## 7.20 Limestone Injection Multistage Burner (LIMB)

Objective: The objective of this program is the development, generalization and documentation of the basis for commercialization of LIMB for simultaneous control of $SO_x$ and $NO_x$ for pulverized coal fired boilers. The program goal for retrofit is 50 to 70% $SO_x$ removal and 0.2 to 0.4 lbs. $NO_x$ per $10^6$ Btu to provide a cost effective approach for control of acid rain. The research goal is 90% reduction in $SO_x$ and 0.2 to 3 lbs. $NO_x$ per $10^6$ Btu for optimized new systems.

Approach: Recent R & D results in the U.S. and Germany have shown the potential for $SO_x$ control by the injection of alkali sorbent through delayed mixing combustion systems, which also control $NO_x$. A coordinated R & D program has been implemented to address the major technical aspects of the technology. It includes bench- and pilot-scale experimentation to establish the emission control potential as a function of process characteristics and a system study to document the approach to commercialization by the private sector. The bench-scale work will establish: 1) critical chemical processes; and 2) the effect of combustion environment and operating variables on $NO_x$ control and $SO_x$ capture efficiency. The pilot-scale studies include experimentation on commercial and prototype low-$NO_x$ coal burners for new and retrofit systems for both wall- and tangentially-fired boilers. The system study defines solutions to application problems and provides the design and cost basis for commercialization of the technology. In view of budget reductions, field evaluation of the technology has been eliminated and the output of this study will provide the technical basis for private sector demonstration of LIMB, which will be necessary for widespread application. In addition, much of the bench-scale research will be performed in-house at IERL-RTP.

Rationale: Several analyses of the causes of acid rain indicate that the major precursors from pulverized coal-fired steam generators are $SO_x$ and $NO_x$. To retrofit conventional $SO_x$ control on the existing boiler population would impose a large economic burden. Therefore, a cost-effective retrofit technology is required. The LIMB technology is projected to give $SO_x$ reductions of 50 to 70% at a cost of $40/kW and $NO_x$ levels in the range of 0.2 to 0.4 lb/$10^6$ Btu on retrofit systems. In addition, the R & D studies will also identify the optimum approach for $SO_x$ and $NO_x$ control applicable to new sources in support of NSPS.