane	13.3973	21.1701
Isobutane	1.6356	3.4067
n-Butane	3.9959	8.3227
Isopentane	0.8486	2.1941
n-Pentane	0.8501	2.1979
Cyclopentane	0.0596	0.1498
n-Hexane	0.1594	0.4922
Cyclohexane	0.0642	0.1936
Other Hexanes	0.3774	1.1584
Heptanes	0.1602	0.5707
Methycyclohexane	0.0486	0.1710
2,2,4 Trimethylpentane	0.0003	0.0012
Benzene	0.0424	0.1187
Toluene	0.0267	0.0882
Ethylbenzene	0.0047	0.0179
Xylenes	0.0056	0.0213
C8+ Heavies	0.1049	0.4570
Subtotal	99.94980	99.93950
Oxygen/Argon	0.05	0.06
Alcohols	0.0002	0.0005
Total	100.00000	100.00000

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201410050	ANALYSIS NO. :	08
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ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 7, 2014
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NAME/DESCRIP :	SALES GAS 14:10 JOHN CRAIG 1-2		
FIELD DATA		SAMPLE TEMP. :	128
SAMPLE PRES. :	29	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 3.0 PPM (1-7PPM) 14:15		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.15	0.02	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.05	0.06	---	---
Nitrogen	---	14.44	14.50	---	---
Carbon Dioxide	---	0.63	0.99	---	---
Methane	P1	48.00810	27.59950	---	---
Ethane	P2	14.9402	16.0985	3.992	4.014
Propane	P3	13.3973	21.1701	3.688	3.708
i-Butane	I4	1.6356	3.4067	0.535	0.538
n-Butane	P4	3.9954	8.3217	1.258	1.265
2,2-Dimethylpropane	I5	0.0068	0.0176	0.003	0.003
i-Pentane	I5	0.8418	2.1765	0.308	0.309
UnknownC4s	U4	0.0005	0.0010	0.000	0.000
n-Pentane	P5	0.8497	2.1969	0.308	0.309
t-Butanol	X4	0.0002	0.0005	0.000	0.000
2,2-Dimethylbutane	I6	0.0038	0.0117	0.002	0.002
Cyclopentane	N5	0.0596	0.1498	0.018	0.018
2,3-Dimethylbutane	I6	0.0179	0.0553	0.007	0.007
2-Methylpentane	I6	0.1653	0.5105	0.068	0.069
3-Methylpentane	I6	0.0923	0.2850	0.038	0.038
UnknownC5s	U5	0.0004	0.0010	0.000	0.000
n-Hexane	P6	0.1594	0.4922	0.065	0.066
2,2-Dimethylpentane	I7	0.0004	0.0014	0.000	0.000
Methylcyclopentane	N6	0.0981	0.2959	0.035	0.035
2,4-Dimethylpentane	I7	0.0037	0.0133	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0003	0.0011	0.000	0.000
Benzene	A6	0.0424	0.1187	0.012	0.012
Cyclohexane	N6	0.0642	0.1936	0.022	0.022
2-Methylhexane	I7	0.0171	0.0614	0.008	0.008
2,3-Dimethylpentane	I7	0.0082	0.0295	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0068	0.0239	0.003	0.003
3-Methylhexane	I7	0.0263	0.0944	0.012	0.012
1c,3-Dimethylcyclopentane	N7	0.0128	0.0450	0.006	0.006
1t,3-Dimethylcyclopentane	N7	0.0101	0.0355	0.005	0.005
3-Ethylpentane	I7	0.0010	0.0036	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0253	0.0890	0.012	0.012
2,2,4-Trimethylpentane	I8	0.0003	0.0012	0.000	0.000
n-Heptane	P7	0.0413	0.1483	0.019	0.019
1c,2-Dimethylcyclopentane	N7	0.0017	0.0060	0.001	0.001
Methylcyclohexane	N7	0.0486	0.1710	0.019	0.019
2,2-Dimethylhexane	I8	0.0037	0.0152	0.002	0.002

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Ethylcyclopentane	N7	0.0052	0.0183	0.002	0.002
2,5-Dimethylhexane	I8	0.0007	0.0029	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0004	0.0016	0.000	0.000
2,4-Dimethylhexane	I8	0.0015	0.0061	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0032	0.0129	0.001	0.001
3,3-Dimethylhexane	I8	0.0004	0.0016	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0046	0.0185	0.002	0.002
2,3,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0267	0.0882	0.009	0.009
2,3-Dimethylhexane	I8	0.0013	0.0053	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0006	0.0025	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0091	0.0373	0.005	0.005
4-Methylheptane	I8	0.0019	0.0078	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0006	0.0025	0.000	0.000
3,4-Dimethylhexane	I8	0.0005	0.0020	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0002	0.0008	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0002	0.0008	0.000	0.000
3-Methylheptane	I8	0.0024	0.0098	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0065	0.0261	0.003	0.003
3-Ethylhexane	I8	0.0013	0.0053	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0022	0.0088	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0008	0.0032	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0010	0.0040	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0008	0.0032	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0024	0.0096	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0026	0.0105	0.001	0.001
n-Octane	P8	0.0066	0.0270	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0056	0.0225	0.003	0.003
i-Propylcyclopentane	I8	0.0002	0.0008	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0003	0.0014	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0004	0.0016	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0033	0.0149	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0016	0.0073	0.001	0.001
2,4-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
4,4-Dimethylheptane	I9	0.0004	0.0018	0.000	0.000
Ethylcyclohexane	N8	0.0018	0.0072	0.001	0.001
n-Propylcyclopentane	N8	0.0006	0.0024	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0009	0.000	0.000
2,5-Dimethylheptane	I9	0.0003	0.0014	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
2,6-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0002	0.0009	0.000	0.000
Ethylbenzene	I8	0.0047	0.0179	0.002	0.002
1c,2t,4t-Trimethylcyclohexane	N9	0.0004	0.0018	0.000	0.000
2,3-Dimethylheptane	I9	0.0007	0.0032	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0027	0.0103	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0009	0.0034	0.000	0.000
3,4-Dimethylheptane	I9	0.0003	0.0014	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0002	0.0009	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0006	0.0028	0.000	0.000
2-Methyloctane	I9	0.0008	0.0037	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0009	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0009	0.000	0.000
3-Methyloctane	I9	0.0011	0.0050	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0003	0.0014	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0005	0.000	0.000

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1,2-Dimethylbenzene (o-Xylene)	A8	0.0020	0.0076	0.001	0.001
i-Butylcyclopentane	N9	0.0006	0.0027	0.000	0.000
UnknownC8s	U8	0.0003	0.0012	0.000	0.000
n-Nonane	P9	0.0027	0.0124	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0010	0.0045	0.001	0.001
i-Propylbenzene	A9	0.0008	0.0034	0.000	0.000
i-Propylcyclohexane	N9	0.0002	0.0009	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
n-Butylcyclopentane	N9	0.0006	0.0027	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
n-Propylbenzene	A9	0.0007	0.0030	0.000	0.000
3,6-Dimethyloctane	I10	0.0006	0.0030	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0002	0.0010	0.000	0.000
1,3-Methylethylbenzene	A9	0.0006	0.0026	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0009	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0003	0.0013	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
5-Methylnonane	I10	0.0004	0.0020	0.000	0.000
1,2-Methylethylbenzene	A9	0.0003	0.0013	0.000	0.000
2-Methylnonane	I10	0.0001	0.0005	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0005	0.000	0.000
3-Methylnonane	I10	0.0003	0.0015	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
t-Butylbenzene	A10	0.0009	0.0043	0.000	0.000
i-Butylcyclohexane	N10	0.0002	0.0010	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0005	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0034	0.0156	0.002	0.002
n-Decane	P10	0.0014	0.0071	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0004	0.0017	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	A10	0.0005	0.0025	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Diethylbenzene	A10	0.0002	0.0010	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0002	0.0010	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0005	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0002	0.0010	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0031	0.0158	0.002	0.002
n-Undecane	P11	0.0008	0.0045	0.001	0.001
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0001	0.0005	0.000	0.000
sec-Pentylbenzene	A11	0.0001	0.0005	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0001	0.0006	0.000	0.000
Tetrahydronaphthalene	A10	0.0002	0.0009	0.000	0.000
Naphthalene	A10	0.0001	0.0005	0.000	0.000
1,3-Di-n-propylbenzene	A12	0.0001	0.0006	0.000	0.000
UnknownC11s	U11	0.0008	0.0045	0.001	0.001
n-Dodecane	P12	0.0004	0.0024	0.000	0.000
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

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2-Methylnaphthalene	A11	0.0001	0.0005	0.000	0.000
1-Methylnaphthalene	A11	0.0001	0.0005	0.000	0.000
UnknownC12s	U12	0.0007	0.0039	0.000	0.000
n-Tridecane	P13	0.0002	0.0013	0.000	0.000
UnknownC13s	U13	0.0003	0.0020	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
n-Pentadecane	P15	0.0001	0.0007	0.000	0.000
UnknownC15s	U15	0.0001	0.0007	0.000	0.000
n-Hexadecane	P16	0.0001	0.0008	0.000	0.000
n-Nonadecane	P19	0.0001	0.0010	0.000	0.000
UnknownC19s	U19	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	10.5081	10.5653

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0424	0.1187
TOLUENE	0.0267	0.0882
ETHYLBENZENE	0.0047	0.0179
XYLENES	0.0056	0.0213
TOTAL BTEX	0.0794	0.2461

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1270.1 /scf	1277.1 /scf
	NET WET REAL :	1247.9 /scf	1254.9 /scf
HIGH	GROSS DRY REAL :	1390.7 /scf	1398.3 /scf
	GROSS WET REAL :	1366.4 /scf	1374.0 /scf
	NET DRY REAL :	17299.1 /lb	17393.6 /lb
	GROSS DRY REAL :	18943.5 /lb	19046.9 /lb
	RELATIVE DENSITY (AIR=1):		0.9622
	COMPRESSIBILITY FACTOR :		0.99503

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

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

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