How an SCR works

An SCR uses ammonia gas to create a chemical reaction that converts nitrogen oxide into nitrogen and water. Here’s how:

- AEP often uses urea, a harmless compound often used as fertilizer, delivered to the plant site where it is mixed with water.
- The urea mixture is then cracked by the use of steam to drive off the ammonia as a gas.
- The ammonia gas is piped into the flue gas ahead of the SCR.
- The ammonia reacts with the NOx in the flue gas as it passes over the catalyst resulting in the formation of nitrogen gas and water vapor.
- The nitrogen and water vapor are released into the atmosphere.

What is NOx?

During combustion, nitrogen in coal and nitrogen and oxygen in air combine at high temperature to form a group of molecules: nitrogen oxides (NOx). Nitrogen oxides (NO, N2O, NO2) convert to nitric compounds when exposed to the air. These eventually can fall to earth as acid rain.

NOx has been cited as one of the precursors of ozone at ground level. When NOx combines with Volatile Organic Compounds, or VOCs, in the presence of summer temperatures and sunlight, ozone is produced. Ozone in higher levels of the atmosphere protects the earth from ultraviolet radiation. But ground-level ozone can cause regional haze and potential health problems for some people.

The U.S. Environmental Protection Agency (EPA) has adopted new regulations requiring many electric utilities in the United States, including AEP, to further reduce NOx emissions.

What an SCR does

A Selective Catalytic Reduction system (SCR) uses a chemical reaction to convert NOx back into harmless nitrogen and water vapor, reducing NOx emissions by up to 90 percent.

At the present time, SCR technology is the best available technology for making significant reductions in NOx emissions. While SCRs are rather new in the U.S., they are common in Europe.

On-site urea to ammonia

AEP’s SCR units often use an on-site ammonia production system for the SCRs’ ammonia supply. This means that ammonia gas for SCR use is not shipped to or stored at the plant. Instead, urea is transported to and stored near the plant and is used to create ammonia gas on an as-needed basis. Under atmospheric conditions urea is a stable white, granular power that is not classified as toxic. It is common to see this granular urea in lawn fertilizers.

SCRs at AEP

At present, AEP has installed or is installing SCR technology at more than 20 coal-fired generating units in the eastern U.S.

Facts at a glance

- SCRs reduce nitrogen oxide (NOx) emissions. Nitrogen oxides are a precursor to ozone at ground level.
- Despite increases in power generation using coal, NOx emissions have decreased 35% in the past 30 years.
- SCRs typically remove up to 90 percent of NOx emissions.