


ATTACHMENT 1
(confidential pricing
information redacted)

Energyneering Solutions Inc.

Attachment 1

 QUANTUM FUEL SYSTEMS	Quotation	Date: Nov 7, 2018
Energyneering Solutions Inc. 15820 Barclay Drive Sisters, OR 97759	Attention: Cassidy Fisher Phone: (541) 549-8766 ext. 231 Email: CFisher@energyneeringsolutions.com	
Virtual Pipeline Trailers –VP²¹ & VP⁴⁵		Quote No.: 1018-574_Rev1

Overview

Quantum Technologies proposes to supply VPLite²¹ & VPLite⁴⁵ trailers for the transportation and storage of compressed natural gas. Quantum's configuration includes a 45' Hi Cube shipping container with an array of Quantum ultra-lightweight Q-Lite™ tanks. The total capacity for the VP²¹ system is 219,541 SCF, the total capacity for the VP⁴⁵ is 470,445 SCF and the VP⁵¹ is 530,009 all 3,600psi.



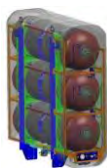
Quantum's History with High Pressure

Quantum has been a pioneer in CNG technologies for decades! Our engineers were the first to develop the Type IV tank in the early 1990's. Having the type IV technology and a robust software integration team at the center of our technology, has catapulted us to produce over 20,000 gaseous fuel (CNG & Hydrogen) systems for the likes of GM from 1995-2007. In addition to this we continue to support OEM advanced technologies that now include CNG fuels systems for heavy duty (Class 8) trucks. We entered the heavy duty business approximately 4-years ago and within a short period of time gained a 40%

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market share for on-road trucks. This is primarily due to a combination of Quantum's ultra-light weight carbon fiber tanks and its decades of CNG system experience bringing new features and high reliability to the heavy duty trucking industry. Quantum's tanks are used in some of the most demanding applications around the world such as in the mining truck shown below. Notice the mining truck is not only powered by Quantum tanks, it is running over a tank showing the extreme strength of our tanks.

Quantum offers the lightest-weight back-of-cab storage system in the industry



Trailer Specifications are shown below (assumption that GAS mass is .0450 lb/scf @ 59°F)

	VPLite21	VPLite45	VPLite51
Pressure	3600 psi	3600 psi	3600 psi
Gas Volume	219,541 scf	470,445 scf	530,009 scf
Diesel Equiv.	1,804 G	3,867 G	4,356 G
Total Weight*	34,459 lb	60,543 lb	66,810 lb
Dimensions			
Length	20 ft	45 ft	45 ft
Width	8.22 ft	8.22 ft	8.22 ft
Height	13.42 ft	13.42 ft	13.42 ft

*Weight includes container, gas & chassis

Operation & Safety

Quantum has also incorporated hardware to automate operation and extensive safety equipment so its trailers are very simple and safe to operate. **Quantum has incorporated CNG operated valves on each of its tanks so the entire system can be closed for transport and opened for off-loading, with the turn of a single valve.** This eliminates the possibility of an operator not opening or closing valves which can lead to operational failures. In addition, Quantum's robust thermal safety system includes PRDs associated with each tank. If one of the thermal sensors is activated, only the affected tanks are vented.

Of course, if a fire were to continue to progress through the vehicle, the remaining sections would vent as needed. This minimizes external venting and potential ignition.

Requested Information:

1 Storage Tank

Quantum's Type IV tanks are widely recognized as the lightest tanks in the industry. This allows customers to carry more gas or payload than alternative designs. The offered tanks are based on Quantum's current Q-Lite product line, with dual tank opening and collar mounting. The tanks and all associated hardware will be rated for 3,600 psi service pressure.

The picture below shows a current Quantum Type IV tank.



Collar Mount 3,600 psi Tank

2 Minimum Operating Process Pressure

The minimum operating pressure for the cylinder is 200 psi.

3 Minimum Operating Process Temperature

The minimum operating process temperature is -70°F (-57°C) for defueling, however, a restitution period is required (which usually occurs during return to base of the trailer) to increase the temperature to -40°F (-40°C) before refueling the trailer. The lower limit can be dropped to -40°F (-40°C) with no period of restitution before refill.

4 Maximum Operating Process Pressure

The cylinders and trailer hardware will be rated to a service pressure of 3,600 psi.

5 Minimum Operating Ambient Temperature

The system will be rated down to -40°F (-40°C) ambient temperatures.

6 Maximum Operating Process Temperature

The maximum operating process temperature is 185°F (82°C).

7 Mechanism to close all Cylinder Valves for Transport

Quantum has a very unique mechanism for opening and closing cylinder valves, this requires the turn of one valve located on the central manifold. In addition, each cylinder can be closed by individual CNG actuated valves. These valves are normally closed. When CNG is applied, the valves will open allowing defueling. There are also accessible manual valves in case a tank should need to be separated for troubleshooting; however, these are only used during service or maintenance events.

8 Number of Tanks, Layout and Sizes

The Quantum VP21 and VP45 Trailers consist of 21 Type IV cylinders mounted vertically in 20' length high cube, pallet wide ISO container; and the 45 Type IV cylinders mounted vertically in a 45' length high cube, pallet wide ISO container. The VP51 has 51 Type IV cylinders. The ISO container will be mounted on an intermodal container chassis.



Cylinder Packaging View



Main Panel View

9 Remote Process Shutoff of Trailer

The Quantum trailers include an emergency shutoff **valve** located at the front and rear end of the trailer. If defueling needs to be interrupted, the emergency shutoff valve will cut off gas supply to the individual tank valves, turning them to the closed position.

Fill side has check valves preventing backflow during fueling. Fill shutoff would be achieved via E-stop at fill station. An additional shutoff valve can be added to fill side of trailer if requested.

10 Pressure Cycle Limit

Quantum cylinders are tested to 15,000 pressure cycles and then confirmed for any fatigue. This is sufficient to allow a 15yr life for the cylinder. The tank is designed for ISO 11119-3.

11 Trailer Dimensions & Weight (loaded and empty)

The trailer with container (& gas) is expected to weigh < 80,000 lbs with tractor for the VP²¹ and VP⁴⁵. The weight of the VP51 is > than 80,000 lbs.

12 Trailer Running Gear (Brakes, axles, landing gear)

The Quantum large capacity CNG trailer will be carried on a 45' gooseneck chassis.

Brakes: Drum brakes, outboard mounted with ABS

Axles: 2 axles, 109" tandem location, kingpin 30.5" from rear face of front booster (VP³⁵)

Landing Gear: 2 speed AAR approved, 55,000lb lift capacity and 160,000 static load capacity

Suspension: Air ride suspension

See **Appendix A** for a complete trailer specification.

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13 Door to Brake Interlock

The container will utilize a door to brake-interlock located inside the doors to prevent unintentional drive away during fueling and unloading

14 Thermal Venting System

Each gas cylinder will be individually protected with TPRDs. Upon thermal event, only tank(s) with activated PRDs will vent through dedicated line to roof. Unaffected tanks will not vent. This minimizes vented gas and further fire potential.

15 Support Plan for 5-year DOT Test Requirement

Quantum will be offering a 5-year inspection service for the recertification of the tanks in the trailer. Pricing can be quoted.

16 Delivery Schedule

Standard lead times for the VP⁴⁵ and VP⁵¹ is 3-4 mos. at the receipt of order; **initial lead** time for the VP²¹ is 4-5 mos.

17 Standard Warranty Terms

Quantum's Standard Limited Warranty is 1 year for trailers systems. Please see Quantum's Standard Limited Warranty statement in [Appendix C](#). Quotations for extended warranties can be provided upon request.

18 Pricing

Quantity	1-9
VP ²¹	
VP ⁴⁵	
VP ⁵¹	

*Chassis is included for the VP²¹, VP⁴⁵, and VP⁵¹ the F.E.T tax will apply separately for only the chassis and not the entire trailer.

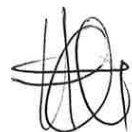
Terms:

All sales are subject to Quantum's standard Terms of Sale in [Appendix B](#). **Payment term shall be 50% with Purchase Order and the remaining 50% prior to shipment FOB, Lake Forest, California.**

UNLESS OTHERWISE NOTED, PRICING IS GOOD FOR 90-DAYS FROM RECEIPT OF PROPOSAL.

For further assistance, please contact Hernan Henriquez @ (949) 373-6012 / hhenriquez@qtww.com.

With best regards,



Hernan S. Henriquez
Executive Vice President, Business Development
Quantum Fuel Systems LLC

Appendix A – Trailer Specification

Chassis for VP⁴⁵ and VP⁵¹

EQUIPMENT TYPE: Gooseneck container chassis		SPECIFICATION #: CC000G-R001
MODEL NUMBER: GN45259A-HDS-CC000G-R001		REVISION: R001
MODEL NAME: GN45259A-HDS		SPECIFICATION DATE: October 21, 2016
MODEL DESCRIPTION: Heavy Duty Gooseneck 45' spread axle airride		PRINTED BY: Joel
INDUSTRY CATEGORY: Container Chassis		PRINTED ON: December 29, 2016
FUNCTION: (1) 45 FT SPECIAL CONTAINER		

DIMENSIONS	
NOMINAL LENGTH	45'-7"
NOMINAL WIDTH	102"
KING PIN LOCATION	24"
FIFTH WHEEL HEIGHT	48"
REAR DECK HEIGHT	47"
AXLE SPREAD	109" (TANDEM)
TARE WEIGHT	6,340 LBS +/-3%
GVWR	64,300 lbs
FRAME RATING	57,000 LBS

STANDARD FEATURES	
MATERIAL	Main Rails are of ASTM A514 (130,000 psi); all others are of ASTM A572 Grade 50
MAIN RAILS	Fabricated Continuous I-Beam with T1 top and bottom flanges.
CROSSMEMBERS	Fabricated crossmembers
KING PIN	1/4" pick up plate with 2" diameter king pin.
LANDING GEAR	Two-speed 19" travel w/ sandshoe
TWISTLOCKS	Pratt Twistlocks
SUSPENSION	Tandem Air-ride 109" spacing w/ auto dump valve
AXLES	77 1/2" Track, 22,500 lbs each rated
HUBS	Hub plotted Duralite hubs
DRUMS	Centrifuge drums
BRAKES	16 1/4" x 7" quick-change brakes with non-asbestos lining.
WHEELS	(8) 8.25" x 22.5" Aluminum Wheels
TIRES	(8) 11R22.5 14 Ply Radial
BRAKE SYSTEM	Valve system for service brakes. 48/2M ABS system. w/ R38
ELECTRICAL	12 VOLT w/modular wiring and plug type connectors and 7-way pin electrical plug for ABS system.
PAINT	Sealed wire Harnesses. Sealed grommets and lights.
METAL PREP	Zinc Rich epoxy Primer and Black Urethane top coat
MISC	All metal surfaces are shot blasted and cleaned. All weld areas shot blasted prior to painting
OTHER FEATURES	Conspicuity Striping, 24x30 Pratt Mud Flaps
	Interlock Brake valve, Pressure Protected additional airtank

There may be small variances between chassis suppliers, so specifications can be confirmed at the time of placing the order.

DOCKET NO. G-9, SUB 739

In the Matter of
Application of Foothills Renewables LLC
For Approval to Participate in Pilot Program

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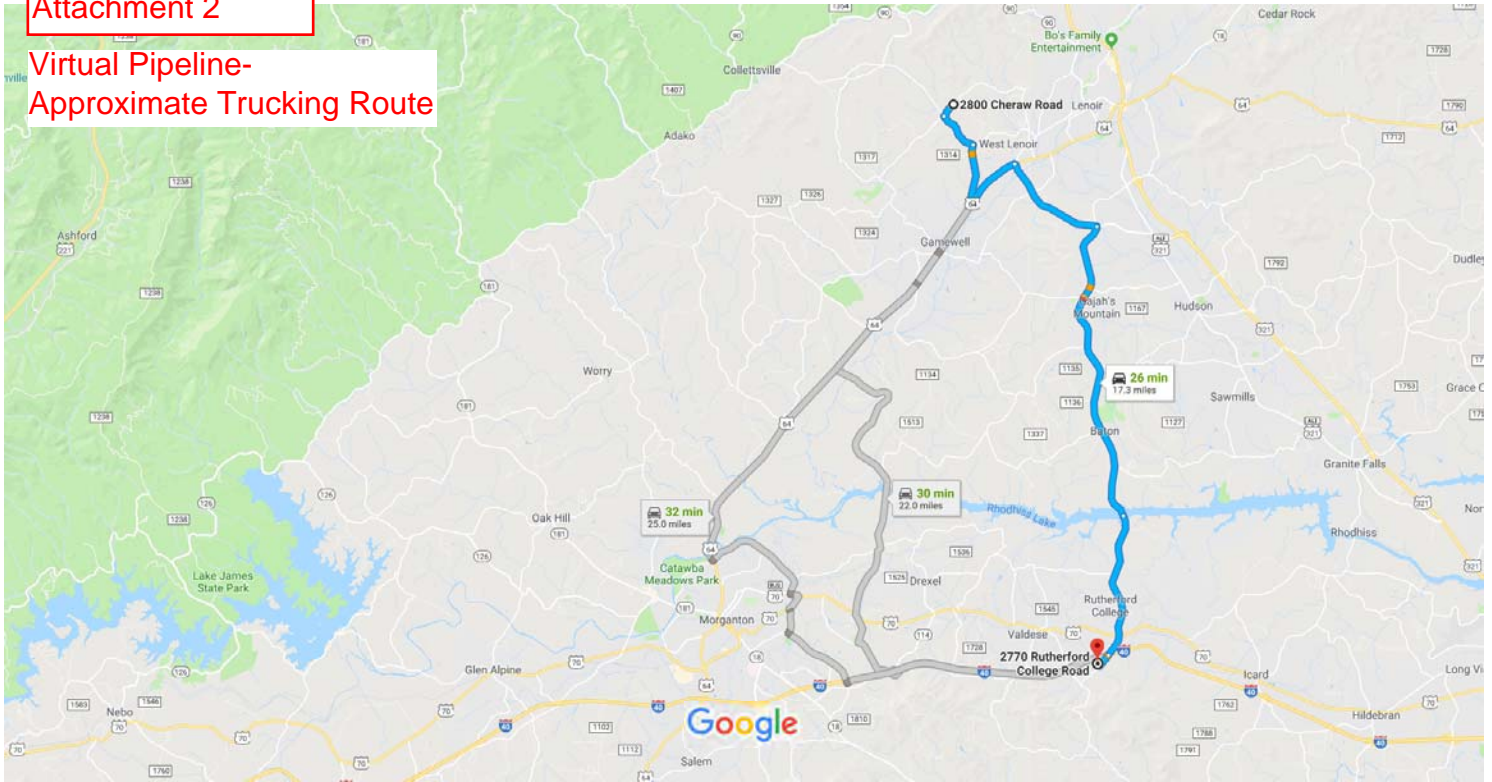
ATTACHMENT 2



2800 Cheraw Rd, Lenoir, NC 28645 to 2770 Rutherford College Rd Drive 17.3 miles, 26 min

Attachment 2

Virtual Pipeline-
Approximate Trucking Route



Map data ©2018 Google 2 mi



via Connelly Springs Rd
Fastest route, the usual traffic

26 min
17.3 miles



via US-64 W

30 min
22.0 miles



via US-64 W and I-40 E

32 min
25.0 miles

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ATTACHMENT 3

Attachment 3

Foothills RNG Facility - Trucking Cycle Time

Trailer Data		
Trailer	Quantum VPLite S1	
Trailer Nameplate Capacity	530,009	scf
Trailer Pressure @ 100% Capacity	3,600	psig
Trailer Weight Empty (lbs)	42,960	
Trailer Weight Loaded (lbs)	66,810	
Trailer Dimensions (LxWxH in feet)	45x8.22x13.42	
Compression		
Trailer Volume @ Compression Start	7%	-
Trailer Volume @ Compression Start	36,806	scf
Trailer Volume @ Compression End	100%	-
Trailer Volume @ Compression End	530,009	scf
Trailer Pressure @ Compression End	3,600	psig
Decant		
Decant Flow (Passive and Active)	150,000	scfh
Trailer Pressure @ Passive Decant End	1120	psig
Trailer Pressure @ Active Decant End	250	psig
Decant Efficiency (Passive)	69%	-
Decant Efficiency (Total)	93%	-
Passive Volume Decanted / Trip	365,117	scf
Active Volume Decanted / Trip	128,086	scf
Decant Time (Passive)	2.4	hr
Decant Time (Active/Compressor)	1.2	hr
Decant Time (Total)	3.6	hr
Travel Details		
Compression Point Address	2800 Cheraw Road, Lenoir, NC 28645	
Decant Site Address	2770 Rutherford College Road, Connelly Springs, NC 28612	
Presumed Truck Route	https://goo.gl/maps/ox25tuYktYB2	
Travel Distance	27.3	miles
Transit Time	1.5	hr
Misc. Time	0.5	hr

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Plant LFG Flow (SCFM-Dry)	2078	2162	2241	2315	2384	2448	2507	2563	2615	2663	2708	2751	2790	2826	2860	2854	2993
Plant RNG Flow (SCFM)	997	1038	1076	1111	1144	1175	1203	1230	1255	1278	1300	1320	1339	1356	1373	1370	1437
Plant RNG Flow (SCFD)	1,436,314	1,494,374	1,548,979	1,600,128	1,647,821	1,692,058	1,732,838	1,771,546	1,807,488	1,840,666	1,871,770	1,901,491	1,928,448	1,953,331	1,976,832	1,972,685	2,068,762
Compression Time (hr)	8.24	7.92	7.64	7.40	7.18	7.00	6.83	6.68	6.55	6.43	6.32	6.23	6.14	6.06	5.99	6.00	5.72
Transit / Decant Time (hr)	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Total Cycle Time (hr)	13.8463523980576	13.53	13.25	13.00	12.79	12.60	12.44	12.29	12.15	12.04	11.93	11.83	11.74	11.67	11.59	11.61	11.33
Lag Time (hr)	2.64	2.32	2.04	1.79	1.58	1.39	1.23	1.08	0.94	0.83	0.72	0.62	0.53	0.45	0.38	0.40	0.12
Approx. # of Trips / Day	3	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	5
Minimum # of Trailers Needed	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Annual Trips	1063	1106	1147	1185	1220	1253	1283	1312	1338	1363	1386	1408	1428	1446	1463	1460	1532

ATTACHMENT 4

Micro Motion[®] ELITE[®] Coriolis Flow and Density Meters



Ultimate real world performance

- Unchallengeable ELITE performance on liquid mass flow, volume flow, and density measurements
- Best-in-class gas mass flow measurement
- Reliable two-phase flow measurement for the most challenging applications
- Designed to minimize process, mounting, and environmental effects

Best fit-for-application

- Scalable platform for the widest range of line size and application coverage including hygienic, cryogenic, high pressure, and high temperature
- Available with the broadest range of I/O offerings highlighted by expansive digital protocol support

Superior measurement confidence

- Smart Meter Verification delivers complete, traceable calibration verification, continuously or on-demand at the press of a button
- Globally leading ISO/IEC 17025 calibration facilities offers best in class uncertainty of $\pm 0.014\%$
- Intelligent sensor design mitigates the need for zero calibration in the field

Micro Motion® ELITE® Coriolis flow and density meters

Micro Motion ELITE meters provide unmatched flow and density measurement performance to deliver the ultimate control and confidence in your most complex and challenging liquid, gas, and slurry applications.

Tip

If you need help determining which Micro Motion products are right for your application, check out the [Micro Motion® Technical Overview and Specification Summary](#) and other resources available at www.emerson.com/flowmeasurement.

Achieving the ultimate flow fit for your application

- Able to achieve the best fit for your flow measurement with a wide range of tube designs and flow rate coverage to best serve your application
- Peak performance in a drainable design with a variety of industry approvals for use in strictly governed sanitary applications
- Scalable platform for a broad array of application coverage including hygienic, cryogenic, high temperature, and high pressure

Smart Meter Verification: advanced diagnostics for your entire system

- Included as standard, with the option to license coating detection and other advanced meter health diagnostics
- A comprehensive test that can be run locally or from the control room to provide confidence in your meter functionality and performance
- Verifies that your meter performs as well as the day it was installed, giving you assurance in less than 90 seconds
- Saves significant expenditure by reducing labor and outsourced calibration service costs while eliminating process interruption

Industry-leading capabilities that unleash your process potential

- Available with the most extensive offering of transmitter and mounting options for maximum compatibility with your system
- State of the art, ISO-IEC 17025 compliant calibration stands achieving $\pm 0.014\%$ uncertainty drive best in class measurement accuracy
- The most robust communication protocol offering in the industry including Smart Wireless
- True multi-variable technology measures necessary flow and density process variables simultaneously
- Widest selection of safety, country, and custody transfer approvals

Unparalleled performance in two-phase flow conditions

- Featuring the lowest frequency Coriolis sensors that ensure the two-phase mixture vibrates with the tube to drastically reduce uncertainty contributions from both the presence of liquid in a gas flow measurement, and entrained gas or aeration in liquid flow
- Unmatched MVD transmitter technology with digital signal processing (DSP) delivers the fastest response and refresh rates enabling accurate batch and other two-phase flow measurement
- Measure fluids with any Gas Void Fraction (GVF). The relationship to mass flow accuracy varies with application

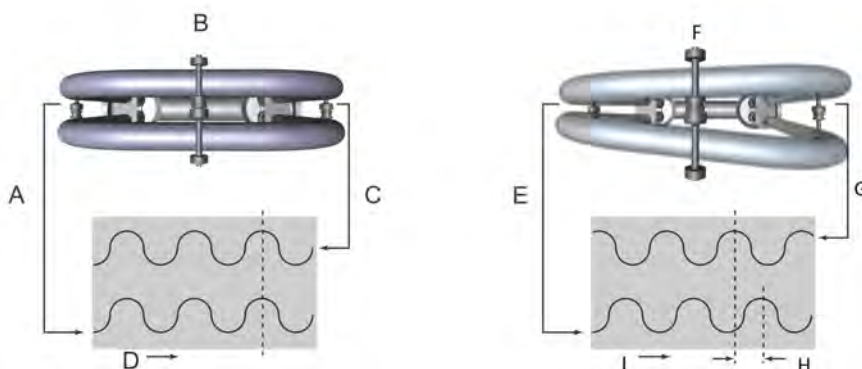
Measurement principles

As a practical application of the Coriolis effect, the Coriolis mass flow meter operating principle involves inducing a vibration of the flow tube through which the fluid passes. The vibration, though it is not completely circular, provides the rotating reference frame which gives rise to the Coriolis effect. While specific methods vary according to the design of the flow meter, sensors monitor and analyze changes in frequency, phase shift, and amplitude of the vibrating flow tubes. The changes observed represent the mass flow rate and density of the fluid.

Mass flow measurement

The measuring tubes are forced to oscillate producing a sine wave. At zero flow, the two tubes vibrate in phase with each other. When flow is introduced, the Coriolis forces cause the tubes to twist resulting in a phase shift. The time difference between the waves is measured and is directly proportional to the mass flow rate.

Watch this video to learn more about how a Coriolis flow meter measures mass flow and density (click the link and select **View Videos**): <https://www.emerson.com/en-us/automation/measurement-instrumentation/flow-measurement/coriolis-flow-meters>.



- A. Inlet pickoff displacement
- B. No flow
- C. Outlet pickoff displacement
- D. Time
- E. Inlet pickoff displacement
- F. With flow
- G. Outlet pickoff displacement
- H. Time difference
- I. Time

Density measurement

The measuring tubes are vibrated at their natural frequency. A change in the mass of the fluid contained inside the tubes causes a corresponding change to the tube natural frequency. The frequency change of the tube is used to calculate density.

Temperature measurement

Temperature is a measured variable that is available as an output. The temperature is also used internal to the sensor to compensate for temperature influences on Young's Modulus of Elasticity.

Meter characteristics

- Measurement accuracy is a function of fluid mass flow rate independent of operating temperature, pressure, or composition. However, pressure drop through the sensor is dependent upon operating temperature, pressure, and fluid composition.
- Specifications and capabilities vary by model and certain models may have fewer available options. For detailed information regarding performance and capabilities, either contact customer service or refer to www.emerson.com/flowmeasurement.
- All meters with the CMF designation (CMF, CMFHC, CMFS) are members of the ELITE meter family and should be considered to possess the same qualities and specifications as other ELITE family meters unless specifically noted.
- The letter at the end of the base model code (for example, CMF100M) represents wetted part material and/or application designation: M = 316L stainless steel, L = 304L stainless steel, H = nickel alloy C22, P = high pressure, A = high temperature 316L stainless steel, B = high temperature nickel alloy C22, Y = Super Duplex (UNS S32750). Detailed information about the complete product model codes are described later in this document.

Performance specifications

Reference operating conditions

For determining the performance capabilities of our meters, the following conditions were observed/utilized:

- Water at 68 °F (20.0 °C) to 77 °F (25.0 °C) and 14.5 psig (1.000 barg) to 29 psig (2.00 barg)
- Air and Natural Gas at 68 °F (20.0 °C) to 77 °F (25.0 °C) and 500 psig (34.47 barg) - 1,450 psig (99.97 barg)
- Accuracy based on industry leading accredited calibration stands according to ISO 17025/IEC 17025
- All models have a density range up to 5 g/cm³ (5000 kg/m³)

Accuracy and repeatability

Accuracy and repeatability on liquids and slurries

Performance Specification	Standard	Optional ⁽¹⁾
Mass/volume flow accuracy ⁽²⁾⁽³⁾	±0.10% of rate	±0.05% of rate
Mass/volume flow repeatability	0.05% of rate	0.025% of rate
Density accuracy ^{(3) (4)}	±0.0005 g/cm ³ (±0.5 kg/m ³)	±0.0002 g/cm ³ (±0.2 kg/m ³)
Density repeatability	0.0002 g/cm ³ (0.2 kg/m ³)	0.0001 g/cm ³ (0.1 kg/m ³)
Temperature accuracy	±1 °C ±0.5% of reading; BS1904 Class, DIN43760 Class A (±0.15 +0.002 x T °C)	
Temperature repeatability	0.2 °C	
Environmental temperature compensation	BS1904 Class, DIN 43760 Class B (±0.30 +0.005 x T °C) - Qty 3 case sensors ⁽¹⁾	

(1) Not available on all models.

(2) Stated flow accuracy includes the combined effects of repeatability, linearity, hysteresis, orientation and other non-linearities.

(3) For cryogenic applications with process temperatures below -100 °C, the liquid mass flow accuracy is ±0.35% of rate and density accuracy specification does not apply.

(4) The standard density accuracy option for the sensor models CMFS007, CMFS010, and CMFS015 is ±0.002 g/cm³ (±2 kg/m³), for models CMFS010 and CMFS015 optional accuracy is ±0.0005 g/cm³ (±0.5 kg/m³).

Accuracy and repeatability on gases

Performance specification	Standard models
Mass flow accuracy ⁽¹⁾	±0.25% of rate
Mass flow repeatability	0.20% of rate
Temperature accuracy	±1 °C ±0.5% of reading; BS1904 Class, DIN43760 Class A (±0.15 +0.002 x T °C)
Temperature repeatability	0.2 °C

(1) Stated flow accuracy includes the combined effects of repeatability, linearity, hysteresis, orientation and other non-linearities.

ATTACHMENT 5

MAX300-RTG

Industrial Process Mass Spectrometer



PRODUCT NOTE



- Real-Time Gas Analysis
- Process Automation and Control
- Product Quality Analysis

Introducing the MAX300-RTG

Optimize Your Manufacturing

Mass spectrometry is a powerful tool for process automation.

Rapid, accurate gas analysis enables high-precision reactor control and increased production efficiency.

The MAX300-RTG™ uses cutting-edge quadrupole mass spectrometer technology to deliver continuous online gas monitoring for industrial process control.

It has the speed necessary to analyze the total composition of a sample in seconds, and can be fully automated to measure several points in a process, or multiple production lines, with a single analyzer.

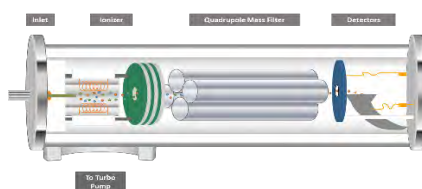
The mass spectrometer uses an ionizer to break sample molecules into charged fragment ions that are then separated based on their mass-to-charge ratio as they move through the electric fields generated by the quadrupole mass filter. The ions register a current at the detector, creating a set of peaks called a mass spectrum. Each compound has a unique spectrum, making mass spectrometry a highly selective, flexible technique.



MAX300-RTG Industrial Gas Analyzer

Industrial Process Gas Analyzer Features

- Automated online analysis and data delivery
- Control parameters reported in real-time
- Complete quantitative stream composition
- High precision and accuracy for exceptional process control
- Multiport sample systems for up to 160+ sample streams
- Low maintenance, utilities and calibration required
- Complete method scale-up
 - Lab, Pilot, Production



The MAX300's industry-leading 19mm quadrupole mass filter, combined with state of the art electronics, provides the user with an impressive list of **Extrel Advantages:**

- Near-zero mass scale drift for outstanding measurement precision and stability
- Uniform resolution across the entire mass range for ultra-high sensitivity to all compounds
- Extreme resistance to corrosion and contamination for long-term, continuous, low-maintenance operation
- Performance specifications that exceed those common to other mass spectrometers and process technologies

Reliable Data, Durable Performance

With over four decades of excellence in industrial automation and thousands of installations worldwide, Extrel process mass spectrometers provide the rugged stability and ease-of-use necessary for continuous operation in demanding manufacturing environments.



Hydrocarbon Processing

Ethylene Cracker Control

Polyethylene

Fuel Gas BTU

Ethylene Oxide

LNG

PVC and EDC

Benzene

Metals Manufacturing

Steel Carbon Content

Blast Furnace Off Gas

Coke Making

EAF Monitoring

Syngas Manufacturing

Ammonia

Methanol

Hydrogen

Gasification

Acetic Acid

Low-Sulfur Diesel

Gas Purity

Trace Contamination

Pharmaceutical Solvents

Semiconductor Manufacturing

Scrubber Efficiency

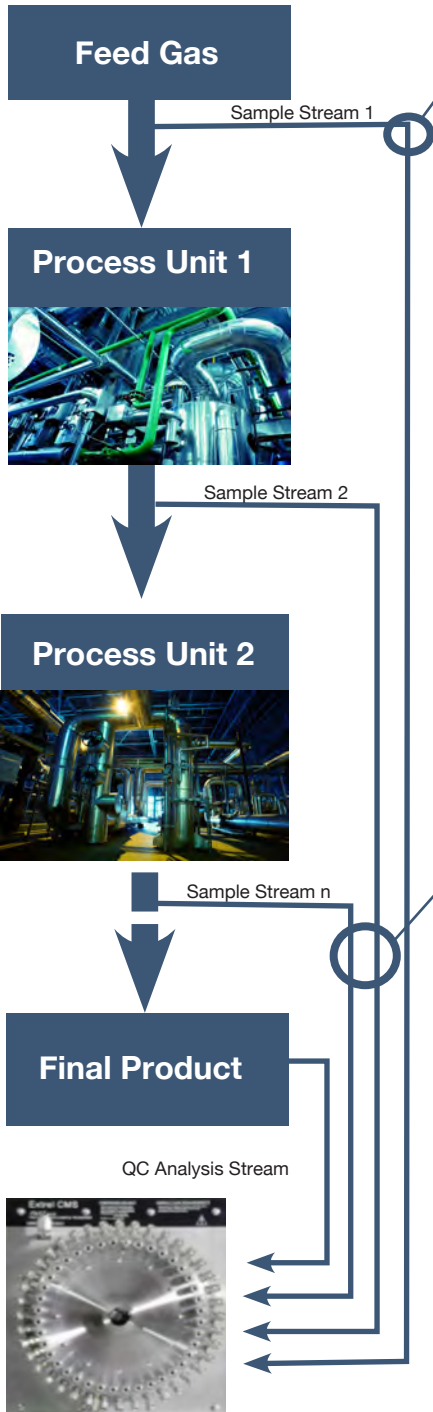
Food and Beverage Gas

Rapid Online Analysis to Maximize Your Production

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Accuracy and Flexibility



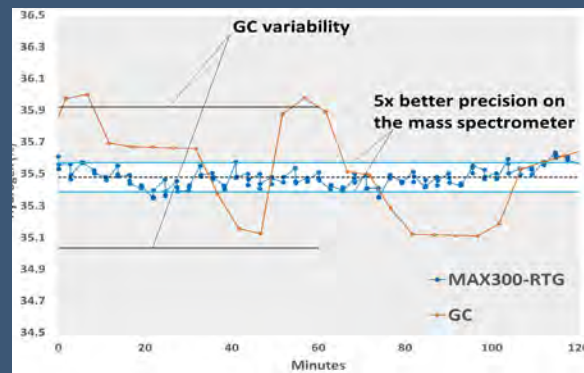
Component	% Molecular Concentration	Precision % Absolute
Hydrogen	16.5	0.006
Methane	77.9	0.007
Nitrogen	0.38	0.002
Propane	0.9	0.001
Ethane	2.35	0.002
N-pentane	0.16	0.001
Isobutane	0.27	0.001
Carbon dioxide	0.95	0.001
Isopentane	0.15	0.001
N-Butane	0.45	0.001
Hexane	0.01	0.0002
Hydrogen sulfide	0.001	0.00001

Example 1. Process Feed Gas

The MAX300-RTG measures all of the hydrocarbons in the feed gas stream as well as ppm contaminants, like H_2S . Control parameters, such as BTU value, Specific Gravity, and Wobbe Index, are instantly calculated and transmitted for use by the plant's process control system.

Precision and Control

Example 2. Polyethylene Reactor Control



Fast, high-precision data allows the plant to operate process units closer to optimum conditions

- GC Measurements
 - 1 reactor
 - 3 components
 - Cycle time: 5 min
- MAX300 Measurements
 - 4 reactors
 - 10 components
 - Cycle time: 29 sec

Consistent Ongoing ROI

- Fast online gas analysis for increased manufacturing efficiency, product yield, and equipment uptime
- The full stream composition provides additional information necessary for Advanced Process Control
- Lower capital cost compared to other technologies
- Reduced operation costs due to low maintenance and utility requirements
- By monitoring the operation of several process units, the MAX300-RTG is often used to replace multiple gas chromatograph (GC) systems

The 80 Port FASTvalve Sample Selector

The inlet system of the MAX300-RTG can be configured with any number of zero-dead-volume sample selector options.

System Specifications:

- Detectable compounds: Any gas or vapor sample
- Detection range:
 - Faraday detector: 100% - 5 ppm
 - Electron multiplier: 100% - 5 ppb*
 - Membrane inlet: 100% - 10 ppt*
- Number of sample streams: 16, 31, 40, 80, 120, 160+
- Analysis rate: 0.1 - 16 seconds per component
 - User selectable
- Number of components: Unlimited
- Number of analysis routines: Unlimited
- Number of user configurable data tags: Unlimited
- Precision: <0.05% RSD over 24 hours**
- Stability: <0.5% RSD over 30 days**
- Filaments: Two, one active and one spare with automatic switchover
- Analyzer maintenance: 1-3 years[†]
- Roughing pump: 6-12 months[†]
- Manual or fully automated calibration and validation
 - 3-12 month calibration intervals
- Mass range options: 1-250, 300, 500 amu

* Matrix dependent. Documented on trace air components and benzene.

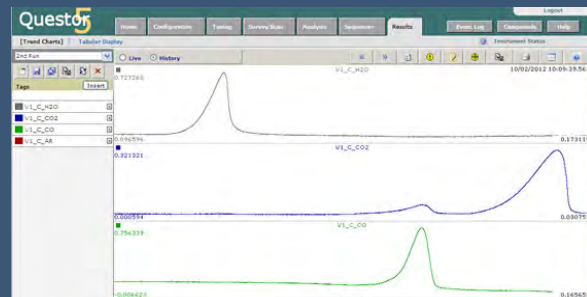
** Based on the analysis of 1% argon, scan speed 1 second per analysis.

[†]Application dependent.

Low Maintenance, Easy to Use

The Questor5 control software that drives the MAX300-RTG measures all sample points in a fully customizable sequence for site-specific, automated production control. The intuitive web-based interface allows the user to check instrument status, review data, or run a validation sequence from anywhere on the plant network, while maintaining government and industry security standards for login and electronic record keeping (21 CFR 11).

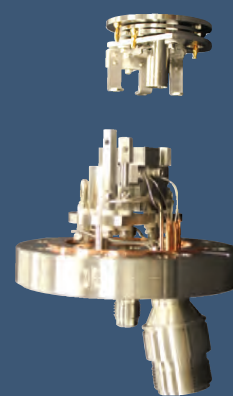
The MAX300-RTG is a 24-7 online gas analyzer with a documented uptime >99%.



Simultaneously trend high precision measurements of bulk components and ppm-level contaminants with the easy-to-use Questor5 control software



Extrel's 19 mm quadrupole next to a common 6 mm filter. The larger device provides greater ion transmission for unparalleled sensitivity and signal stability.



The MAX300 disposable, plug-and-play ionizer eliminates the cleaning requirement, and includes dual filaments, one active and one spare.

MAX300-RTG System Specifications

Power Supply Options:

- 110 VAC, 50/60 Hz, Two 15 Amp circuits
- 230 VAC, 50/60 Hz, One 20 Amp circuit

Power Consumption:

- Nominal 2740 Watts
- Heat Load: 2700 Watts (9215 BTU/h)

Weight:

- Standard Enclosure: 450 lbs (205 kg)
- Optional cart: 40 lbs (18 kg)

Ambient Requirements:

- Temperature: -4°F to 120°F (-20°C to 49°C)
- With A/C, cold start $\geq 54^{\circ}\text{F}$ (12°C)
- Area Classification Options:
 - General Purpose
 - Class 1, Division 1 or 2, Groups B, C, D, T4
 - IEC/ATEX, Zone 1 or 2, Group IIC or IIB +H2*, T4

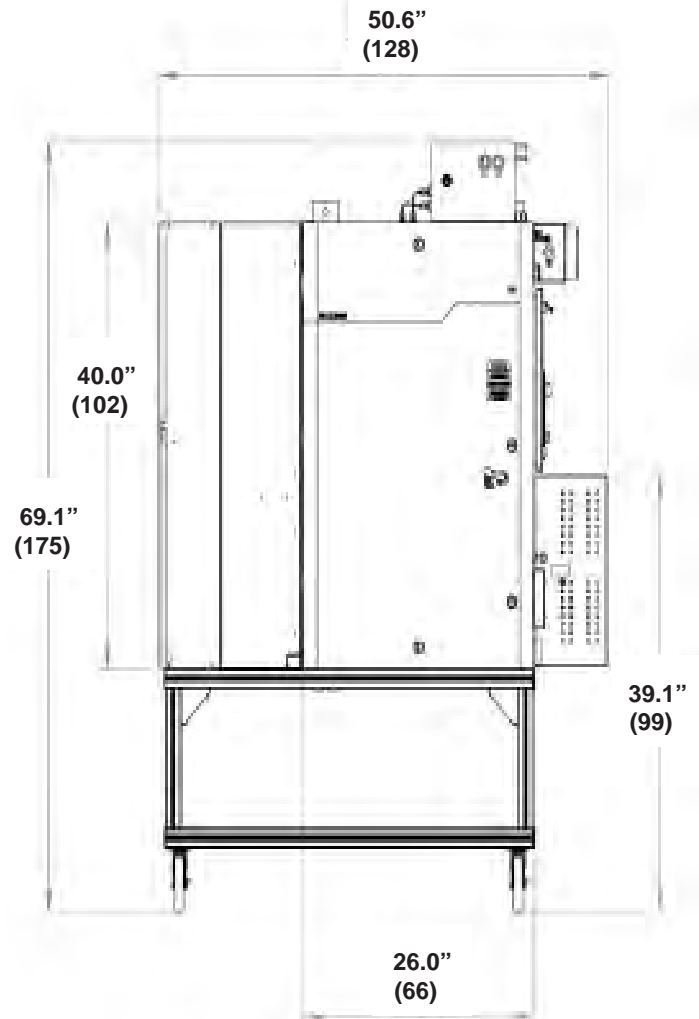
Additional Utilities:

- Purge gas (for hazardous area installations)
- Base calibration requirement: 2 gas bottles

Data System and Communications:

- System control interface options: Ethernet, RS-422 4-wire
- Login security levels: Administrator, User, Viewer
- External communications:
 - Ethernet, Modbus serial, digital I/O, analog I/O, OPC

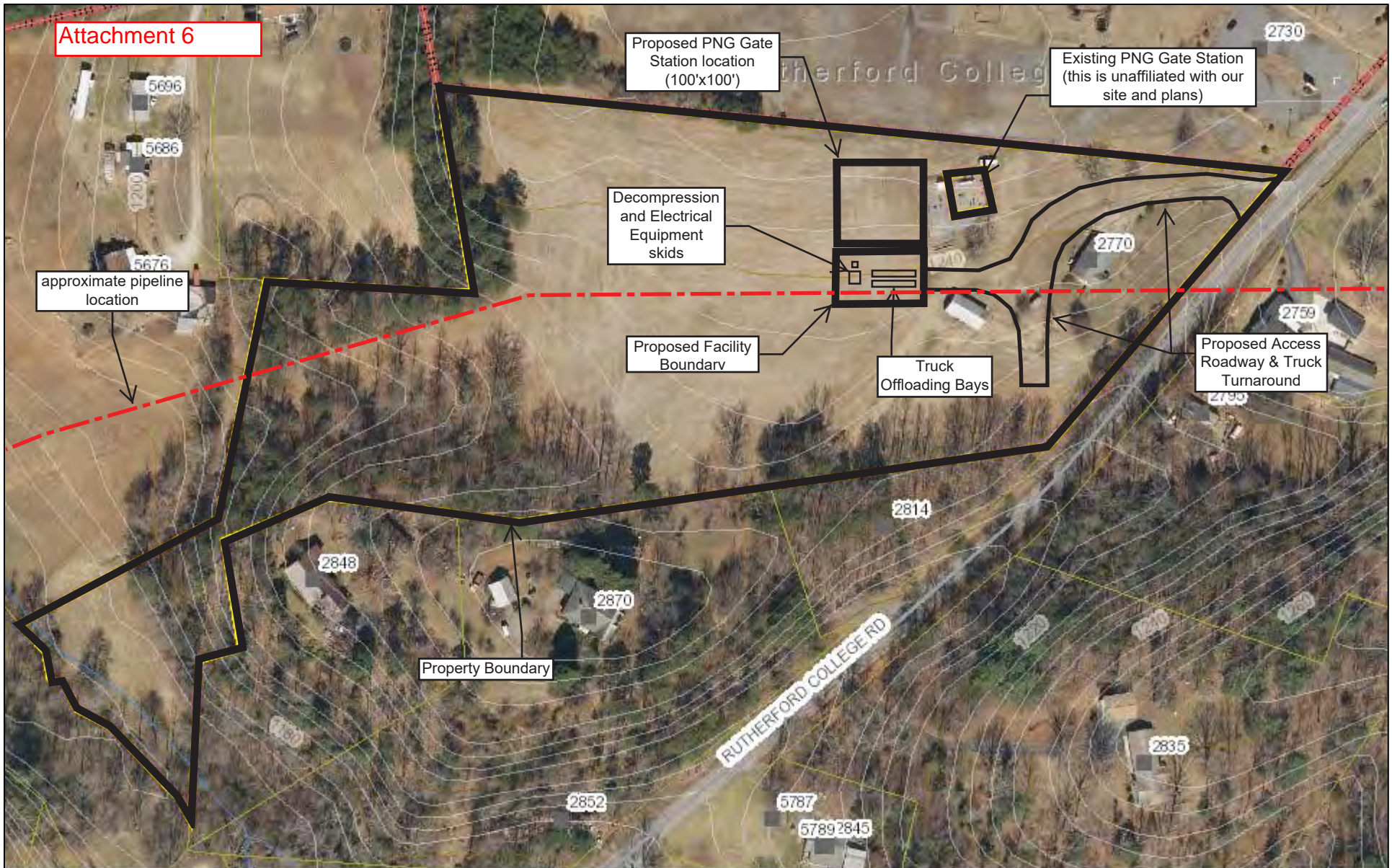
*Configuration dependent



MAX300-RTG enclosure with A/C, Cart and X Purge Options. Dimensions shown in inches [mm]

Exceptional Worldwide Service and Support: For over 50 years, Extrel has been committed to providing the highest quality support services for the thousands of instruments installed worldwide. Factory trained and certified personnel offer industry-leading support to Extrel customers at every stage of process development and manufacturing.

ATTACHMENT 6



November 12, 2018

Burke County, NC

Owner: VANHORN, GLENN EUGENE
2733 RUTHERFORD COLLEGE RD

CONNELLY SPRINGS, NC 28612

Property Address: 2770 RUTHERFORD COLLEGE RD
CONNELLY SPRINGS 28612
PROPERTY_DESC

PIN: 2743708614
PIN EXT: 000
REID: 14460

Property Value:
Acreage: 10.86
Deed Book: 000950
Deed Page: 02448
Deed Date: 7/19/2000 1:00:00 AM

0 155 310
Feet

1:1,988

1 inch = 166 feet



Disclaimer: The information contained on this page is taken from aerial mapping, tax mapping, and public records and is NOT to be construed or used as a survey or 'legal description'. Only a licensed professional land surveyor can legally determine boundaries, elevations, lengths, areas, and other physical features.

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ATTACHMENT 7

7 VIRTUAL PIPELINE SYSTEM- BASIS-OF-DESIGN

7.1 DESCRIPTION AND OVERVIEW

Due to lack of proximity between suitable injection points on PNG's transmission lines and the RNG facility, a "virtual pipeline" will serve to collect and transport product gas for decompression and injection into the utility natural gas line. A suitable property has been located at 2770 Rutherford College Rd, Connelly Springs, NC, 28612 for the virtual pipeline injection station and FR is in the process of finalizing acquisition of the property. A charging station will be built at the RNG facility site (see section 4.9) to fill the trailers and a discharge station will be built at the injection station property for pipeline injection.

7.2 SITE SPECIFICS

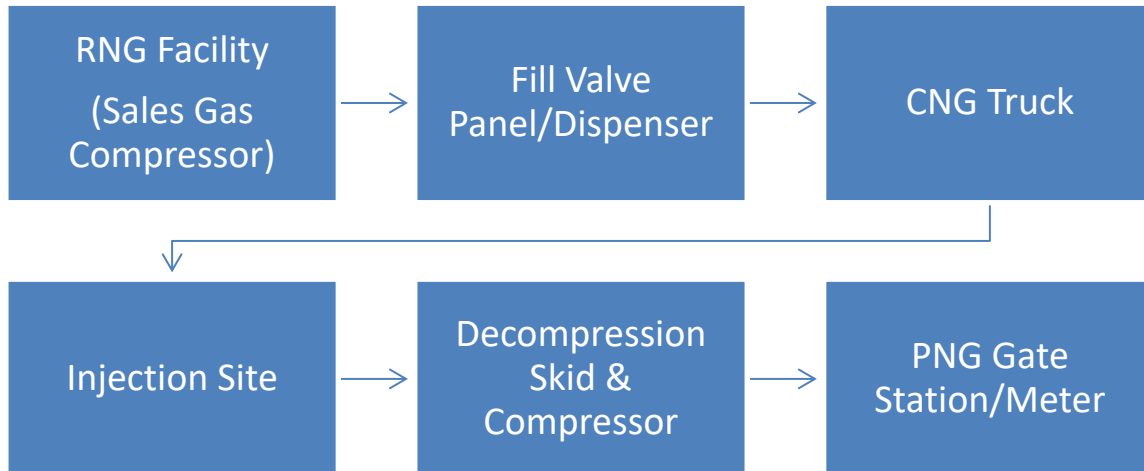
The Virtual Pipeline will transport RNG as CNG to the injection station located at 2770 Rutherford College Rd, Connelly Springs, NC, 28612. FR is in escrow for the purchase/lease of this property, on which stands a pre-existing PNG-owned station utilized in transferring transmission gas to distribution pipelines. Due to the nature of their existing system, an additional PNG-owned gate station (100'x100' per PNG discussions) will be installed for connection to FR's decompression system. The existing station is shown below (Figure 3), along with FR's expected injection station location. Upgrades to the site will include: a site access road, truck turnaround, two truck unloading/discharge bays, decompression skid, electrical pad, and the PNG-owned gate station.



Figure 3- Project Area

7.3 PROCESS FLOW AND TRUCKING CYCLE

A simplified process flow diagram and description of the Virtual Pipeline is provided below for description.



- A. Filling- The virtual pipeline begins at the filling station at the RNG facility which is described in Section 4.9 and shown on the site GA layout (see Appendix F). EPC will design and construct a 3 bay trailer storage area with sufficient truck turnaround/back-in space for CNG trailers to be maneuvered into position for connection to the filling station. The filling station will be designed to fill multiple trailers with seamless transition between the filling of one trailer to the next trailer. Based on the specified trailers (see Section 7.5), fill time for a single trailer is anticipated to start at ~7.8 hours at facility startup and shrink to 5.5 hours as the amount of product flow being generated by the facility increases with the LFG flow curve for the plant.
- B. Transport- After a trailer is filled to capacity, an FR contracted hauling company will pull the trailer along a route between 17 and 25 miles to the injection site (see approximate route in Appendix L). Travel time is anticipated to take 30-40 min under normal traffic scenarios, but additional time is accounted for in the projected trucking cycle (see Appendix L) to allow for traffic congestion and other unknown complications.
- C. Decompression (Passive)- At the injection site, an EPC designed and installed 3-bay trailer decompression station will be located directly adjacent to the PNG gate station with sufficient truck turnaround space for maneuvering. The trailer will park in one of the bays and connect their discharge flange to the decompression header. Upon opening of the flange, product gas will travel through a natural gas fired water bath heating unit designed to manage downstream temperature and avoid freezing conditions in the decompression equipment due to rapid pressure changes. The decompression equipment will be designed to offload the trailer at a consistent rate of 150,000 standard cubic feet per hour. The trailers will decompress for ~2.4 hours from ~3,600psig down to ~120psig above pipeline injection pressure (1,000psig per Section 2.6).
- D. Decompression (Active)- Further study through detailed design is required to determine whether additional compression to fully evacuate the CNG trailers would be economically beneficial to the

project. Under this approach, a 4-stage reciprocating compressor will activate after passive decompression is completed and push most of the remaining product gas in the trailer into the pipeline while dropping pressure in the CNG trailers to as low as 180psig. Total trailer offload time under this approach, including passive and active offloading, would take ~3.6 hours (see Appendix L- Trucking Cycle). For the sake of the BOD, estimated cost for the compressor is included in the CAPEX budget.

- E. Gate Station/Metering/Analyzing- PNG will install an approximate 100'x100' gate station at the site under the yet to be determined terms of an interconnect agreement between PNG and FR. The gate station will be located directly adjacent to FR's decompression equipment. It is anticipated that the gate station will include, at minimum: shutoff valve, flow meter, pressure regulating equipment, and gas analyzer. PNG will require 24-7 access to the gate station for servicing their equipment.
- F. Trucking Cycle Time/Trailer Requirements- To meet the demands of the facility, while allowing sufficient flexibility for operations, maintenance, and unknowns, it is expected that 3 CNG trailers will be utilized for the virtual pipeline. The Trucking Cycle calculations in Appendix L outline the expected trucking cycle required for the facility through the entire life of the plant. At minimum, the virtual pipeline will require 2 trailers taking 3-5 trips per day throughout the life of the facility to maintain continual operating conditions at the RNG plant. The third trailer will allow for flexibility in the plant operations, help provide buffer storage capacity, and be utilized for added storage capacity during night time operations.
- G. Injection Site Parasitic Load Requirements- To operate the injection site, FR will need to have access to natural gas and/or electricity for parasitic load requirements of the decompression equipment. Items that will require utilities will include:
- Water Bath Heater- will require between 0.5 and 1.2 MMBTU/hr of natural gas
 - Reciprocating Decant Compressor (pending economic benefit analysis)- ~300HP
 - Decompression Equipment Controls/Lighting/Outlets- A relatively small 120V service will be required to for decompression equipment PLCs, lighting, and electrical outlets. This service is already available at the site via an existing residential connection.

Natural Gas is readily available at the site due to close proximity to PNG distribution lines. It is anticipated that FR will obtain a commercial or industrial NG service for the water bath heater. If a compressor is utilized, there are four options, each with pros and cons that will require further investigation during detailed design: electric utility supply from Duke, natural gas fired electric generator, diesel fired electric generator, or direct drive natural gas compressor.

7.4 VIRTUAL PIPELINE- MAJOR EQUIPMENT

Major equipment for the Virtual Pipeline is to be purchased directly by the Owner at EPC specification and installed by EPC. Owner supplied major equipment will include:

A) SALES COMPRESSION/FILLING STATION

See Section 4.9.

B) CNG TRAILERS (QUANTITY-3)

CNG transportation options are limited to a few experienced suppliers. The CNG trailers will consist of ~45' long shipping containers, mounted on a chassis, and equipped with multiple CNG storage vessels. Each trailer will meet the following minimum design specifications/capacity:

- Vendor/Supplier- Quantum or Hexagon
- Inlet/Outlet Flow Rate- 150,000 scfh
- Tank Pressure- 3,600 psi after temperature equalization
- Burst Pressure- >6,000psi
- Capacity- >500,000 scf
- Max Weight (including tractor/trailer based on NCDOT road restrictions)- 80,000 lb

A detailed specification and quote has been supplied by Quantum Fuel Systems for their VPLite⁵¹ virtual pipeline trailers (See detailed quotes and specs in Appendix L). Further coordination is required through detailed design to obtain purchase order ready quotes for this equipment.

C) TRACTOR/HAULING EQUIPMENT

FR will contract directly with a local hauling company to move the CNG trailers between the two locations. The hauling company will maintain ownership of the tractors.

D) PASSIVE DECOMPRESSION EQUIPMENT

The passive decompression equipment will be comprised of a multi-port trailer unloading station for multiple truck connections, water-bath heater, glycol piping/circulation pump system, decompression gas train/pressure reduction equipment, and product discharge flange connection. The decompression equipment will meet the following minimum design specifications/capacity:

- 3 Injection Flanges for Multiple Trailers
- Inlet pressure: 3,600-4,000 psi minimum
- Outlet temperature: 40-60°F
- Capacity: 150,000 scf/h
- Integrated PLC Control System

A detailed specification and quote has been supplied by ANGI (See detailed quotes and specs in Appendix L). Further coordination is required through detailed design to finalize purchase order ready quotes for this equipment.

E) ACTIVE DECOMPRESSION EQUIPMENT (PENDING FURTHER DETAILED DESIGN)

If active decompression via a compressor proves to be economically beneficial to the project through further detailed design, a reciprocating compressor would be utilized to evacuate gas from the CNG trailers to the pipeline. The compressor would be designed to meet the following minimum specifications:

- Drive- Electric or Natural Gas
- Min. Inlet Pressure- 180psig
- Max. Inlet Pressure- 1,200psig
- Discharge pressure: 1,050 psig
- Outlet temperature: 100degF Max
- Capacity: 150,000 scf/h
- Integrated PLC Control System

A preliminary specification and quote for an electrically driven decant compressor has been supplied by ANGI (See detailed quotes and specs in Appendix L). Further coordination is required through detailed design to obtain purchase order ready quotes for this equipment.

F) OTHER POTENTIAL INJECTION SITE EQUIPMENT

Pending further detailed design, additional equipment may be required at the injection site including:

- Natural Gas or Diesel Fired Generator- to power decant compressor. This would require separate air permitting and may overly complicate the project. Will require further definition
- Controls/Telecommunications Equipment- for interfacing with RNG plant for alarm conditions, notifications, and communications between the injection site and RNG plant.
- Truck/Trailer Maintenance Shop/Equipment- It may be beneficial to utilize the injection site for servicing the trucks/trailers employed in the virtual pipeline. Cost for this has not been included in the CAPEX estimate but would be assessed in detailed design.

7.5 VIRTUAL PIPELINE- INJECTION SITE UPGRADES

The required injection site upgrades are described below:

- Civil: The site is located on a fairly significant grade. To ensure the most accurate estimate of the required site upgrades, ESI contracted a local civil engineering firm, Clayton Engineering, to perform a preliminary civil site and grading plan for the injection site property (see Appendix L). Budgetary estimates for both site plans provided are expected to have minimal differences, totaling approximately \$250,000.
- Mechanical: Site mechanical upgrades will be limited to those discussed in Section 7.4 D-F. Further design is required to determine the extent of the required equipment and the costs for these upgrades.
- Electrical & Control: Further detailed design is required to define the extent of the electrical and control upgrades, as these are based on the type of decompression that is utilized at the site (see Section 7.4 D-E). Further design is required to determine costs for these upgrades.

A Phase 1 Environmental Site Assessment (ESA) is underway at the proposed injection site to determine any potential environmental concerns with the location. The ESA will be utilized by FR to verify that no

existing environmental conditions exist that would complicate the site upgrades for the pipeline injection site.

For the sake of this BOD and the CAPEX budget, placeholder estimates are being carried as follows: \$100k for mechanical upgrades, and \$50k for electrical/controls upgrades.