



UTILITIES CO.

A Division of MDU Resources Group, Inc.

400 North Fourth Street  
Bismarck, ND 58501  
(701) 222-7900

January 25, 2016

Executive Secretary  
North Dakota Public Service Commission  
State Capitol Building  
Bismarck, ND 58505-0480

Re: Case No. PU-15-002 (Therm Billing)  
Monthly Report – November 2015

Montana-Dakota Utilities Co., a Division of MDU Resources Group, Inc., herewith submits the following information, pursuant to the Ordering paragraphs one and two of the Order issued in Case No. 11,006, dated October 20, 1987 and pursuant to the North Dakota Administrative Code 69-09-01-02, part 2.

1. Attachment A is a schedule showing the thermal billing factors by community that reflect the BTU values shown on Attachment B and were used for billing purposes in December 2015.
2. Attachment B consists of copies of the monthly Heating Value Test Reports received from our suppliers for the month of November 2015.
3. Attachment C is a listing which states the type of measuring device in place at each zone.
4. Attachment D is a monthly list of the heating value data, by zone, for the most recent 12-month period and an average thereof. It is being provided pursuant to a Staff request.
5. Attachment E provides a brief explanation of the thermal variances, where applicable, for the month of November 2015.

Please acknowledge receipt by stamping or initialing the duplicate copy of this letter attached hereto and returning the same in the enclosed self-addressed, stamped envelope. Should the Commission or its Staff have any comments or questions with respect to these reports, please call me.

Sincerely,

A handwritten signature in red ink that reads 'Tamie Aberle'.

Tamie Aberle  
Director of Regulatory Affairs

**Montana-Dakota Utilities Co.  
Therm Billing Factors - North Dakota  
December 2015**

Town	Heat Zone	Therm Factor
MDU-303-ALEXANDER	025	1.1551
MDU-308-ARNEGARD	025	1.1551
MDU-314-APPLE VALLEY	271	1.1501
MDU-318-BEACH	032	1.0267
MDU-319-BELFIELD	032	1.0343
MDU-323-BERTHOLD	262	1.1258
MDU-327-BISMARCK	028	1.0999
MDU-330-BOWMAN	034	1.0109
MDU-337-BURLINGTON	262	1.1501
MDU-343-CARRINGTON	273	1.1482
MDU-344-CLEVELAND	272	1.1401
MDU-364-CAVALIER	273	1.1724
MDU-365-DAWSON	271	1.1420
MDU-368-DES LACS	262	1.1339
MDU-369-DICKINSON	031	1.4255
MDU-374-FT TOTTEN	273	1.1563
MDU-375-DEVILS LAKE	273	1.1563
MDU-379-BARLOW	273	1.1482
MDU-384-EPPING	264	1.1126
MDU-387-ELDRIDGE	272	1.1492
MDU-407-GLADSTONE	031	1.0643
MDU-411-GLEN ULLIN	311	1.1136
MDU-413-GOLVA	032	1.0116
MDU-416-GARRISON	262	1.1339
MDU-417-GRAFTON	273	1.1805
MDU-421-HALLIDAY	031	1.0643
MDU-429-HEBRON	311	1.0833
MDU-432-HETTINGER	903	2.3875
MDU-449-JAMESTOWN	272	1.1572
MDU-459-KILLDEER	033	1.1192
MDU-463-LANGDON	273	1.1482
MDU-469-LEFOR	031	1.0643
MDU-474-LIGNITE	263	1.0578
MDU-475-LINTON	802	1.0353
MDU-478-LINCOLN	028	1.1077
MDU-488-MCKENZIE	271	1.1501
MDU-494-MEDINA	271	1.1420
MDU-498-MANDAN	028	1.1077
MDU-500-MARMARTH	034	1.0184
MDU-505-MINOT	262	1.1501
MDU-510-MOTT	031	1.0643
MDU-512-MAX	262	1.1258
MDU-522-NEW ENGLAND	031	1.0566
MDU-524-NEW SALEM	028	1.1077
MDU-532-NEW ROCKFORD	273	1.1482
MDU-539-PARK RIVER	273	1.1724
MDU-540-PALERMO	262	1.1258
MDU-558-RAY	264	1.1126
MDU-561-REGENT	031	1.0643

MDU-563-RHAME	034	1.0034
MDU-564-RICHARDTON	311	1.0678
MDU-568-ROSS	261	0.9818
MDU-572-RUTHVILLE	262	1.1501
MDU-574-SANBORN	272	1.1572
MDU-583-SENTINEL BUTTE	032	1.0350
MDU-588-SOUTH HEART	031	1.0566
MDU-717-SPIRITWOOD	272	1.1572
MDU-590-SPRINGBROOK	264	1.1126
MDU-591-STANLEY	261	0.9889
MDU-593-STEELE	271	1.1420
MDU-598-SHEYENNE	273	1.1563
MDU-605-SURREY	262	1.1501
MDU-610-TAPPEN	271	1.1420
MDU-611-TAYLOR	031	1.0566
MDU-616-TIOGA	261	0.9818
MDU-619-TURTLE LAKE	262	1.1339
MDU-620-TRENTON	024	1.1254
MDU-624-UNDERWOOD	262	1.1339
MDU-625-VALLEY CITY	272	1.1653
MDU-629-WALHALLA	273	1.1724
MDU-632-WATFORD CITY	610	1.1306
MDU-636-WHEELOCK	264	1.1046
MDU-637-WHITE EARTH	261	0.9889
MDU-642-WILLISTON	024	1.1254
MDU-646-WASHBURN	262	1.1420
MDU-647-WILTON	262	1.1258
MDU-664-RIVERDALE	262	1.1339
MDU-691-FAIRVIEW	241	1.1263
MDU-712-MINOT AFB	262	1.1501
MDU-718-FAIRMOUNT	600	1.1179
MDU-732-NEKOMA	273	1.1482
MDU-732-MSR SITE	273	1.1549

## GQ Source Daily Summary November 2015

Number: 251

Pressure Base: 14,730

Contract Day: 1

Name: SIDNEY BORDER-MONDAK JNCTN-SIDNEY PLANT Temperature Base:

Contract Hour: 9

Day	Relative Density	Heating Value Wet	Heating Value Dry																	Wobbe	CCT
				CO2	N2	C1	C2	C3	IC4	NC4	IC5	NC5	C6	C7	C8	C9	C10				
1	0.7273	1167.7	1188.4	1.210	3.967	69.898	20.734	3.797	0.127	0.240	0.014	0.012	0.000	0.000	0.000	0.000	0.000	0.000	1393.50		
2	0.7274	1168.0	1188.6	1.213	3.957	69.859	20.796	3.785	0.126	0.237	0.014	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1393.68		
3	0.7273	1167.7	1188.4	1.224	3.948	69.872	20.798	3.772	0.125	0.236	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1393.45		
4	0.7259	1165.1	1185.7	1.220	3.976	69.990	20.803	3.647	0.118	0.222	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1391.77		
5	0.7258	1164.6	1185.2	1.226	3.993	70.038	20.703	3.672	0.120	0.224	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1391.21		
6	0.7258	1164.2	1184.9	1.225	4.019	70.052	20.631	3.705	0.120	0.224	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1390.75		
7	0.7266	1165.6	1186.2	1.226	4.009	69.979	20.639	3.770	0.123	0.229	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1391.60		
8	0.7268	1165.9	1186.5	1.227	4.010	69.976	20.612	3.793	0.125	0.233	0.014	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1391.76		
9	0.7261	1164.4	1185.0	1.233	4.020	70.093	20.511	3.771	0.122	0.226	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1390.70		
10	0.7284	1168.7	1189.4	1.230	3.983	69.874	20.513	4.019	0.125	0.231	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1393.55		
11	0.7280	1167.9	1188.6	1.221	4.002	69.969	20.394	4.040	0.123	0.227	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1393.04		
12	0.7280	1167.7	1188.4	1.225	4.008	69.916	20.484	3.996	0.123	0.225	0.012	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1392.83		
13	0.7284	1168.7	1189.4	1.224	3.983	69.871	20.536	4.004	0.126	0.232	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1393.68		
14	0.7287	1169.2	1189.9	1.220	3.993	69.859	20.481	4.060	0.126	0.236	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1393.92		
15	0.7285	1168.8	1189.5	1.221	3.992	69.902	20.442	4.059	0.126	0.235	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1393.69		
16	0.7279	1167.9	1188.6	1.217	4.000	70.037	20.281	4.079	0.127	0.235	0.013	0.010	0.000	0.000	0.000	0.000	0.000	0.000	1393.13		
17	0.7293	1170.6	1191.4	1.210	3.978	69.862	20.377	4.177	0.130	0.241	0.013	0.011	0.000	0.000	0.000	0.000	0.000	0.000	1395.03		
18	0.7247	1169.7	1190.4	0.990	3.940	69.942	21.121	3.684	0.108	0.196	0.011	0.008	0.000	0.000	0.000	0.000	0.000	0.000	1398.40		
19	0.7142	1181.6	1202.5	0.079	3.624	69.665	23.940	2.602	0.034	0.052	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1422.89		
20	0.7132	1181.4	1202.3	0.050	3.582	69.685	24.134	2.487	0.026	0.035	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1423.71		
21	0.7131	1181.6	1202.5	0.053	3.565	69.688	24.149	2.481	0.026	0.035	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1423.93		
22	0.7132	1181.7	1202.6	0.052	3.566	69.646	24.209	2.468	0.025	0.032	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1424.02		
23	0.7143	1182.8	1203.8	0.056	3.590	69.525	24.229	2.527	0.030	0.043	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1424.34		
24	0.7140	1182.4	1203.4	0.056	3.591	69.623	24.100	2.542	0.034	0.051	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1424.09		
25	0.7156	1185.2	1206.2	0.051	3.581	69.350	24.349	2.590	0.031	0.045	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1425.81		
26	0.7147	1183.6	1204.6	0.049	3.595	69.546	24.086	2.651	0.029	0.041	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1424.79		
27	0.7158	1185.8	1206.8	0.046	3.563	69.369	24.261	2.692	0.029	0.039	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1426.42		
28	0.7157	1185.6	1206.6	0.054	3.555	69.412	24.217	2.676	0.034	0.050	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1426.26		
29	0.7169	1185.3	1206.3	0.110	3.602	69.404	23.957	2.822	0.040	0.062	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1424.68		
30	0.7166	1186.3	1207.3	0.048	3.610	69.216	24.345	2.706	0.031	0.043	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	1426.17		
Avg	0.7223	1174.0	1194.6	0.749	3.827	69.771	22.028	3.369	0.086	0.155	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000	1405.76		

Zone 211

# GQ Source Analysis

<b>GQ Source Number:</b>	0602330	<b>Specific Gravity:</b>	0.7068
<b>GQ Source Name:</b>	WILLISTON BORDER	<b>Dry Heat Value:</b>	1182.71
<b>Effective Date:</b>	11/1/2015 9:00:00 AM	<b>Wet Heat Value:</b>	1162.12
<b>Effective End Date:</b>	1/18/2038 9:14:07 PM	<b>As Deliv. Heat Value:</b>	1182.71
<b>Pressure Base:</b>	14.730	<b>Sample Pressure:</b>	341.00
<b>Viscosity:</b>		<b>Sample Temperature:</b>	

		<u>Mol %</u>	<u>Liquid Content</u>			<u>Mol %</u>
C1	Methane	72.226		CO2	Carbon Dioxide	0.873
C2	Ethane	21.220	0.0000	N2	Nitrogen	2.862
C3	Propane	2.457	0.6748	O2	Oxygen	0.000
IC4	Isobutane	0.093	0.0303	He	Helium	
NC4	n-Butane	0.213	0.0668	H2	Hydrogen	
IC5	Isopentane	0.023	0.0085	H2S	Hydrogen Sulfide	
NC5	n-Pentane	0.031	0.0111	Ar	Argon	
C6	Hexanes	0.003	0.0015	CO	Carbon Monoxide	
C7	Heptanes			H2	Water	
C8	Octanes			Neo-C5	Neopentane	
C9	Nonanes					
C10	Decanes					

**Totals** 100.000% 0.793 GPM

**Sample Date:** 12/1/2015 12:00:00 AM  
**Sample Type:** Composite  
**Sample Tech:** Eric Smeltzer  
**H2S:** ppm

**Sample Remarks:**

**Analysis Tech:** DW

**Analysis Remarks:**

Zone 24





**GQ Source Analysis**

<b>GQ Source Number:</b>	2501030	<b>Specific Gravity:</b>	0.6705
<b>GQ Source Name:</b>	LIGNITE PLANT	<b>Dry Heat Value:</b>	1112.32
<b>Effective Date:</b>	10/1/2015 9:00:00 AM	<b>Wet Heat Value:</b>	1092.96
<b>Effective End Date:</b>	1/18/2038 9:14:07 PM	<b>As Deliv. Heat Value:</b>	1112.32
<b>Pressure Base:</b>	14.730	<b>Sample Pressure:</b>	357.00
<b>Viscosity:</b>		<b>Sample Temperature:</b>	

	<u>Mol %</u>	<u>Liquid Content</u>			<u>Mol %</u>	
C1	Methane	76.490		CO2	Carbon Dioxide	0.128
C2	Ethane	17.640	4.7036	N2	Nitrogen	4.571
C3	Propane	0.944	0.2594	O2	Oxygen	0.218
IC4	Isobutane	0.002	0.0008	He	Helium	
NC4	n-Butane	0.004	0.0012	H2	Hydrogen	
IC5	Isopentane	0.000	0.0000	H2S	Hydrogen Sulfide	
NC5	n-Pentane	0.000	0.0000	Ar	Argon	
C6	Hexanes	0.002	0.0008	CO	Carbon Monoxide	
C7	Heptanes			H2	Water	
C8	Octanes			Neo-C5	Neopentane	
C9	Nonanes					
C10	Decanes					
<b>Totals</b>			100.000%	4.966 GPM		

**Sample Date:** 11/2/2015 12:00:00 AM  
**Sample Type:** Composite  
**Sample Tech:** Eric S.  
**H2S:** ppm

**Sample Remarks:**

**Analysis Tech:** MB  
**Analysis Remarks:**

Zone 263

\*\*\* End of Report \*\*\*

# GQ Source Analysis

<b>GQ Source Number:</b>	0702010	<b>Specific Gravity:</b>	0.7000
<b>GQ Source Name:</b>	EPPING BORDER	<b>Dry Heat Value:</b>	1178.41
<b>Effective Date:</b>	11/1/2015 9:00:00 AM	<b>Wet Heat Value:</b>	1157.91
<b>Effective End Date:</b>	1/18/2038 9:14:07 PM	<b>As Deliv. Heat Value:</b>	1178.41
<b>Pressure Base:</b>	14.730	<b>Sample Pressure:</b>	343.00
<b>Viscosity:</b>		<b>Sample Temperature:</b>	

		<u>Mol %</u>	<u>Liquid Content</u>			<u>Mol %</u>
C1	Methane	73.764		CO2	Carbon Dioxide	0.841
C2	Ethane	19.938	5.3165	N2	Nitrogen	2.531
C3	Propane	2.536	0.6967	O2	Oxygen	0.000
IC4	Isobutane	0.105	0.0341	He	Helium	
NC4	n-Butane	0.234	0.0736	H2	Hydrogen	
IC5	Isopentane	0.023	0.0083	H2S	Hydrogen Sulfide	
NC5	n-Pentane	0.026	0.0093	Ar	Argon	
C6	Hexanes	0.002	0.0011	CO	Carbon Monoxide	
C7	Heptanes			H2	Water	
C8	Octanes			Neo-C5	Neopentane	
C9	Nonanes					
C10	Decanes					

---

**Totals**      100.000%      6.140 GPM

**Sample Date:** 12/1/2015 12:00:00 AM  
**Sample Type:** Composite  
**Sample Tech:** ES  
**H2S:** ppm

**Sample Remarks:**

**Analysis Tech:** DW

**Analysis Remarks:**

Zone 264







## GQ Source Daily Summary November 2015

Number: 061

Pressure Base: 14.730

Contract Day: 1

Name: CLEVELAND STATION-GRAFTON BORDER

Temperature Base:

Contract Hour: 9

Day	Relative Density	Heating Value Wet	Heating Value Dry											Wobbe	CCT					
				CO2	N2	C1	C2	C3	IC4	NC4	IC5	NC5	C6			C7	C8	C9	C10	
1	0.7411	1169.3	1190.0	0.747	5.867	67.645	20.442	4.713	0.173	0.371	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1382.31	
2	0.7418	1170.1	1190.8	0.749	5.885	67.524	20.508	4.748	0.174	0.371	0.020	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1382.56	
3	0.7409	1170.4	1191.1	0.750	5.782	67.665	20.537	4.674	0.174	0.376	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1383.73	
4	0.7422	1171.9	1192.6	0.755	5.805	67.450	20.666	4.739	0.173	0.370	0.020	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1384.30	
5	0.7357	1163.2	1183.8	0.732	5.750	68.465	20.000	4.508	0.159	0.346	0.020	0.020	0.000	0.000	0.000	0.000	0.000	0.000	1380.22	
6	0.7443	1176.3	1197.1	0.774	5.702	67.118	21.056	4.748	0.173	0.381	0.023	0.025	0.000	0.000	0.000	0.000	0.000	0.000	1387.58	
7	0.7341	1162.3	1182.9	0.723	5.667	68.804	19.764	4.486	0.162	0.352	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1380.66	
8	0.7462	1177.9	1198.8	0.777	5.770	66.801	21.231	4.821	0.176	0.380	0.022	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1387.79	
9	0.7429	1173.1	1193.9	0.760	5.785	67.354	20.768	4.732	0.176	0.381	0.022	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1385.14	
10	0.7393	1168.6	1189.3	0.734	5.757	67.910	20.413	4.607	0.170	0.367	0.021	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1383.22	
11	0.7400	1169.0	1189.7	0.744	5.785	67.848	20.360	4.680	0.172	0.368	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1382.98	
12	0.7343	1162.8	1183.4	0.723	5.663	68.761	19.805	4.490	0.164	0.352	0.020	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1380.95	
13	0.7382	1168.6	1189.3	0.747	5.634	68.075	20.428	4.555	0.164	0.356	0.020	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1384.26	
14	0.7386	1168.5	1189.2	0.743	5.687	68.018	20.408	4.573	0.167	0.362	0.021	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1383.70	
15	0.7413	1172.3	1193.1	0.752	5.689	67.598	20.716	4.662	0.171	0.370	0.021	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1385.78	
16	0.7388	1169.3	1190.0	0.740	5.662	68.003	20.426	4.590	0.170	0.368	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1384.45	
17	0.7378	1167.8	1188.5	0.735	5.663	68.232	20.186	4.595	0.173	0.375	0.020	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1383.69	
18	0.7416	1172.2	1192.9	0.762	5.717	67.607	20.624	4.670	0.180	0.396	0.022	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1385.25	
19	0.7377	1167.1	1187.8	0.730	5.700	68.313	20.034	4.607	0.179	0.395	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	1382.98	
20	0.7385	1174.7	1195.5	0.760	5.273	67.966	21.071	4.318	0.172	0.389	0.024	0.027	0.000	0.000	0.000	0.000	0.000	0.000	1391.19	
21	0.7376	1173.8	1194.6	0.720	5.304	67.986	21.123	4.300	0.163	0.361	0.021	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1390.96	
22	0.7396	1176.0	1196.8	0.731	5.342	67.709	21.237	4.397	0.168	0.373	0.021	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1391.67	
23	0.7454	1182.9	1203.8	0.781	5.386	66.931	21.630	4.640	0.180	0.400	0.024	0.027	0.000	0.000	0.000	0.000	0.000	0.000	1394.38	
24	0.7451	1179.7	1200.6	0.772	5.570	66.987	21.357	4.671	0.183	0.412	0.023	0.024	0.000	0.000	0.000	0.000	0.000	0.000	1390.90	
25	0.7454	1178.7	1199.6	0.796	5.617	66.969	21.296	4.673	0.184	0.416	0.024	0.025	0.000	0.000	0.000	0.000	0.000	0.000	1389.49	
26	0.7306	1159.4	1180.0	0.691	5.563	69.401	19.429	4.337	0.167	0.373	0.019	0.020	0.000	0.000	0.000	0.000	0.000	0.000	1380.51	
27	0.7307	1161.0	1181.5	0.678	5.503	69.272	19.697	4.302	0.160	0.352	0.018	0.019	0.000	0.000	0.000	0.000	0.000	0.000	1382.21	
28	0.7328	1161.9	1182.4	0.699	5.611	68.979	19.755	4.385	0.166	0.366	0.019	0.020	0.000	0.000	0.000	0.000	0.000	0.000	1381.31	
29	0.7321	1159.5	1180.0	0.705	5.679	69.178	19.432	4.428	0.169	0.370	0.019	0.020	0.000	0.000	0.000	0.000	0.000	0.000	1379.16	
30	0.7295	1156.7	1177.2	0.693	5.626	69.632	19.105	4.373	0.166	0.365	0.020	0.020	0.000	0.000	0.000	0.000	0.000	0.000	1378.27	
Avg	0.7388	1170.0	1190.2	0.740	5.648	68.007	20.450	4.567	0.171	0.374	0.021	0.022	0.000	0.000	0.000	0.000	0.000	0.000	1384.72	

\*\*\* End of Report\*\*\*

Zone 273





# GQ Source Analysis

<b>GQ Source Number:</b>	0202080	<b>Specific Gravity:</b>	0.6770
<b>GQ Source Name:</b>	RICHARDTON-GLEN ULLIN COMPRE	<b>Dry Heat Value:</b>	1146.68
<b>Effective Date:</b>	11/1/2015 9:00:00 AM	<b>Wet Heat Value:</b>	1126.72
<b>Effective End Date:</b>	1/18/2038 9:14:00 PM	<b>As Deliv. Heat Value:</b>	1146.68
<b>Pressure Base:</b>	14.730	<b>Sample Pressure:</b>	336.00
<b>Viscosity:</b>		<b>Sample Temperature:</b>	0.00

	<u>Mol %</u>	<u>Liquid Content</u>			<u>Mol %</u>	
C1	Methane	76.107		CO2	Carbon Dioxide	0.144
C2	Ethane	18.918	5.0440	N2	Nitrogen	3.373
C3	Propane	1.391	0.3820	O2	Oxygen	
IC4	Isobutane	0.024	0.0080	He	Helium	
NC4	n-Butane	0.039	0.0120	H2	Hydrogen	
IC5	Isopentane	0.002	0.0010	H2S	Hydrogen Sulfide	
NC5	n-Pentane	0.002	0.0010	Ar	Argon	
C6	Hexanes			CO	Carbon Monoxide	
C7	Heptanes			H2	Water	
C8	Octanes			Neo-C5	Neopentane	
C9	Nonanes					
C10	Decanes					

---

**Totals**      100.000%      5.448 GPM

**Sample Date:** 11/1/2015 10:29:00 AM  
**Sample Type:** Composite  
**Sample Tech:** RR  
**H2S:** ppm

**Sample Remarks:**

**Analysis Tech:** MB

**Analysis Remarks:**

Zone 311





# GQ Source Analysis

<b>GQ Source Number:</b>	1202160	<b>Specific Gravity:</b>	0.8020
<b>GQ Source Name:</b>	BOWMAN BORDER	<b>Dry Heat Value:</b>	1140.05
<b>Effective Date:</b>	11/1/2015 9:00:00 AM	<b>Wet Heat Value:</b>	1120.21
<b>Effective End Date:</b>	1/18/2038 9:14:07 PM	<b>As Deliv. Heat Value:</b>	1140.05
<b>Pressure Base:</b>	14.730	<b>Sample Pressure:</b>	
<b>Viscosity:</b>		<b>Sample Temperature:</b>	

		<u>Mol %</u>	<u>Liquid Content</u>			<u>Mol %</u>
C1	Methane	54.238		CO2	Carbon Dioxide	2.413
C2	Ethane	28.017	7.4710	N2	Nitrogen	12.081
C3	Propane	2.535	0.6960	O2	Oxygen	
IC4	Isobutane	0.100	0.0330	He	Helium	
NC4	n-Butane	0.299	0.0940	H2	Hydrogen	
IC5	Isopentane	0.090	0.0330	H2S	Hydrogen Sulfide	
NC5	n-Pentane	0.093	0.0340	Ar	Argon	
C6	Hexanes	0.046	0.0190	CO	Carbon Monoxide	
C7	Heptanes			H2	Water	
C8	Octanes			Neo-C5	Neopentane	0.088
C9	Nonanes					
C10	Decanes					
<b>Totals</b>			100.000%		8.380 GPM	

**Sample Date:** 11/1/2015 9:00:00 AM  
**Sample Type:** Composite  
**Sample Tech:**  
**H2S:** ppm

**Sample Remarks:**

**Analysis Tech:**

**Analysis Remarks:** USED MARMATH PLANT GC AVERAGE - UNABLE TO ANALYZE BOWMAN BOTTLE PER M GENTILINI

Zone 34

Nov-15

ZONE 610

		Watford City 01320 Watford City Border			01312 Watford City East Border			Weighted		
Begin Date	End Date	MCF	DK	BTU Zone 25	MCF	DK	BTU Zone 43	AVG BTU		
11/1/2015	11/2/2015	293	358	1.223	62	67	1.081	1.198	11/1/2015	
11/2/2015	11/3/2015	338	413	1.223	40	43	1.078	1.208	11/2/2015	
11/3/2015	11/4/2015	408	500	1.223	37	40	1.083	1.211	11/3/2015	
11/4/2015	11/5/2015	440	538	1.223	50	54	1.087	1.209	11/4/2015	
11/5/2015	11/6/2015	483	591	1.223	71	78	1.090	1.206	11/5/2015	
11/6/2015	11/7/2015	514	628	1.223	127	137	1.079	1.194	11/6/2015	
11/7/2015	11/8/2015	391	478	1.223	164	177	1.078	1.180	11/7/2015	
11/8/2015	11/9/2015	358	438	1.223	177	191	1.083	1.177	11/8/2015	
11/9/2015	11/10/2015	426	521	1.223	130	141	1.083	1.190	11/9/2015	
11/10/2015	11/11/2015	499	611	1.223	106	115	1.086	1.199	11/10/2015	
11/11/2015	11/12/2015	523	639	1.223	93	101	1.086	1.202	11/11/2015	
11/12/2015	11/13/2015	532	651	1.223	87	95	1.086	1.204	11/12/2015	
11/13/2015	11/14/2015	413	505	1.223	52	57	1.102	1.209	11/13/2015	
11/14/2015	11/15/2015	325	398	1.223	43	47	1.093	1.208	11/14/2015	
11/15/2015	11/16/2015	324	396	1.223	50	55	1.093	1.206	11/15/2015	
11/16/2015	11/17/2015	491	600	1.223	77	84	1.094	1.206	11/16/2015	
11/17/2015	11/18/2015	485	593	1.223	88	96	1.093	1.203	11/17/2015	
11/18/2015	11/19/2015	659	807	1.223	207	226	1.093	1.192	11/18/2015	
11/19/2015	11/20/2015	642	786	1.223	178	197	1.101	1.197	11/19/2015	
11/20/2015	11/21/2015	627	767	1.223	172	189	1.098	1.196	11/20/2015	
11/21/2015	11/22/2015	596	729	1.223	121	132	1.095	1.201	11/21/2015	
11/22/2015	11/23/2015	507	620	1.223	76	83	1.092	1.206	11/22/2015	
11/23/2015	11/24/2015	552	675	1.223	113	122	1.084	1.199	11/23/2015	
11/24/2015	11/25/2015	545	666	1.223	108	117	1.085	1.200	11/24/2015	
11/25/2015	11/26/2015	675	825	1.223	273	296	1.087	1.184	11/25/2015	
11/26/2015	11/27/2015	694	848	1.223	306	332	1.086	1.181	11/26/2015	
11/27/2015	11/28/2015	666	815	1.223	210	228	1.087	1.190	11/27/2015	
11/28/2015	11/29/2015	634	776	1.223	185	201	1.084	1.192	11/28/2015	
11/29/2015	11/30/2015	647	792	1.223	217	235	1.084	1.188	11/29/2015	
11/30/2015	12/1/2015	649	794	1.223	394	427	1.083	1.170	11/30/2015	
		15,336	18,758		4,014	4,363	1.0878	1.1969		

Gas Quality

ROW ID	LOCATION DESCRIPTION	GROSS HEATING VALUE (BTU/CF)	SPECIFIC GRAVITY	WOBBE (cale)	CRICONDENTHERM (deg F)	NITROGEN (mole percent)	CARBON DIOXIDE (mole percent)	METHANE (mole percent)	ETHANE (mole percent)	PROPANE (mole percent)	NORMAL BUTANE (mole percent)	ISO BUTANE (mole percent)	PENTANE (mole percent)	ISO PENTANE (mole percent)	NEO PENTANE (mole percent)	HEXANES PLUS (mole percent)	HYDROGEN (mole percent)	HELIUM (mole percent)	PRODUCTION DATE	POSTING DATE	Changetimestamp	NOTE
11587	GLEN ULLIN	1065.9	0.615	1359.2	-62.5	1.4179	0.7706	88.7433	8.0337	0.7684	0.0367	0.0274	0.0037	0.0052	0	0.0018	0.1736	0.021	10/31/2015	11/1/2015	11/1/2015 2:36:09 PM	
11587	GLEN ULLIN	1077.5	0.623	1365.1	-50.2	1.4136	0.8136	87.3997	9.1016	0.9502	0.056	0.0429	0.0071	0.0093	0	0.0041	0.1853	0.021	11/1/2015	11/2/2015	11/2/2015 2:31:57 PM	
11587	GLEN ULLIN	1075.8	0.6228	1363.1	-58.6	1.533	0.7917	87.2177	9.2621	0.9045	0.0378	0.0261	0.0032	0.0042	0	0.0008	0.2025	0.021	11/2/2015	11/3/2015	11/3/2015 2:33:20 PM	
11587	GLEN ULLIN	1074.7	0.6227	1361.9	-59.9	1.5886	0.7919	87.1408	9.3007	0.8892	0.0296	0.0195	0.0017	0.0024	0	0.0005	0.217	0.021	11/3/2015	11/4/2015	11/4/2015 2:33:33 PM	
11587	GLEN ULLIN	1089.1	0.6327	1369.1	-45.4	1.6359	0.811	85.4925	10.5334	1.157	0.0562	0.0435	0.0059	0.008	0	0.0046	0.2358	0.021	11/4/2015	11/5/2015	11/5/2015 2:33:45 PM	
11587	GLEN ULLIN	1086.6	0.6297	1369.3	-44	1.4988	0.8146	86.2076	9.9504	1.1469	0.0671	0.0532	0.0086	0.0115	0	0.0053	0.2194	0.021	11/5/2015	11/6/2015	11/6/2015 2:33:20 PM	
11587	GLEN ULLIN	1073.2	0.6198	1363.2	-47.8	1.4162	0.7796	88.0944	8.4304	0.9416	0.064	0.0527	0.0084	0.0119	0	0.0055	0.1785	0.021	11/6/2015	11/7/2015	11/7/2015 2:32:08 PM	
11587	GLEN ULLIN	1079.7	0.624	1366.8	-38.6	1.4083	0.7897	87.4568	8.867	1.0898	0.0789	0.0658	0.0113	0.0156	0	0.009	0.1932	0.021	11/7/2015	11/8/2015	11/8/2015 2:32:12 PM	
11587	GLEN ULLIN	1080.8	0.6246	1367.6	-39.8	1.4141	0.7809	87.3657	8.9529	1.1271	0.0758	0.0631	0.0103	0.0142	0	0.0083	0.1726	0.021	11/8/2015	11/9/2015	11/9/2015 2:32:11 PM	
11587	GLEN ULLIN	1082.5	0.6251	1369.1	-36.9	1.3421	0.789	87.2975	9.0888	1.107	0.0792	0.0669	0.0108	0.0151	0	0.0101	0.1765	0.021	11/9/2015	11/10/2015	11/10/2015 2:32:21 PM	
11587	GLEN ULLIN	1080.5	0.6234	1368.5	-37.1	1.3096	0.7827	87.6065	8.8153	1.1035	0.0768	0.0648	0.0106	0.0148	0	0.0102	0.1903	0.021	11/10/2015	11/11/2015	11/11/2015 2:34:06 PM	
11587	GLEN ULLIN	1065.9	0.6139	1360.4	-61.4	1.2778	0.7938	88.9497	7.9897	0.7051	0.039	0.031	0.0041	0.0059	0	0.0023	0.1861	0.021	11/11/2015	11/12/2015	11/12/2015 2:34:27 PM	
11587	GLEN ULLIN	1066.8	0.6142	1361.2	-60.7	1.2668	0.785	89.0454	7.8764	0.7819	0.0409	0.0313	0.0041	0.0058	0	0.0024	0.1442	0.021	11/12/2015	11/13/2015	11/13/2015 2:34:09 PM	
11587	GLEN ULLIN	1066.6	0.615	1360.1	-64.2	1.3819	0.7704	88.6799	8.1244	0.7661	0.0337	0.0246	0.003	0.0043	0	0.0011	0.1943	0.021	11/13/2015	11/14/2015	11/14/2015 2:33:51 PM	
11587	GLEN ULLIN	1071.5	0.6189	1362	-60	1.4269	0.7895	87.9673	8.7052	0.8238	0.0372	0.0277	0.0033	0.0049	0	0.0018	0.197	0.021	11/14/2015	11/15/2015	11/15/2015 2:37:34 PM	
11587	GLEN ULLIN	1075	0.6215	1363.6	-57.8	1.4498	0.7959	87.4685	9.1218	0.8654	0.039	0.0288	0.0035	0.005	0	0.0019	0.2052	0.021	11/15/2015	11/16/2015	11/16/2015 2:33:58 PM	
11587	GLEN ULLIN	1076.5	0.6221	1364.9	-55.7	1.4206	0.7888	87.4201	9.149	0.9111	0.0421	0.0323	0.0042	0.0061	0	0.0026	0.2065	0.021	11/16/2015	11/17/2015	11/17/2015 2:33:72 PM	
11587	GLEN ULLIN	1078.3	0.6236	1365.5	-53.1	1.4209	0.8105	87.3139	9.2465	0.9437	0.0494	0.0365	0.0051	0.0071	0	0.0031	0.1473	0.021	11/17/2015	11/18/2015	11/18/2015 2:34:11 PM	
11587	GLEN ULLIN	1074.1	0.6199	1364.2	-54.9	1.3483	0.7994	87.9004	8.7657	0.8796	0.0468	0.0353	0.0054	0.0073	0	0.0031	0.1934	0.021	11/18/2015	11/19/2015	11/19/2015 2:34:24 PM	
11587	GLEN ULLIN	1068	0.6144	1362.5	-54.9	1.1905	0.8007	89.1062	7.7577	0.8581	0.0485	0.0392	0.0059	0.0081	0	0.0037	0.1676	0.021	11/19/2015	11/20/2015	11/20/2015 2:33:35 PM	
11587	GLEN ULLIN	1065.4	0.6124	1361.5	-57	1.1808	0.7865	89.421	7.5472	0.7916	0.0444	0.0361	0.0052	0.0075	0	0.0036	0.1618	0.021	11/20/2015	11/21/2015	11/21/2015 2:34:20 PM	
11587	GLEN ULLIN	1065.8	0.6126	1361.7	-57.9	1.2168	0.7591	89.32	7.6608	0.7735	0.043	0.0341	0.0046	0.0068	0	0.0034	0.1625	0.021	11/21/2015	11/22/2015	11/22/2015 2:33:46 PM	
11587	GLEN ULLIN	1069.1	0.6154	1362.9	-55.5	1.2557	0.7725	88.8021	8.1012	0.7921	0.0462	0.0363	0.0053	0.0075	0	0.0037	0.161	0.021	11/22/2015	11/23/2015	11/23/2015 2:32:55 PM	
11587	GLEN ULLIN	1069.5	0.6159	1362.8	-57.4	1.291	0.7675	88.6454	8.242	0.7788	0.0441	0.0337	0.0048	0.0067	0	0.0033	0.1655	0.021	11/23/2015	11/24/2015	11/24/2015 2:33:22 PM	
11587	GLEN ULLIN	1065.4	0.6134	1360.3	-61.7	1.3057	0.7643	89.0885	7.8265	0.7549	0.0378	0.028	0.0035	0.005	0	0.0025	0.1663	0.021	11/24/2015	11/25/2015	11/25/2015 2:34:25 PM	
11587	GLEN ULLIN	1068.7	0.6161	1361.5	-59.3	1.357	0.7687	88.6083	8.1752	0.8115	0.0428	0.0329	0.0046	0.0064	0	0.0025	0.173	0.021	11/25/2015	11/26/2015	11/26/2015 2:37:59 PM	
11587	GLEN ULLIN	1076.7	0.6223	1364.9	-45.7	1.4729	0.762	87.5498	8.8489	0.989	0.0687	0.0545	0.0093	0.0123	0	0.0058	0.21	0.021	11/26/2015	11/27/2015	11/27/2015 2:32:59 PM	
11587	GLEN ULLIN	1074.7	0.6207	1364.1	-47.3	1.4434	0.7618	87.8713	8.6041	0.9652	0.0655	0.0521	0.0088	0.0117	0	0.0054	0.1929	0.021	11/27/2015	11/28/2015	11/28/2015 2:34:08 PM	
11587	GLEN ULLIN	1065.6	0.6141	1359.8	-58	1.3472	0.7757	88.8805	7.9322	0.7364	0.0454	0.0354	0.0053	0.0074	0	0.0031	0.2136	0.021	11/28/2015	11/29/2015	11/29/2015 2:33:28 PM	
11587	GLEN ULLIN	1062.1	0.6119	1357.7	-65.1	1.3542	0.7773	89.1341	7.7569	0.6531	0.035	0.0263	0.0033	0.0048	0	0.0018	0.2372	0.021	11/29/2015	11/30/2015	11/30/2015 2:34:09 PM	
11587	GLEN ULLIN	1063.3	0.6131	1358	-63.9	1.3882	0.7732	88.9467	7.9028	0.6742	0.0358	0.0266	0.0034	0.0049	0	0.0019	0.2251	0.021	11/30/2015	12/1/2015	12/1/2015 2:33:08 PM	

31 record(s) retrieved

Zone 802

<b>NORTH DAKOTA HEATING VALUE ZONES</b>		
<b>ZONES</b>	<b>MEASURING DEVICE</b>	<b>LOCATION</b>
211	Chromatograph	Sidney Area
24	Chromatograph	Williston Area
241	Monthly Sampler	Fairview Area
25	Monthly Sampler	Watford City Area
261	Chromatograph	Williston – Tioga – Minot Line
262	Chromatograph	Minot Area
263	Monthly Sampler	Tioga – Portal
264	Chromatograph	Williston – Ray
265	Chromatograph	North Tioga
271	Chromatograph	Bismarck – Cleveland
272	Chromatograph	Cleveland – Mapleton
273	Chromatograph	Cleveland – Grafton
28	Chromatograph	Bismarck
31	Chromatograph	Dickinson
311	Monthly Sampler	Taylor Take-Off – Glen Ullin Comp
32	Chromatograph	Cabin Creek – Dickinson
33	Chromatograph	Killdeer
34	Monthly Sampler	Bowman Area
600	Chromatograph	Hankinson Area
610	Monthly Sampler & Chromatograph	Watford City
802	Chromatograph	Linton

MONTANA DAKOTA UTILITIES CO  
 NORTH DAKOTA  
 HEATING VALUE DATA

STATE	ZONE	ZONE BOUNDARY	12 MONTH AVERAGE	NOV 15	OCT 15	SEPT 15	AUG 15	JULY 15	JUNE 15	MAY 15	APRIL 15	MAR 15	FEB 15	JAN 15	DEC 14	ZONE
MT/ND	211	Sidney Area	1202	1195	1188	1193	1196	1199	1205	1202	1204	1205	1209	1215	1214	211
ND	24	Williston Area	1180	1183	1177	1166	1179	1185	1187	1206	1174	1171	1180	1173	1180	24
ND	25	Watford City Border	1206	1223	1216	1198	1198	1188	1207	1220	1212	1207	1196	1203	1201	25
ND/MT	241	Fairview Area	1193	1184	1182	1177	1188	1195	1195	1197	1198	1196	1202	1203	1203	241
ND	261	Williston - Tioga - Minot Line	1019	1047	1000	1042	1015	1028	1026	1006	1021	992	1004	1015	1035	261
ND	262	Minot Area	1187	1192	1198	1201	1201	1201	1185	1188	1188	1175	1173	1173	1169	262
ND	263	Tioga - Portal	1104	1112	1112	1104	1117	1121	1107	1090	1090	1084	1121	1097	1094	263
ND	264	Williston - Ray	1172	1178	1162	1154	1146	1170	1187	1189	1174	1171	1180	1173	1180	264
ND	265	North Tioga Transfer - Portal	1189	1189	1180	1188	1188	1191	1187	1187	1183	1187	1197	1195	1190	265
ND	271	Bismarck - Cleveland	1181	1192	1199	1203	1199	1201	1186	1189	1186	1171	1139	1151	1160	271
ND	272	Cleveland - Mapleton	1180	1191	1197	1202	1199	1200	1186	1188	1185	1169	1137	1149	1157	272
ND	273	Cleveland - Grafton	1180	1190	1197	1203	1199	1200	1185	1189	1182	1167	1137	1149	1158	273
ND	28	Bismarck - Cabin Creek	1161	1148	1196	1203	1200	1201	1186	1189	1170	1133	1089	1101	1116	28
ND	31	Dickinson Area	1136	1135	1161	1161	1145	1181	1127	1129	1136	1139	1091	1104	1122	31
ND	311	Taylor Take-Off - Glen Ullin Comp	1142	1147	1179	1168	1158	1200	1168	1171	1096	1115	1090	1094	1114	311
ND/MT	32	Cabin Creek - Dickinson	1133	1111	1120	1176	1173	1181	1169	1165	1118	1110	1079	1091	1103	32
ND	33	Killdeer	1183	1185	1186	1186	1191	1185	1183	1183	1180	1179	1177	1177	1178	33
ND	34	Bowman Area	1100	1102	1084	1025	1133	1176	1121	1130	1123	1099	1068	1049	1089	34
ND	610	MDU-Watford City BTU	1192	1197	1211	1197	1197	1145	1175	1216	1202	1192	1190	1189	1195	
ND	802	Linton	1060	1073	1064	1055	1055	1057	1068	1064	1064	1054	1054	1056	1055	802
ND	903	Hettinger Propane	2549	2549	2549	2549	2549	2549	2549	2549	2549	2549	2549	2549	2549	903

**THERMAL ZONE VARIANCE  
DOCUMENTATION**

**November 2015**

<b><i>ZONE</i></b>	<b><i>BTU VARIANCE</i></b>	<b><i>REASON</i></b>
261	47	Operational/Direction
311	-32	Operational/Blend of Gas
28	-48	Operational/Supply Source
31	-26	Operational/Supply Source