HAWAI'I GAS
THE CLEAN ENERGY COMPANY

12-21-16 A11:37 RCVD

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 16, 2016

Mr. Chris Hoidal
Director, Western Region
Office of Pipeline Safety
Pipeline and Hazardous Materials Safety Administration
12300 West Dakota Avenue, Suite 110
Lakewood, CO 80228

Reference: CPF 5-2016-0026 (Notice of Probable Violation)

Dear Mr. Hoidal:

This letter is in response to the above-referenced Notice of Probable Violation (NOPV) dated November 16, 2016. Hawaii Gas believes that it has met the minimum regulatory requirements outlined in the NOPV except as noted below. In those areas where deficiencies exist, we are committed to implementing appropriate changes to assure that our operations, procedures and records meet the intent of the regulations.

A summary of the NOPV items, corresponding records, and appropriate changes (if applicable) addressing these issues are described below:

1. 49 CFR §192.491 – Corrosion Control Records
   Regarding records retention for corrosion control, Hawaii Gas is submitting documentation, which confirms that adequate corrosion control measures are in place. Hawaii Gas has been maintaining records of each test, survey, and/or inspection required under 49 CFR §192.941.

   Attachment I is a copy of a Cathodic Protection test record that was performed in 2013 and 2014 on HG's transmission pipeline system in accordance with 49 CFR §192.465. HG's Cathodic Protection records are retained as required by 49 CFR §192.491. The archive Cathodic Protection test records were available, but may not have been provided to the inspector at the time of the 2014 inspection.
   - **Attachment I – Cathodic Protection Survey Sheet**

   In reference to the alleged violation of 49 CFR §192.475(a), HG does not transport corrosive gas through its pipelines. Attachment II is a copy of the MSDS for Synthetic Natural Gas (SNG) and a copy of the most recent SNG analysis reports (2014-2016) that demonstrates SNG is not a corrosive gas within the meaning of this regulation. These records were available, but may not have been provided to the inspector at the time of the 2014 inspection.
   - **Attachment II – MSDS for SNG & SNG Analysis Report**

2. 49 CFR §192.603 – Maximum Allowable Operating Pressure (MAOP) Records
   Regarding records retention for MAOP, Hawaii Gas is submitting historical records that validate current MAOP designations (500 PSIG). Attachment III is a copy of the MAOP records at the time of construction in 1974. These records establish that HG is in compliance with 49 CFR §192.603 at the time of the 2014 inspection. These records were available, but may not have been provided to the inspector at the time of the 2014 inspection.
   - **Attachment III – Hawaii Gas MAOP Historical Records**

3. 49 CFR §192.605 – Procedural Manual for Operations, Maintenance, and Emergencies
   Hawaii Gas lacks documentation to establish that it followed its O&M manual for conducting activities related to its odorizing program. Hawaii Gas has since amended its standard D-960 "Odorizing Program" to ensure processes exist to document and confirm the frequency for sampling gas is met at least four (4) times a year and its form D-960-1 "Odorant Test Log" to assure calibration of its odorant testing equipment is conducted on an annual basis. Additionally, in accordance with PHMSA's Proposed Compliance Order, Hawaii Gas is submitting an odorant test conducted after receipt of the NOPV.
   - **Attachment IV – Hawaii Gas Standard D-960 "Odorizing Program"**
   - **Attachment V – Hawaii Gas Form D-960-1 "Odorant Test Log"**
   - **Attachment VI – Odorant Test Log - 12/14/2016**

   Hawaii Gas believes that the attachments IV, V, and VI satisfies the requirements for this item and complies with 49 CFR §192.605.

4. 49 CFR §192.706 – Transmission Line Leak Surveys
   Hawaii Gas acknowledges that it lacks documentation to establish that it followed its O&M manual for conducting activities related to its transmission leak survey program in 2013. Hawaii Gas has since started to implement an internal compliance tracking system to assure the frequency of transmission leak surveys are met and appropriately documented in accordance with 49 CFR §192.706.

5. 49 CFR §192.709 – Transmission Line Records
   Regarding records retention for transmission line repairs, Hawaii Gas documents and maintains repair records but acknowledges the description of repairs may lack sufficient detail. Hawaii Gas has amended form D-931-1B "District Regulator Station Report" to improve documentation of the details of each discrepancy and the repair performed on its transmission line regulator stations; See e.g., Attachment VII. Additional training on documentation has also been provided to our technicians who perform and record the work.
   - **Attachment VII – Hawaii Gas Form D-931-1B "District Regulator Station Report"**

6. 49 CFR §192.739 – Inspection and Testing of Pressure Limiting & Regulating Stations
   Hawaii Gas (HG) confirmed the Regulator Inspection records for Malakole Regulator Station on April 7, 2014, as cited in the Notice of Probable Violation. HG performs an annual "lock-up" test on each of the regulators to ensure that the regulator valve properly seats to stop gas flow. The lock-up pressure for a regulator is typically higher than the set-point pressure of a regulator, and can vary with gas flow rate at the time of the test as well as the speed at which the downstream valve is closed to accomplish the test. Furthermore, the distance between the regulator and the

valve is only a few feet so the pressure can build up quickly in that short span. Upon closing the downstream valve, the regulator will sense the change in flow and "lock-up"; closing the valve to stop gas flow. At that time, a HG technician confirms that the valve has successfully closed by watching the pressure on a gauge between the regulator and the downstream valve. When the pressure downstream of the regulator stabilizes, the technician confirms that the "lock-up" pressure is lower than the inlet pressure; demonstrating that the valve in the regulator is effectively operational and holding a pressure differential. If the pressure downstream of the regulator creeps up to become equal to the inlet pressure, the technician knows the valve has failed to "lock-up" and requires repair or replacement.

For both the "lock-up" test of the first and second stage regulators performed on the Malakole Regulator Station on April 7, 2014, the technician confirmed that the lock-up pressure was below the inlet pressure for the regulator; demonstrating that the valve in the regulator provided a positive seal, and confirmed proper operation. The "lock-up" test is not intended to test for overpressure protection. The test performed for overpressure protection involves simulating failure of each regulator and confirming that the stand-by monitor regulator activates to maintain system pressures within MAOP, thus protecting downstream facilities from excessive pressures.

Hawaii Gas does not agree that this inspection procedure and record reflects a violation of 49 CFR §192.739 and requests that this alleged violation be dismissed together with the proposed penalty of $14,800.

7. 49 CFR §192.805 – Operator Qualification

Hawaii Gas acknowledges that it lacks documentation to establish Operator Qualification records for individuals performing odorant tests from 2011 to 2014. All individuals performing odorant tests have been retrained in 2015 for Operator Qualification for the covered task.

Regarding Operator Qualification records for the four individuals identified as having performed transmission line patrolling from 2012 to 2014, Hawaii Gas is submitting records that demonstrate compliance for this covered task. Attachment VIII is a copy of our 2010 Operator Qualification records for Mod 271 "Leak Surveys and Patrols" for the four individuals identified. These records show that HG was in compliance with 49 CFR §192.805 at the time of the 2014 inspection. These records were available, but may not have been provided to the inspector at the time of the 2014 inspection.

- **Attachment VIII – 2010 Operator Qualification Records Mod 271 "Leak Surveys and Patrols"**

Additionally, Hawaii Gas has reviewed its Operator Qualifications standard and training records to ensure only qualified individuals will be performing covered tasks on its pipeline system. Hawaii Gas asks that you consider a reduction in the proposed penalty of $16,900.

8. 49 CFR §192.907 – Integrity Management Program Implementation

Hawaii Gas acknowledges that an IMP Organizational Chart has not been created in accordance with IMP Manual Section 6.2.3. After reviewing this section, Hawaii Gas has determined that an IMP Organizational Chart provides little value and has removed this requirement from its IMP manual.

Regarding records that demonstrate Hawaii Gas performed program evaluations for its Integrity Management Program (IMP), Hawaii Gas is submitting annual reviews from 2013 to 2014. Attachments IX, X, & XI are copies of our 2013 IMP annual review records, 2014 IMP annual review records, and 2013 third party IMP audit records (respectively). These records show that HG performed the required IMP annual reviews in accordance with 49 CFR §192.907 and its IMP manual at the time of the 2014 inspection. These records were available, but may not have been provided to the inspector at the time of the 2014 inspection.

- **Attachment IX – 2013 IMP Annual Review Records**
- **Attachment X – 2014 IMP Annual Review Records**
- **Attachment XI – 2013 Third Party IMP Audit (Kendrick Consulting)**

9. 49 CFR §192.917 – Interactive Threat Identification
   Hawaii Gas acknowledges that it did not consider interactive threats during its Risk Assessment and P&MM Evaluation Report. Hawaii Gas has since updated its Risk Assessment and P&MM Evaluation Report to include consideration of interactive threats to comply with 49 CFR §192.917.

10. 49 CFR §192.935 – Preventive & Mitigative Measures
    Regarding records that demonstrate Hawaii Gas has taken additional preventive and mitigative measures (P&MM) beyond those already required by 49 CFR §192, Hawaii Gas is submitting records which outline P&MMs performed by Hawaii Gas. Attachments XII, XIII, & XIV are copies of our IMP Standard IM-007 "Preventive and Mitigative Measures", 2012 Risk Assessment and P&MM Evaluation Report, and 2013 Risk Assessment and P&MM Evaluation Report (respectively). These records show that HG took P&MMs beyond those required by Part 192 and was in compliance with 49 CFR §192.935 at the time of the 2014 inspection. These records were available, but may not have been provided to the inspector at the time of the 2014 inspection.
    - **Attachment XII – IM-007 "Preventive and Mitigative Measures"**
    - **Attachment XIII – 2012 Risk Assessment and P&MM Evaluation Reports**
    - **Attachment XIV - 2013 Risk Assessment and P&MM Evaluation Reports**
    - **Attachment XV – P&MM Tracking Form**

    Additionally, Hawaii Gas has since created a P&MM tracking form to better manage the status of each new P&MM. Hawaii Gas believes that it is in compliance with 49 CFR §192.935 and requests PHMSA reconsider its position that an alleged violation of law occurred.

11. 49 CFR §192.945 – Integrity Management Program Effectiveness
    Regarding records that demonstrate Hawaii Gas has measured its Integrity Management Program's (IMP) effectiveness, Hawaii gas is submitting documents which analyze integrity and threat trends on a year to year basis. Attachment XVI is a copy of our Transmission Line Performance Measures Worksheet. This record shows that HG has tracked and trended performance measures since 2007 and was in compliance with 49 CFR §192.945 at the time of the 2014 inspection. This record was available, but may not have been provided to the inspector at the time of the 2014 inspection.
    - **Attachment XVI – Transmission Line Performance Measures**

Hawaii Gas believes that the attached documentation resolves items 1, 2, 5, 6, parts of 7, 8, 10, and 11 cited in the Notice of Probable Violation, and requests PHMSA's reconsideration of its position under the NOPV. Hawaii Gas is committed to operating a safe and reliable pipeline system, protecting the public and environment from any potential product release.

Should there be any questions regarding the information provided, please contact Ed Sawa, Manager, Pipeline Operations, by phone at (808) 594-5661, or by email at esawa@hawaiigas.com.

Sincerely,

Mustafa Demirbag

Mustafa Demirbag
Executive Director of Operations

Enclosures:
Attachment I – Cathodic Protection Survey Sheet
Attachment II – MSDS for SNG & SNG Analysis Report
Attachment III – Hawaii Gas Historical MAOP Records
Attachment IV – Hawaii Gas Standard D-960 "Odorizing Program"
Attachment V – Hawaii Gas Form D-960-1 "Odorant Test Log"
Attachment VI – Odorant Test Log - 12/14/2016
Attachment VII – Hawaii Gas Form D-931-1B "District Regulator Station Report"
Attachment VIII – 2010 Operator Qualifications Records Mod 271 "Leak Surveys and Patrols"
Attachment IX – 2013 Annual IMP Review Records
Attachment X – 2014 Annual IMP Review Records
Attachment XI – 2013 IMP Third Party Audit (Kendrick Consulting)
Attachment XII – IM-007 "Preventive and Mitigative Measures"
Attachment XIII – 2012 Risk Assessment and P&MM Evaluation Reports
Attachment XIV – 2013 Risk Assessment and P&MM Evaluation Reports
Attachment XV – P&MM Tracking Form
Attachment XVI – Transmission Line Performance Measures

ATTACHMENT I

CORROSION CONTROL
FORM D-820-1

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

SURVEYED BY: G. WALKER
DATE: 8-1-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
90	1	Nimitz - Weyerhauser	-1597	-637
90	1	1130 Nimitz - New Eagle Cafe	-1496	-568
TMK 1-5-42B	-	1210 Nimitz - Daltile (block valve MH)	-1323	
88,89	-	1210 Nimitz - Kapalama Canal bridge crossing	Visual inspection of gasline only: OK	
TMK 1 -5-42	-	Pier 38 Kapalama canal (TB) - 6" transmission 1K	-1484	-1488
		8" supply 2K		-1483
TMK 1-5-42		Pier 38 Mauka Buried Tank (TW)	-1493	After insul. -384
TMK 1-5-42		Pier 38 Makai Buried Tank (TW)	-1505	After insul. -388
TMK 1-5-42		Pier 38 6" riser at letdown station (TW)	-1488	
86	1	Nimitz & Mokauea	-1472	
76	1	Nimitz Post Office	-1665 / -1674	
73	1	Valkenburg Block Valve (16" & 4" tied)	-1744	
67	1	Bouganville Dr. - Hale Keiki. Sch.	-2029 / -2127	
66	1	Radford High School	-1807 / -1925	-280 / -271
65	1	Makalapa Elementary - Salt Lake Blvd	-1928	
65	-	Salt Lake Blvd. (**Salt Lake Rectifier** Folder)		
65		Luapele Dr. / Lua'ole St. (TB) 16" casing		-758
		10" casing		-647

Revised 6/12

INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

8/22/2013

The Gas Company

CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER

Date: 8-1-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
64	1	Salt Lake Blvd. - Halawa Stream	-1881 / -1932	
58	-	Kam. Hwy. - Kalauao Stream Bridge	Visual inspection of gasline only: OK	
	1	I. Diamond Head	-1710 / -1640	-465 / -398
	2	II. Ewa	-1721 / -1648	-511 / -1142
57	-	Kam. Hwy. - Kalauao Springs Bridge	Visual inspection of gasline only: OK	
	1	I. Diamond Head	Tesoro 10" - verified by pipe location.	
	2	II. Ewa	-1696 / -1626	-539 / -534
56	-	Kam. Hwy. - Anna Miller's drip	-1679	
56	1	Kam. Hwy. - Mitsubishi dealership	-1701 / -1660	
55	1	Kam. Hwy. - Best Buys	-1661 / -1630	
54	-	Kam. Hwy. - Waimalu Stream Bridge	Visual inspection of gasline only: OK	
	1	Ewa End	-1690 / -1675	-335 / -296

Revised 6/12

INSTRUMENTS USED: Fluke 27(S/N), Half Cell (S/N)

REMARKS: *( ) Combined potential.

16ETS.XLS

The Gas Company

CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8-1-13
8-6-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
47	1	2nd St. - Aqua Farm	-1528	
48	1	2nd St. - Across Refuse Company	-1444	-458
49	1	Kam. & Lehua - Pearl City Block Valve(16")	-1590	
		Test box (4")	-1267	
51	1	Kam. Hwy. - Pearl City Plaza	-1600 / -1554	
59A	1	Kam. Hwy. - Aiea Block Valve (16" / 10")	-1639 / -1532	
		(4")	-1331	
60A	1	Kam. Hwy. - Aiea Stream	-1717 / -1602	-703 /
61A	1	Kam Hwy. - Richardson Field	-1912 / -1799	-1104 / -381
82	1	Keehi Pig Receiver	-1681	
83	1	*I. Moanalua Stream Bridge:	Visual inspection of gasline only: OK	
		A. Ewa	*(-1592) -1615 / -1474	
		B. Diamond Head (Riser in Cage)	Visual inspection of gasline only: OK	
83	2	Between Moanalua & Kalihi Stream Bridge (TB)	-1577	-662
84	3	II. Kalihi Stream Bridge	Visual inspection fo gasline only: OK	
		A. Ewa (Riser in Cage)	Visual inspection of gasline only: OK	
		B. Diamond Head	*(-1450) -1591 / -1133	

Revised 6/12

INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

CORROSION CONTROL
FORM D-820-1

The Gas Company

CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8-2-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
33	1	Kunia Block Valve (16")	-1268	
		(4")	-1210	
34	1	Leowaena St. - Bend in Pipe	-1274	
35	-	Hoaeae Canal	Visual inpection of gasline only: OK	
	-	Ewa End	-1340	
37	-	Concrete Canal	Visual inspectionof gasline only: OK	
37	1	Waipahu Intermediate School	-1259	
38	-	Ota Camp - Waipahu Flood Control Bridge	Visual inspection of gasline only: OK	
38	-	Ota Camp - Waipahu Flood Control Bridge	Feb_Aug X Close inspection of former corrosion.	
38	1	Ota Camp - 2 leads are continuous.	-1322	
39	-	Awanei St. - (**Waipahu Rectifier** Folder)		
39	-	Waipahu Depot Rd. - Chevron rectifier bond station.	-1364	Current: 68.2 mA

Revised 5/13

INSTRUMENTS USED: Fluke 27 (S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

CORROSION CONTROL
FORM D-820-1

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8-5-13
8-6-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
39	2	Bike Path - Rectifier Tie-in **1 K** - 16" (TB) **2K** - 10", **3K** - Rectifier, **No K** - curb TB tie in.	-1681	
40	-	Bike Path - Drainage Canal(Makalena Golf C.)	Visual inspection of gasline only: OK	
40	-	Bike Path - Drainage Canal(Makalena Golf C.)	Feb_Aug X Close inspection of former corrosion.	
41	1	Bike Path - Golf Course HECO P/45 & 44	-1382	
42	1	Navy Road - 2" Pipe - HIRI Mile Post 2 pipe leads are continuous.	-1383	-99, -91
42	2	Cane Haul Road - New ETS 4" Post	-1316	
43	1	Waipahu High School (TB)	-1404 / -1180	
44	1	Waiawa Road - Navy Fence	-1421 / -1166	
45	1	Basketball Court - Rear of L.C.C	-1680	-284
45	2	Tennis Court - Rear of L.C.C.	-1693	-368
46	1	Waiawa Road - College Gardens	-1616 / -1179	
45	3	Waiawa Road - HECO P/93	-1675	
Revised 6/12	INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17) REMARKS: *( ) Combined potential.			
16ETS.XLS				page 5 of 7

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8-5-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
32	1	Farr. Hwy. & Fort Weaver Road	-923	-511
29	1	Farr. Hwy. HECO P/11-Chevron rectifier bond sta.	-1799	
28	1	Farr. Hwy. HECO P/25	-1151	
27	1	Farr. Hwy. HECO P/33	-1206	
25	1	Farr. Hwy. HECO P/42	-1180	
24	1	Farr. Hwy. HECO P/50 & 51	-1240	
23	-	Farr. Hwy. - Bridge	Visual inspection of gasline only: OK	
	1	Farr. Hwy. - Bridge 2 Gasco leads are continuous	-1177 / -1073	
22	1	Farr. Hwy. - HECO P/61	-1282 / -1158	
21	3	Farr. Hwy. HECO P/67 & 68	-1209	
21	2	Farr. Hwy. Acr. Kapolei Golf Course entrance	-1254	-355
21	1	Farr. Hwy. Gravel Rd,start of housing, rock wall	-1271	-546
20	1	Farr. Hwy. / Kowelo Ave - base of line marker	-1237	
19	1	Farr. Hwy. Between LP 25 & 23 (in sidewalk)	-1218	
18		Kmart drainage culvert - in planter by bus stop	-1206 / -1159	
18	1	Makakilo Block Valve (16")	-1236	
		(MH) (4")	-1162	
17	1	Kapolei Shopping Center- Chilis	-1191	-385 / -360
17	B	Kapolei Shopping Center-Between KFC / Taco Bell	-1215	
16	1	Kapolei Shopping Center-Ho Ho Chinese Buffet	-1063	-488

Revised 5/13

INSTRUMENTS USED: Fluke 27 (S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

CORROSION CONTROL
FORM D-820-1

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8-6-13

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
8	1	Malakole (Liberty House)	-1272	
7	2	Malakole & Oihana	-1293	-334
7	1	Malakole & Komohana	-1208	-430
3		Komohana bend-marks end of 16" supply (TB)	-1173	
3		Komohana/Kauhi - **makai** reg. sta. (TB)	-1242	
3		SNG plant - new 6" riser next to pig launcher.	-1063	
6	1	Komohana & Lumber Yard	-1274	
9	1	Malakole & Kalaeloa Blvd. - **Keep bonded.**	-1255	
9	2	Kalaeloa Blvd. - Hawaii Raceway	-1229	-304
10	A	Kalaeloa Blvd. - Bond Sta., near above ETS	*(-1250) -1124 / -1291	
10	1	Kalaeloa Blvd.	-1141	
11	1	Kalaeloa Blvd./Kapolei Busn.Park, makai side	-1286	-327
12	1	Kalaeloa Blvd./Lawiliwili St.-mauka side, sidewalk.	-1196	-222
13	1	Kalaeloa Blvd. - R/R Crossing, on pole.	-1207	-461
13	2	Kalaeloa Blvd.-On Ramp Fronting wooden E.P.	-1266	
15	1	Farr. Hwy. - Kapolei off ramp	-1268	

Revised 10/12

INSTRUMENTS USED: Fluke 27 (S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

8/22/2013

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The Gas Company

CATHODIC PROTECTION SURVEY SHEET

SURVEYED BY: G. WALKER

DISTRICT: 16" ETS

DATE: 8/4/14

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
90	1	Nimitz / Alakawa St.	-1399	-649
90	1	1130 Nimitz - New Eagle Cafe	-1329	-596
TMK 1-5-42B	-	1210 Nimitz - Daltile (block valve TB)	-1144	
88,89	-	1210 Nimitz - Kapalama Canal bridge crossing	Visual inspection of gasline only: OK	
TMK 1-5-42	-	Pier 38 Kapalama canal (TB) - 6" transmission 1K	-1298 / -1316	
		8" supply 2K	-1296	
TMK 1-5-42		Pier 38 Mauka Buried Tank (TW)	-1314	After insul. -403
TMK 1-5-42		Pier 38 Makai Buried Tank (TW)	-1322	After insul. -409
TMK 1-5-42		Pier 38 6" riser at letdown station (TW)	-1303	
86	1	Nimitz & Mokauea	-1268	
76	1	Nimitz Post Office	-1330 / -1346	
73	1	Valkenburg Block Valve (16" & 4" tied)	-1412	
69		Bouganville / Radford bike path	-1480	
67	1	Bouganville Dr. - Hale Keiki. Sch.	-1521 / -1637	
66	1	Radford High School	-1329 / -1476	-275 / -274
65	1	Makalapa Elementary - Salt Lake Blvd	-1579	
65	-	Salt Lake Blvd. (**Salt Lake Rectifier** Folder)		
65		Luapele Dr. / Lua'ole St. (TB) 16" casing		-634
		10" casing		-610

Revised 6/14

INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

We are in the process of renaming the Salt Lake anode bed. Coordinating this with Don Stears. 8-20-14

The Gas Company

CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER

Date: 8/4/14

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
64	1	Salt Lake Blvd. - Halawa Stream	-1475 / -1574	
58	-	Kam. Hwy. - Kalauao Stream Bridge	Visual inspection of gasline only: OK	
	1	I. Diamond Head	-1445 / -1427	-483 / -434
	2	II. Ewa	-1424 / -1403	-486 / -403
57	-	Kam. Hwy. - Kalauao Springs Bridge	Visual inspection of gasline only: OK	
	1	I. Diamond Head	Tesoro 10" - verified by pipe location:	
	2	II. Ewa	-1475 / -1461	-598 / -597
56	-	Kam. Hwy. - Anna Miller's drip	-1364	
56	1	Kam. Hwy. - Mitsubishi dealership	-1442 / -1433	
55	1	Kam. Hwy. - Best Buys	TB BURIED /	
54	-	Kam. Hwy. - Waimalu Stream Bridge	Visual inspection of gasline only: OK	
	1	Ewa End	-1464 / -1459	-357 / -333

Revised 6/12

INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8/6/14

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
47	1	2nd St. - Aqua Farm	-1418	
48	1	2nd St. - Across Refuse Company	-1309	-481
49	1	Kam. & Lehua - Pearl City Block Valve(16")	-1376	
		Test box (4")	-1261	
51	1	Kam. Hwy. - Pearl City Plaza-Mauka side of fence	-1338 / -1350	
59A	1	Kam. Hwy. - Aiea Block Valve (16" / 10")	-1443 / -1420	
		(4")	-1416	
60A	1	Kam. Hwy. - Aiea Stream	-1409 / -1390	-677 /
61A	1	Kam Hwy. - Richardson Field	-1481 / -1492	-396 / -373
82	1	Keehi Pig Receiver	-1364	
83	1	*I. Moanalua Stream Bridge:	Visual inspection of gasline only: OK	
		A. Ewa	-1388	
		B. Diamond Head (Riser in Cage)	Visual inspection of gasline only: * OK	
83	2	Between Moanalua & Kalihi Stream Bridge (TB)	-1274	-634
84	3	II. Kalihi Stream Bridge	Visual inspection fo gasline only: OK	
		A. Ewa (Riser in Cage)	Visual inspection of gasline only: * OK	
		B. Diamond Head	-1356	

Revised 10/13

INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

* GRASS WAS CUT AT BOTH CAGES AND PIG LAUNCHER

16ETS.XLS

The Gas Company

CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8/7/14

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
33	1	Kunia Block Valve (16")	-1284	
		(4")	-1202	
34	1	Leowaena St. - Bend in Pipe	-1273	
35	-	Hoaeae Canal	Visual inpection of gasline only: OK	
	-	Ewa End	-1320	
37	-	Concrete Canal	Visual inspectionof gasline only: OK	
37	1	Waipahu Intermediate School	-1357	
38	-	Ota Camp - Waipahu Flood Control Bridge	Visual inspection of gasline only: OK	
38	-	Ota Camp - Waipahu Flood Control Bridge	Feb_Aug✓Close inspection of former corrosion.	
38	1	Ota Camp - 2 leads are continuous.	-1320	
39	-	Awanei St. - (**Waipahu Rectifier** Folder)		
39	-	Waipahu Depot Rd. - Joint ETS Heco,Chevron, HG	-1397	**Bond removed 7/2014**

Revised 7/2014

INSTRUMENTS USED: Fluke 27 (S/N), Half Cell (S/N)
REMARKS: *( ) Combined potential.

16ETS.XLS

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8/5/14

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
39	2	Bike Path - Rectifier Tie-in **Bond Station on post**	-1831	
40	-	Bike Path - Drainage Canal(Makalena Golf C.)	Visual inspection of gasline only: OK	
40	-	Bike Path - Drainage Canal(Makalena Golf C.)	Feb_Aug✓Close inspection of former corrosion.	
41	1	Bike Path - Golf Course HECO P/45 & 44	-1290	
42	1	Navy Road - 2" Pipe - HIRI Mile Post 2 pipe leads are continuous.	-1352	-173 , -89
42	2	Cane Haul Road - New ETS 4" Post	-1406 , -1276	
42	3	Waipahu High School **Bond Station in Heco cage**	** -3110	
43	1	Waipahu High School (TB)	-1441 , -1282	
44	1	Waiawa Road - Navy Fence	-1390, -1187	
45	1	Basketball Court - Rear of L.C.C	-1300	-234
45	2	Tennis Court - Rear of L.C.C.	-1378	-336
46	1	Waiawa Road - College Gardens	-1295 , -1049	
45	3	Waiawa Road - HECO P/93	-1323	

Revised 6/14

INSTRUMENTS USED: Fluke 27(S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

= **Bonds Heco, Hie, Hawaii Gas & Chevron

16ETS.XLS

CORROSION CONTROL
FORM D-820-1

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8/7/14

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
32	1	Farr. Hwy. & Fort Weaver Road	-1142	-508
29	1	Farr. Hwy. HECO P/11-Chevron rectifier bond sta.	-1629, -1544	Current: 83.4 mA
28	1	Farr. Hwy. HECO P/25	-1007	
27	1	Farr. Hwy. HECO P/33	-1138	
25	1	Farr. Hwy. HECO P/42	-1075	
24	1	Farr. Hwy. HECO P/50 & 51	-1147	
23	-	Farr. Hwy. - Bridge	Visual inspection of gasline only: OK	
	1	Farr. Hwy. - Bridge 2 Gasco leads are continuous	-1142, -1011	
22	1	Farr. Hwy. - HECO P/61	-1202, -1080	
21	3	Farr. Hwy. HECO P/67 & 68	-1152	
21	2	Farr. Hwy. Acr. Kapolei Golf Course entrance	-1157	-291
21	1	Farr. Hwy. Gravel Rd,start of housing, rock wall	-1235	-554
20	1	Farr. Hwy. / Kowelo Ave - base of line marker	-1147	
19	1	Farr. Hwy. Between LP 25 & 23 (in sidewalk)	-1174	
18		Kmart drainage culvert - in planter by bus stop	-1162, -1115	
18	1	Makakilo Block Valve (16")	-1162	
		(MH) (4")	-1110	
17	1	Kapolei Shopping Center- Chilis	-1134	-383, -363
17	B	Kapolei Shopping Center-Between KFC / Taco Bell	-1156	
16	1	Kapolei Shopping Center-Ho Ho Chinese Buffet	-940	-541

Revised 5/13

INSTRUMENTS USED: Fluke 27 (S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

16ETS.XLS

8/19/2014

The Gas Company
CATHODIC PROTECTION SURVEY SHEET

Surveyed By: G. WALKER
Date: 8/5/14

DISTRICT: 16" ETS

SHEET No.	ETS No.	ADDRESS	P/S (MVDC) (PIPE)	P/S(MVDC) (CASING)
8	1	Malakole (Liberty House)	-1165	
7	2	Malakole & Oihana	-1170	-351
7		Malakole reg. pit - Ewa pit. (TB)	-1164	
7	1	Malakole & Komohana	-1155	-446
3		Komohana bend-marks end of 16" supply (TB)	-1057	
3		Komohana/Kauhi - **makai** reg. pit. (TB)	-1132	
3		SNG plant - new 6" riser next to pig launcher.	-1075	
6	1	Komohana - Hawaii Logistic Services	-1177	
9	1	Malakole & Kalaeloa Blvd. - **Keep bonded.**	-1126	
9	2	Kalaeloa Blvd. - Hawaii Raceway	-1131	-325
10	A	Kalaeloa Blvd. - **Bond Station** near above ETS	(-1157) -1016/ -1206	
10	1	Kalaeloa Blvd.	-1032	
11	1	Kalaeloa Blvd./Kapolei Busn.Park, makai side	-1188	-347
12	1	Kalaeloa Blvd./Lawiliwili St.-mauka side, sidewalk.	-1126	-220
13	1	Kalaeloa Blvd. - R/R Crossing, on pole.	-1096	-471
13	2	Kalaeloa Blvd.-On Ramp Fronting wooden E.P.	-1179	
15	1	Farr. Hwy. - Kapolei off ramp	-1169	

Revised 4/14

INSTRUMENTS USED: Fluke 27 (S/N 2), Half Cell (S/N 17)

REMARKS: *( ) Combined potential.

Aulani gate code: 21075.

16ETS.XLS

ATTACHMENT II

HAWAI'I GAS
THE CLEAN ENERGY COMPANY

Safety Data Sheet

1. Substance Identity and Company Contact Information

Product Name	**Synthetic Natural Gas**
Manufacturer	The Gas Company LLC P.O. Box 3000 Honolulu, Hawaii 96802-3000
Information Phone Number	(808) 535-5933
Emergency Phone Number	(808) 526-0066
MSDS Prepared by	Bureau Veritas North America, Inc.
Issue Date	December 2007
Last Revision	July 26, 2013
Synonyms	SNG

2. Hazards Identification

Emergency Overview	EXTREMELY FLAMMABLE GAS – MAY CAUSE FLASH FIRE OR EXPLOSION! Releasing this gas in a confined or unventilated area can result in asphyxiation, which is a lowering of the oxygen level. This condition can be life threatening and persons should be removed from the area immediately. May contain carbon monoxide. If exposed to concentrations over 50 ppm for eight hours, hazards associated with carbon monoxide may occur.
Eye Contact	Vapors are not known to be irritating to the eyes.
Inhalation	High concentrations in confined spaces may cause asphyxiation. Oxygen depletion during pregnancy may adversely affect fetus development. Moderate concentrations may lead to headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Low concentrations are not known to cause chronic, harmful effects, but may lead to increased respiration and headache.
Ingestion	This product is a gas under normal atmospheric conditions and is therefore not likely to be ingested.
Skin Contact	Vapors are not known to be irritating to the skin. Skin absorption is not a likely route of entry to the body.
Signs and Symptoms of Exposure	Symptoms of overexposure that are reversible if exposure is stopped include headache, dizziness, nausea, drowsiness, shortness of breath, confusion, decreased coordination, visual disturbances, and vomiting. Continued exposure may lead to inadequate oxygen levels, bluish discoloration of the skin, extremity numbness, central nervous system depression, cardiac sensitization, unconsciousness, and death.

Potential Health Effects	
Cancer	Not considered a carcinogen by IARC, NTP, ACGIH, or OSHA.
Target Organs	No data currently available.

Developmental	No data currently available.
Effects on Fetus	Inadequate levels of oxygen due to high exposure in confined spaces may have adverse effects on a developing fetus.
Pre-Existing Medical Condition	Exposure to high concentrations of this product by persons with a pre-existing medical condition may increase the sensitivity of the heart to certain drugs.

Signal word/Warning:

Extremely Flammable Gas- May cause flash fire or explosion.

3. Chemical Composition and Data on Components

Chemical Name	Quantity	CAS #	OSHA PEL	ACGIH TLV TWA & STEL
Methane	78 – 85%	74-82-8	None	None None
Hydrogen	8.5 – 11%	1333-74-0	None	None None
Carbon Dioxide	3 – 5%	124-38-9	5,000 ppm	5,000 ppm 30,000 ppm
Carbon Monoxide	0 – 1%	630-08-0	35 ppm	25 ppm 200 ppm
Tetrahydrothiophene	0.004%	110-01-0	None	None None
Mixture of ethane, propane, butane, iso-butane, and iso-pentane	0 – 6%	74-84-0, 74-98-6, 106-97-8, 75-28-5, and 78-78-4	None	None None

4. First Aid Measures

Eye Contact	Vapors are not known to be irritating to the eye; however, if irritation or redness occurs, move victim into fresh air and flush the eye with water. If the condition continues, seek medical attention.
Inhalation	Quickly remove affected person to fresh air. Apply artificial respiration and oxygen if necessary. Seek immediate medical attention.
Ingestion	This product is a gas under normal atmospheric conditions and is therefore not likely to be ingested.

Skin Contact	Vapors are not known to be irritating to the skin; however, it is good practice to wash portions of the skin exposed to chemicals. Also, skin contact with liquefied gas may cause frostbite burns.
Aggravated Medical Conditions	May aggravate symptoms of respiratory illness.
Note to Physicians	Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

5. Fire-Fighting Measures

Flash Point	Flammable gas
Flash Point Method Used	N/A
Autignition	900 – 1170°F / 482.2 – 632.2°C
LEL	5.3%
UEL	14.0%
Extinguishing Media	Water fog, halon, dry chemical, or carbon dioxide extinguisher.
Special Fire-Fighting Procedures	Stop gas flow before extinguishing the fire. Protect surrounding structures. Stay upwind.
Unusual Fire and Explosion Hazards	Hazard of re-ignition or explosion exists if flame is extinguished without stopping the flow of gas or cooling the surroundings.
Hazardous Combustion Byproducts	Carbon monoxide, carbon dioxide, and un-combusted hydrocarbons (soot and smoke).

6. Accidental Release Measures

If it can be done with minimal risk, stop the spill. Since the gas is flammable, remove all sources of ignition. Stay upwind of the release and notify other personnel of the release. Everyone should evacuate the area, the fire department is to be contacted, and the leak should be reported to HAWAI`I**GAS** at (808) 526-0066.

7. Handling and Storage

Handling	Synthetic natural gas is contained in piping and equipment designed to withstand elevated pressure. Use explosion-proof, Class I, Group D electrical equipment. Keep away from strong oxidizing agents, heat, and sources of ignition. No smoking in areas of use. Be careful not to drop or puncture containers. Wash hands before and after use. Release gas slowly as rapid release may produce static charge. Ground and bond all lines and equipment.
Storage	Keep containers in a well-ventilated area away from heat and sources of ignition. Protect containers from physical damage and inspect regularly. Ground all equipment holding the containers. Post signs in the storage area that say, "No Smoking or Open Flames".

8. Exposure Controls and Personal Protection

Respiratory Protection	Self-contained breathing apparatus or supplied air respirator should be used for high concentrations.
Ventilation	Natural or general ventilation should be adequate under most circumstances. Any mechanical means of ventilation must be explosion proof. Maintain airborne concentration below the LEL.
Skin Protection	Protective gloves and flame-resistant clothing should be used when handling this material.
Eye Protection	Glasses, goggles, or face shields for protection from pressurized gases.
Engineering Controls	Use exhaust ventilation to prevent the accumulation of too much synthetic natural gas, which can lead to lower oxygen levels. Use explosion-proof/grounded equipment and lighting in the potential presence of free gas.
Note	In the presence of free gas, remove any non-flame resistant materials such as reflective traffic vests.

9. Physical and Chemical Properties

Solubility in Water	Slightly soluble	**Evaporation**	N/A
Appearance	Colorless gas	**Cubic Foot per Pounds**	20.929
Odor	Distinctive "rotten egg" odor added so it can be detected at <1% in air.	**Cubic Foot per Gallon**	61.162
Boiling Point	-259°F / -162°C	**Specific Gravity**	0.55 – 0.65
Vapor Pressure	>4,000 psi	**Melting Point**	-305 to -295°F / -187 to -182°C
Percent Volatile	100	**pH**	N/A
Molecular Weight	15 – 19	**Vapor Density**	0.67

10. Stability and Reactivity

Stability	This product is stable.
Conditions to Avoid	High heat
Incompatible Materials	Strong oxidizers, halogens, inter-halogens, ignition sources, and heat
Hazardous Decomposition or Byproducts	Carbon monoxide, carbon dioxide, sulfur dioxide, and soot
Hazardous Polymerization	N/A

11. Toxicological Information

See Section 3.

HAWAI'I GAS
THE CLEAN ENERGY COMPANY

12. Ecological Information

There is no information available on the toxicity of this product in ecology; however, since the gas is so volatile, it is unlikely to pollute the water and air.

13. Disposal Considerations

In general, the best procedures for disposal of flammable gases are to burn the gas using a flare system. Disposal should be undertaken only by personnel familiar with the gas and procedures for disposal. Disposal should be done in accordance with all applicable federal, state, and local laws and regulations.

HAWAI'I GAS
THE CLEAN ENERGY COMPANY

14. Transport Information

Proper Shipping Name	Compressed Gas, Flammable, N.O.S. (methane and hydrogen)
Hazard Class	2.1
UN Number	UN1971
Packing	Pipeline
DOT Placard	FLAMMABLE GAS

15. Regulations

Federal Clean Water Act	Release of liquid oils associated with this product into surface waters or adjoining shorelines that causes a visible sheen or deposits a sludge must be reported immediately to the National Response Center (1-800-424-8802). Appropriate state and local agencies should be contacted as well.
CERCLA Section 103	Under Section 103 of the CERCLA, natural gas is exempt from reporting requirements.
EPCRA Section 304	There are no known components of this product that would require reporting under Section 304 of the EPCRA.
EPCRA Section 311/312	This product is classified as Immediate (acute) Health Hazard and Fire Hazard under Section 311/312 of EPCRA; therefore, it requires an MSDS.
EPCRA Section 313	This product contains no components subject to reporting requirements under Section 313 of EPCRA.
Toxic Substance Control Status	The components of this product are on the Toxic Substance Control Status Inventory.

16. Other Information

HMIS Hazard Ratings	
Health	1 (slight)
Fire	4 (severe)
Reactivity	0 (minimal)
NFPA 704 Hazard Rating	
Health	1 (slight)
Fire	4 (extreme)
Reactivity	0 (negligible)

List of Acronyms	
ACGIH	American Conference of Government Industrial Hygienists, Inc.
CAS #	Chemical Abstracts Service Number
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980

DOT	Department of Transportation
EPCRA	Emergency Planning and Community Right-To-Know Act
HMIS	Hazardous Materials Information System
IARC	International Agency for Research on Cancer
LEL	Lower Explosive Limit
NFPA	National Fire Protection Association
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PPM	Parts per million
STEL	Short-Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time-Weighted Average
UEL	Upper Explosive Limit
UN	United Nations

Disclaimer: The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information. Users should make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials, the safety and health of employees and customers, and the protection of the environment.

The Gas Company

11/5/2014

Stream G/C Analysis Report

Composite ID SNG
Date of Composite Sample 11/5/2014

Components [Mol Fraction]*100		Analysis	
O2	0	Molecular Weight [lbs/lbmol]	16.170
N2	0	Base Compressibility Factor	0.998
CO	0.1533	Liq Specific Wt [lb/gal (@60'F)]	2.446
CO2	2.0958	Liq Specific Grav [H2O=1]	0.295
H2	11.0816	API [(141.5/Sp. Gr.)-131.5]	348.812
C1	82.923	C/H Ratio [lbs(C)/lbs(H)]	2.912
C2	0.0157	Gas Specific Gravity [Air=1]	0.559
=C3	0	DCF/lb [Dry@30"HG+4"H2O, 60'F]	23.141
-C3	3.5317	DCF/gal [Dry@30"HG+4"H2O, 60'F]	62.992
IC4	0.1865	BTU/WCF [Wet @30"HG 60'F]	956.371
NC4	0.0124	BTU/DCF [Wet * 1.02766]	982.814
IC5	0	BTU/lb [BTU/DCF * DCF/lb]	22742.944
NC5	0	BTU/Gal [BTU/lb * Liq Sp Wt lb/gal]	55632.413
EC5	0	Air req'd for combustion [mcf/therm]	924.523
NC6	0	Wobbe Index [btu/wcf (@30"HG 60'F)]	1279.148
NC7	0	Weaver flame speed [H2=100, c3=16]	12.332
NC8	0	Pseudocritical Temp [°R]	329.637
NC9	0	Pseudocritical Pressure [PSIA]	633.792
C10	0	Vapor Pressure [PSIG @ 100'F]	4131.298
Components Total	100.0000	Gross Heating Value [BTU/DCF]	971.190
		Net Heating Value	873.940
		Lbs/mcf [Dry @ 30"HG+4"H2O, 60'F]	43.214

The Gas Company

11/5/2015

Stream G/C Analysis Report

Composite ID SNG
Date of Composite Sample 9/9/2015

Components [Mol Fraction]*100		Analysis	
O2	0	Molecular Weight [lbs/lbmol]	15.714
N2	0	Base Compressibility Factor	0.998
CO	0.3508	Liq Specific Wt [lb/gal (@60°F)]	2.399
CO2	0.8105	Liq Specific Grav [H2O=1]	0.289
H2	10.7577	API [(141.5/Sp. Gr.)-131.5]	358.289
C1	84.8774	C/H Ratio [lbs(C)/lbs(H)]	2.877
C2	0.0208	Gas Specific Gravity [Air=1]	0.543
=C3	0	DCF/lb [Dry@30"HG+4"H2O, 60°F]	23.814
-C3	3.0744	DCF/gal [Dry@30"HG+4"H2O, 60°F]	62.833
IC4	0.0709	BTU/WCF [Wet @30"HG 60°F]	980.596
NC4	0.0375	BTU/DCF [Wet * 1.02765]	987.157
IC5	0	BTU/lb [BTU/DCF * DCF/lb]	23507.703
NC5	0	BTU/Gal [BTU/lb * Liq Sp Wt lb/gal]	56388.802
EC5	0	Air req'd for combustion [mcf/therm]	925.228
NC6	0	Wobbe Index [btu/wcf (@30"HG 60°F)]	1303.346
NC7	0	Weaver flame speed [H2=100, c3=16]	12.183
NC8	0	Pseudocritical Temp [°R]	325.864
NC9	0	Pseudocritical Pressure [PSIA]	629.633
C10	0	Vapor Pressure [PSIG @ 100°F]	4228.190
Components Total	100.0000	Gross Heating Value [BTU/DCF]	978.113
		Net Heating Value	877.568
		Lbs/mcf [Dry @ 30"HG+4"H2O, 60°F]	41.993

The Gas Company

11/5/2016

Stream G/C Analysis Report

Composite ID SNG
Date of Composite Sample 11/5/2016

Components [Mol Fraction]*100		Analysis	
O2	0	Molecular Weight [lbs/lbmol]	14.582
N2	0	Base Compressibility Factor	0.999
CO	0.2536	Liq Specific Wt [lb/gal (@60°F)]	2.310
CO2	0.5493	Liq Specific Grav [H2O=1]	0.278
H2	11.742	API [(141.5/Sp. Gr.)-131.5]	377.127
C1	87.4426	C/H Ratio [lbs(C)/lbs(H)]	2.817
C2	0.0126	Gas Specific Gravity [Air=1]	0.504
=C3	0	DCF/lb [Dry@30"HG+4"H2O, 60°F]	25.670
-C3	0	DCF/gal [Dry@30"HG+4"H2O, 60°F]	64.132
iC4	0	BTU/WCF [Wet @30"HG 60°F]	909.091
NC4	0	BTU/DCF [Wet * 1.02765]	934.228
IC5	0	BTU/lb [BTU/DCF * DCF/lb]	23981.166
NC5	0	BTU/Gal [BTU/lb * Liq Sp Wt lb/gal]	55386.885
EC5	0	Air req'd for combustion [mcf/therm]	923.846
NC6	0	Wobbe Index [btu/wcf (@30"HG 60°F)]	1280.629
NC7	0	Weaver flame speed [H2=100, c3=16]	12.098
NC8	0	Pseudocritical Temp [°R]	312.413
NC9	0	Pseudocritical Pressure [PSIA]	627.094
C10	0	Vapor Pressure [PSIG @ 100°F]	4351.497
Components Total	100.0000	Gross Heating Value [BTU/DCF]	923.521
		Net Heating Value	828.719
		Lbs/mcf [Dry @ 30"HG+4"H2O, 60°F]	38.957