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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201411070	ANALYSIS NO. :	05
COMPANY NAME :	NIGHTHAWK PRODUCTION COMPANY	ANALYSIS DATE:	NOVEMBER 19, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 13, 2014
PRODUCER :		CYLINDER NO. :	0819
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS 12:55 SALEN 14-35		
FIELD DATA		SAMPLE TEMP. :	35
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 0.50 PPM (1-7PPM) 13:00		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0014	0.0026		
HELIUM	0.25	0.03	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.10	0.10	---	---
NITROGEN	12.81	11.35	---	---
CARBON DIOXIDE	1.06	1.48	---	---
METHANE	35.24340	17.88980	---	---
ETHANE	18.8575	17.9418	5.0493	5.0769
PROPANE	20.3686	28.4196	5.6185	5.6492
I-BUTANE	2.3960	4.4065	0.7850	0.7893
N-BUTANE	5.4764	10.0716	1.7286	1.7380
I-PENTANE	1.2924	2.9454	0.4678	0.4703
N-PENTANE	1.1930	2.7235	0.4327	0.4350
HEXANES PLUS	0.9413	2.6392	0.3771	0.3793
TOTALS	100.00000	100.00000	14.4590	14.5380

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0261	0.0645
TOLUENE	0.0072	0.0210
ETHYLBENZENE	0.0005	0.0017
XYLENES	0.0005	0.0018
TOTAL BTEX	0.0343	0.0890

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1473.3 /scf	1481.4 /scf
	NET WET REAL :	1447.5 /scf	1455.6 /scf
HIGH	GROSS DRY REAL :	1609.1 /scf	1617.9 /scf
	GROSS WET REAL :	1581.0 /scf	1589.8 /scf
	NET DRY REAL :	17703.2 /lb	17799.8 /lb
	GROSS DRY REAL :	19335.6 /lb	19441.2 /lb
	RELATIVE DENSITY (AIR=1):		1.0904
	COMPRESSIBILITY FACTOR :		0.99306

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

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

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GLYCALC INFORMATION

PROJECT NO. :	201411070	ANALYSIS NO. :	05
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FIELD DATA		SAMPLE TEMP. :	35
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 0.50 PPM (1-7PPM) 13:00		

Componet	Mole %	Wt %
Helium	0.25	0.03
Hydrogen	0.01	0.00
Carbon Dioxide	1.06	1.48
Nitrogen	12.81	11.35
Methane	35.24340	17.88980
Ethane	18.8575	17.9418
Propane	20.3686	28.4196
Isobutane	2.3960	4.4065
n-Butane	5.4764	10.0716
Isopentane	1.2129	2.7690
n-Pentane	1.1930	2.7235
Cyclopentane	0.0795	0.1764
n-Hexane	0.1809	0.4933
Cyclohexane	0.0296	0.0788
Other Hexanes	0.5204	1.4117
Heptanes	0.1351	0.4251
Methycyclohexane	0.0151	0.0469
2,2,4 Trimethylpentane	0.0002	0.0007
Benzene	0.0261	0.0645
Toluene	0.0072	0.0210
Ethylbenzene	0.0005	0.0017
Xylenes	0.0005	0.0018
C8+ Heavies	0.0257	0.0937
Subtotal	99.89860	99.89740
Oxygen/Argon	0.10	0.10
Alcohols	0.0014	0.0026
Total	100.00000	100.00000

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

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VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 0.50 PPM (1-7PPM) 13:00		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.25	0.03	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.10	0.10	---	---
Nitrogen	---	12.81	11.35	---	---
Carbon Dioxide	---	1.06	1.48	---	---
Methane	P1	35.24340	17.88980	---	---
Ethane	P2	18.8575	17.9418	5.049	5.077
Propane	P3	20.3686	28.4196	5.619	5.649
i-Butane	I4	2.3960	4.4065	0.785	0.789
n-Butane	P4	5.4764	10.0716	1.729	1.738
2,2-Dimethylpropane	I5	0.0069	0.0158	0.003	0.003
i-Pentane	I5	1.2060	2.7532	0.442	0.444
Acetone	X3	0.0011	0.0020	0.000	0.000
i-Propanol	X3	0.0003	0.0006	0.000	0.000
n-Pentane	P5	1.1929	2.7233	0.433	0.435
2,2-Dimethylbutane	I6	0.0033	0.0090	0.001	0.001
Cyclopentane	N5	0.0795	0.1764	0.023	0.023
2,3-Dimethylbutane	I6	0.0109	0.0297	0.004	0.004
2-Methylpentane	I6	0.2483	0.6771	0.103	0.104
3-Methylpentane	I6	0.1354	0.3692	0.055	0.056
UnknownC5s	U5	0.0001	0.0002	0.000	0.000
n-Hexane	P6	0.1809	0.4933	0.074	0.075
2,2-Dimethylpentane	I7	0.0001	0.0003	0.000	0.000
Methylcyclopentane	N6	0.1153	0.3071	0.041	0.041
2,4-Dimethylpentane	I7	0.0033	0.0105	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0001	0.0003	0.000	0.000
Benzene	A6	0.0261	0.0645	0.007	0.007
Cyclohexane	N6	0.0296	0.0788	0.010	0.010
2-Methylhexane	I7	0.0128	0.0406	0.006	0.006
2,3-Dimethylpentane	I7	0.0060	0.0190	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0037	0.0115	0.002	0.002
3-Methylhexane	I7	0.0251	0.0796	0.011	0.011
1c,3-Dimethylcyclopentane	N7	0.0101	0.0314	0.005	0.005
1t,3-Dimethylcyclopentane	N7	0.0070	0.0217	0.003	0.003
3-Ethylpentane	I7	0.0034	0.0108	0.002	0.002
1t,2-Dimethylcyclopentane	N7	0.0271	0.0842	0.012	0.012
2,2,4-Trimethylpentane	I8	0.0002	0.0007	0.000	0.000
UnknownC6s	U6	0.0072	0.0196	0.003	0.003
n-Heptane	P7	0.0240	0.0761	0.011	0.011
1c,2-Dimethylcyclopentane	N7	0.0017	0.0053	0.001	0.001
Methylcyclohexane	N7	0.0151	0.0469	0.006	0.006

EMPACT Analytical Systems, Inc 365 S. Main Street, Brighton, CO 80601 303-637-0150

2,2-Dimethylhexane	I8	0.0009	0.0033	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0004	0.000	0.000
Ethylcyclopentane	N7	0.0043	0.0134	0.002	0.002
2,5-Dimethylhexane	I8	0.0005	0.0018	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0003	0.0011	0.000	0.000
2,4-Dimethylhexane	I8	0.0004	0.0015	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0019	0.0067	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0004	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0032	0.0114	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0072	0.0210	0.002	0.002
2,3-Dimethylhexane	I8	0.0007	0.0025	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0034	0.0123	0.002	0.002
4-Methylheptane	I8	0.0009	0.0033	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0003	0.0011	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0004	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
3-Methylheptane	I8	0.0005	0.0018	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0023	0.0082	0.001	0.001
3-Ethylhexane	I8	0.0002	0.0007	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0005	0.0018	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0002	0.0007	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0005	0.0018	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0004	0.0014	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0013	0.0046	0.001	0.001
1t,2-Dimethylcyclohexane	N8	0.0006	0.0021	0.000	0.000
UnknownC7s	U7	0.0063	0.0200	0.003	0.003
n-Octane	P8	0.0014	0.0051	0.001	0.001
1c,4-Dimethylcyclohexane	N8	0.0009	0.0032	0.000	0.000
i-Propylcyclopentane	I8	0.0001	0.0004	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0004	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0004	0.0016	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0003	0.0012	0.000	0.000
2,4-Dimethylheptane	I9	0.0002	0.0008	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
Ethylcyclohexane	N8	0.0004	0.0014	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0004	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
Ethylbenzene	I8	0.0005	0.0017	0.000	0.000
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0002	0.0007	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0004	0.000	0.000
4-Methyloctane	I9	0.0001	0.0004	0.000	0.000
2-Methyloctane	I9	0.0001	0.0004	0.000	0.000
3-Methyloctane	I9	0.0002	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0007	0.000	0.000
i-Butylcyclopentane	N9	0.0001	0.0004	0.000	0.000
UnknownC8s	U8	0.0002	0.0007	0.000	0.000
n-Nonane	P9	0.0002	0.0008	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0004	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0004	0.000	0.000
UnknownC9s	U9	0.0004	0.0016	0.000	0.000
UnknownC10s	U10	0.0001	0.0004	0.000	0.000
TOTAL		100.00000	100.00000	14.4590	14.5380

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BTEX COMPONENTS	MOLE%	WT%
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TOTAL BTEX	0.0343	0.0890

BTU @	14.650	14.730
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NET WET REAL :	1447.5 /scf	1455.6 /scf
HIGH GROSS DRY REAL :	1609.1 /scf	1617.9 /scf
GROSS WET REAL :	1581.0 /scf	1589.8 /scf
NET DRY REAL :	17703.2 /lb	17799.8 /lb
GROSS DRY REAL :	19335.6 /lb	19441.2 /lb
RELATIVE DENSITY (AIR=1):		1.0904
COMPRESSIBILITY FACTOR :		0.99306

(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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