



September 12, 2017

Mr. Jonathan A. Lanford
Alleghany County Administrator
9212 Winterberry Avenue
Covington, VA 24426

**Re: Feasibility Analysis of Establishing Natural Gas Service in Low Moor, VA.
Heath and Associates, Inc. PN# 21710**

Dear Jon,

This letter report details my observations and analysis concerning establishing natural gas service to Low Moor, Virginia. These observations and recommendations were developed from my trip on May 18-19, 2017 and subsequent analysis.

Scope

Heath and Associates was commissioned by Alleghany County to investigate and analyze the feasibility of establishing natural gas service in Low Moor, Virginia. Columbia Gas of Virginia currently serves portions of Covington and Clifton Forge in Alleghany County. Alleghany County has requested Columbia Gas of Virginia extend natural gas service to Low Moor; however, Columbia has conveyed to the County that this is economically infeasible. Efforts to bring natural gas service to Low Moor have been ongoing since the 1990's or earlier.

Alleghany County asked Heath and Associates to conduct an independent, cursory analysis for validation of Columbia's conclusion and to investigate other ways natural gas service might be established. Specifically, Heath and Associates investigated the economics of the County establishing a municipal gas system and remote solutions such as trucked-in Liquefied Natural Gas (LNG) and Compressed Natural Gas (CNG). Our analysis, which is not a detailed analysis, was commissioned to advise the County of the general feasibility of the establishment of a natural gas system and whether or not to continue to pursue these efforts.

Existing Commercial and Industrial Facilities and Estimated Energy Requirements

Heath and Associates reviewed the Alleghany County Administrator's files detailing efforts to establish natural gas service in Low Moor. The Low Moor area is composed of several hundred residential dwellings, a few small commercial establishments, and about a dozen commercial/industrial facilities that could use a

significant amount of natural gas. The rate of return associated with extending natural gas service to established residential/small commercial areas is poor and the infrastructure costs and load forecast for the general population in the area was not addressed by this analysis. The larger potential gas users were previously identified and usage surveys and histories were previously obtained by Columbia Gas of Virginia. Heath and Associates reviewed the historical and potential energy usage of these facilities to develop a load demand for the project. Exhibit A illustrates the top potential users of natural gas and their current annual fuel use history/estimates.

The combined natural gas equivalent annual usage is estimated to be 92,208 decatherms (DT) per year, assuming all facilities convert their energy needs to utilize natural gas. It is optimistic to assume that all of the energy requirements will be met with natural gas as this is directly related to the fuel savings that can be obtained if industries were to switch to natural gas. Heath and Associates is not aware of any small (municipal or private) gas systems who operate with this small of a load.

The annual estimate of potential usage by Columbia Gas of Virginia is 361,252 DT/YR. Columbia developed this estimate by combining the connected load capacity at each facility with an assumed load factor. Actual usage is much less, and we would expect Columbia to revise their estimates downward if they utilized the historical usage in developing a load forecast.

Allegheny County is actively engaged in industrial recruitment activities to locate facilities in a commercial/industrial park located along Commerce Center Drive in Low Moor. Future industries who locate here may have need for natural gas; however, it is unlikely that an industry with a large natural gas requirement will locate in the park prior to a commitment of natural gas service at rates competitive with other fuels. Any pipeline built to service Low Moor should have extra capacity to serve future industries. However, future natural gas loads were not included in the economic analysis.

The existing commercial/industrial facilities utilize propane/fuel oil for building heat, heating water, and light manufacturing. More of these type energy users will not significantly change the feasibility of bringing gas to Low Moor. If the equivalent square footage of Westrock, Balchem, Bacova, and the Allegheny County Governmental Complex were added to the emerging industrial park with similar type energy needs, the feasibility of bringing natural gas to Low Moor will not substantively change. The only way the feasibility will improve is with the addition of a high energy requirement manufacturing facility.

Pipeline Routing and Capital Costs

Heath and Associates visited the area on May 18-19, 2017 to investigate pipeline routing options and estimate construction costs to establish a natural gas system. The mountainous terrain greatly increases the difficulty and costs to pipe gas to Low Moor. We also used topographic and aerial maps to evaluate routing options. In 2005, the

County engaged Columbia Gas of Virginia to conduct engineering and routing of a pipeline to serve Low Moor. The route named “Horse Mountain Route” was determined to be the lowest cost and most feasible route. Heath and Associates did not have time to conduct a field review or access to the majority of the areas where a pipeline could be routed. In our limited scope, we have no reason to believe that this route is not the best one.

Heath and Associates estimated costs to establish a natural gas system in Low Moor in two segments; 1) the high pressure steel distribution pipeline that would connect the Low Moor area with Columbia of Virginia’s high pressure distribution pipeline, and 2) a polyethylene distribution system that would serve the targeted industrial/commercial facilities. Exhibit B shows the Horse Mountain Route of the high pressure steel pipeline. This exhibit also illustrates the terrain and difficulty of the area to be traversed. Exhibit C illustrates a medium pressure distribution system with limited coverage that could be constructed with polyethylene pipe and serve the community. The construction costs are estimated to be \$10,513,551 for the high pressure steel section and \$2,090,401 for the polyethylene distribution piping. Exhibit D details these costs. Exhibit E combines the direct construction cost with the other engineering, right-of-way, inspection, and permitting costs for the project. Heath and Associates estimates the combined capital costs to construct the gas system to be \$15,663,131. The latest Columbia Gas of Virginia cost estimate to establish gas in Low Moor is \$26,541,776. Our estimate was based on an initial visit and we did not get a chance to investigate the route in detail. Typically, our client’s cost to install pipelines are lower than investor owned gas systems, but this difference is significant and our estimate may be low as a result of not having conducted a detail review of the route.

Heath and Associates also prepared a quick estimate of other capital costs that would be associated with establishing a municipal system, if Alleghany County were to pursue operating the system independently of Columbia Gas of Virginia. Exhibit F is an estimate of the vehicles and equipment needed to conduct gas operations. The startup capital equipment and inventory costs assume that excavation equipment and other supporting County office staff and equipment can be borrowed/shared with other County operations departments.

Operations and Maintenance for a Municipal Gas System

In the event that the County did establish a municipal natural gas system, Heath and Associates estimated the annual costs associated with the operations. The Federal Department of Transportation, Pipeline Safety and Hazardous Materials Administration (PHMSA) has federal minimum safety standards that all natural gas operators must adhere to. In addition to federal safety code, the Virginia State Corporate Commission has additional safety regulations and reporting requirements. The Federal and State regulations apply to all gas operators and are disproportionately burdensome for smaller operators.

Cost recovery of operations and maintenance expenses result in unacceptably high recovery factors for the proposed system due to the low volume of sales identified above. Exhibit G is a projected annual operating and maintenance budget for the County to operate the proposed natural gas system. When annual operating and maintenance costs are divided by the annual sales (optimistically assuming 100% of energy loads are converted to natural gas), the cost recovery component is \$4.36/decatherm. When this recovery factor is added to the commodity cost of natural gas, the resulting rate becomes unattractive for industrial conversion regardless of any amortized construction and startup capital costs.

Simply stated, the identified potential usage of existing industrial/commercial facilities does not represent the economies of scale to support an independently operated gas system, even if the capital costs were minimal. Retail rates offered by Columbia Gas of Virginia are regulated and cost recovery of their operations is spread over all its customers in the State. Columbia's incremental operations cost would also be lower since they can incorporate the required maintenance and reporting into existing operations.

Service Options and Fuel Savings

Any natural gas service extension to Low Moor will only be successful if the delivered cost of natural gas is lower than existing energy fuel options such as propane, fuel oil, or electricity. There are two scenarios for developing fuel savings. One is to work with Columbia Gas of Virginia and provide a capital contribution to offset the construction plant investment by Columbia in order to have the project meet their investment criteria. The latest correspondence from Columbia states that the capital plant investment less a credit for sales margins to the targeted customers result in a net present value of negative \$21,110,595. This is only an estimate and is subject to refinement. In addition to the negative NPV, the County may need to also provide a tax gross-up charge of \$6,588,617. The County Administrator indicated that the tax gross-up may be waived due to their governmental structure; however, we could not get Columbia to verify this.

Establishment of a municipal natural gas system is also highly infeasible. Due to the low energy requirements of the Low Moor community and the high cost to construct a pipeline system, natural gas cannot be delivered at rate which is competitive with propane or fuel oil. Exhibit H illustrates the components of a retail commercial/industrial rate and how this rate does not represent savings to existing facilities.

Natural gas systems rates must recover the cost of gas supply (gas commodity and transportation costs), operations and maintenance expenses, and provide funds to cover debt service. Exhibit H illustrates these rate recovery components and compares the needed rates to propane and fuel oil alternatives. The natural gas commodity price varies significantly month to month. A commodity price of \$3.10/DT was used and represents a 12 month NYMEX futures average. Interstate transportation (\$1.74/DT)

and Columbia Gas of Virginia (\$.80/DT) transportation charges were estimated and are somewhat dependent on system load factor. The cost of gas supply is estimated to be \$5.74/DT.

Operating costs per decatherm are estimated to be \$4.36/DT. The gas system rates will need to generate net earnings and cash flow to service short and long term debt service. The rate component to service the anticipated debt is \$8.22/DT. This was calculated using the project total development cost of \$15,663,131 and the initial startup consulting/legal fees of \$200,000 financed at 2.5%/yr. over 30 years. Initial cash capital investments will be required for startup equipment and tools, and additional cash can be invested to lower the total long-term principal to be financed.

The natural gas rate required to maintain operations is significantly higher than propane or fuel oil costs. Even if a majority of the capital development costs were funded with a grant, the gas system cannot provide gas service that offers savings to facilities using propane or fuel oil.

Operating Subsidy Requirements

If Alleghany County were to establish a municipal system and set natural gas rates to lower energy costs for industries equivalent to areas where natural gas is available, significant operations subsidies will be required. Exhibit I illustrates the operational and maintenance costs and the long-term debt service requirements for the system proposed.

Annual gross margin revenues (sales less the commodity cost of natural gas) are estimated to be approximately \$184,400 assuming comparable natural gas industrial rates. Higher gross sales may be achievable; however this offsets the savings to the industries. The operating deficit (\$975,403) would need to be supplemented by the County or another funding source. As mentioned earlier, doubling the existing square footage of industrial facilities that are light manufacturing does little to help the economics. Adding the equivalent load of the combined Westrock, Balchem, Bacova, and Alleghany County Governmental Complex would only increase gross sales margins by \$36,132/yr.

Pro forma economics were not prepared for this study due to the overwhelming negative fuel savings analysis.

Natural Gas Service Via Trucking Solutions

Heath and Associates investigated scenarios whereby natural gas could be delivered to Low Moor via truck. Heath and Associates contacted Thigpen Energy to investigate a satellite Liquefied Natural Gas terminal and trucked LNG. The LNG onsite facilities would require \$800,000 – \$2,000,000 in onsite LNG storage and vaporization

equipment. The delivered cost of natural gas to the facility is projected to be approximately \$.86/gallon or \$10.04/DT. When LNG facility operating costs are added, the delivered gas cost exceeds propane cost. When gas system operational costs of \$4.360/DT plus a debt service recovery rate component is added, this solution is economically infeasible.

Heath and Associates contacted Xpress Natural Gas, LLC (XNG) and solicited input for delivering compressed natural gas to Low Moor. The costs associated with this scenario are illustrated on Exhibit J. XNG provides the onsite facilities and charges a fixed demand charge per DT to compress the gas and redeliver gas onsite to a distribution system. Operational costs for these facilities are included in the demand charge (\$1.75/DT at 100% load factor). A natural gas system does not front the capital investment for these facilities; these costs are embedded in the demand charge. There is also a transportation fee (\$2.00/DT) for all gas actually delivered to the site. The XNG demand charge and transportation charge must be added to the cost of gas delivered into Virginia (Transco Zone 5). The combined delivered gas cost to Low Moor would be \$8.69 /DT for a scenario to service an annual load of 82,500 DT/YR. XNG indicated that placing separate delivery facilities to serve the three largest users is economically infeasible. Therefore, Alleghany County would need to construct and operate a natural gas distribution system, and when the operating costs are added to the delivered gas price, the delivered cost exceeds propane and fuel oil prices.

Conclusions

The capital costs to extend natural gas service to Low Moor are very high relative to the existing commercial/industrial energy needs. The mountainous terrain and distance from existing natural gas service presents challenges to construction that will not change.

The existing commercial and industrial facilities in Low Moor use very little energy. It is difficult to recruit industries to the area that would require a significant natural gas usage without a competitive natural gas service.

Alternatives that utilize trucked in LNG or CNG are not competitive at this time. The economics are not close to being feasible.

Columbia of Virginia is willing to bring natural gas service to Low Moor if the County (or individual industries) provide the negative NPV gap of \$21,110,595 (plus tax gross up if applicable). A program to aid the feasibility of extending natural gas by investor owned systems was enacted in Virginia in 2012. This is the NEEDS program. The NEEDS program requires the investment to meet certain criteria. The extension of natural gas service to Low Moor does not meet this criteria. Heath and Associates is unaware of other sources of grants that could be applied to the NPV gap makeup, but it is possible that funds may exist. The combined total fuel costs to the targeted commercial/industrial facilities in the area are approximately \$1,000,000 per year. An

investment of \$21,110,595 to bring fuel savings to these facilities is an unsupportable expenditure.

The only way we see natural gas service being extended to Low Moor is in conjunction with a new industry with a very large natural gas requirement. Larger sales reduce the negative NPV gap and could possibly render a project feasible.

Heath and Associates appreciates the opportunity to provide this analysis to Alleghany County. Unfortunately, the feasibility is very poor to establish a natural gas service to the community. If we can be of further aid to Alleghany County, please do not hesitate to give us a call.

Respectfully submitted,

Heath and Associates, Inc.

E. Scott Heath, P.E.

President

ESH/ds

Attachments

Appendix Index

Exhibit A	Potential Natural Gas Users
Exhibit B	Pipeline Route to Columbia Gas of Virginia
Exhibit C	Medium Pressure Natural Gas Distribution System
Exhibit D	Construction Cost Estimate
Exhibit E	Total Project Cost Estimate
Exhibit F	Initial Capital Needed for Gas Operations
Exhibit G	Projected Operations and Maintenance Cost
Exhibit H	Fuel Savings: Natural Gas via Pipeline Scenario
Exhibit I	Operating Subsidy Required
Exhibit J	Fuel Savings: Natural Gas via Trucked CNG Scenario