

**EXTENDED GAS ANALYSIS (INCLUDING O2)**

TUNDA21GE B722590:QU2998-01  
*MaxxID* *Client ID* *Meter Number* *Laboratory Number*

**TUNDRA OIL AND GAS** **04-01-002-28-W1M**  
*Operator Name* *LSD* *Well ID*

**TUNDRA 04-01-002-28-W1M** **KW** **MAXXAM ANALYTICS**  
*Well/Plant/Facility* *Initials of Sampler* *Sampling Company*

**COMPRESSOR INLET** **13745,21655**  
*Field or Area* *Pool or Zone* *Sample Point* *Container Identity* *Percent Full*

**2017/03/24** **2017/03/29** **2017/04/05** **2017/04/05** **GS1,KKO**  
*Date Sampled Start* *Date Sampled End* *Date Received* *Date Reissued* *Analyst*

COMPOSITION				Historical Aver Mole Fraction (0 data points)	Tolerance Score
Component	Mole Fraction As Rec'd*	Mole Fraction Air Free As Rec'd*	Mole Fraction Air Free Acid Gas Free		
CO	0.0000				
H <sub>2</sub>	0.0001	0.0001	0.0001		
He	0.0003	0.0003	0.0003		
O <sub>2</sub>	0.0000	0.0000			
N <sub>2</sub>	0.0940	0.0940	0.0953		
CO <sub>2</sub>	0.0126	0.0126			
H <sub>2</sub> S	0.0008	0.0008			
C <sub>1</sub>	0.4796	0.4796	0.4860		
C <sub>2</sub>	0.1808	0.1808	0.1832		
C <sub>3</sub>	0.1398	0.1398	0.1417		
iC <sub>4</sub>	0.0174	0.0174	0.0176		
nC <sub>4</sub>	0.0448	0.0448	0.0454		
iC <sub>5</sub>	0.0094	0.0094	0.0096		
nC <sub>5</sub>	0.0103	0.0103	0.0105		
C <sub>6</sub>	0.0056	0.0056	0.0057		
C <sub>7</sub>	0.0025	0.0025	0.0025		
C <sub>8</sub>	0.0019	0.0019	0.0020		
C <sub>9</sub>	0.0001	0.0001	0.0001		
C <sub>10+</sub>	Trace	Trace	Trace		
Total	1.0000	1.0000	1.0000		
C <sub>7+</sub>	0.0045	0.0045	0.0046		
C <sub>12+</sub>	Trace	Trace	Trace		
C <sub>15+</sub>	0.0000	0.0000	0.0000		

**PROPERTIES**

Calculated Molar Mass Moisture Free as Sampled: **28.5** Total, **94.9** C<sub>7+</sub>

Calculated Relative Densities: **0.988** Moisture Free as Sampled, **0.981** Moisture & Acid Gas Free, **3.294** C<sub>7+</sub> Moisture Free

Calculated Pseudo Critical Properties: **4432.5** pPc (kPa) As Sampled, **254.9** pTc (Kelvin) Acid Gas Free, **4391.3** pPc (kPa), **254.2** pTc (Kelvin)

Calculated Vapour Pressure: **99.4** C<sub>5+</sub> (kPa)

Calculated Gross Heating Value (MJ/m<sup>3</sup>) @ 101.325 kPa & 15°C: **55.89** GPA 2172, **56.63** GPA 2172 Acid Gas Free, **190.55** C<sub>7+</sub> as Received

Gas Compressibility @ 101.325 kPa & 15°C: **0.9939**

Hydrogen Sulphide: **780** On Site (Gastec (ppm v/v)), **780** In Lab (Tutweiler (mole%))

Onsite analysis is required for accurate source H<sub>2</sub>S content. H<sub>2</sub>S degrades variably in all sample containers and is also matrix dependent.

QC Check Std # 0415/5226 Date 2017/04/03 QC Passed Yes

No historical data available for calculating statistical information  
 The H<sub>2</sub> content may be effected due to the degradation of H<sub>2</sub>S.  
 \*per Method GPA 2286-M

\*\* Information not supplied by Client -- data derived from LSD information Results relate only to items tested

Remarks:

**EXTENDED GAS ANALYSIS (INCLUDING O2)**

TUNDRA OIL AND GAS

B722590:QU2998-01

Operator Name

Laboratory Number

TUNDRA 04-01-002-28-W1M

COMPRESSOR INLET

Well Name

Sample Point

MAXXAM ANALYTICS

TUNDA21GE

Sampling Company

MaxxID

Client ID

2017/03/24

2017/03/29

2017/04/05

2017/04/05

GS1,KKO

Date Sampled Start

Date Sampled End

Date Received

Date Reported

Date Reissued

Analyst

COMPONENT	BOILING POINT (°C)	MOLE FRACTION AS RECEIVED	MASS FRACTION AIR FREE AS REC'D	MOLE FRACTION AIR & ACID GAS FREE	LIQUID VOLUME mL/m3 AIR FREE AS REC'D	
Hydrogen	-253	0.0001	0.0001	0.0001		
Helium	-269	0.0003	0.0003	0.0003		
Oxygen	-183	0.0000	0.0000			
Nitrogen	-196	0.0940	0.0940	0.0953		
Carbon Monoxide	-191	0.0000				
Carbon Dioxide	-79	0.0126	0.0126			
Hydrogen Sulphide	-60	0.0008	0.0008			
Methane	-162	0.4796	0.4796	0.4860		
Ethane	-89	0.1808	0.1808	0.1832	642.17	
Propane	-42	0.1398	0.1398	0.1417	513.64	
Iso-Butane	-12	0.0174	0.0174	0.0176	75.84	
n-Butane	0	0.0448	0.0448	0.0454	188.69	
Iso-Pentane	28	0.0094	0.0094	0.0096	46.11	
n-Pentane	36	0.0103	0.0103	0.0105	49.95	
C <sub>6</sub>	37-69	0.0056	0.0056	0.0057	30.90	
C <sub>7</sub>	70-98	0.0025	0.0025	0.0025	11.87	
C <sub>8</sub>	99-126	0.0019	0.0019	0.0020	11.17	
C <sub>9</sub>	127-151	0.0001	0.0001	0.0001	0.96	
C <sub>10</sub>	152-174	Trace	Trace	Trace	0.20	
C <sub>11</sub>	175-196	Trace	Trace	Trace	0.03	
C <sub>12</sub>	197-216	Trace	Trace	Trace	0.01	
C <sub>13</sub>	217-236	Trace	Trace	Trace	0.03	
C <sub>14</sub>	237-253	Trace	Trace	Trace	0.01	
C <sub>15+</sub>	254+	0.0000	0.0000	0.0000	0.00	
<b>TOTAL</b>		<b>1.0000</b>	<b>1.0000</b>	<b>1.0000</b>	<b>1571.58</b>	
<b>SPECIFIC COMPONENTS</b>						
neoHexane (C <sub>6</sub> )	50	0.0000	0.00006	0.00006	0.31	
n-Hexane (C <sub>6</sub> )	69	0.00209	0.00209	0.00212	11.50	
Methylcyclopentane (C <sub>7</sub> )	72	0.00106	0.00106	0.00107	4.99	
Benzene (C <sub>7</sub> )	80	0.00021	0.00021	0.00021	0.79	
Cyclohexane (C <sub>7</sub> )	81	0.00076	0.00076	0.00077	3.46	
2,2,4-Trimethylpentane (C <sub>8</sub> )	99	0.00016	0.00016	0.00017	1.14	
Methylcyclohexane (C <sub>8</sub> )	101	0.00035	0.00035	0.00035	1.86	
Toluene (C <sub>8</sub> )	111	0.00014	0.00014	0.00014	0.63	
Ethylbenzene (C <sub>9</sub> )	136	0.0000	0.00002	0.00002	0.12	
m&p-Xylene (C <sub>9</sub> )	139	0.0000	0.00003	0.00003	0.15	
o-Xylene (C <sub>9</sub> )	144	0.0000	0.00001	0.00001	0.04	
1,2,4-Trimethylbenzene (C <sub>10</sub> )	169	0.0000	0.00001	0.00001	0.03	
<b>SUMMARY</b>						<b>MOLAR MASS AIR FREE AS REC'D.</b>
C <sub>3+</sub>	-42+	0.2318	0.2318	0.2351	929.41	52.2
C <sub>5+</sub>	28+	0.0298	0.0298	0.0304	151.24	78.2
C <sub>6+</sub>	36+	0.0101	0.0101	0.0103	55.18	90.1
C <sub>7+</sub>	70+	0.0045	0.0045	0.0046	24.28	94.9
C <sub>10+</sub>	152+	Trace	Trace	Trace	0.28	140.4
C <sub>12+</sub>	197+	Trace	Trace	Trace	0.05	184.4

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Remarks: