Office of Technical Assistance Research Proposal

Investigation of the Formation of Polycyclic Aromatic Compounds in the Combustion of Fossil Fuels

BACKGROUND

The combustion of fossil fuels by electric utilities and industrial and commercial facilities produces a wide range of air emissions, some of which are classified as hazardous air pollutants (HAPs). The emissions of HAPs, also known as air toxics, from a large number of industries are regulated by Title III of the 1990 Clean Air Act Amendments. In addition, many electric utilities and combustion systems at industrial facilities in Massachusetts are currently subject to the requirements of TURA. These requirements apply not only to listed toxics used in these facilities, but also to any listed toxics produced as byproducts of combustion, which includes HAPs such as polycyclic aromatic compounds (PACs). PACs are included on the TURA list both as a category (consisting of 19 specific compounds) and in the form of a number of individually listed compounds (e.g., anthracene, chrysene, and naphthalene). In 1998, the most recent year for which TURA data is available, two utilities reported the generation of more than 32 million pounds of PACs.

An assessment of HAPs emissions by the Electric Power Research Institute (EPRI) concluded that existing particulate and SO_2 control equipment at fossil-fired plants captured significant amounts of the HAPs studied. This finding, however, does not reduce the TURA compliance requirements of combustion system operators. Rather than rely on end-of-pipe treatment or controls, TURA requires companies to evaluate the processes they use in their facilities to identify opportunities to reduce or eliminate the use or byproduct generation of listed toxics. In the case of combustion systems, this means that operators are searching for ways to reduce the formation of HAP emissions through changes in equipment design, system operating and maintenance procedures, and/or the type of fuels fired.

PROJECT OBJECTIVE

To assist combustion system operators in these efforts, additional research is needed to better understand the formation of organic HAPs such as PACs. The long-term goal of this work would be to identify changes in equipment design and/or operation that will lead to reducing the quantity of these materials produced in a combustion unit, i.e., conditions that will result in the more complete combustion of the fuels fired. Depending on available resources, this research should be conducted in both coal and oil-fired units using fuels similar to those burned in combustion systems at electric utilities and manufacturing plants in the state. OTA can assist in the identification of an industry partner for this project.