

## GAS CONDITIONING PROCESS

### General Process Diagram

The flue gas conditioning process includes the following elements. For further graphic detail, see the Process and Instrumentation Diagram sheet number listed beside each element.

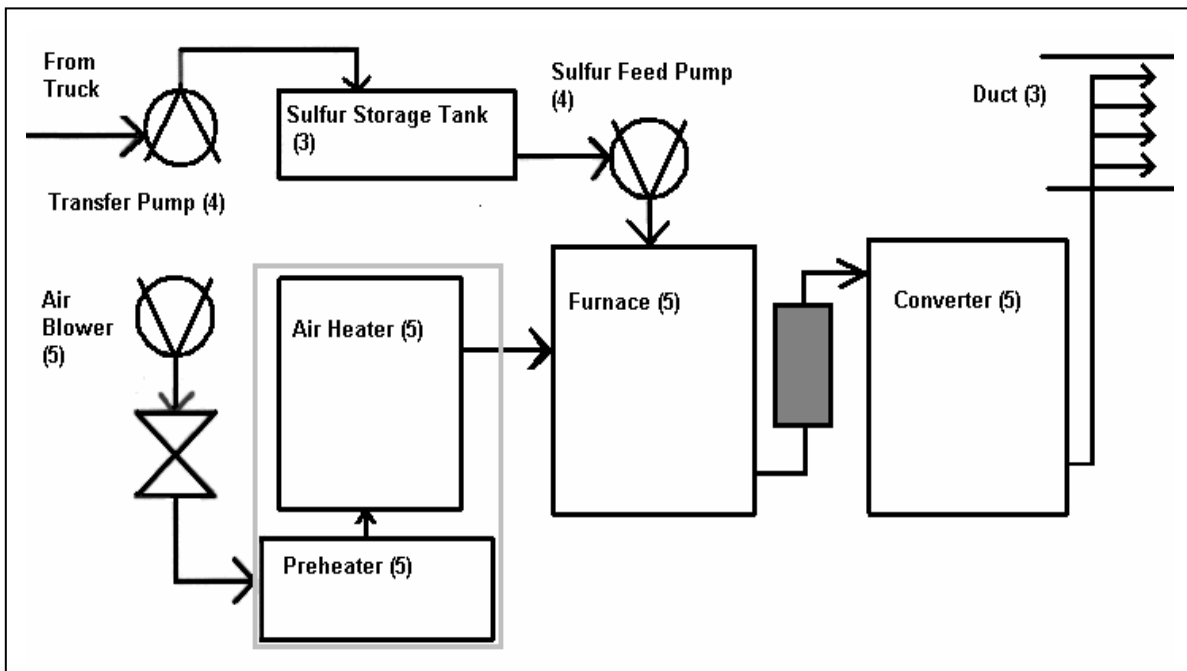


Figure 1-1 Process Diagram of the Flue Gas Conditioning System

### Delivery, Unloading, and Sulfur Feed

Step	Event
1	The sulfur is delivered to the power plant in a heated, liquid state in tank trucks.
2	A pump transfers the liquid sulfur to a heated storage tank.
3	From the storage tank, the sulfur is pumped through steam jacketed piping by a positive displacement feed pump to the combustion furnace. The pump speed is controlled to regulate the amount of sulfur trioxide to be produced by the system in accordance with the amount of flue gas to be conditioned.

(continued)

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*(continued)*

### **Combustion**

The sulfur is oxidized according to the following formula.



<i>Step</i>	<i>Event</i>
1	Combustion air is provided by a fan through a heater which preheats the air to 800 °F. The hot air ignites the sulfur in the furnace without an external ignition source.
2	Once combustion has been established, the air heater power is reduced to maintain the temperature of the gas leaving the furnace between 800 - 825 °F.
3	The combustion gases pass through a static mixer to the catalytic converter.

### **Conversion**

<i>Step</i>	<i>Event</i>
1	The catalytic converter contains a bed of ceramic media filter material and a bed of vanadium pentoxide catalyst which converts the sulfur dioxide to sulfur trioxide according to the following formula: $2 SO_2 + O_2 \rightarrow 2 SO_3 \quad (\text{Heat of reaction} = 1,252 \text{ BTU/lb S})$
2	The mixture of gases leaving the converter consists of about 3.5% SO <sub>3</sub> , 0.3% S O <sub>2</sub> , and the balance air. The gas temperature varies between 850° and 975° F, depending upon the amount of sulfur being burned.
3	From the converter, the gases flow through insulated piping to a manifold at the point of injection into the flue gas duct.

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*(continued)*

### ***Injection***

<i>Step</i>	<i>Event</i>
1	From the converter, the SO <sub>3</sub> is piped to two manifolds, one for each duct.
2	From the manifold, the SO <sub>3</sub> is distributed into a series of six injection lances which are permanently mounted in the flue gas duct.
3	The SO <sub>3</sub> is injected into the flue gas by a series of pipe nozzles, arranged according to the cross section of the flue gas duct at the injection point. This enables the nozzles to distribute the conditioning gas uniformly in the flue gas.