

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

LEASE #: NAME/DESCRIP : **BIG SKY 12-11 SALES GAS**

PROJECT NO. : **201701043** ANALYSIS NO. : **03**

COMPANY NAME : **NIGHTHAWK PRODUCTION COMPANY** ANALYSIS DATE: JANUARY 17, 2017 12:20

OFFICE / BRANCH: **HIGHLANDS RANCH, CO** SAMPLE DATE : JANUARY 10, 2017 16:20

CUSTOMER REF: TO:

PRODUCER : EFFECTIVE DATE:

*****FIELD DATA*****

SAMPLE CYCLE: SAMPLE TYPE: SPOT

SAMPLE PRES. : 32 psig CYLINDER NO. : 0438

LAB PRES: psig SAMPLED BY : GALE MCENDREE

SAMPLE TEMP. : 89 °f SAMPLING COMPANY EMPACT

AMBIENT TEMP.: °f H2S BY STAIN TUBE: **17** ppm

H2O BY STAIN TUBE: - #/mmcf CO2 BY STAIN TUBE: - Mol %

FIELD COMMENTS: NO PROBE; TAKEN AT WELLHEAD

LAB COMMENTS:

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.730</u>	<u>GPM @ 14.650</u>
HELIUM	0.62	0.09	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.43	0.48	---	---
NITROGEN	51.7900	50.1100	---	---
CARBON DIOXIDE	2.93	4.45	---	---
METHANE	27.80190	15.39900	---	---
ETHANE	3.6188	3.7577	0.9694	0.9641
PROPANE	4.9855	7.5918	1.3763	1.3688
I-BUTANE	1.0610	2.1296	0.3476	0.3457
N-BUTANE	3.4571	6.9389	1.0920	1.0860
I-PENTANE	0.8828	2.1974	0.3214	0.3197
N-PENTANE	1.1980	2.9848	0.4350	0.4326
HEXANES PLUS	1.2249	3.8708	0.5040	0.5018
TOTALS	100.00000	100.00000	5.0457	5.0187

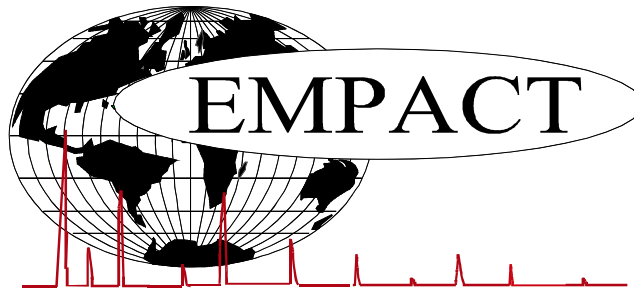
<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>	<u>BTU @</u>	<u>14.730</u>	<u>14.650</u>
BENZENE	0.0023	0.0062	LOW NET DRY REAL :	698.5 /scf	694.7 /scf
TOLUENE	0.0018	0.0057	NET WET REAL :	686.4 /scf	682.5 /scf
ETHYLBENZENE	0.0006	0.0022	HIGH GROSS DRY REAL :	764.4 /scf	760.2 /scf
XYLENES	0.0012	0.0044	GROSS WET REAL :	751.1 /scf	746.9 /scf
TOTAL BTEX	0.0059	0.0185	NET DRY REAL :	9177.9 /lb	9128.0 /lb
			GROSS DRY REAL :	10040.9 /lb	9986.4 /lb

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

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

RELATIVE DENSITY (AIR=1): 0.9987
COMPRESSIBILITY FACTOR : 0.99776

The data presented herein has been acquired by means of current analytical techniques and represents the judicious conclusion EMPACT Analytical Systems, Inc. Results of the analysis can be affected by the sampling conditions, therefore, are only warranted through proper lab protocol. EMPACT assumes no responsibility for interpretation or any consequences from application of the reported information and is the sole liability of the user. The reproduction in any media of this reported information may not be made, in portion or as a whole, without the written permission of EMPACT Analytical Systems, Inc.



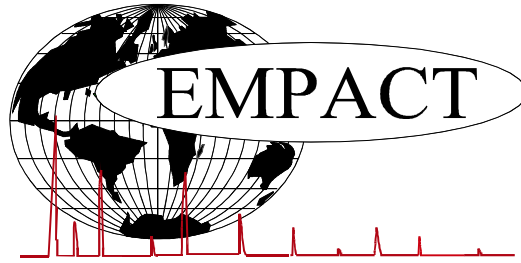
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GLYCALC INFORMATION

PROJECT NO. :	201701043	ANALYSIS NO. :	03
COMPANY NAME :	NIGHTHAWK PRODUCTION COMPANY	ANALYSIS DATE:	JANUARY 17, 2017 12:20
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 10, 2017 16:20
PRODUCER :		CYLINDER NO. :	0438
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	BIG SKY 12-11 SALES GAS		
FIELD DATA		SAMPLE TEMP. :	89
SAMPLE PRES. :	32	AMBIENT TEMP.:	
COMMENTS :	NO PROBE; TAKEN AT WELLHEAD SPOT		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.62	0.09
Hydrogen	0.00	0.00
Carbon Dioxide	2.93	4.45
Nitrogen	51.79	50.11
Methane	27.80190	15.39900
Ethane	3.6188	3.7577
Propane	4.9855	7.5918
Isobutane	1.0610	2.1296
n-Butane	3.4571	6.9389
Isopentane	0.8523	2.1235
n-Pentane	1.1980	2.9848
Cyclopentane	0.0305	0.0739
n-Hexane	0.3236	0.9630
Cyclohexane	0.0698	0.2029
Other Hexanes	0.4461	1.3214
Heptanes	0.2260	0.7785
Methycyclohexane	0.0604	0.2048
2,2,4 Trimethylpentane	0.0011	0.0043
Benzene	0.0023	0.0062
Toluene	0.0018	0.0057
Ethylbenzene	0.0006	0.0022
Xylenes	0.0012	0.0044
C8+ Heavies	0.0920	0.3774
<u>Subtotal</u>	<u>99.57000</u>	<u>99.52000</u>
<u>Oxygen/Argon</u>	<u>0.43</u>	<u>0.48</u>
Total	100.00000	100.00000

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DHA COMPONENT LIST

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LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	BIG SKY 12-11		
	SALES GAS		
FIELD DATA		SAMPLE TEMP. :	89
SAMPLE PRES. :	32	AMBIENT TEMP.:	
COMMENTS :	NO PROBE; TAKEN AT WELLHEAD		
	SPOT		

<u>COMPONENT</u>	<u>PIANO #</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.730</u>	<u>GPM @ 14.650</u>
Helium	---	0.62	0.09	---	---
Oxygen/Argon	---	0.43	0.48	---	---
Nitrogen	---	51.79	50.11	---	---
Carbon Dioxide	---	2.93	4.45	---	---
Methane	P1	27.80190	15.39900	---	---
Ethane	P2	3.6188	3.7577	0.969	0.964
Propane	P3	4.9855	7.5918	1.376	1.369
i-Butane	I4	1.0610	2.1296	0.348	0.346
n-Butane	P4	3.4571	6.9389	1.092	1.086
2,2-Dimethylpropane	I5	0.0072	0.0179	0.003	0.003
i-Pentane	I5	0.8451	2.1056	0.309	0.308
n-Pentane	P5	1.1971	2.9826	0.435	0.433
2,2-Dimethylbutane	I6	0.0049	0.0146	0.002	0.002
Cyclopentane	N5	0.0305	0.0739	0.009	0.009
2,3-Dimethylbutane	I6	0.0163	0.0485	0.007	0.007
2-Methylpentane	I6	0.1071	0.3187	0.044	0.044
3-Methylpentane	I6	0.2278	0.6779	0.093	0.093
UnknownC5s	U5	0.0009	0.0022	0.000	0.000
n-Hexane	P6	0.3236	0.9630	0.134	0.133
2,2-Dimethylpentane	I7	0.0002	0.0007	0.000	0.000
Methylcyclopentane	N6	0.0889	0.2584	0.031	0.031
2,4-Dimethylpentane	I7	0.0049	0.0170	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0004	0.0014	0.000	0.000
Benzene	A6	0.0023	0.0062	0.001	0.001
3,3-Dimethylpentane	I7	0.0013	0.0045	0.001	0.001
Cyclohexane	N6	0.0698	0.2029	0.024	0.024
2-Methylhexane	I7	0.0246	0.0851	0.011	0.011
2,3-Dimethylpentane	I7	0.0082	0.0284	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0069	0.0234	0.003	0.003
3-Methylhexane	I7	0.0356	0.1232	0.016	0.016
1c,3-Dimethylcyclopentane	N7	0.0128	0.0434	0.006	0.006
1t,3-Dimethylcyclopentane	N7	0.0102	0.0346	0.005	0.005
3-Ethylpentane	I7	0.0023	0.0079	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0230	0.0780	0.011	0.011
2,2,4-Trimethylpentane	I8	0.0011	0.0043	0.001	0.001

UnknownC6s	U6	0.0011	0.0033	0.000	0.000
n-Heptane	P7	0.0826	0.2858	0.038	0.038
1c,2-Dimethylcyclopentane	N7	0.0013	0.0044	0.001	0.001
Methylcyclohexane	N7	0.0604	0.2048	0.024	0.024
2,2-Dimethylhexane	I8	0.0049	0.0193	0.002	0.002
1,1,3-Trimethylcyclopentane	N7	0.0010	0.0039	0.000	0.000
Ethylcyclopentane	N7	0.0027	0.0091	0.001	0.001
2,5-Dimethylhexane	I8	0.0010	0.0039	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0002	0.0008	0.000	0.000
2,4-Dimethylhexane	I8	0.0019	0.0075	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0038	0.0147	0.002	0.002
3,3-Dimethylhexane	I8	0.0004	0.0016	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0054	0.0209	0.002	0.002
2,3,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0018	0.0057	0.001	0.001
2,3-Dimethylhexane	I8	0.0015	0.0059	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0005	0.0020	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0103	0.0406	0.005	0.005
4-Methylheptane	I8	0.0027	0.0106	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0004	0.0016	0.000	0.000
3,4-Dimethylhexane	I8	0.0004	0.0016	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0003	0.0012	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
3-Methylheptane	I8	0.0032	0.0126	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0075	0.0291	0.004	0.004
3-Ethylhexane	I8	0.0014	0.0055	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0022	0.0085	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0019	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0006	0.0023	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0005	0.0019	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0012	0.0047	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0021	0.0081	0.001	0.001
UnknownC7s	U7	0.0080	0.0277	0.004	0.004
n-Octane	P8	0.0141	0.0556	0.007	0.007
1c,4-Dimethylcyclohexane	N8	0.0008	0.0031	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0002	0.0009	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0004	0.0015	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0019	0.0083	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0012	0.0053	0.001	0.001
2,4-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
4,4-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
Ethylcyclohexane	N8	0.0009	0.0035	0.000	0.000
n-Propylcyclopentane	N8	0.0005	0.0019	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
2,5-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
Ethylbenzene	I8	0.0006	0.0022	0.000	0.000
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
2,3-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0006	0.0022	0.000	0.000

1,4-Dimethylbenzene (p-Xylene)	A8	0.0003	0.0011	0.000	0.000
3,4-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0001	0.0004	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0004	0.000	0.000
4-Methyloctane	I9	0.0005	0.0022	0.000	0.000
2-Methyloctane	I9	0.0006	0.0027	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0009	0.000	0.000
3-Methyloctane	I9	0.0009	0.0040	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0004	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0003	0.0011	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0013	0.000	0.000
UnknownC8s	U8	0.0005	0.0020	0.000	0.000
n-Nonane	P9	0.0021	0.0093	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0004	0.0017	0.000	0.000
i-Propylbenzene	A9	0.0002	0.0008	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0004	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	0.0002	0.0009	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0012	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0005	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0004	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0002	0.0008	0.000	0.000
5-Methylnonane	I10	0.0002	0.0010	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0004	0.000	0.000
3-Methylnonane	I10	0.0001	0.0005	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0014	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0025	0.0111	0.001	0.001
n-Decane	P10	0.0006	0.0029	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
UnknownC10s	U10	0.0006	0.0029	0.000	0.000
n-Undecane	P11	0.0005	0.0027	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0001	0.0005	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0001	0.0005	0.000	0.000
UnknownC11s	U11	0.0003	0.0016	0.000	0.000
n-Dodecane	P12	0.0004	0.0023	0.000	0.000
1,3,5-Triethylbenzene	A12	0.0001	0.0005	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0001	0.0005	0.000	0.000
UnknownC12s	U12	0.0001	0.0005	0.000	0.000
n-Tridecane	P13	0.0002	0.0013	0.000	0.000
UnknownC13s	U13	0.0001	0.0006	0.000	0.000
n-Tetradecane	P14	0.0002	0.0014	0.000	0.000
UnknownC14s	U14	0.0002	0.0014	0.000	0.000
n-Pentadecane	P15	0.0002	0.0014	0.000	0.000
UnknownC15s	U15	0.0003	0.0022	0.000	0.000
n-Hexadecane	P16	0.0002	0.0015	0.000	0.000
UnknownC16s	U16	0.0002	0.0015	0.000	0.000
n-Heptadecane	P17	0.0001	0.0008	0.000	0.000

UnknownC18s	U18	<u>0.0001</u>	<u>0.0009</u>	<u>0.000</u>	<u>0.000</u>
TOTAL		100.00000	100.00000	5.0457	5.0187

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.730	14.650
BENZENE	0.0023	0.0062	LOW NET DRY REAL :	698.5 /scf	694.7 /scf
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ETHYLBENZENE	0.0006	0.0022	HIGH GROSS DRY REAL :	764.4 /scf	760.2 /scf
XYLENES	0.0012	0.0044	GROSS WET REAL :	751.1 /scf	746.9 /scf
TOTAL BTEX	0.0059	0.0185	NET DRY REAL :	9177.9 /lb	9128.0 /lb
			GROSS DRY REAL :	10040.9 /lb	9986.4 /lb

RELATIVE DENSITY (AIR=1): 0.9987
 COMPRESSIBILITY FACTOR : 0.99776

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

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