GROOME
Industrial Service Group

CASE STUDY FOCUS

HRSG Maintenance
SCR System Retrofit, Modification, Cleaning & Tuning

CLIENT

Pacific Northwest Gas-Fired Facility

BACKGROUND

A gas-fired power facility in the Pacific Northwest consists of a 1 x 1 7EA combustion turbine configured for co-generation of power and steam. The plant was originally constructed with CO catalyst and SCR catalyst for the control of CO and NOx, respectively.

For various reasons, previous ownership removed the CO catalyst and CO catalyst framework from the exhaust system, leaving only the SCR system. The SCR system was also upgraded to include a lower pressure drop option. After these changes were made, there was a reduction in the overall SCR system performance. Numerous attempts were made by the plant and other contractors to restore performance, but it was never able to be restored.

OBJECTIVE

Groome was contracted by the plant to determine the root cause of sub-optimal system performance, recommend a solution, and perform the system modifications required. Groome partnered with Environex, Inc. for support with investigation, engineering, and design.

SOLUTION

Through a detailed investigation, the root cause of the SCR system non-performance was determined to be bulk exhaust flow maldistribution. The removal of the CO catalyst and the change in SCR design unintentionally reduced exhaust flow dispersion and created an insurmountable RMS distribution.

After determining the root cause of the SCR performance issues, several methods to improve performance were identified. Ultimately it was decided to design and install a perforated plate to improve exhaust flow distribution. The perforated plate used the superstructure remaining from the CO catalyst for support. Repurposing the CO catalyst superstructure helped save the plant significantly in terms of overall project cost.

The ammonia delivery and injection systems were cleaned, modified, and tuned based on the new exhaust flow profile.

RESULTS

After the SCR system retrofit, modification, cleaning, and tuning, ammonia consumption was shown to be reduced by 85 lbs/hr on average. Inlet ammonia-to-NOx %RMS distribution improved from 37% to 21%. Ammonia slip was reduced from 6.7 ppmvdc to 1.1 ppmvdc, while achieving between 88 and 89% NOx conversion. The SCR system performance was successfully restored.