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Engineering Development of a Low-Emission Boiler System: Phase IV

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Abstract

The objective of the U.S. Department of Energy's Low Emission Boiler System (LEBS) program is to dramatically improve the environmental performance of future electric power generating plants fired with pulverized coal. LEBS performance goals are emissions no greater than 0.1 lbs NO_x/million Btu, 0.1 lbs SO₂/million Btu, and 0.01 lbs particulate/million Btu, and net plant efficiency exceeding 42% (HHV basis). Additional objectives include improved ash disposability, reduced waste generation, and reduced toxic substance emission.

DB Riley, Inc., has developed a 400 MWe Commercial Generating Unit (CGU) design meeting all environmental and efficiency goals, and has been selected to demonstrate key components of the LEBS concept in a Proof of Concept (POC) facility.

The Low Emission Boiler System incorporates a low-NO_x slag-tap boiler, and a regenerable, moving bed copper oxide adsorber for flue gas cleanup. In addition to meeting the emission goals, this approach eliminates flyash and scrubber solid waste streams. After a review of the CGU design and supporting test results, this paper describes the development of the Proof-of-Concept facility to be constructed in this final phase of the project. Plans to prove the LEBS firing system in commercial operation have been developed for two sites: A new, 80 MWe, mine-mouth IPP, and a 40 MWe equivalent repowering project at an existing cogeneration plant. Both options include a 10 MWe equivalent gas treatment facility for continuous operation of a single, commercial-scale copper oxide module.

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