Case No. 801: Controlling NOx from Gas Drilling Rig Engines with Johnson Matthey’s Urea SCR System

The state of Wyoming and the Bureau of Land Management (BLM) requested all gas drilling companies in the Pinedale Anticline to reduce NOx emissions from their drilling rigs. After a competitor’s SCR systems failed to meet the requirements, Shell Exploration and Production Company contacted Johnson Matthey for a solution to this challenging application.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Targeted Emission Level</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx</td>
<td>90% reduction or 0.70 g/hp-hr</td>
<td>91 to 99%</td>
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<tr>
<td>NH3</td>
<td>≤10 ppm</td>
<td>Average 2 to 3 ppm</td>
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Background

Rapidly expanding natural gas drilling activity in the Pinedale Anticline in Wyoming has resulted in the need for environmental emissions reduction regulations for all gas drilling rigs in Southeastern Wyoming.

Shell Exploration and Production Company needed to control NOx emissions from their natural gas drilling rigs (each equipped with three Caterpillar 3512BDITA engines). However, the dramatic engine load swings experienced in the drilling operation coupled with the harsh environment led to the near immediate failure of all the SCR systems provided by a competitor.

To solve the problem, Johnson Matthey and Shell worked closely together to replace the competitor’s non-functional systems with Johnson Matthey equipment and their more advanced catalyst technology.

Johnson Matthey provided extensive engineering, project management and complete installation and commissioning support for the project. The modular design of the Johnson Matthey SCR systems also makes them easy to transport and reassemble at a new drilling location with minimal effort.

Summary

- **Product:** Urea SCR system
- **Application:** Three 1476 hp Caterpillar 3512 BDITA diesel engines
- **Customer:** Shell Exploration and Production Company
- **Location:** Pinedale, Wyoming
- **Installed By:** Johnson Matthey SSEC
- **Date Installed:** March 2008
- **Operation:** Drilling rig prime power
- **Pollutants:** NOx
- **Comments:** In this harsh environment, the Johnson Matthey SCR system reduced NOx emissions by >90% and maintained ammonia slip of <10ppm throughout the extreme engine load swings of the gas drilling operation.