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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201410002	ANALYSIS NO. :	11
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	OCTOBER 5, 2014
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 30, 2014
PRODUCER :		CYLINDER NO. :	1087
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 15:20 SNOW KING 13-33		
FIELD DATA		SAMPLE TEMP. :	105
SAMPLE PRES. :	25	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 1.25PPM (1-7PPM) 15:25		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0061	0.0100		
HELIUM	0.46	0.06	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.33	0.32	---	---
NITROGEN	42.03	35.46	---	---
CARBON DIOXIDE	1.91	2.53	---	---
METHANE	22.67060	10.95360	---	---
ETHANE	5.2331	4.7393	1.3977	1.4053
PROPANE	13.1447	17.4576	3.6164	3.6362
I-BUTANE	2.2305	3.9047	0.7289	0.7329
N-BUTANE	6.7510	11.8182	2.1256	2.1372
I-PENTANE	1.4255	3.0936	0.5166	0.5194
N-PENTANE	1.6927	3.6783	0.6127	0.6161
HEXANES PLUS	2.1058	5.9747	0.8829	0.8870
TOTALS	100.00000	100.00000	9.8808	9.9341

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0119	0.0280
TOLUENE	0.0160	0.0444
ETHYLBENZENE	0.0026	0.0083
XYLENES	0.0109	0.0349
TOTAL BTEX	0.0414	0.1156

BTU @		14.650	14.730
LOW	NET DRY REAL :	1081.1 /scf	1087.0 /scf
	NET WET REAL :	1062.2 /scf	1068.1 /scf
HIGH	GROSS DRY REAL :	1177.7 /scf	1184.2 /scf
	GROSS WET REAL :	1157.1 /scf	1163.6 /scf
	NET DRY REAL :	12385.9 /lb	12453.5 /lb
	GROSS DRY REAL :	13495.8 /lb	13569.5 /lb

RELATIVE DENSITY (AIR=1):	1.1447
COMPRESSIBILITY FACTOR :	0.99565

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

(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730

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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201410002	ANALYSIS NO. :	11
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	OCTOBER 5, 2014
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 30, 2014
PRODUCER :		CYLINDER NO. :	1087
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 15:20 SNOW KING 13-33		
FIELD DATA		SAMPLE TEMP. :	105
SAMPLE PRES. :	25	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 1.25PPM (1-7PPM) 15:25		

Componet	Mole %	Wt %
Helium	0.46	0.06
Hydrogen	0.01	0.00
Carbon Dioxide	1.91	2.53
Nitrogen	42.03	35.46
Methane	22.67060	10.95360
Ethane	5.2331	4.7393
Propane	13.1447	17.4576
Isobutane	2.2305	3.9047
n-Butane	6.7510	11.8182
Isopentane	1.3577	2.9504
n-Pentane	1.6927	3.6783
Cyclopentane	0.0678	0.1432
n-Hexane	0.4089	1.0613
Cyclohexane	0.1494	0.3787
Other Hexanes	0.6733	1.7376
Heptanes	0.3922	1.1759
Methycyclohexane	0.1425	0.4214
2,2,4 Trimethylpentane	0.0009	0.0031
Benzene	0.0119	0.0280
Toluene	0.0160	0.0444
Ethylbenzene	0.0026	0.0083
Xylenes	0.0109	0.0349
C8+ Heavies	0.2972	1.0811
Subtotal	99.66390	99.67000
Oxygen/Argon	0.33	0.32
Alcohols	0.0061	0.0100
Total	100.00000	100.00000

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201410002	ANALYSIS NO. :	11
COMPANY NAME :	NIGHTHAWK PRODUCTION	ANALYSIS DATE:	OCTOBER 5, 2014
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 30, 2014
PRODUCER :		CYLINDER NO. :	1087
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 15:20 SNOW KING 13-33		
FIELD DATA		SAMPLE TEMP. :	105
SAMPLE PRES. :	25	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 1.25PPM (1-7PPM) 15:25		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.46	0.06	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.33	0.32	---	---
Nitrogen	---	42.03	35.46	---	---
Carbon Dioxide	---	1.91	2.53	---	---
Methane	P1	22.67060	10.95360	---	---
Ethane	P2	5.2331	4.7393	1.398	1.405
Propane	P3	13.1447	17.4576	3.616	3.636
i-Butane	I4	2.2305	3.9047	0.729	0.733
n-Butane	P4	6.7508	11.8178	2.126	2.137
2,2-Dimethylpropane	I5	0.0101	0.0220	0.004	0.004
Ethanol	X2	0.0036	0.0050	0.001	0.001
i-Pentane	I5	1.3476	2.9284	0.493	0.495
Acetone	X3	0.0011	0.0019	0.000	0.000
UnknownC4s	U4	0.0002	0.0004	0.000	0.000
n-Pentane	P5	1.6917	3.6761	0.613	0.616
t-Butanol	X4	0.0013	0.0029	0.000	0.000
2,2-Dimethylbutane	I6	0.0099	0.0257	0.004	0.004
Cyclopentane	N5	0.0678	0.1432	0.020	0.020
2,3-Dimethylbutane	I6	0.0376	0.0976	0.015	0.015
2-Methylpentane	I6	0.3026	0.7854	0.125	0.126
3-Methylpentane	I6	0.1585	0.4114	0.065	0.065
UnknownC5s	U5	0.0010	0.0022	0.000	0.000
n-Hexane	P6	0.4089	1.0613	0.168	0.169
2-Butanol	X4	0.0001	0.0002	0.000	0.000
2,2-Dimethylpentane	I7	0.0007	0.0021	0.000	0.000
Methylcyclopentane	N6	0.1643	0.4165	0.058	0.058
2,4-Dimethylpentane	I7	0.0094	0.0284	0.004	0.004
2,2,3-Trimethylbutane	I7	0.0006	0.0018	0.000	0.000
Benzene	A6	0.0119	0.0280	0.003	0.003
3,3-Dimethylpentane	I7	0.0010	0.0030	0.000	0.000
Cyclohexane	N6	0.1494	0.3787	0.051	0.051
2-Methylhexane	I7	0.0488	0.1473	0.023	0.023
2,3-Dimethylpentane	I7	0.0061	0.0184	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0163	0.0482	0.007	0.007
3-Methylhexane	I7	0.0580	0.1750	0.027	0.027
1c,3-Dimethylcyclopentane	N7	0.0292	0.0863	0.013	0.013
1t,3-Dimethylcyclopentane	N7	0.0256	0.0757	0.012	0.012
3-Ethylpentane	I7	0.0031	0.0094	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0434	0.1283	0.020	0.020
2,2,4-Trimethylpentane	I8	0.0009	0.0031	0.000	0.000

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

UnknownC6s	U6	0.0004	0.0010	0.000	0.000
n-Heptane	P7	0.1305	0.3938	0.060	0.060
1c,2-Dimethylcyclopentane	N7	0.0036	0.0106	0.002	0.002
Methylcyclohexane	N7	0.1425	0.4214	0.057	0.057
2,2-Dimethylhexane	I8	0.0153	0.0526	0.007	0.007
Ethylcyclopentane	N7	0.0061	0.0180	0.002	0.002
2,5-Dimethylhexane	I8	0.0022	0.0076	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0008	0.0027	0.000	0.000
2,4-Dimethylhexane	I8	0.0035	0.0120	0.002	0.002
1c,2t,4-Trimethylcyclopentane	N8	0.0101	0.0341	0.005	0.005
3,3-Dimethylhexane	I8	0.0009	0.0031	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0121	0.0409	0.006	0.006
2,3,4-Trimethylpentane	I8	0.0002	0.0007	0.000	0.000
Toluene	A7	0.0160	0.0444	0.005	0.005
2,3-Dimethylhexane	I8	0.0053	0.0182	0.003	0.003
2-Methyl-3-ethylpentane	I8	0.0007	0.0024	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0002	0.0007	0.000	0.000
2-Methylheptane	I8	0.0248	0.0853	0.013	0.013
4-Methylheptane	I8	0.0055	0.0189	0.003	0.003
3-Methyl-3-ethylpentane	I8	0.0022	0.0076	0.001	0.001
3,4-Dimethylhexane	I8	0.0008	0.0027	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0003	0.0010	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0004	0.0014	0.000	0.000
3-Methylheptane	I8	0.0105	0.0361	0.005	0.005
1c,2t,3-Trimethylcyclopentane	N8	0.0182	0.0615	0.009	0.009
3-Ethylhexane	I8	0.0062	0.0213	0.003	0.003
1t,4-Dimethylcyclohexane	N8	0.0075	0.0254	0.004	0.004
1,1-Dimethylcyclohexane	N8	0.0022	0.0074	0.001	0.001
3t-Ethylmethylcyclopentane	N8	0.0016	0.0054	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0012	0.0041	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0033	0.0111	0.002	0.002
2,2,4-Trimethylhexane	I9	0.0005	0.0019	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0078	0.0263	0.004	0.004
UnknownC7s	U7	0.0098	0.0296	0.005	0.005
n-Octane	P8	0.0254	0.0874	0.013	0.013
1c,4-Dimethylcyclohexane	N8	0.0073	0.0247	0.004	0.004
i-Propylcyclopentane	I8	0.0006	0.0020	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0003	0.0011	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0011	0.0042	0.001	0.001
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0004	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0004	0.0015	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0010	0.0034	0.001	0.001
2,2-Dimethylheptane	I9	0.0002	0.0008	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0088	0.0335	0.005	0.005
2,2,3-Trimethylhexane	I9	0.0049	0.0189	0.003	0.003
2,4-Dimethylheptane	I9	0.0005	0.0019	0.000	0.000
4,4-Dimethylheptane	I9	0.0004	0.0015	0.000	0.000
Ethylcyclohexane	N8	0.0041	0.0138	0.002	0.002
n-Propylcyclopentane	N8	0.0032	0.0108	0.001	0.001
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0007	0.000	0.000
2,5-Dimethylheptane	I9	0.0006	0.0023	0.000	0.000
3,3-Dimethylheptane	I9	0.0007	0.0027	0.000	0.000
3,5-Dimethylheptane	I9	0.0004	0.0015	0.000	0.000
2,6-Dimethylheptane	I9	0.0005	0.0019	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0008	0.0030	0.000	0.000
Ethylbenzene	I8	0.0026	0.0083	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0015	0.0057	0.001	0.001
1,3-Dimethylbenzene (m-Xylene)	A8	0.0053	0.0170	0.002	0.002
1,4-Dimethylbenzene (p-Xylene)	A8	0.0029	0.0093	0.001	0.001
3,4-Dimethylheptane	I9	0.0003	0.0011	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0009	0.0035	0.000	0.000
4-Ethylheptane	I9	0.0005	0.0019	0.000	0.000
4-Methyloctane	I9	0.0024	0.0093	0.001	0.001
2-Methyloctane	I9	0.0028	0.0108	0.002	0.002

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

1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0007	0.000	0.000
3-Ethylheptane	I9	0.0010	0.0039	0.001	0.001
3-Methyloctane	I9	0.0042	0.0162	0.002	0.002
1c,2t,4c-Trimethylcyclohexane	I9	0.0003	0.0011	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
3,3-Diethylpentane	I9	0.0002	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0027	0.0086	0.001	0.001
i-Butylcyclopentane	N9	0.0015	0.0057	0.001	0.001
UnknownC8s	U8	0.0015	0.0051	0.001	0.001
n-Nonane	P9	0.0073	0.0282	0.004	0.004
1,1-Methylethylcyclohexane	N9	0.0040	0.0152	0.002	0.002
i-Propylbenzene	A9	0.0013	0.0047	0.001	0.001
i-Propylcyclohexane	N9	0.0006	0.0023	0.000	0.000
2,2-Dimethyloctane	I10	0.0002	0.0008	0.000	0.000
2,4-Dimethyloctane	I10	0.0004	0.0017	0.000	0.000
2,6-Dimethyloctane	I10	0.0001	0.0004	0.000	0.000
2,5-Dimethyloctane	I10	0.0002	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0018	0.0068	0.001	0.001
3,3-Dimethyloctane	I10	0.0003	0.0013	0.000	0.000
n-Propylbenzene	A9	0.0013	0.0047	0.001	0.001
3,6-Dimethyloctane	I10	0.0007	0.0030	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0004	0.0017	0.000	0.000
1,3-Methylethylbenzene	A9	0.0010	0.0036	0.001	0.001
1,4-Methylethylbenzene	A9	0.0003	0.0011	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0008	0.0029	0.000	0.000
2,3-Dimethyloctane	I10	0.0003	0.0013	0.000	0.000
5-Methylnonane	I10	0.0013	0.0056	0.001	0.001
1,2-Methylethylbenzene	A9	0.0009	0.0032	0.001	0.001
2-Methylnonane	I10	0.0001	0.0004	0.000	0.000
3-Ethyloctane	I10	0.0002	0.0008	0.000	0.000
3-Methylnonane	I10	0.0008	0.0034	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
t-Butylbenzene	A10	0.0010	0.0040	0.000	0.000
i-Butylcyclohexane	N10	0.0004	0.0017	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0004	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	0.0169	0.0653	0.009	0.009
n-Decane	P10	0.0044	0.0188	0.003	0.003
1,2,3-Trimethylbenzene	A9	0.0005	0.0018	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0002	0.0008	0.000	0.000
Sec-Butylcyclohexane	A10	0.0011	0.0046	0.001	0.001
1,2-Methyl-i-propylbenzene	A10	0.0006	0.0024	0.000	0.000
3-Ethylnonane	I10	0.0001	0.0005	0.000	0.000
1,3-Diethylbenzene	A10	0.0002	0.0008	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Diethylbenzene	A10	0.0005	0.0020	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
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Diethylbenzene	A10	0.0003	0.0012	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0004	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0003	0.0012	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0003	0.0012	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0004	0.0016	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0002	0.0008	0.000	0.000
1,2-Ethyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0003	0.0013	0.000	0.000
UnknownC10s	U10	0.0094	0.0403	0.006	0.006
n-Undecane	P11	0.0019	0.0089	0.001	0.001
1,2,4,5-Tetramethylbenzene	A11	0.0002	0.0008	0.000	0.000

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

1,2-Methyl-n-butylbenzene	A11	0.0001	0.0004	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0002	0.0009	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0002	0.0009	0.000	0.000
2-Methylindan	A11	0.0001	0.0004	0.000	0.000
1,3-Methyl-n-butylbenzene	A11	0.0001	0.0004	0.000	0.000
1,3-Di-i-propylbenzene	A11	0.0001	0.0005	0.000	0.000
sec-Pentylbenzene	A11	0.0001	0.0004	0.000	0.000
n-Pentylbenzene	A11	0.0002	0.0009	0.000	0.000
1,2-Di-n-propylbenzene	A11	0.0002	0.0010	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0001	0.0005	0.000	0.000
Naphthalene	A10	0.0001	0.0004	0.000	0.000
1,4-Ethyl-t-butylbenzene	A11	0.0001	0.0005	0.000	0.000
1,3-Di-n-propylbenzene	A12	0.0002	0.0010	0.000	0.000
UnknownC11s	U11	0.0026	0.0122	0.002	0.002
n-Dodecane	P12	0.0008	0.0041	0.001	0.001
1,2,4-Triethylbenzene	A12	0.0003	0.0015	0.000	0.000
1,4-Methyl-n-pentylbenzene	A12	0.0001	0.0005	0.000	0.000
n-Hexylbenzene	A12	0.0001	0.0005	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0002	0.0009	0.000	0.000
2-Methylnaphthalene	A11	0.0001	0.0004	0.000	0.000
1-Methylnaphthalene	A11	0.0001	0.0004	0.000	0.000
UnknownC12s	U12	0.0011	0.0052	0.001	0.001
n-Tridecane	P13	0.0004	0.0022	0.000	0.000
UnknownC13s	U13	0.0008	0.0044	0.001	0.001
n-Tetradecane	P14	0.0001	0.0006	0.000	0.000
UnknownC14s	U14	0.0005	0.0030	0.000	0.000
UnknownC15s	U15	0.0002	0.0013	0.000	0.000
TOTAL		100.00000	100.00000	9.8818	9.9351

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0119	0.0280
TOLUENE	0.0160	0.0444
ETHYLBENZENE	0.0026	0.0083
XYLENES	0.0109	0.0349
TOTAL BTEX	0.0414	0.1156

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1081.1 /scf	1087.0 /scf
	NET WET REAL :	1062.2 /scf	1068.1 /scf
HIGH	GROSS DRY REAL :	1177.7 /scf	1184.2 /scf
	GROSS WET REAL :	1157.1 /scf	1163.6 /scf
	NET DRY REAL :	12385.9 /lb	12453.5 /lb
	GROSS DRY REAL :	13495.8 /lb	13569.5 /lb
	RELATIVE DENSITY (AIR=1):		1.1447
	COMPRESSIBILITY FACTOR :		0.99565

(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.

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