Non-Road Diesel Supply Q's & A's

(Prepared by petroleum industry representatives on the MSTRS Non-Road Work Group)

What will be the effect of mandating that all non-road diesel meet the 15 ppm max standard?

While the final form of EPA's proposed non-road standards has not been defined, one option is for EPA to mandate that all Part 89 (8.6% of the diesel pool) or Part 89 plus marine and railroad (22% of diesel pool) be produced meeting the 15 ppm maximum sulfur highway diesel specification. Refineries currently supplying exclusively non-road diesel have avoided making diesel desulfurization investments in the past and thus, may have significantly higher 15 ppm diesel production costs than refineries that have previously made highway diesel investments. If 50% of either of these parts of the diesel pool cannot be cost effectively produced by current non-road production refineries, a 4.3% total pool supply shortfall in the case of Part 89 diesel or a 11% total pool supply shortfall in the case of a Part 89 plus railroad and marine mandate would result.

Because the highway diesel fuel requirement for 100% 15 ppm takes effect in mid-2010, non-road diesel fuel mandates in the MY2008 to 2012 timeframe could significantly aggravate the overall supply of 15 ppm diesel fuel by inducing historical non-road production out of the market (into home heating oil or export out of US or out of business). In fact, even a 4.3% total pool shortage (representing a 50% shortfall of Part 89 diesel or 5.7% of total 15 ppm pool) creates a potential for significant supply disruption all by itself. For these reasons a total mandate of 15 ppm maximum sulfur diesel for either Part 89 or Part 89 plus marine and railroad non-road diesel during the highway phase in is not recommended.

Why not phase in ULS non-road diesel fuel in the same way as the highway diesel fuel?

Another possible approach would be an 80/20 phase-in similar to EPA's final highway diesel rule, with a 100% requirement four years later. An 80/20 phase-in will require 4 of 5 refineries to make major investments required to produce 15 ppm diesel fuel. Presumably, the highest cost refineries would continue production of the higher sulfur product for four years. Due to the large mandated oversupply of 15 ppm product relative to the vehicles that need it, during this period both 15 ppm and 500 ppm non-road diesel fuel will serve the same market. Fundamental economics suggests that market differentials will be small regardless of the differences in the production costs. This situation will reward refineries that have delayed or continue to delay investments and makes it unlikely that large investment costs will be recovered by producers of 15 ppm diesel.

Large investments and poor returns make it unlikely that the investing refiners will build additional capacity. This capacity may be needed four years later should remaining refineries leave the non-road diesel market rather than making the additional investment.

How can the potential supply problems be minimized?
A third more cost-effective approach is to let the market match supply with demand. While a market based approach to new non-road diesel will not provide any relief to the potential for highway diesel supply problems, it does provide an opportunity for early introduction of non-road equipment utilizing 15 ppm diesel fuel with substantially less impact on the total diesel supply situation. This is mainly due to the relatively small size of the non-road diesel demand and the very slow rate of non-road equipment turnover coupled with the large mandated oversupply of 15 ppm diesel under the highway rule.

How large will the non-road ULS fuel demand be relative to amount that will be available?
At the end of MY 2010, just prior to the requirement that 100% of the highway diesel pool meet the 15 ppm standard, and if all refiners choose to invest, 54% of the total diesel pool (highway, non-road and home heating oil) is projected to be at 15 ppm based on the highway rule. If the new highway fleet has converted 7.5% per year for the previous four years, these new vehicles will demand only 20% of the diesel fuel in the entire pool. Assuming non-road equipment is converted or retrofitted to equipment requiring 15 ppm diesel fuel at a rate of 5% per year (a 20 year turnover period), the 15 ppm fuel required for new part 89 non-road engines will be 0.4% of the total diesel pool per year and other non-road would require 0.7%. If part 89 non-road conversion starts in MY 2008 and other non-road conversion starts in 2010, then by the end of MY 2010, there will be a demand for 22% (20% highway and 1.3% part 89 and 0.7% other non-road) of the total diesel pool to be 15 ppm compared to the mandated production of 54% under the promulgated highway rule. Even if a 20% production shortfall of 15 ppm product occurs, 43% of the diesel pool will still be 15 ppm. Thus, the volume of 15 ppm produced will still be about double the projected volume required to satisfy new vehicles.

Under this market-based approach, there would be adequate supply of 15 ppm fuel for new and retrofitted engines. There would also be adequate supply of current non-road diesel fuels. The area of concern is whether the 500 ppm diesel production plus the excess 15 ppm production could meet the needs of the older highway fleet. While the non-road requirement for 2% has the potential to slightly increase the total shortfall of highway diesel, it is a very small volume compared to the highway diesel pool and is probably smaller than the accuracy of diesel production and demand estimates.

What happens after MY 2010?
In MY 2011 the production of 15 ppm highway diesel jumps to 100% or 67% of the total diesel pool. Assuming normal fleet turnover, the highway demand for 15 ppm increases to 25% of the total pool and non-road (assuming the above fleet conversion requirements) increases to 3.1% for a total requirement of 28.1%. This is far below the 54% of total pool as required by the highway fuel. As the attached graph shows, the 15 ppm fuel required by vehicles and equipment for MY 2012 would be 35% of the total diesel pool.

Why does the refining industry claim that there will be a shortage of highway diesel fuel?

The refining industry remains very concerned about the initial supply of highway diesel fuel both in mid-2006, when there is a requirement for 80% 15 ppm max fuel and 20% 500 ppm max fuel and in mid-2010 when the 100% requirement for 15 ppm max fuel goes into effect. A study by Charles River Associates, Inc. and Baker and O'Brien, Inc. for the American Petroleum Institute assessed the likely refining industry response to a 100% 15 ppm requirement highway requirement and indicated the possibility that production of 15 ppm fuel could fall 12 % below demand in MY2007. The shortfall is due to current diesel production that cannot be converted to produce 15 ppm fuel at competitive costs using today's commercial technology. Even though 2007 15 ppm production is projected to be below 2007 demand, the total production of 15 ppm highway diesel fuel is higher than 1999 production of 500 ppm highway diesel. This is due to capacity expansions at refineries that can economically make the conversion from 500 ppm to 15 ppm.

Why are refiners hesitant to make investments to produce ultra-low sulfur highway diesel fuel?

To date there have been no studies that have specifically examined potential for a shortfall of highway diesel supply under EPA's final highway diesel regulation or that have examined the impact of non-road standards on highway or total diesel supply. Even though EPA's regulatory phase-in was designed to avoid supply problems, the refining industry remains concerned about the highway diesel supply situation. EPA's requirement for large volumes of 15 ppm diesel fuel, far in excess of the actual vehicle demand for this fuel, forces refiners to produce a product with very little demand. This creates a situation of being unable to recover the very large capital investments needed to produce the product. Such a situation is not sustainable and brings into question the ability of refiners making these investments to invest even more to increase capacity for a product that is already vastly oversupplied relative to the vehicles that need it. Once the opportunity to make these production capacity increases has passed initially, it will become much more expensive to pursue these same options in the future. Without capacity expansion, production in 2007 will still fall 12% below the 2007 demand. This is a result of the highway regulation that discourages investment in increased production capacity. When cost inefficient refineries that elected not to invest in 15 ppm diesel no longer supply the market, a supply shortfall could potentially exceed 20% because the lost increases in production will be added to this lost production.

How long would the potential highway diesel supply disruptions last?

If supply shortfalls occur, market forces will act and supply will eventually equilibrate with demand. This process could take 2-3 years because of the time required to construct new capacity.

What options exist should shortfalls occur under a market-based phase-in of non-road diesel fuel?

The refinery distillation cut points between gasoline, kerosene and diesel are not exact and can be moved slightly depending on the overall economics of each fuel type.

Typically, most refineries adjust these cut points to maximize gasoline production in the summer and to maximize diesel production in the winter. These changes can add or subtract around 5% of the diesel pool. The small volume of 15 ppm diesel fuel required for non-road should be able to be covered by this annual 2.5% (5% for half of a year) switching capability until additional capacity is added. Note that this switching capability moves a part of any supply shortfall into the gasoline market. However gasoline production is about 4 times diesel production, so the impact is much smaller.

Won't other factors, such as single customer tanks, result in a demand for ULS non-road diesel fuel that is much greater than that of the new engines equipped with emissions controls?

Concerns have been raised that many non-road diesel fuel users may have only one fuel tank, which must be converted to 15 ppm diesel with the first purchase of a new piece of equipment or the retrofit of existing equipment. The supply corresponding with these tanks would be larger than the supply needed by the new engines. At construction sites, diesel fuel is often delivered to equipment by trucks that have multiple compartments, which should be able to handle both fuels; however at farms and many other small sites only a single diesel fuel tank is available. Many farmers currently use highway diesel and it is expected that most of these will use highway 15 ppm diesel fuel in the future. Agricultural non-road diesel sales account for 1.5% of the total diesel pool. The remainder of Part 89 non-road diesel is about 7.5% of the total diesel pool.

If tankage constraints force all of the agricultural non-road diesel and 20% on the construction non-road diesel to be converted to 15 ppm diesel at the beginning of the non-road diesel program, this would result in an increased demand of 3% of the total diesel pool and would increase the MY 2010 demand for 15 ppm diesel from 22% to 25% of the total pool, still well below the 54% of the total pool that is mandated under the highway rule. While a 25% demand for 15 ppm diesel fuel will require more investment than a 22% demand, the amount of non-road diesel required would be 5% (2% for non-road equipment plus 3% for tanks) at the end of MY 2010, still much smaller than for a mandated requirement for all of part 89 or part 89 plus marine and railroads.

Note also that a longer phase-in period provides users with more time to recover potential investments that might be required to provide segregated tankage for existing non-road diesel for older equipment that is not replaced or retrofitted and for ULS diesel for new or retrofitted equipment.

What would be an appropriate date to require 100% of the non-road diesel to meet the 15 ppm specification?

The excess supply of 15 ppm created by the highway rule and slow fleet turnover, will continue until about 2018. Since the estimates to derive these dates can vary significantly, actual market performance should define when this requirement takes place. We estimate that when approximately 80% of the non-road engines in the marketplace require the 15 ppm diesel fuel, the refining industry will find it more economical to make all of the non-road diesel as ULSD rather than maintain a small volume of 5000 ppm fuel.