

New opportunities

SCR could bring fresh business potential for tank fleets

MOST of the new diesel engines set for launch in 2010 will have an emission control system that includes selective catalytic reduction (SCR). The new system will bring both business opportunities and technology challenges for the tank truck industry.

On the opportunity side, the SCR systems currently under development use a diesel exhaust fluid containing an engineered grade of urea, a liquid chemical. According to some estimates, the US trucking industry will consume at least one billion gallons of urea a year within four to five years of the 2010 engine launch. Diesel engines in cars and light trucks also will have SCR emission control systems, which could push total demand for SCR-grade urea well above one billion gallons.

All of the urea used in trucks and cars will be transported by tank truck at some point in the distribution process. Suppliers of SCR-grade urea are now in the process of developing transport requirements and building a distribution network.

Managers from Terra Environmental Technologies Inc, headquartered in Sioux City, Iowa, and part of one of the largest producers of nitrogen-based products in North America, met recently with *Bulk Transporter* to discuss their plans for serving the SCR urea market in North America. They stressed that SCR urea is an engineered chemical that must be handled properly to maintain quality and purity.

"We're developing an integrated supply approach for this highly engineered product," says Barry Lonsdale, president of Terra Environmental Technologies. "We have to ensure that we can meet tight quality requirements throughout the distribution process. We have two key issues: The SCR urea must contain a precise concentration of ammonia when it

reaches the customer; and the purity of the urea solution must be very high.

"Impurities could cause failure of the emission aftertreatment system. We're already seeing the effects of non-compliant urea in test fleets. One



John Lounsbury, Terra Environmental Technologies, stands next to a diesel exhaust fluid dispensing unit manufactured by Dresser Wayne. This dispensing unit could be installed at truck stops, fleet terminals, and truck repair shops.

of the biggest concerns we have is that some truck operators will be tempted to use ag-grade urea, which doesn't meet the 2010 diesel engine spec and will kill the catalytic converter. In addition, we know that off-spec foreign imports probably will enter the North American market."

Strict requirements

Terra Environmental Technologies calls for strict requirements to ensure problem-free distribution of its SCR-grade urea. Tank trailers and truck-mounted cargo tanks can be non-code but must be constructed from 304 stainless steel at a minimum. Cargo tanks must be insulated because urea freezes at 12°F. Stainless steel pumps with filters will be needed. Seals and

product hoses should be made of urea-compatible materials such as EPDM (ethylene-propylene diene monomer).

"It's critical to avoid tank hardware containing iron or carbon steel and alloy materials such as aluminum or brass," Lonsdale says. "Ideally, cargo tanks should be dedicated to SCR-grade urea. We think dedicated tanks are the best way to limit the need for cleaning, which adds to shipping costs and might leave residues that could contaminate a urea shipment."

Other participants in the SCR-urea supply chain will include truck stops, truck dealers and repair shops, and fleet terminals. "We're working hard to assemble all of the pieces of the supply chain," says John Lounsbury, marketing director for Terra Environmental Technologies. "We're confident that we'll be ready for the 2010 rollout of the SCR-equipped diesel truck engines. We believe we'll be able to get the urea distribution process up and running fairly quickly in heavily traveled areas."

Terra Environmental Technologies is working with dispensing system manufacturers Gilbarco Veeder-Root and Dresser Wayne on standardized urea dispensing units that would be placed on the diesel fuel islands at truck stops.

"We may start with a tote or two of urea at some truck stops, but we should have the permanent systems with bulk storage in place fairly quickly," Lounsbury says. "Repair shops and fleet terminals may use totes. We will also provide urea in smaller packages, including one- and two and 1/2 gallon plastic bottles for topping off the urea supply."

Among truck stops, Pilot Travel Centers recently announced that it plans to be the first to carry diesel exhaust fluid (urea) "at the pump" for SCR-equipped trucks. Initial rollout plans call for urea to be economically

available in bulk at more than 100 Pilot Travel Center locations across the United States in mid-to-late 2009. In addition to urea dispensers at the fuel islands, Pilot Travel Centers will sell pre-packaged top-off quantities.

Over a relatively short time, demand for SCR-grade urea will surge in the trucking industry. Heavy-duty truck engine builders that plan to use SCR include Cummins Engine, Detroit Diesel, Mack Trucks Inc, Paccar Inc, and Volvo Trucks North America. International is the only major North American truck engine builder announcing plans to forego SCR at this time.

The other engine builders chose SCR because they believe it is the only reasonable technology option for meeting the near-zero emission limits required for diesel engines built in 2010 and beyond. SCR works by injecting diesel exhaust fluid—automotive grade urea and demineralised water—into the exhaust stream of the diesel engine before it passes through a catalyst.

The ensuing chemical process, called selective catalytic reduction, converts the exhaust into nitrogen and water vapor, resulting in near-zero emission levels. Tests have shown that SCR can reduce nitrogen oxide (NOx) emissions up to 90% while increasing fuel efficiency (which lowers CO2 emissions). Combined with a diesel particulate filter, SCR reduces engine emissions to nearly zero.

That's the upside for the technology. The downside is that trucks with the 2010 engines will cost more and will have more emission control hardware. Including the diesel exhaust fluid (9.3 pounds per gallon), this is going to increase truck tare weight. The SCR-grade urea also is pricy.

Tank fleets will face even more of a weight penalty with SCR-equipped trucks, according to some maintenance managers. PTO-powered product pumps on tractors may become a thing of the past. The SCR emission control system takes up so much space that there is no room to mount a pump on the tractor frame.

The amount of diesel exhaust fluid carried on a truck will depend on the fuel capacity. Based on an estimated dosing rate of 3% to 5%, a truck with a 300-gallon fuel supply probably would need a 15-gallon plastic or 304 stainless steel insulated diesel exhaust fluid tank.

Failure to replenish the diesel exhaust fluid would create big problems. As the fluid runs out, warnings would sound. Once the fluid is gone, engine torque will drop rapidly, and the engine will go into a limp mode.

Six plants

Terra Environmental Technologies will produce SCR-grade urea at its six plants in Canada and the United States. Terra Environmental Technologies was formed by Terra Industries Inc in 2003 to serve customers using nitrogen products to reduce NOx emissions from various sources, including power plants, and in environmental processes such as water treatment plants.

The SCR-grade urea is made from natural gas. The solution used for diesel exhaust fluid consists of 32.5% urea and 67.5% ultrapure deionized water. The ideal

Terra Environmental Technologies is the right choice for your supplier partnership. Our clearly defined supply chain, quality reagents and individualized services help customers all over the country meet local, state and federal quality standards.

QUALITY OF SUPPLY

- More than 40 years of manufacturing, handling and delivering all forms of nitrogen
- Onsite lab analyses to ensure conformity to specifications
- Certificate of Analysis with each shipment

RELIABILITY OF SUPPLY

- Integrated supply approach (from the supply chain to the gas fields)
- Robust North American distribution and infrastructure

PROXIMITY OF SUPPLY

- Strategically located manufacturing facilities
- Extensive manufacturing capacity in North America

operating range for the product is 12°F to 86°F. When stored within this temperature range the product has a shelf life of at least one year. Sustained storage at higher than 86°F temperatures can reduce shelf life.

A better diesel exhaust fluid with greater temperature stability may be on its way. Terra Environmental Technologies recently was licensed to offer Kemira's Denoxium product technology. Terra Environmental Technologies will market this product as TerraCair Plus. TerraCair Plus is a mixture of urea, formic acid, and ultrapure deionized water.

TerraCair Plus offers users a number of benefits over straight urea. Most significantly, it will perform better at lower temperatures and does not freeze until -22°F. ■

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