

**Comments on Non-Road NO_x Reduction Strategies
8 Hour Ozone Attainment SIP Revision**

Houston-Galveston Area Council

July 15, 2008

BNSF Railway Company
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HGAC ID Number 30 – Use of APUs for locomotive operations to reduce idling

Note that auxiliary power units (APUs) are best suited for use in colder climates. BNSF typically deploys the APU units on switch engines that operate in areas such as Chicago and Denver. For example, the EcoTrans K-9 APU is used to provide electrical power to immersion heaters for lube oil and the main engine water. The south Texas climate would minimize the use of the APU. In the colder, winter months, the APU would operate as designed. However, for most of the year, the locomotive lube oil, diesel fuel and cooling water would never get cold enough for the APU to run.

BNSF has an aggressive program of adding idle reduction kits to the switch engines in the Houston-Galveston (HG) area. Currently, 15 switch engines have ZTR SmartStart units installed. The SmartStart unit monitors the “health” of critical locomotive systems such as battery charge and water coolant temperature. If the SmartStart unit determines that the locomotive is idling and can be restarted, the engine is shutdown. Unlike the APU, if the temperature drops and the lube oil and coolant water also cool below a set temperature, the main engine is restarted instead of using a smaller engine to provide auxiliary electrical power or heat.

As information, all new line haul locomotives that BNSF is purchasing come with idle reduction technology installed at the factory. All of the switch engines purchased under the TERP are equipped with idle reduction technology.

HGAC ID Number 31 – Accelerated Purchase of Tier II Locomotives

Since these NOx control measures were developed by HGAC, the EPA has passed new locomotive emission rules. Starting in 2009, the phase-in of Tier 3 locomotives will begin. Tier 4 locomotives, employing catalytic aftertreatment technology for exhaust gases, will be phased-in beginning in 2014.

BNSF has been aggressively purchasing new, more fuel efficient locomotives. As new locomotives enter the fleet, older units are removed from service. At the end of 2007, BNSF had 989 Tier II locomotives in its fleet. The annual purchase plan for new locomotives is approximately 300 per year. BNSF has spent billions of dollars modernizing its locomotive fleet over the last five years.

HGAC ID Number 32 – Electrification of Rail Switching Yards

The electrification of rail facilities is not practical for several reasons. First, the cost of undertaking such an effort would require massive expenditures of capital on construction and equipment acquisition. There are currently no Class I railroads in the United States that move freight using electricity off of the grid. Second, there is no large scale production of high horsepower locomotives that use external electrical power. Lastly, the implementation of this strategy would take many years to fully implement.

HGAC ID Number 33 – Efficiency Improvements on In-Use Class 1 Rail Equipment

BNSF requested further clarification from HGAC on this implementation strategy and never received a reply.

HGAC ID Number 34 – Limitation on Idling of Locomotives

Comments were provided by BNSF to the TCEQ on proposed locomotive idling regulations in 2005. See the attached document for specific comments on this NOx reduction strategy.

**COMMENTS OF THE
THE BURLINGTON NORTHERN AND SANTA FE
RAILWAY COMPANY**

on

**TCEQ's Proposed Rules 114.520, 114.522,
114.526 and 114.529**

Rule Project Number 2005-006-114-AI

**Submitted to the
Texas Commission on Environmental Quality
January 6, 2005**

The Burlington Northern and Santa Fe Railway Company (BNSF) is pleased to submit these comments on the above-referenced proposed TCEQ rules and revised State Implementation Plan narrative. The proposed rules were issued by the TCEQ on November 17, 2004. BNSF has approximately 70 switch locomotives operating in the Dallas / Forth Worth (DFW) area which would be subject to the regulation. We applaud TCEQ, the Council of Governments, and the business community for all the efforts to reduce emissions and improve air quality. Our corporate headquarters is located in this region and thousands of our employees live in the DFW area.

BNSF has several concerns regarding the effective implementation of the rules as they are currently drafted. The concerns include rail safety issues, employee productivity, preventing locomotive freezing, unnecessary requirements when we already are reducing emissions, and extreme recordkeeping requirements. The ramifications of a restriction for switch engines limiting idling to no more than 15 minutes are much greater than might be imagined to those unfamiliar with railroad operations. A locomotive is quite unique compared to trucks or construction equipment which also can idle considerably.

Safety of BNSF Employees and the Public

The Federal Railroad Administration (FRA) requires that the braking system on all trains be tested before they are cleared to leave a yard. The braking system on the railcars is operated by the presence of high pressure air. This high pressure air is supplied by a compressor that is powered by the locomotive engine. Depending on the length of train, it could take at least an hour of engine idle time to generate enough air

pressure to fully charge the braking system. To comply with FRA requirements, and provide for the safety of BNSF employees and the public, it is critical that the switch engine idle more than fifteen minutes to allow the braking system to be properly tested. In addition, if the air pressure in the system were to bleed off when the locomotive is standing with a group of cars and shut down waiting for the track to clear, the brakes could release allowing the train to roll into the path of other trains, cars or locomotives.

Every time that a switch engine is shutdown, BNSF policy requires that the locomotive be “tied-down.” This is done by setting the handbrake on the switch engine. If the switch engine is coupled to any railcars when it is shutdown, the handbrakes on several of the cars must also be engaged. This is a laborious process that involves spinning a large wheel that activates the brakes. When the switch engine is started again for movement, the process has to be reversed. The increased physical exertion on employees required to set brakes dozens of times during an eight hour shift could possibly lead to safety concerns.

During periods of cold weather, it is necessary to run the cab heater to provide warmth for employees. The cab heater operates off of power and heat provided by the main engine. Obviously, if the switch engine has to be turned off when occupied, the employees will not have a source of heat. This scenario presents unnecessary discomfort and danger during periods of abnormally cold weather.

Reduced Rail Facility Productivity

As was shown above, the act of shutting off a switch engine is not as simple as pressing a button and “walking-away.” Even the smallest engines exceed 1500 horsepower. These engines are difficult to start. An intricate set of procedures is in

place to start and stop the engine so that the switch engine is safe when shut off and that it will restart when needed.

The procedure that is in place at BNSF to turn off a locomotive has approximately five steps. Specific switches and circuit breakers must be turned off and isolated while others must be left on or closed. According to BNSF operating personnel, running through this shutdown procedure takes approximately 15 minutes per engine. Most switching is done with two locomotives, so each required shutdown would take approximately 30 minutes.

The EPA standard duty-cycle for a switch engine assumes that approximately 50% of the engine working time is at idle. Most rail facilities typically never close and the switch engines operate 24 hours a day. If 12 hours of the typical working day is spent at idle, the crews manning the switch engines will be required to perform the shutdown procedure dozens of times per day, causing significant delays to the movement of freight.

Trains that operate on our network have critical, highly sensitive time schedules that require strict adherence. This allows BNSF to maximize the utilization of its infrastructure and train crews. If a train can not leave a terminal due to congestion caused by slow railcar switching, a cascade of events occurs, which can cause a whole segment of track to become less efficient. For example, a locomotive on a train from Ft. Worth may be assigned to another train leaving Amarillo when it arrives. If the train from Ft. Worth is late leaving, it can also cause the train originating in Amarillo to be late. You can easily see how slowing efficiency at one yard begins to affect efficiency and time schedules across the system.

Under the proposed rules, the rail facilities in the DFW area will likely become less efficient. As a result, more switch engines will likely have to be used to perform the same level of work before the implementation of the proposed rules. This will have the adverse effect of negatively impacting air quality in the DFW non-attainment area, and actually increasing locomotive emissions instead of decreasing them.

Locomotive Freeze Protection

Unlike most internal combustion engines, locomotive engines do not use antifreeze compounds in their engine cooling systems. This is due to the high heat load that must be efficiently transferred from the engine to the cooling water during use. Because of this, locomotive engines are typically left idling during cold weather. If the engine were to stop during cold weather, the engine block could freeze, causing significant damage. Because of this, locomotive engines are equipped with an automatic dump system for the radiator water when it nears the freezing point.

All new line-haul locomotives come equipped with automatic start and stop equipment that is designed to keep the engine and fluids warm while minimizing idle time. We have retrofitted more than 1700 high horsepower General Electric locomotives with automatic start-stop equipment. This will reduce the amount of time our road fleet will idle in yards and at locomotive servicing facilities. However, due to the age of the locomotives, most existing switch engines do not have this equipment. BNSF is addressing this issue by adding after market idle control technology to a number of switch engines.

TERP Funded Idle Reduction Equipment

BNSF applied in 2003 for funding under the Texas Emissions Reduction Program (TERP) for the installation of idle reduction technology on approximately 30 switch engines in the DFW area. The application was successful and \$333,000 was granted.

The switch engines are being equipped with the ZTR SmartStart system. With this technology, several critical locomotive operating parameters, such as air pressure and cooling water temperature, are continuously monitored by the ZTR system. If all of the parameters are within an acceptable range, the locomotive is automatically shutdown during idle. If during the shutdown mode, one of the operating parameters falls below an acceptable limit, the locomotive is automatically restarted. This system does not have any auxiliary heating system to add heat to the locomotive fluids or the cab and will not shut down locomotives during cold weather.

If BNSF is forced to shutdown all switch engines after only 15 minutes of idle time, the effectiveness of the TERP funded ZTR systems is going to be negatively effected. The ZTR units that are currently being installed are programmed to conduct an auto stop of the switch engine at 20 minutes of idle time. While the switch engines are in the yard working, it is not anticipated that many auto stops will be initiated. This technology primarily addresses unnecessary locomotive idling that occurs.

Increased Recordkeeping Requirements

The recording of every shutdown event for every switch engine will be extremely burdensome. This additional recordkeeping reduces the productivity of our train crews. The proposed shutdowns will require the development of forms, either single event records or daily logs that will have to be managed, collected, reviewed and stored. There

was no indication if anyone outside of the railroad would ever see these forms or logs. This brings into question the value of collecting this information. If this information really is necessary, a less intrusive and disruptive method must be found.

Other Locomotive Emission Reductions

BNSF is reducing emissions in other ways which should be counted in the SIP. For example, BNSF has retrofitted 952 older locomotives to Tier 0 levels. This reduces the nitrogen oxide emissions by 33 percent from the uncontrolled levels. BNSF has also purchased four Green Goat hybrid switch engines for use in the DFW area. These were purchased with TERP funding and BNSF has agreed to operate these units in the DFW area for nine years. We also purchase low torque bearings for our railcars. This reduces train resistance and thereby reduces emissions from the engine.

Conclusions

BNSF is aggressively addressing emissions from switch engines in the DFW area. Approximately 30 switch engines are having ZTR SmartStart idle reduction units installed. This equipment is designed to identify unnecessary idling of the switch engine, check its operational status, and safely shut it down. BNSF has also invested in new road locomotives with automatic engine start/stop features. Some of these locomotives will be used in and through the DFW area. BNSF, with assistance through the TERP, will bring four hybrid switch engines into use in the DFW area, which will lead to eliminating four older traditional switch engines.

With these technological improvements and additions, Appendix K could be unnecessary as it pertains to BNSF and most likely the rest of the rail industry in the DFW area.

BNSF has a good working relationship with TCEQ and the USEPA. We are available to further discuss these comments with TCEQ and look forward to working with you on this issue.