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THE EFFECT OF IN-FURNACE COAL BLENDING TO COMBUSTION PERFORMANCE IN COAL-FIRED BOILERS

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Abstract

Coal-fired power plants typically receive coals of different qualities with different combustion characteristic that may cause problems to boilers such as poor combustion efficiency and high slagging potential. The use of such coals therefore presents a challenging task in terms of maintaining the plant availability and efficiency. One potential way to mitigate this issue is by conducting a proper in-furnace coal blending to optimize combustion performance in coal-fired boilers. In this study, the effects of in-furnace coals blending on combustion performance using coal properties assessment and computational fluid dynamic (CFD) modeling were investigated. Parameters such as ash fusion temperature, volatile matter, basic to acidic oxides ratio and iron loading have been used to determine the impact of coal on boiler performance. Four different coals that include bituminous and sub-bituminous coals have been selected for this study. Results from the simulation were then used to develop a guideline for the utilization of in-furnace blending method in coal-fired boilers. The results show that the use of in-furnace blended coal in tangential fired boiler was found to be able to improve combustion performance in term of furnace exit gas temperature and particle residence time. Iron loading was found to be the best parameter to determine suitable coal candidate in order to obtain optimum combustion for in-furnace blending cases as well as to predict problems associated with the firing.