

Integrated System to Control Primary PM 2.5 from Electric Power Plants

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Summary

The fabrication drawings for the Advanced ElectroCore module and the water-cooled precharger were completed during this reporting period. The drawings were sent to four fabrication shops as part of a bid package. Of the three companies that chose to participate, the contract to fabricate the two components was awarded to Advanced Fabrication Services of Lemoyne, PA on 3 November 2000. Fabrication began the following week. The components are scheduled to be completed in mid to late January 2001.

The design of the dry scrubber was delayed while the problem of low dew point spread in the exhaust stream was resolved. The temperature of the exhaust gas from the outlet of the existing ESP is only 260 °F. Some of the sorbents to be tested are liquid and therefore, the amount of sorbent that can be added before the exhaust gas reaches the dew point is limited. The solution was to use a combustor to burn LPG and mix the two exhaust streams to get the desired temperature. Calculations indicated that burning LPG at the rate of 500,000 Btu/hr would be sufficient to raise the gas temperature to 400 °F.

Details

The detail drawings for the Advanced ElectroCore module and the water-cooled precharger were completed in mid-October. The drawing package consists of 40 drawings. During the last part of October the drawings were packaged with a set of bid instructions and sent to four companies that we had pre-screened to bid on the project. The prescreening was done to make sure that there was a reasonable fit between the size of the prospective company and the size of our job. Another criterion used in pre-screening was to make sure the company had the proper equipment and it was in good working order. The most important was the set of rollers needed to roll the 11-gauge, 10-foot long cylinders that make up the separators. The separators need to be rolled as one sheet and have a nice smooth inner surface so particles do not adhere to the inner surface. Of the four companies selected, one company was in Massachusetts, one in Florida, one in Tennessee and one in Pennsylvania.

The fabrication was awarded to Advanced Fabrication System (AFS) of Lemoyne, Pennsylvania on 3 November 2000. AFS came in as the lowest bidder. Construction began the following week with the support steel. The unit, shown in Figure 1, consists of a stainless steel precharger and Advanced ElectroCore module that are top supported by carbon steel support frames. The unit stands nearly 40 feet high and is fitted with ladders and catwalks to allow field access to inspect and monitor the operation of the unit.

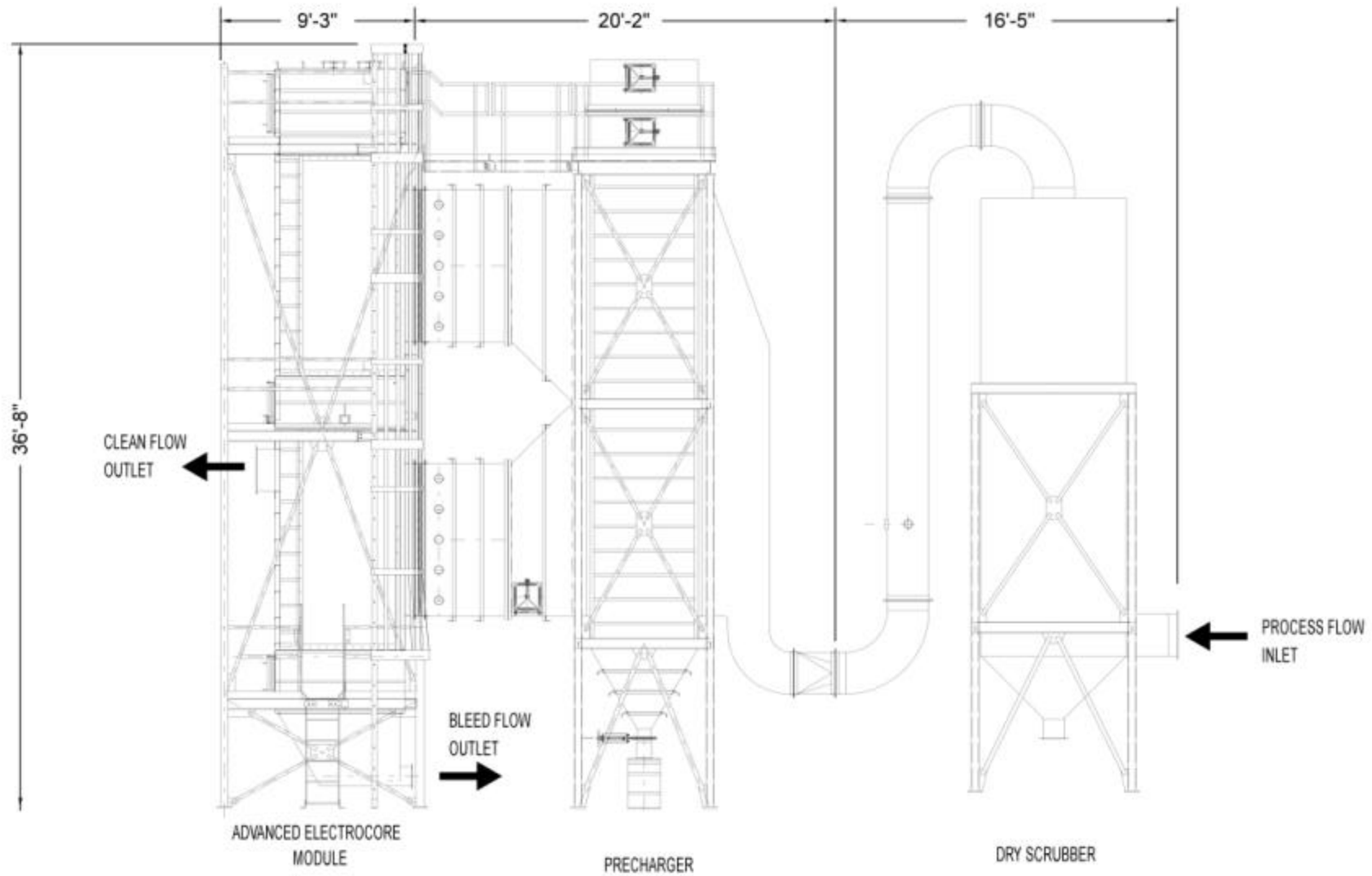


Figure 1: Advanced ElectroCore Field Prototype Elevation

Dry Scrubber Supplemental Heat

Initial estimates of the dry scrubber performance showed that the gas inlet temperature of 260 °F was probably too low to allow sufficient sorbent addition without reaching the gas acid dew point. Some thermodynamic calculations showed that, to generate 6000 acfm of 400 °F gas would require adding about 1270 acfm of 2000 °F exhaust gas to 4650 acfm of the existing 260 °F gas. It requires about 620,000 Btu/hr of heat input to generate the required 2000 °F exhaust stream. LSR has a combustor rated at 1.4 million Btu/hr that operates on natural gas but, since natural gas is not available at Gaston power station, the burner will be converted to LPG. According to Wallace Harrison of Southern Company Services, the plant uses LPG regularly and there is a supply company close by that can deliver the required tanks.

Work Planned For Next Period

In early January, LSR Technologies and Merrick Environmental will have a progress meeting at Advanced Fabrication Services to ensure all quality issues are resolved before the unit is assembled. Final details preparations for shipping will be discussed including meeting DOT requirements for oversized loads. LSR will also have a site preparation meeting with Alabama Power Company at the Gaston power station. The goal of the meeting is to make sure that issues such as space limitations, electrical power, water services and compress air services can be ready when the unit arrives in late January. The big milestone will be the erection and shakedown of the unit expected in February of 2000.

The dry scrubber drawings will be completed and construction of the scrubber will begin in January 2001. This delay is not expected to impact the testing schedule as the scrubber tests are not scheduled until the last part of the field testing. Tests of the Advance ElectroCore unit with just the precharger will begin as soon as the shakedown tests are finished. The dry scrubber will be installed next to the unit and connected into the system just before the sorbent tests begin.

Contractual Matters

EPRI has been soliciting interest from its member utilities to contribute additional funds to this project. The goal is to bring six (6) utility companies forward who will contribute \$100 K each. At the time of this writing, LSR and EPRI are negotiating a contract with the first of these companies (FIRST ENERGY). In connection with these funds, the power industry is presently fixated on PM2.5, mercury control, and various other HAP's. Therefore, our intention is to use these additional funds for extension in the performance period of this contract as we get more commitments from power companies for additional funding.