

Appendix A: Gas Pipeline RFP Specification

BIG SANDY POWER PLANT - 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 the Big Sandy Power Plant, located in Louisa, Kentucky.

The new Metering and Regulation Yard (M&R Yard) has a target completion date of March 2030.

(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 500 psig (velocity not to exceed 10,000 feet per minute) for a mass flow of 231,500 lbs./hr. or 126,600 Dth/day, based on an estimated HHV = 22,786 BTU/lb.) to two (2) GE 7FA.05 gas turbines.

(a1.1) Minimum pressure of 500 psig

(a1.2) Maximum pressure of 700 psig

(a1.3) Minimum flow rate compatible with a single CGT @ 93 MW unit heat rate of 12,134 Btu/kWh (LHV), or 1,129 MMBtu/hr (LHV).

(a1.4) Maximum flow rate of 231,500 lbs./hr. or 126,600 Dth/day

(a1.5) Higher heating value (HHV) of 22,786 Btu/lb, With a LHV value of 20,695 Btu/lb.

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

The gas supply pipe from the main gas header will come to the Big Sandy site from the north and terminate in a new metering and regulation yard to be located on the north side of Big Sandy property, just west of FM3521. The proposed custody transfer point is assumed to a 26 NPS Class 300 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. Drawings shall be submitted after award of contract and prior to installation for review.

(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 drains tank), a gas chromatograph (if required), revenue meter station, worker monitor regulators and double block and bleed.

(a5.1) The filter-separator shall remove 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 (if required) to report realtime gas composition and the other data as noted in item (a11)

(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 250,000 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 ft of pipe shall be supplied between the individual block valves.

(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 reserves the right to review and approve 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 are preferred.) The gas transporter shall provide a single mode fiber patch panel as the interface 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.

(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" dated 1-1-13. 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 General Electric's document: "Cleanliness Requirements for Power Plant Installation, Commissioning, and Maintenance" (GEK110843c), Section V: "Gas Fuel System Cleanliness and Acceptance Criteria".

(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 in GEK110483F. 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 described in GEK110843F, Section VII: "Steam Piping cleaning and Acceptance Criteria".

(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.

(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" dated 1-1-13.

(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.



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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.



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ATTACHMENT A1 – M&R YARD PROCESS FLOW DIAGRAM



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ATTACHMENT A2 – M&R YARD LOCATION PLAN