



Appendix A: Gas Pipeline RFP Specification

Comanche U2, U3: GAS PIPELINE RFP SPECIFICATION EXTENT OF WORK

Work Included:

This specification addresses the gas transporter's supply pipe equipment and material requirements of the gas supply to Comanche U2, U3, located in Lawton, Oklahoma.

The new Metering and Regulation Yard (M&R Yard) has a target completion date of November 30, 2028.

(a1) The gas supply pipe is to be sized for the largest flow requirement. The design base is for providing a capacity sufficient to deliver fuel gas, at a minimum expected pressure of 820 psig (velocity not to exceed 10,000 feet per minute) for a mass flow of 424,557 lbs./hr. or 225,287 Dth/day, based on an estimated HHV = 22,110 BTU/lb.) to two (2) Mitsubishi 501JAC combined cycle gas turbine (CCGT) power blocks.

(a1.1) Minimum pressure of 820 psig

(a1.2) Maximum pressure of 1,000 psig

(a1.3) Minimum flow rate for a **single** CCGT at 269 MWn and heat rate of 6,816 Btu/kWh (LHV), or 1,832 MMBtu/hr. (LHV).

(a1.4) Maximum flow rate of 424,557 lbs./hr. or 225,287 Dth/day

(a1.5) Higher heating value (HHV) of 22,110 Btu/lb., With a LHV value of 19,978 Btu/lb.

(a1.6) Velocity no greater than 10,000 feet per second (ft./min.)

The gas supply pipeline from the main gas header will terminate at a new metering and regulation yard to be located due East of the existing Comanche facility, North of the existing transmission lines, North of the existing M&R yard (subject to change based on Supplier's equipment sizing and spacing). The proposed custody transfer point is assumed to be a 26 NPS Class 600 carbon steel flange.

(a2) Design and pipe routing drawings shall be submitted for review and record. The drawings shall show tie-in connections, pipe routing, elevations, burial depth, coordinates at direction changes and equipment layout details, including material and equipment identification, and planned range of fuel gas pressure, temperature, and flow rates. Drawings shall be submitted after award of contract and prior to installation for review. The Supplier shall specify interconnection point flange details (for plant piping design) at time of proposal, for Owner's review, comment, and approval.

(a3) All underground pipe shall have a high visibility marker tape placed parallel and above the pipe. The tape shall contain a metal strip for easy detection from the ground surface.

(a4) All above ground gas piping, on AEP property, to be painted yellow (Federal Std. Color #13655) and labeled with black lettering as “Natural Gas” with flow direction indicated. Labeling shall be at 20 ft. intervals and easily readable from a distance of 25 ft. Lead-based paint is not acceptable and shall not be used.

(a5) As close as practical to the gas supply header, the gas supply pipe shall include a filter-separator (with drain tank), a gas chromatograph, revenue meter station, worker monitor regulators and double block and bleed.

(a5.1) Gas supplied shall be free of gas condensates, 99.5% of solid particulates greater than 0.3 micron, and 100% of solid particulates greater than 3 micron from the gas stream. The filter-separator shall have an automatic drain system to remove liquid from the vessel. The filter-separator shall have a thermal relief valve in accordance with ASME Section VIII. Level controls and alarms will be part of the automated drain system.

(a5.2) The gas chromatograph shall be supplied to report real-time gas composition and the other data as noted in item (a11). Supplier shall provide a datalink connection for Owner’s DCS – OPC interface, serial modbus protocol.

(a5.3) The revenue meter station shall comply with the appropriate AGA requirements, have an accuracy of +/- 0.25% of full flow, and have a measurable range from 1,800 lbs./hr. to 450,000 lbs./hr.

(a5.4) A worker/monitor set of regulators shall be provided, with one regulator (worker) doing the bulk of the regulation with a backup (monitor) provided in case of failure of the worker regulator. Regulators shall be pilot operated, pressure balanced, and soft seated.

(a5.5) A dedicated double block and bleed shall be provided to isolate the M&R yard from the new power plant. This shall be done with two individual block valves with a bleed valve located in the piping between the two valves, no more than 2 feet of pipe shall be supplied between the individual block valves. If a bypass is provided for Supplier Pigging processes, the bypass shall be designed in such a way as to totally prevent carryover.

(a5.6) Every precaution shall be taken, including in Supplier’s pigging maintenance of the line to totally prevent condensate carryover beyond these stated levels (including compressor lube oil, pipeline debris, residuals, or any other processing issues upstream). Supplier pipeline PIG trap receiver shall be



in Supplier’s yard, upstream of Supplier’s filter-separator at least 100 ft. from Owner’s equipment and designed in such a way as to completely prevent carryover. Any pigging performed shall be communicated 2 weeks in advance and shall be during off-peak generation periods (preferably done March to May and September to November, as coordinated with Owner personnel on site).

(a5.7) Gas quality shall meet the specifics as provided in the table below:

| <u>Condition</u> | <u>Must Meet</u> |
|-----------------------------|---|
| Gas Supply | Per a1 & all of a5 |
| Methane Content | >80% to 98%mol |
| Sulfur Content | <0.5 grains per 100 standard cubic feet H ₂ S <0.2% mol as H ₂ S |
| Ethane or Propane Content | <12% by volume |
| Fuel Gas Supply Temperature | < 130°F at supply point |
| Gas Heating Value (HHV) | Between 950 and 1,150 BTU/standard cubic feet |
| Condensate Carryover | None allowable – this is the purpose of Supplier’s filter-separator |

(a6) All materials, equipment, services, and future maintenance for the gas supply pipe, to the site termination point will be the gas transporter’s responsibility. The pipe internal diameter must be capable of being cleaned using “pigs” and is to be clean and acceptable for service upon completion of the installation. AEP shall review and provide approval for all engineering drawings for any portion of piping and associated facilities installed on AEP property.

(a7) The gas transporter will provide all necessary access roadways for construction activity, future maintenance, and inspection needs. Additionally, any power requirements and lighting will be the responsibility of the transporter.

(a8) The gas transporter shall restore all construction site areas, other than roadways and access, to an “as-found” condition. Any excavated material shall be distributed evenly to blend in with the general contours of the area, unless otherwise required per any right-of-way agreements.



(a9) The gas transporter shall restore AEP property to “as-found” conditions, including re-seeding of grassy areas, except access and roadways. Any excavated material shall be distributed evenly to blend in with the general contours of the area. Areas immediately under equipment and termination points shall be covered with a 6-inch base of gravel.

(a10) As a minimum, for pipe and equipment installation, the gas transporter must meet the requirements of B31.8 and 10CFR, Title 49, Part 192 safety requirements, NFPA 54 and 56, and applicable AGA measurement standards. Additionally, the gas transporter is to be in compliance with the FERC approved tariff, if applicable, for the associated pipeline the gas transporter is interconnecting to, and the gas transporter must provide physical security of its equipment to safeguard against improper actions.

(a11) The gas transporter’s revenue meter station shall provide the following data information to AEP’s Process Information system. (All inputs to the AEP system shall be secure and must not be internet addressable. Modbus Serial communication via single mode fiber optic links is preferred.) The gas transporter shall provide a single mode fiber patch panel as the interface point and including the gas chromatograph connection point.

1. Gas Heating Value: BTU/SCF
2. Gas Flow: MSCF/HR
3. Gas Used Today: MSCF
4. Gas Used Yesterday: MSCF
5. Heat Input: MMBTU/HR
6. Energy Used Today: MMBTU
7. Energy Used Yesterday: MMBTU
8. Nat Gas Temp: DEG F
9. CO2 Concentration: %
10. N2 Concentration: %
11. Specific Gravity
12. Static Pressure: PSIG
13. Heat Value Signal Failure (this is built into our logic)
14. Instantaneous flow rate (MMBtu/Day)

(a12) All electrical components shall meet Class I, Division II, Group D, requirements for hazardous locations per NEC. All instrumentation shall be kept in good working order and proper calibration – any failed equipment shall be repaired and replaced as soon as is practicable, i.e., such that Owner Operations are not affected.

(a13) The pipe lateral must be cleaned, prior to service, in accordance with NFPA 56, and comply with AEP's "Natural Gas Venting, Purging, Inerting Procedure". The preferred cleaning method is a continuous inert gas (nitrogen or air) blow performed at low pressure and high velocity. Natural gas shall not be used for the cleaning media. Gas blows shall be performed in accordance with gas turbine OEM procedure.

(a13.1) All appropriate safety considerations shall be addressed in the Pre-Work Hazard Analysis, or Job Safety Analysis, including:

1. Barricading off the blow discharge area, exclusion zones
2. Ensuring all piping is secure and properly tightened
3. Review of blow procedures, including install/remove blow targets
4. Evacuation plan, muster point, hearing and eye protection, communication
5. Debris is captured, at the discharge point, from becoming projectiles
6. Safety related to use of nitrogen (asphyxiation, cryogenic temperatures)

(a13.2) The goal of the cleaning process is to flow the cleaning medium through the piping system to generate higher forces than can be achieved from the flow of natural gas during operation. The line blowing effectiveness is a function of the cleaning force ratio (CFR), as defined by gas turbine OEM. The gas transporter (contractor) shall conduct pipe flow velocity and CFR calculations. The CFR shall be greater than 1.1, but less than 1.5 throughout the length of the pipe. Calculations shall be submitted to AEP for record, prior to blow.

(a13.3) The pipe cleanliness criteria for the completion of the pipe blow shall be determined by the use and examination of a target plate, as defined by gas turbine OEM.

(a14) Other internal pipe cleaning methods may be acceptable provided the pipe is cleaned from all loose material and adherent material which could become detached during operation of the plant; and all water, oil, grease, and protective coatings are removed, and validated by target plate examination.

(a15) If launching and receiving pigging stations are provided, the portions requiring venting of gases will adhere to the NFPA 56 and comply with AEP's "Natural Gas Venting, Purging, Inerting Procedure". Locations shall be in Supplier's yard, upstream of Supplier's filter-separator, and shall be reviewed by Owner.

(a16) All below grade piping shall be provided with a fusion bonded epoxy exterior coating and cathodically protected. Cathodic protection design drawings shall be submitted for review and shall be completed by a NACE certified corrosion specialist. Venting on or within 50 yards of Owner's properties shall be identified with a Hazardous Area Map.



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(a17) Above grade piping shall be electrically isolated from the below grade piping and provided with a minimum of a dielectric insulating flange kit and a solid state decoupler at the below grade to above grade flange joint.

(a18) Throughout the execution of this agreement, Supplier shall be subject to damages if Site operations are negatively impacted due to Supplier's scope of supply as detailed in a1, a5, and a12.



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ATTACHMENT A1 – M&R YARD PROCESS FLOW DIAGRAM



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ATTACHMENT A2 – M&R YARD LOCATION PLAN