

DEER 2004 Conference
NESCAUM Sunday Evening "View From The Bridge" Presentation

"Perspectives Regarding Diesel Engine Emissions Reduction in the Northeast"
Michael Block, August 29, 2004, San Diego

Introduction

Hello, everybody, I would like to thank you for the opportunity to speak with you this evening, and I especially like to thank the organizers of this wonderful conference for this opportunity, as well. My name is Michael Block, and I represent the Northeast States' For Coordinated Air Use Management or NESCAUM.

As many of you may know, NESCAUM serves the Northeast States – the New England States as well as New York and New Jersey – in a variety of capacities, but primarily provides guidance on a myriad of regulatory fronts, encompassing heavy-duty and light duty, mobile sources and stationary sources. We don't promulgate regulation, but often craft model programs for our states to follow in their regulatory activity, and we collectively focus on air quality issues, exclusively. Additionally, in the past few years, we have become engaged in developing and implementing specific diesel emission reduction programs in our region, including retrofit projects as well as "best practices" programs such as idling reduction and truck stop electrification. It is against this backdrop that I would like to share our observations, and perhaps even offer suggestions to better understand the complex issues surrounding diesel engine emissions reductions.

NE States Pollution Issues – health, non-attainment

The Northeast States are really no different from many areas of the country, sharing many of the same air quality issues. Whether it is trying to meet State Implementation Plan (SIP) requirements or challenging health issues, NE states strive to find ways to reduce criteria pollutants, especially NOx and PM.

The NESCAUM region is very diverse, from the rural, picturesque countryside of many New England villages to the major metropolitan centers of Boston and New York City, from rural farmlands to major industrial corridors, from back roads to major transportation centers. The State of Vermont has less than ¾ M people, the City of New York over 8 million alone; the ports of Boston and New York/New Jersey are among the largest in the United States.

Against this backdrop are a myriad of air quality challenges, with many differences, but also many similarities. Areas as different as the South Bronx in NYC, and the State of Maine, for example, share many of the same health issues – the inner city South Bronx has an asthma mortality rate that is approximately three times higher than the national average, yet the comparatively rural state of Maine has one of the highest state-wide asthma rates in the nation, as well. Atmospheric and climatic conditions and air transport phenomena, among others, are contributing factors for this dubious distinction for both of these locales.

The bad news, of course, is these air quality issues permeate more areas of our region than I sometimes care to admit. The good news is that many of the model programs that NESCAUM develops for our states to consider are often embraced by the majority of our member states, because, as my small example demonstrates, what works for Maine can also work for Manhattan.

Northeast States' Diesel Engine Emissions Reduction Activity

Retrofits

The Northeast States, like many other parts of the country, have responded to these diesel emissions challenges through a number of voluntary programs supported by Federal and State funding. On the retrofit front, we've been instrumental in developing and implementing the two Federal Supplemental Environmental Projects (SEPs), with Cummins and Mack. Both programs are nearly complete, and both will yield significant NO_x and PM reductions for our region. The Mack program is of particular interest, since it incorporates a chassis dynamometer testing component designed to evaluate the in-use performance of the SCR and DPF combination that was used in the program. Installed on city refuse and Class 8 line-haul, trucks, testing performed in June of 2003 and again in 2004 yielded NO_x and PM results consistent with laboratory observations – 80 to 95% NO_x reductions for example. Details of the program and testing will be issued in an SAE paper at next years' Congress in Detroit.

In addition to Federal SEPs, a number of state and regional SEPs have prompted considerable retrofit activity, including no less than four separate programs for school buses in Connecticut. The Norwich School Bus Retrofit Program, now completed, included use of ULSD, DOCs and DPFs, for a fleet of over 40 school buses. It has the unique distinction of incorporating not just in-use, real-world tailpipe emissions data-collection, but also in-cabin and ambient student PM exposure monitoring. Our rationale was simple – we wanted to better understand the influence of the application of these emission control strategies on the students' environment. Results are expected, shortly.

In addition to Norwich, ambitious programs are underway in the Connecticut cities of New Haven, Bridgeport and Hartford, covering nearly 300 buses, and involving ULSD and a number of different PM-reduction strategies. Impressive as these may be, they are but stepping stones to Connecticut's longer-range goal of having every one of the more than 6,000 school buses in the state using ULSD and retrofit technology.

The City of New York has also taken significant initiatives to reduce diesel emissions, in this case from their sanitation and transit bus fleet. Both entities have been using ULSD – Transit since 2000 and Sanitation since 2002 -- and by the end of this year, over 3,000 refuse trucks, transit buses and construction vehicles will have been retrofitted with a variety of diesel emissions control devices.

For the nonroad sector, NESCAUM's work at the World Trade Center re-construction, which started in 2001 shortly after 9/11, continues and has been extended to construction projects in nearby Battery Park. On yet another front, diesel emissions from passenger ferryboat activity has come under intense public scrutiny. The transportation landscape in New York City changed dramatically after 9/11. Because of the extensive damage and current ongoing rebuilding of the rail and bus route infrastructure, ferryboat operation has emerged as a viable commuter transportation alternative, to the point where, today, New York City has the largest amount of ferryboat activity in the world. Two major emissions reduction pilot programs, one for the City-owned Staten Island Ferry fleet, and the other for a number of private ferries were initiated this year with the ultimate goal of retrofitting the entirety of both fleets.

Finally, a major construction project in Connecticut to rebuild the I-95 Bridge over the Quinnipiac River near New Haven has been under way for some time. This contacts-based project is incorporating use of ULSD, DOCs and DPFs where feasible, on over 25 pieces of construction equipment involved in with the project.

Best Practices

The other area of emissions reduction activity in the Northeast falls under “best practices” and primarily focuses upon anti-idling. Five of the eight NESCAUM states have some form of anti-idling regulation in effect, with varying levels of enforcement. Both New York City and New York State have a well-developed and funded enforcement program.

An adjunct to the “best practices” component of anti-idling is truck stop electrification or TSE. A number of TSE projects have popped up in the Northeast, with the most recent being a 100-space project currently under construction in Paulsboro, New Jersey. Using the IdleAire technology and funded by a state SEP, the project also incorporates an ambient monitoring at the site to assess TSE performance. This program complements two other completed installations, one at the Hunt’s Point Market in New York City with 28 spaces, and the other at two locations in Syracuse, New York totaling 44 spaces.

Regulatory Activity in the Northeast

Even with voluntary programs, the sheer size and longevity of the diesel fleet contributes to their being significant sources of diesel emissions. Diesel engines are near legendary for their robustness, and vehicles that remain in the fleet for many years are the norm, rather than the exception. In response, there have been a number of voluntary-based retrofit projects in the Northeast, as I’ve outlined above. The comparatively new development, however, is legislative and regulatory activity for *mandated* programs to use ULSD and some type of aftertreatment strategy to reduce diesel engine emissions. These encompass two broad areas, contract-based requirements, and outright regulatory mandates.

In December of last year, the New York City Council passed Local Law 77 which mandates use of ULSD and Best Available Technology (BAT) for all vehicles engaged in NYC municipal construction projects, starting in Lower Manhattan and phasing-in to all five boroughs within one year. Additionally, all NYC-owned municipal nonroad fleets have to use ULSD and BAT, regardless of whether they are actively engaged on a project – “if it’s owned, it’s installed.” NYC Departments of Sanitation and Transportation have sizable affected fleets. This legislation is one of the first endeavors of its kind, and it follows upon work that NESCAUM did in the late 1990s with Boston’s Central Artery and Tunnel Construction Project – the “Big Dig” – tying in use of diesel oxidation catalysts to construction contracts. In all, over 100 DOCs were installed between 1998 and 2000.

Following upon the LL 77, the State of New York has recently mandated a similar ULSD/BAT approach for construction projects statewide. Furthermore, at the most recent New York City Council Meeting on August 12th, no less than five new bills governing mandatory diesel engine emission reductions were introduced. These include mandatory low-emissions vehicle purchase requirements for the City, and use of ULSD and BAT for the following applications: all diesel-

powered vehicles owned by The City; refuse trucks either owned by The City or under City contract; all sight-seeing buses (private); and all school buses operating in The City. While these are still in the proposal stage, the success with LL77 as well as the New York State ULSD/BAT statute is indicative of a political climate in New York favoring mandatory programs for the current fleet.

On the mandatory front, The State of New Jersey has proposed sweeping requirements for use of ULSD and BACT for on-highway and nonroad applications – it would apply to both state and privately owned fleets. While still in the proposal stage, this endeavor has the strong support of the Governor until he leaves office in November, but all indications are that his successor until the next gubernatorial election, the state Speaker of the House, is committed to maintaining this high level of support. The stated goal is a 20% reduction in emissions from eligible vehicles, with the focus on PM but also including NOx, over a ten year period.

A public hearing was held in Trenton on July 22nd, NESCAUM and many others provided comment. It is highly likely that this legislation will be passed by early next year, and the State is promising significant funding to spur implementation. NESCAUM has already started working with NJ DEP on the regulatory aspects of this endeavor.

Needless to say, the seven other NESCAUM states are watching these developments for both contacts-based requirements and mandatory requirements very closely. NESCAUM has been asked to develop prototype model programs that the other Northeast states might adopt with the goal of having all the states promulgating similar programs of this type.

The other mobile sources regulatory activity occurring in the Northeast is not heavy-duty, but light-duty in nature and involves our low-emissions vehicle or LEV legislation. Like all states except California, we are preempted from promulgating our own regulations covering in-use vehicles, but we are allowed to opt-in to California regulation. The Northeast States have made significant strides in this area, and while not all LEV provisions have been adopted by all the states – there are differences in some ZEV provisions, for example – all have, or are in the process of becoming, LEV states other than New Hampshire, where there just has not been the political support.

Diesel Fuel Quality

As you all are aware, on the diesel regulatory front for new vehicles and equipment, EPA has promulgating the On-Highway Rule taking effect starting in 2007, and the Nonroad Rule, with the first phase starting in 2008. These are good regulations which NESCAUM has fully supported. They offer a balanced yet effective set of NOx and PM-reduction standards that will significantly improve our air quality. That is certainly true for the Northeast where diesel emissions from both trucking as well as construction are significant contributors to air pollution.

In conjunction with these new vehicle and equipment regulations are an associated set of diesel fuel requirements, designed not only to reduce the sulfur oxides of diesel engine emissions, but also, of course, to enable specific aftertreatment technologies. As expected, these provisions are also strongly supported by NESCAUM.

That said, while we are encouraged by the efforts and the results of mandated sulfur limits on diesel fuel, I would be less than candid if I did not express to you our concerns regarding the other properties of diesel fuel, and whether efforts should be made to consider some sort of legislated requirements. It is certainly known that diesel fuel quality for a number of parameters above and beyond sulfur content – cetane number, aromatics, even viscosity, lubricity and heating value, for example – have a marked effect upon diesel engine emissions. It is also well-established that fuel quality varies considerably, on a worldwide basis. What may not be apparent, or as well publicized, is the difference in diesel fuel quality on a regional basis. While on-highway, and soon nonroad sulfur limits are carefully controlled to meet regulatory requirements, other parameters are not. Most of the emissions reduction activity for the existing on-highway and nonroad fleet in the Northeast, encompasses installation of aftertreatment technology in conjunction with a fuel change from low sulfur diesel (<500 ppm sulfur wt., nominal 350) to ultra-low sulfur diesel (ULSD, <30 ppm sulfur wt., nominal 15), for the reasons stated earlier, which are primarily as a technology enabler, and secondarily for SO_x reduction. What we've discovered is the other fuel properties are also very different between these two, and while the sulfur reduction serves the dual functions of enabling technology and reducing SO_x, the differences in other fuel properties may compromise emissions and performance.

In the Northeast, there exists at the moment no supply of No. 2 ULSD; it is all No. 1, and aromatics, cetane and heating value differ considerably. Certainly, one can see the obvious cause and effect of the sulfur reduction, but are the variances in the other parameters having negative effects? NESCAUM is in the early stages of thinking about how to somehow ensure that the other properties of diesel fuel are consistent with what I think are our shared goals – low emissions, with no degradation in engine performance. This is clearly critical since ULSD is a key component for both the voluntary and the mandated programs I outlined earlier.

Diesel Emissions Reduction “Clearinghouse” Concept

Up to now, I've been discussing a number of programs in the Northeast, either real or contemplated, that may ring familiar to all of you, and this is by design and not coincidental. Mandatory heavy-duty emission reduction programs, our LEV activity, and our interest in diesel fuel quality, all mirrors in some way, legislative and/or regulatory activity that has been underway in California for some time. While California has been a leader on a number of fronts, there has nevertheless been considerable activity in the Northeast, in the Pacific Northwest and in Texas with their Texas Emission Reduction Program, or TERP. What becomes apparent is that many of these programs have many similarities, and considering the commonalty of the air quality problems from these seemingly disparate regions, this is not entirely surprising. And while there may be considerable dialogue between these regions, there is no formalized mechanism in place to reference these programs. What might make sense is an effort to develop this mechanism as a means of providing some sort of a glidepath for future programs.

What exactly do I mean by this? Well, in attending a number of retrofit workshops, and indeed in organizing our own regional workshop in New York City last year, it has become apparent that there is considerable amount of “wheel reinventing” going on. This encompasses many areas and doesn't just include control technology applications engineering, but also includes program development, management and implementation, securing funding sources, engaging fleet

participation, and so on. There are significant numbers of folks from the engine, vehicle, equipment and aftertreatment industry, from government, NGOs, environmental groups and other organizations that have and are continually garnering more and more experience with retrofit projects, and it may be time to try and synthesize this expertise into some type of clearinghouse, for want of a better term, so others less familiar, as well as the more experienced, can benefit from the emissions reductions from these types of programs.

Two initiatives already in place have started the ball rolling. First, the MOA between ARB and EPA for reciprocity between their two verification programs is certainly a first step. Second, under the Federal Advisory Committee Act (FACA), a Retrofit Sub-Group has been formed, and one of their many tasks has been to take a first cut at identifying and cataloguing as many retrofit programs worldwide as possible.

These are both admirable first steps. Now we need to take the next step, and I think what that might involve is adding to this worldwide retrofit list as many of the facets that make or break retrofit programs as possible – I named a few such as funding, fleets engagement, aftertreatment device engineering – but I'm sure we could collectively think of more. I envisage a web-based “home base” to share our collective experiences and insights into diesel engine emission reduction strategies (retrofits and, best practices) from which a set of guidelines can be developed as an enabler for future emissions reduction programs.

Conclusions

Finally, an acknowledgment of what has been accomplished. I think industry has done an impressive job of tackling the NOx and PM emissions challenge. Similarly, I see a trend where government and the environmental community appear to be working more closely in this regard, as well. Through this, I can envisage a balanced perspective that, through cooperative approaches, accomplishes environmental, regulatory and industry goals. NESCAUM will continue to work with all stakeholders to not only ensure continued air quality in our region, but to promote retrofit and other emission reduction activity throughout the US.

Thank you for listening.

Michael Block, August 29, 2004, San Diego