Marcellus Shale Testimony

Hello,

I am Patrick Gardiner and I am the Construction Services Manager for Michael Baker Jr.'s Harrisburg Office. Prior to my joining Michael Baker Jr., I was the Pennsylvania Department of Transportation (PennDOT) Bureau of Maintenance and Operations, Division Chief for Roadway Management. During my 27 years at PennDOT, I was the Chief for the Contract Management Division in the Bureau of Construction and Materials for three years and I was the Chief of the Quality Assurance Division in the Bureau of Construction and Materials for 10 years. I have been a registered Professional Engineer in Pennsylvania for 27 years.

As the Division Chief for Roadway Management, I was responsible for the statewide direction for roadway pavements. This included the anticipated life cycles of roadways and the timing for pavement replacements on a macro scale.

Regarding the Marcellus Shale impacts to the roadway systems, the transportation system was not designed for the heavy truck volumes being witnessed today. There are four basic types of roadway networks in north central Pennsylvania where a significant portion of the Marcellus Shale play is occurring. They are: major arterials, minor arterials, secondary roadways, and local roads. The major arterials are the highest level roads in the area. Examples of these are State Route 220, State Route 6, and State Route 15. The major arterials provide access thru the area and are the core of the transportation network. The minor arterials are the branches off of the through routes. They collect the traffic for specific areas and connect to the major arterials to provide ingress and egress to the public. The secondary system is the state owned roadways from the arterials to the homes and farms of the local residents. Traffic on these roads has traditionally been low and the truck use on these low level routes was milk trucks and farm related loads or local deliveries of supplies or fuel oil. The local roads have similar characteristics to the secondary system with the exception that the maintenance is performed by the local government such as the Township or County. The local roadways generally have a lower quality riding surface than the state owned secondary system. Many of the local roads are dirt and gravel.

When the Marcellus Shale gas play initiated in north central Pennsylvania, land owners signed leases with the gas companies and the operators came to their properties and built large rock drilling pads to support the rigs. Then hundreds of water trucks came to support the hydraulic fracturing operation. Because the State owned secondary system was built for local traffic and only occasional trucks, the roadways could not handle the heavy volume of truck traffic associated with the shale industry. The pavement structure was typically four to six inches of compacted stones for a base and multiple layers of the tar and chip surfacing placed over the years that form a crust. The secondary roadways quickly failed. The surface crust broke up and

turned to gravel. The pavement simply failed and the road was turned gravel in many locations. After a few rain events, the ground became soft and the base material failed. The roadway conditions continued to worsen and safety concerns become evident.

PennDOT initially tried to repair the damage, but this quickly became a losing battle. The secondary system was falling apart faster than PennDOT could repair it. Concurrently, PennDOT started to utilize the "Posted and Bonded Road Program" to control the damage. The "Posted and Bonded Road Program" allows PennDOT to evaluate the roadway pavement structure and place a weight restriction on the road if the pavement structure is not sufficient to carry heavier loads. Most of the secondary roadway system in north central Pennsylvania was not posted prior to the Marcellus Shale Industry coming to the area. PennDOT made a diligent effort to evaluate the pavement structure and post the secondary roadways. Over 4,000 miles of highway statewide have been posted under this program since 2008.

Once a roadway was posted, which is usually with a 10-ton maximum weight restriction, a gas company operator would approach PennDOT and request permission to exceed the weight restriction. In return for approval to use the roadway, the gas operator had to commit to maintain the roadway at the same quality level that it was prior to their heavy hauling. Additionally, the gas operator would have to provide PennDOT a bond to guarantee the integrity of the roadway. If the roadway conditions fall below "equal to or better than" the conditions when the overweight permit was issued, PennDOT would send the gas operator a notice to fix the road in five days or stop hauling on that roadway. As such, PennDOT needs to review the conditions of all bonded roads on a regular basis.

The gas operators have addressed the PennDOT Posted and Bonded requirements with a range of strategies. A few of the larger operators have adopted the concept that they are going to be utilizing the secondary roadway for a long period of time and are totally reconstructing their routes to accommodate heavy trucks. They utilize reclaimers, which are giant essentially rototillers, and grind up the existing roadway and base material. Then, cement and water are added and mixed into the ground up material. After the material is compacted and cures, it is a very good base for a new roadway. Subsequently, asphalt base and wearing materials are laid. After this treatment, the roadway is very sound and can support heavy truck traffic. All this work is done at the gas operators' expense. I was involved in the oversight of over 120 miles of total reconstruction in 2010. There is similar work occurring this year as well.

Other operators try to utilize the existing roadway and place a several inches of asphalt pavement on top of the current road to provide additional support. This scenario looks like a new roadway from the surface but the base does not always have sufficient strength to support heavy trucking for long periods of time or in very wet conditions. Yet again, there are other operators that repair the distressed spots after they develop. When this patching process is used, the contractor usually needs to return to the roadway on a regular basis to patch the distressed spots.

The Posted and Bonded process is working satisfactorily on the secondary system. However, there are commerce issues with utilizing the Posted and Bonded process on the arterial system. There are so many trucks from various companies on the major arterial system that it is not feasible to post that network. The minor arterials need to be evaluated on a case by case basis for the functionality of the Posted and Bonded process. These roads were originally built better than the secondary system especially the major arterials. Initially, these routes were holding up to the heavy truck traffic. However, the thousands of truck loads are taking their toll on the highways. PennDOT is regularly patching State Route 220 in Bradford and Sullivan Counties. State Route 6 is also showing the accelerated distress caused by the heavy trucking.

The gas operators are funding the maintenance of the secondary roadway system that they are using and the additional costs that PennDOT is accruing due to processing permits and road conditions inspections. However, the accelerated deterioration of the major arterials is unfunded and will require future review for a solution.

Thank you.

Do you have any questions?