

**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**MAIN PAGE**

LEASE #: \_\_\_\_\_ NAME/DESCRIP : **BIG SKY 13-11 SALES GAS**

PROJECT NO. : **201701043** ANALYSIS NO. : **01**

COMPANY NAME : **NIGHTHAWK PRODUCTION COMPANY** ANALYSIS DATE: JANUARY 16, 2017 16:55

OFFICE / BRANCH: **HIGHLANDS RANCH, CO** SAMPLE DATE : JANUARY 10, 2017 15:35

CUSTOMER REF: \_\_\_\_\_ TO: \_\_\_\_\_

PRODUCER : \_\_\_\_\_ EFFECTIVE DATE: \_\_\_\_\_

**\*\*\*FIELD DATA\*\*\***

SAMPLE CYCLE: \_\_\_\_\_ SAMPLE TYPE: SPOT

SAMPLE PRES. : 25 psig CYLINDER NO. : 0947

LAB PRES: psig SAMPLED BY : GALE MCENDREE

SAMPLE TEMP. : 83 °f SAMPLING COMPANY EMPACT

AMBIENT TEMP.: °f H2S BY STAIN TUBE: **12** ppm

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

FIELD COMMENTS: \_\_\_\_\_

LAB COMMENTS: \_\_\_\_\_

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.730</u>	<u>GPM @ 14.650</u>
HELIUM	0.85	0.11	---	---
HYDROGEN	0.02	0.00	---	---
OXYGEN/ARGON	0.40	0.42	---	---
NITROGEN	49.6800	45.6000	---	---
CARBON DIOXIDE	3.63	5.23	---	---
METHANE	25.10320	13.19610	---	---
ETHANE	4.1857	4.1237	1.1226	1.1165
PROPANE	6.0042	8.6745	1.6583	1.6493
I-BUTANE	1.2794	2.4364	0.4201	0.4178
N-BUTANE	4.3350	8.2552	1.3698	1.3624
I-PENTANE	1.1128	2.6279	0.4050	0.4028
N-PENTANE	1.5396	3.6394	0.5588	0.5557
HEXANES PLUS	1.8601	5.6868	0.7782	0.7748
<b>TOTALS</b>	<b>100.00000</b>	<b>100.00000</b>	<b>6.3128</b>	<b>6.2793</b>

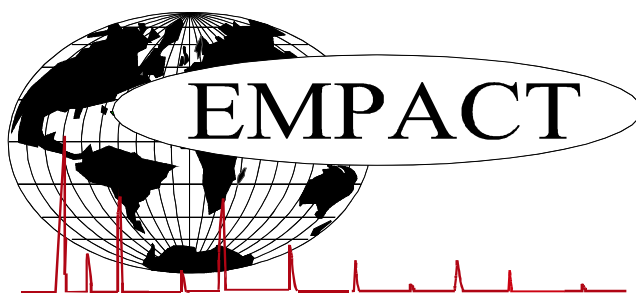
<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>	<u>BTU @ 14.730</u>	<u>14.650</u>	
BENZENE	0.0028	0.0072	<b>LOW NET DRY REAL :</b>	793.2 /scf	788.8 /scf
TOLUENE	0.0033	0.0100	NET WET REAL :	779.4 /scf	775.1 /scf
ETHYLBENZENE	0.0006	0.0021	<b>HIGH GROSS DRY REAL :</b>	865.6 /scf	860.9 /scf
XYLENES	0.0025	0.0086	GROSS WET REAL :	850.6 /scf	845.9 /scf
<b>TOTAL BTEX</b>	<b>0.0092</b>	<b>0.0279</b>	NET DRY REAL :	9885.3 /lb	9831.7 /lb
			GROSS DRY REAL :	10793.0 /lb	10734.4 /lb

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

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

**RELATIVE DENSITY (AIR=1):** 1.0526  
**COMPRESSIBILITY FACTOR :** 0.99732

*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.*



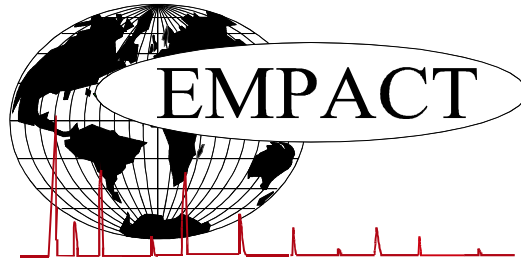
**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**GLYCALC INFORMATION**

PROJECT NO. :	201701043	ANALYSIS NO. :	01
COMPANY NAME :	NIGHTHAWK PRODUCTION COMPANY	ANALYSIS DATE:	JANUARY 16, 2017 16:55
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 10, 2017 15:35
PRODUCER :		CYLINDER NO. :	0947
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	BIG SKY 13-11 SALES GAS		
***FIELD DATA***		SAMPLE TEMP. :	83
SAMPLE PRES. :	25	AMBIENT TEMP.:	
COMMENTS :	SPOT		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.85	0.11
Hydrogen	0.02	0.00
Carbon Dioxide	3.63	5.23
Nitrogen	49.68	45.60
Methane	25.10320	13.19610
Ethane	4.1857	4.1237
Propane	6.0042	8.6745
Isobutane	1.2794	2.4364
n-Butane	4.3350	8.2552
Isopentane	1.0739	2.5385
n-Pentane	1.5396	3.6394
Cyclopentane	0.0389	0.0894
n-Hexane	0.4458	1.2587
Cyclohexane	0.1049	0.2892
Other Hexanes	0.5984	1.6815
Heptanes	0.3696	1.2077
Methycyclohexane	0.1089	0.3503
2,2,4 Trimethylpentane	0.0015	0.0056
Benzene	0.0028	0.0072
Toluene	0.0033	0.0100
Ethylbenzene	0.0006	0.0021
Xylenes	0.0025	0.0086
C8+ Heavies	0.2218	0.8659
<u>Subtotal</u>	<u>99.60000</u>	<u>99.58000</u>
<u>Oxygen/Argon</u>	<u>0.40</u>	<u>0.42</u>
<b>Total</b>	<b>100.00000</b>	<b>100.00000</b>

*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.*



**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**DHA COMPONENT LIST**

PROJECT NO. :	201701043	ANALYSIS NO. :	01
COMPANY NAME :	NIGHTHAWK PRODUCTION COMPANY	ANALYSIS DATE:	JANUARY 16, 2017 16:55
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 10, 2017 15:35
PRODUCER :		CYLINDER NO. :	0947
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	BIG SKY 13-11		
	SALES GAS		
***FIELD DATA***		SAMPLE TEMP. :	83
SAMPLE PRES. :	25	AMBIENT TEMP.:	
COMMENTS :	SPOT		

<u>COMPONENT</u>	<u>PIANO #</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.730</u>	<u>GPM @ 14.650</u>
Helium	---	0.85	0.11	---	---
Hydrogen	---	0.02	0.00	---	---
Oxygen/Argon	---	0.40	0.42	---	---
Nitrogen	---	49.68	45.60	---	---
Carbon Dioxide	---	3.63	5.23	---	---
Methane	P1	25.10320	13.19610	---	---
Ethane	P2	4.1857	4.1237	1.123	1.117
Propane	P3	6.0042	8.6745	1.658	1.649
i-Butane	I4	1.2794	2.4364	0.420	0.418
n-Butane	P4	4.3350	8.2552	1.370	1.362
2,2-Dimethylpropane	I5	0.0086	0.0203	0.003	0.003
i-Pentane	I5	1.0653	2.5182	0.391	0.389
n-Pentane	P5	1.5376	3.6347	0.559	0.556
2,2-Dimethylbutane	I6	0.0062	0.0175	0.003	0.003
Cyclopentane	N5	0.0389	0.0894	0.011	0.011
2,3-Dimethylbutane	I6	0.0225	0.0635	0.009	0.009
2-Methylpentane	I6	0.1437	0.4058	0.059	0.059
3-Methylpentane	I6	0.3010	0.8499	0.124	0.123
UnknownC5s	U5	0.0020	0.0047	0.001	0.001
n-Hexane	P6	0.4458	1.2587	0.184	0.183
2,2-Dimethylpentane	I7	0.0003	0.0010	0.000	0.000
Methylcyclopentane	N6	0.1231	0.3394	0.043	0.043
2,4-Dimethylpentane	I7	0.0071	0.0233	0.003	0.003
2,2,3-Trimethylbutane	I7	0.0005	0.0016	0.000	0.000
Benzene	A6	0.0028	0.0072	0.001	0.001
3,3-Dimethylpentane	I7	0.0004	0.0013	0.000	0.000
Cyclohexane	N6	0.1049	0.2892	0.036	0.036
2-Methylhexane	I7	0.0415	0.1362	0.019	0.019
2,3-Dimethylpentane	I7	0.0109	0.0358	0.005	0.005
1,1-Dimethylcyclopentane	N7	0.0110	0.0354	0.004	0.004
3-Methylhexane	I7	0.0578	0.1898	0.026	0.026
1c,3-Dimethylcyclopentane	N7	0.0203	0.0653	0.009	0.009
1t,3-Dimethylcyclopentane	N7	0.0162	0.0521	0.007	0.007
3-Ethylpentane	I7	0.0039	0.0128	0.002	0.002
1t,2-Dimethylcyclopentane	N7	0.0364	0.1171	0.017	0.017

2,2,4-Trimethylpentane	I8	0.0015	0.0056	0.001	0.001
UnknownC6s	U6	0.0019	0.0054	0.001	0.001
n-Heptane	P7	0.1421	0.4665	0.065	0.065
1c,2-Dimethylcyclopentane	N7	0.0032	0.0103	0.001	0.001
Methylcyclohexane	N7	0.1089	0.3503	0.044	0.044
2,2-Dimethylhexane	I8	0.0090	0.0337	0.004	0.004
1,1,3-Trimethylcyclopentane	N7	0.0014	0.0051	0.001	0.001
Ethylcyclopentane	N7	0.0053	0.0170	0.002	0.002
2,5-Dimethylhexane	I8	0.0018	0.0068	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0006	0.0023	0.000	0.000
2,4-Dimethylhexane	I8	0.0036	0.0135	0.002	0.002
1c,2t,4-Trimethylcyclopentane	N8	0.0073	0.0268	0.003	0.003
3,3-Dimethylhexane	I8	0.0006	0.0023	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0103	0.0379	0.005	0.005
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	0.0033	0.0100	0.001	0.001
2,3-Dimethylhexane	I8	0.0031	0.0116	0.002	0.002
2-Methyl-3-ethylpentane	I8	0.0013	0.0049	0.001	0.001
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0224	0.0838	0.012	0.012
4-Methylheptane	I8	0.0053	0.0198	0.003	0.003
3-Methyl-3-ethylpentane	I8	0.0015	0.0056	0.001	0.001
3,4-Dimethylhexane	I8	0.0008	0.0030	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0006	0.0022	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0002	0.0007	0.000	0.000
3-Methylheptane	I8	0.0073	0.0273	0.004	0.004
1c,2t,3-Trimethylcyclopentane	N8	0.0157	0.0577	0.008	0.008
3-Ethylhexane	I8	0.0047	0.0176	0.002	0.002
1t,4-Dimethylcyclohexane	N8	0.0049	0.0180	0.003	0.003
1,1-Dimethylcyclohexane	N8	0.0011	0.0040	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0013	0.0048	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0013	0.0048	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0029	0.0107	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0003	0.0012	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0049	0.0180	0.003	0.003
1c,2c,3-Trimethylcyclopentane	N8	0.0003	0.0011	0.000	0.000
UnknownC7s	U7	0.0113	0.0371	0.005	0.005
n-Octane	P8	0.0360	0.1347	0.018	0.018
1c,4-Dimethylcyclohexane	N8	0.0017	0.0063	0.001	0.001
i-Propylcyclopentane	I8	0.0002	0.0007	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0004	0.0017	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0006	0.0025	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0003	0.0012	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0010	0.0037	0.001	0.001
2,2-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0057	0.0236	0.003	0.003
2,2,3-Trimethylhexane	I9	0.0031	0.0130	0.002	0.002
2,4-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
4,4-Dimethylheptane	I9	0.0007	0.0030	0.000	0.000
Ethylcyclohexane	N8	0.0025	0.0092	0.001	0.001
1c,3c,5-Trimethylcyclohexane	N9	0.0012	0.0050	0.001	0.001
2,5-Dimethylheptane	I9	0.0003	0.0012	0.000	0.000
3,3-Dimethylheptane	I9	0.0007	0.0030	0.000	0.000
3,5-Dimethylheptane	I9	0.0004	0.0017	0.000	0.000
2,6-Dimethylheptane	I9	0.0003	0.0012	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000

Ethylbenzene	I8	0.0006	0.0021	0.000	0.000
1c,2t,4t-Trimethylcyclohexane	N9	0.0013	0.0054	0.001	0.001
2,3-Dimethylheptane	I9	0.0003	0.0012	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0013	0.0045	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0017	0.000	0.000
3,4-Dimethylheptane	I9	0.0008	0.0034	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0008	0.0034	0.000	0.000
4-Ethylheptane	I9	0.0003	0.0012	0.000	0.000
4-Methyloctane	I9	0.0017	0.0071	0.001	0.001
2-Methyloctane	I9	0.0017	0.0071	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0004	0.0016	0.000	0.000
3-Ethylheptane	I9	0.0005	0.0021	0.000	0.000
3-Methyloctane	I9	0.0025	0.0105	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0008	0.0033	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0002	0.0008	0.000	0.000
3,3-Diethylpentane	I9	0.0003	0.0012	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0007	0.0024	0.000	0.000
i-Butylcyclopentane	N9	0.0011	0.0046	0.001	0.001
UnknownC8s	U8	0.0008	0.0030	0.000	0.000
n-Nonane	P9	0.0078	0.0328	0.004	0.004
1,1-Methylethylcyclohexane	N9	0.0010	0.0041	0.001	0.001
i-Propylbenzene	A9	0.0008	0.0032	0.000	0.000
i-Propylcyclohexane	N9	0.0004	0.0016	0.000	0.000
2,2-Dimethyloctane	I10	0.0002	0.0009	0.000	0.000
2,4-Dimethyloctane	I10	0.0003	0.0014	0.000	0.000
2,5-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
n-Butylcyclopentane	N9	0.0010	0.0041	0.001	0.001
3,3-Dimethyloctane	I10	0.0003	0.0014	0.000	0.000
n-Propylbenzene	A9	0.0013	0.0051	0.001	0.001
3,6-Dimethyloctane	I10	0.0004	0.0019	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0004	0.0019	0.000	0.000
1,3-Methylethylbenzene	A9	0.0004	0.0016	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0008	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0004	0.0016	0.000	0.000
2,3-Dimethyloctane	I10	0.0002	0.0009	0.000	0.000
5-Methylnonane	I10	0.0007	0.0033	0.000	0.000
1,2-Methylethylbenzene	A9	0.0005	0.0020	0.000	0.000
2-Methylnonane	I10	0.0001	0.0005	0.000	0.000
3-Ethylheptane	I10	0.0001	0.0005	0.000	0.000
3-Methylnonane	I10	0.0005	0.0023	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
t-Butylbenzene	A10	0.0006	0.0027	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	0.0096	0.0403	0.005	0.005
n-Decane	P10	0.0019	0.0089	0.001	0.001
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	0.0001	0.0005	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0004	0.0018	0.000	0.000
1,3-Diethylbenzene	A10	0.0004	0.0018	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Diethylbenzene	A10	0.0001	0.0004	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0005	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
1,3-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
UnknownC10s	U10	0.0036	0.0168	0.002	0.002
n-Undecane	P11	0.0006	0.0031	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0004	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0001	0.0005	0.000	0.000
2-Methylindan	A11	0.0001	0.0004	0.000	0.000
UnknownC11s	U11	0.0005	0.0026	0.000	0.000
n-Dodecane	P12	0.0002	0.0011	0.000	0.000
1,3,5-Triethylbenzene	A12	0.0001	0.0005	0.000	0.000
UnknownC12s	U12	0.0001	0.0005	0.000	0.000
n-Tridecane	P13	0.0001	0.0006	0.000	0.000
n-Tetradecane	P14	0.0001	0.0007	0.000	0.000
n-Pentadecane	P15	0.0003	0.0021	0.000	0.000
UnknownC15s	U15	0.0001	0.0007	0.000	0.000
n-Hexadecane	P16	0.0003	0.0022	0.000	0.000
UnknownC16s	U16	0.0003	0.0022	0.000	0.000
n-Heptadecane	P17	0.0001	0.0008	0.000	0.000
UnknownC17s	U17	0.0001	0.0008	0.000	0.000
UnknownC18s	U18	0.0001	0.0008	0.000	0.000
<b>TOTAL</b>		<b>100.00000</b>	<b>100.00000</b>	<b>6.3138</b>	<b>6.2803</b>

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.730	14.650
BENZENE	0.0028	0.0072	<b>LOW NET DRY REAL :</b>	793.2 /scf	788.8 /scf
TOLUENE	0.0033	0.0100	NET WET REAL :	779.4 /scf	775.1 /scf
ETHYLBENZENE	0.0006	0.0021	<b>HIGH GROSS DRY REAL :</b>	865.6 /scf	860.9 /scf
XYLENES	0.0025	0.0086	GROSS WET REAL :	850.6 /scf	845.9 /scf
<b>TOTAL BTEX</b>	<b>0.0092</b>	<b>0.0279</b>	NET DRY REAL :	9885.3 /lb	9831.7 /lb
			GROSS DRY REAL :	10793.0 /lb	10734.4 /lb

RELATIVE DENSITY (AIR=1): 1.0526  
 COMPRESSIBILITY FACTOR : 0.99732

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

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

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