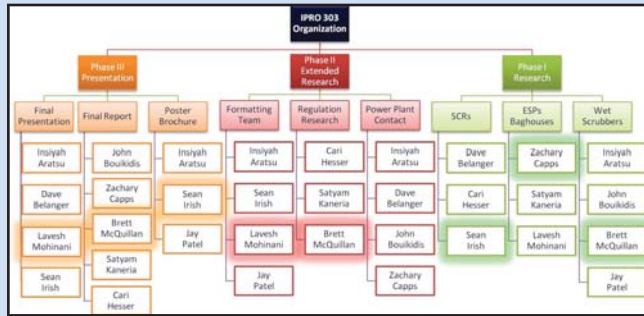


# Sponsor Information

SmartSignal of Lisle, Illinois is a prominent provider of equipment failure warning systems in a variety of industries. SmartSignal's unique solution contains intellectual property that models the behavior of major individual sub-components (assets) of complex facilities and equipment such as commercial airplanes, electric power generation plants, and petroleum refineries. SmartSignal delivers this information via its WatchList web application. The WatchList displays actual versus modeled behavior for each critical sensor on the key operational assets in these industries. This information leads to early warning of mechanical failures, performance problems, and an ongoing indication of the condition of the facility.



# Team Breakdown



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# IPRO 303

## Failure Prediction Modeling for Power Plant Emission Control Systems

## Team Members

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- Insiyah Arastu
- John Boukiddis
- Jay Patel
- Brett McQuillan
- Satyam Kaneria

**Faculty Advisor**  
Edmund Feldy PE

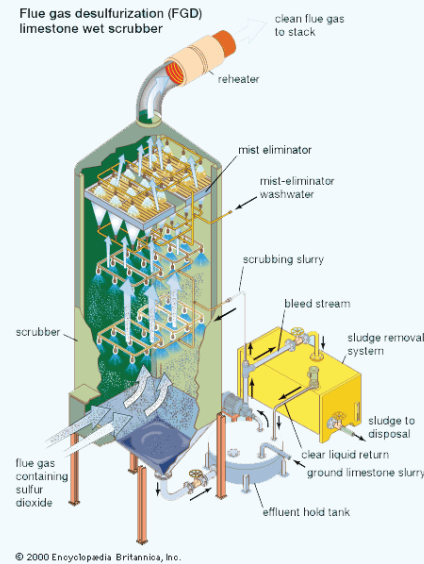
# Goals and Objectives

The main goal of IPRO 303 was to investigate how SmartSignal's modeling technology can provide value in detecting problems on environmental systems: The main objectives that SmartSignal would like for the team to investigate are:

1. What are the regulatory drivers and changes in laws/regulations occurring at various points in time? Are the regulations fleet-wide or regionally specific?
2. What types of systems are being deployed to remove what pollutants?
3. How much instrumentation is available on these systems, and what signals are measured (temperatures, pressures, chemistry analysis, etc.)?
4. What are the failure and performance degradation problems that occur? How common are they? What are the ramifications of these problems: outages, derates, having to burn more expensive fuel or turn on "peaking" generation units that are more expensive to run, just to name a few possibilities.
5. How can available instrumentation be used to remotely monitor and detect developing problems?

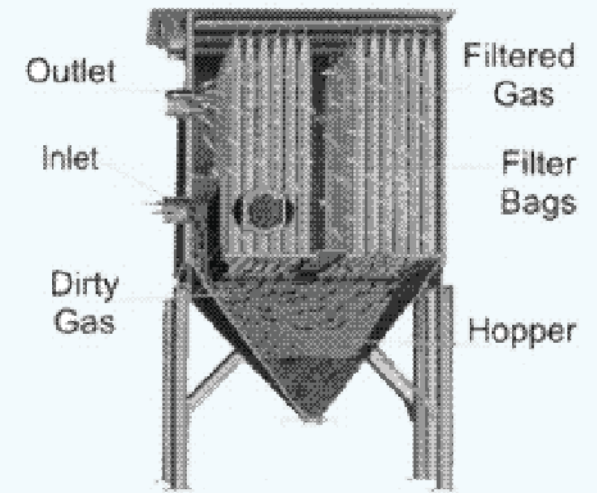
Students in this IPRO researched and answered the questions listed above. The research was gathered from literature, Internet, and experts in the field. Trips to two different coal powered power plants also helped students understand the different systems in question.

# Wet-Scrubbers



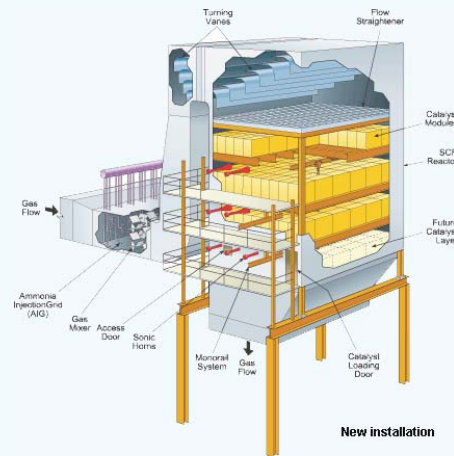
Wet-Scrubbers remove fly ash and sulfur dioxides from the flue-gas exiting the boiler

# Baghouses



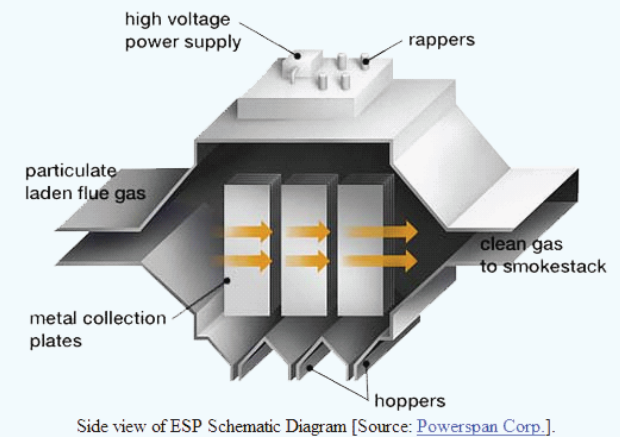
Baghouses remove flyash particulates from the flue-gas exiting the boiler

# Selective Catalytic Reducers



Selective Catalytic Reducers remove nitrous oxide gases from the flue gas exiting the boiler

# Electrostatic Precipitators



Electrostatic Precipitators remove fly ash particulates from the flue-gas exiting the boiler