DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

49 CFR Part 232

[Docket No. FRA–2006–26175, Notice No. 4]

RIN 2130–AB84

Electronically Controlled Pneumatic Brake Systems

AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: FRA is issuing revisions to the regulations governing freight power brakes and equipment by adding a new subpart addressing electronically controlled pneumatic (ECP) brake systems. The revisions are designed to provide for and encourage the safe implementation and use of ECP brake system technologies. These revisions contains specific requirements relating to design, interoperability, training, inspection, testing, handling defective equipment, and periodic maintenance related to ECP brake systems. The final rule also identifies provisions of the existing regulations and statutes where FRA is proposing to provide flexibility to facilitate the voluntary adoption of this advanced brake system technology.

DATES: This final rule is effective December 15, 2008. Petitions for reconsideration must be received on or before December 15, 2008. Petitions received after that date will be considered to the extent possible without incurring additional expenses or delays. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of December 15, 2008.

ADDRESSES: *Petitions for reconsideration:* Any petitions for reconsideration related to Docket No. FRA–2006–26175, may be submitted by any of the following methods:

- *Web site:* The Federal eRulemaking Portal, *http://www.regulations.gov*. Follow the Web site's online instructions for submitting comments.
- *Fax:* 202–493–2251.
- *Mail:* Docket Management Facility, U.S. Department of Transportation, 1200 New Jersey Avenue, SE., W12–140, Washington, DC 20590.
- *Hand Delivery:* Room W12–140 on the Ground level of the West Building, 1200 New Jersey Avenue, SE., Washington, DC between 9 a.m. and 5 p.m. Monday through Friday, except Federal holidays.

Instructions: All submissions must include the agency name and docket number or Regulatory Identification Number (RIN) for this rulemaking. Note that all petitions received will be posted without change to *http://www.regulations.gov* including any personal information. Please see the Privacy Act heading in the **SUPPLEMENTARY INFORMATION** section of this document for Privacy Act information related to any submitted petitions, comments, or materials.

Docket: For access to the docket to read background documents or comments received, go to *http://www.regulations.gov* or to Room W12–140 on the Ground level of the West Building, 1200 New Jersey Avenue, SE., Washington, DC between 9 a.m. and 5 p.m. Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: James Wilson, Office of Safety Assurance and Compliance, Motive Power and Equipment Division, RRS–14, Mail Stop 25, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590 (telephone 202–493–6259); or Jason Schlosberg, Trial Attorney, Office of Chief Counsel, Mail Stop 10, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590 (telephone 202–493–6032).

SUPPLEMENTARY INFORMATION:

I. Background

Since the inception of automatic air brakes by George Westinghouse in the 1870s, brake signal propagation has been limited by the nature of air and the speed of sound. Other adjustments have sought to alleviate this deficiency, but have left the basic system unaltered. As early as 1990, the Association of American Railroads (AAR) began investigating more advanced braking concepts for freight railroads, including ECP brake systems, which promise to radically improve brake propagation by using electrical transmissions of the braking signal through the train while still using air pressure in the brake cylinder to apply the force of the brake shoe against the wheel. During the past 15 years, ECP brake technology has progressed rapidly and has been field tested and used on trains operating in revenue service by various railroads.

FRA has been an active and consistent advocate of ECP brake system implementation. In 1997, FRA participated in an AAR initiative to develop ECP brake standards and in 1999, FRA funded, through Transportation Technology Center, Inc., a Failure Modes, Effects, and Criticality Analysis (FMECA) of ECP brake systems based on the AAR standards. FRA also took part in programs to develop and enhance advanced components for ECP brake systems.

To further assess the benefits and costs of ECP brakes for the U.S. rail freight industry, FRA contracted Booz Allen Hamilton (BAH) in 2005 to conduct a study. BAH engaged an expert panel consisting of principle stakeholders in ECP brake technology conversion to participate in the study. The expert panel made various conclusions relating to technological standards, safety, and efficiency. In addition, the final BAH report provided a comprehensive analysis and comparison of ECP and conventional air brake systems. On August 17, 2006, FRA announced in a press release its intention to issue a notice of proposed rulemaking to revise the federal brake safety standards to encourage railroads to invest in and deploy ECP brake technology. In the press release, FRA encouraged railroads to submit ECP brake implementation plans before the proposed rule changes were completed.

In a petition dated November 15, 2006, and filed November 21, 2006, two railroads—the BNSF Railway Company (BNSF) and the Norfolk Southern Corporation (NS)—jointly requested that FRA waive various sections in parts 229 and 232 as it relates to those railroads' operation of ECP brake pilot trains. *See* Docket No. FRA–2006–26435. FRA held a public fact-finding hearing on this matter on January 16, 2007, featuring testimony from representatives of the petitioners, air brake manufacturers, and labor unions and granted a conditional waiver on March 21, 2007. *See id.*

On September 4, 2007, FRA published a Notice of Proposed Rulemaking (NPRM) containing proposed revisions to the power brake regulation. *See* 72 FR 50820. In the NPRM, FRA proposed revisions to the regulations governing freight power brakes and equipment by adding a new subpart addressing ECP brake systems. The proposed revisions were designed to provide for and encourage the safe implementation and use of ECP brake system technologies. The proposed revisions contained specific requirements relating to design, interoperability, training, inspection, testing, handling defective equipment, and periodic maintenance related to ECP brake systems. The proposed rule also identified provisions of the existing regulations and statutes where FRA believed flexibility to facilitate the introduction of this advanced brake system technology was necessary.

Following publication of the NPRM in the **Federal Register**, FRA held a public

hearing in Washington, DC on October 4, 2007, and a public hearing in conjunction with a public technical roundtable in the Chicago, IL area on October 19, 2007. The purpose of the hearings was to receive oral comments regarding the specific provisions contained in the proposed rule and to receive evidence and to develop findings to determine whether FRA should invoke its discretionary authority under 49 U.S.C. 20306 to provide a limited exemption from § 20303 for freight trains and freight cars operating with ECP brake systems. Section 20303 requires operators to transport rail vehicles with defective or insecure equipment ''from the place at which the defect or insecurity was first discovered to the nearest available place at which the repairs can be made'' to avoid incurring civil penalties related to such movement.

The hearings were attended by numerous railroads, organizations representing railroads, labor organizations, and brake manufacturers. Although the comment period officially closed November 5, 2007, FRA continued to receive comments on the NPRM into January 2008. FRA received substantial oral and written testimony at the hearings and written comments to the NPRM from the following organizations, railroads, and brake manufacturers, listed in alphabetical order:

- American Association for Justice (AAJ).
- Association of American Railroads (AAR).
- Brotherhood of Locomotive Engineers and Trainmen (BLET).
- Brotherhood Railway Carmen Division, Transportation-Communications International Union (BRC).
- General Electric Transportation and General Rail Services (collectively, GE).
- New York Airbrake (NYAB).
- Norfolk Southern Corporation (NS).
- Transport Workers Union of America, AFL–CIO (TWU).
- Union Pacific Railroad Company (UP).
- United Transportation Union (UTU).
- Wabtec Railway Electronics (Wabtec).

UTU supports and incorporates by reference the comments submitted by BLET, TCU, TWU, and its other labor representatives.

FRA carefully considered all the information, data and proposals submitted in relation to Docket No. FRA–2006–26175 when developing this final rule. In addition to the preceding information, FRA's knowledge and experience with enforcing the existing power brake regulations were also relied upon when developing this final rule. FRA will address and summarize all comments in the section-by-section analysis below and elsewhere as appropriate or necessary.

Based on the oral and written comments submitted at the hearing and in the docket to this proceeding, FRA makes the following findings: (1) Safety is not compromised by allowing a train operating with ECP brakes and having a minimal number of ineffective or inoperative defective brakes to travel to its destination, not to exceed 3,500 miles, without any additional intermediate brake inspections; (2) the safety hazards caused by placing cars equipped with ECP brakes into a train with an incompatible brake system are no different than the hazards caused by placing a car equipped with conventional brakes with ineffective or inoperative brakes into a train operated with conventional brakes; (3) safety is not compromised by allowing a train operated with ECP brakes with at least 85 percent effective and operative brakes to haul a car with defective non-brake safety appliances to the nearest or nearest forward repair location; and (4) requiring strict compliance with the movement for repair provision contained in 49 U.S.C. 20303 would constitute a significant disincentive to the implementation and use of ECP brake technologies. Based on these findings, FRA has elected to utilize its discretionary authority provided under 49 U.S.C. 20306 to provide a limited exemption for freight trains and freight cars operating with ECP brake systems from the requirements contained in 49 U.S.C. 20303.

Subsequent to the close of the comment period in this proceeding, AAR modified two of its existing ECP brake standards, S–4200 and S–4210, and continued to develop standards regarding hardware and software configuration management issues for ECP brake systems. AAR sought comments from its members concerning a proposed standard S–4270 addressing the configuration management issues. As FRA is interested in incorporating by reference the most current standards into the final rule, FRA reopened the comment period on April 18, 2008, for an additional fifteen (15) days for the limited purpose of receiving comments on revised standards S–4200 and S–4210 and newly developed draft S–4270. FRA continues to believe that reopening the comment period was the most efficient method of ensuring that the most current industry standards were included in this final rule.

The NPRM and this subsequent notice indicated that FRA intended to include S–4270 in the final rule if it was finalized by AAR with sufficient time for inclusion and if its final version remained substantially similar to the draft standard reference in the notice reopening the comment periods. Ultimately, AAR adopted S–4270 without any changes.

II. Conventional Brake Operations

While the basic operational concept of the automatic air brake system, originally conceived by George Westinghouse in the 1870s, remains the same, it has seen continuous improvement in practice. An air compressor in the locomotive charges a main reservoir to about 140 pounds per square inch (psi). With controls located in the locomotive, the locomotive engineer uses the main reservoir to charge the brake pipe—a 1¼ inch diameter pipe—that runs the length of the train and is connected between cars with hoses. The brake pipe's compressed air—used as the communication medium to signal brake operations and the power source for braking action—then charges each car's two-compartment reservoir to a pressure of 90 psi. Braking occurs through a reduction of air pressure in the brake pipe, which signals the valves on each car to direct compressed air from the reservoir on each car to its respective brake cylinder for an application of brakes. When air pressure is supplied to the brake cylinder—which is connected to a series of rods and levers that apply and release the brakes—the resulting force presses the brake shoes against the wheel, retarding the car's speed.

While brake applications were initially directed by George Westinghouse's triple valve, modern applications use a control valve, which directs air from the brake pipe into the air reservoir when air pressure is rising in the brake pipe in order to charge the auxiliary and emergency reservoir and be ready for a brake application. To perform a brake application, the locomotive automatic brake valve reduces air pressure in the brake pipe by exhausting air, causing the car's control valve to direct air from the auxiliary reservoir into the brake cylinder. The increase in air pressure to the brake cylinder is approximately 2½ times the drop in brake pipe pressure. A 26 psi reduction in brake pipe pressure is equal to a full service brake application on a fully charged brake pipe, and should result in a brake cylinder pressure adequate to achieve a full service braking effort (brake force). While the control valve is directing air

into the brake cylinder, or holding air in the brake cylinder, it is unable to recharge the auxiliary reservoir on each car. The engineer can apply the brakes in increments, of a few psi at a time, go directly to a full service application, or initiate an emergency application of the brakes.

Unlike a brake application, the incremental release of brakes on a typical freight train operating in direct release cannot be accomplished. Brakes can only be fully released, called a direct release, and only with the brakes released can the auxiliary reservoirs then begin to recharge. Brake applications are possible, but are more complicated, from undercharged brake pipe and air reservoirs. Recharging takes more time for a longer train, because the air has to be sent down the length of the train's brake pipe—which can be up to a mile and a half. In addition, on extremely long trains, it is often difficult to fully charge the brake pipe due to small air leaks throughout the brake pipe and cold weather.

Brake pipe pressure can be measured by an end-of-train (EOT) device, which is pneumatically connected to the rear of a train equipped with conventional pneumatic brakes and sends signals (EOT Beacon) via radio indicating the brake pipe pressure to the lead locomotive. Current Federal regulations specify the design and performance standards for both one-way and two-way EOT devices. *See* Part 232, subpart E. Both EOT device designs comprise of a rear unit pneumatically connected to the rear of the train's last car that transmits an EOT Beacon to a an EOT Head End Unit—a device located in the cab of the lead locomotive displaying the brake pipe pressure of the rear car to the locomotive engineer. The two-way EOT device also has the capability to transmit an electronic signal from the locomotive to the rear end unit to initiate an emergency brake application by venting brake pipe pressure to atmosphere at the rear end unit.

An emergency brake application can be initiated in several ways. The locomotive engineer can initiate the application by moving the brake handle to the emergency position, which depletes brake pipe pressure to zero at a faster rate than the service application by exhausting brake pipe air pressure at the locomotive. Emergency brake applications can also be initiated by opening the conductor's valve, located in the cab of the locomotive, or by a break-in-two, where the train separates between cars and the brake pipe hoses separate, thereby venting brake pipe pressure to zero. While performing an emergency brake application from the locomotive, a locomotive engineer can also use the two-way EOT device to initiate an emergency brake application at the rear of the train. This permits the emergency application to be simultaneously initiated from both the front and rear of the trains and ensures that the brakes on the cars at the rear of the train apply in the event a brake pipe blockage occurs.

III. ECP Brake Operations

As early as 1990, AAR began investigating a more advanced braking concept for freight railroads, the ECP brake system. The ECP brake system radically improves the operation of the automatic air brake by using electrical transmissions to signal the application and release of brakes on each car in a train while still using compressed air to supply the air reservoirs on each car, which will be used to pressurize the brake cylinders to apply the force of the brake shoes against the wheels. ECP brakes also greatly simplify the brake system by eliminating multiple pneumatic valves used by conventional brakes and replacing them with printed circuit boards, each with a microprocessor, one electrically activated application valve, and one electrically activated release valve, with feedback on brake cylinder pressure for uniform control.

ECP brake technology requires equipping locomotives and cars with special valves and electronic equipment that are unique to the operation of ECP brakes. While this system still requires a brake pipe to supply compressed air from the locomotive to each car's reservoir in a train, there are currently two known methods to send the electronic signal for ECP brake operations from the locomotive to each car in the train. These methods include using a hard wire electrical cable running the length of the train or a radio-based technology requiring a transmitter and a receiver installed on the cars and locomotives. At this time, it appears that the railroad industry has chosen to use a cable-based system for ECP brake operation.

ECP brake systems still employ the automatic air brake system's basic concept where the locomotive supplies compressed air to each car's reservoir via the conventional brake pipe. Each car's brake valve reacts to a signal to apply the brakes by directing compressed air from the car's reservoir to the brake cylinder or to release the brakes by releasing air from the brake cylinder. The similarities between the conventional pneumatic and ECP brake systems end here. Instead of utilizing reductions and increases of the brake pipe pressure to convey application and release signals to each car in the train, ECP brake technology uses electronic signals, resulting in an almost instantaneous application and release of brakes on each car in the entire train. Since the brake pipe pressure no longer serves as the communication medium in ECP braked trains, the brake pipe is constantly being supplied or charged with compressed air from the locomotive regardless of whether the brakes are applied or released. In addition, ECP brake-equipped trains offer graduated release, where a partial brake release command provides a partial, proportional brake release.

The basic ECP brake system is controlled from the Head End Unit (HEU) and each car is equipped with a Car Control Device (CCD), an electronic control device that replaces the function of the conventional pneumatic control valve. The CCD acknowledges and interprets the electronic signals from the HEU and controls the car's service and emergency braking functions. The CCD controls charging the car's air reservoir and also has diagnostic capabilities to send a warning signal to the locomotive in the event any component fails to appropriately respond to a braking command. Each CCD has a unique electronic address located in the Car ID Module, which is keyed to a car's reporting mark and number.

Each car connects to the locomotive via special connectors and junction boxes. More specifically, an ECP brake-equipped train's train line cable—a two-conductor electric cable (#8 A–WG and a shield)—connects the locomotive and cars and carries train line power to operate all CCDs and the ECP brake system's end-of-train (ECP–EOT) device and communicates network signals via the power voltage. A Power Supply Controller (PSC)—mounted within the locomotive and providing 230 VDC of electricity—interfaces with the train line cable's communication network, provides power to all connected CCDs and ECP–EOT devices, and controls the train line power supply as commanded by the HEU. Under the AAR standards, a single power supply shall be capable of supplying power to an ECP brake-equipped train consisting of at least 160 CCDs and an ECP–EOT device.

Under the existing regulations, the conventional pneumatic brake system's EOT device can lose communication for 16 minutes and 30 seconds before the locomotive engineer is alerted. *See* 49 CFR 232.407(g). After the message is displayed, the engineer must restrict the speed of the train to 30 mph or stop the train if a defined heavy grade is involved. Per the regulations, railroads

must calibrate each conventional two-way EOT device every 365 days and incur additional maintenance and cost expenses while replacing its batteries.

By contrast, an ECP–EOT device uniquely monitors both brake pipe pressure and operating voltages and sends an EOT Beacon every second from its rear unit to its HEU on the controlling locomotive. The HEU will initiate a full service brake application should brake pipe pressure fall below 50 psi or initiate an emergency brake application should a communication loss occur for five consecutive seconds or if there is a break in the train line electrical cable. An ECP–EOT device does not require calibration and its battery, only a back-up for the computer, is charged by the train line cable and is much lighter in weight than the conventional EOT device battery. Physically the last network node in the train, the ECP–EOT device also contains an electronic train line cable circuit—a 50 ohm resistor in series with 0.47 micro-farad capacitor—and must be connected to the network and transmit status messages to the HEU before the train line cable can be initially powered.

ECP brake systems have the great advantage of real-time monitoring of the brake system's health. In normal operation, the HEU transmits a message/status down the train line cable to each car. If an individual car's brakes do not respond properly to the HEU's brake command, or if air pressures are not within the specified limits for operation, a message indicating the problem and the applicable car number is sent back to the HEU, which in turn notifies the locomotive engineer of the problem. The ECP brake system can identify various faults, including, but not limited to: low brake pipe pressure; low reservoir pressure; low train line cable voltage; low battery charge; incorrect brake cylinder pressure; and offline or inoperative CCDs.

Emergency or full service brake applications automatically occur when the ECP brake system's software detects certain faults. For instance, if the HEU detects that the percentage of operative brakes falls below 85 percent, a full service brake application will automatically occur. In addition, the brakes will automatically apply when the following occurs: (1) Two CCD's or the ECP–EOT report a ''Critical Loss'' within 5 seconds; (2) the train line cable indicates low voltage with less than 90 percent operative brakes; (3) the ECP–EOT reports a low battery charge; (4) the train moves during set-up; (5) the train line cable becomes disconnected; or (6) the train exceeds 20 mph in Switch Mode. Under the AAR standards, the ECP brake system shall also have a pneumatic back-up system on each car for an emergency brake application in the event of a vented brake pipe or a train separation. These features preserve and exceed the fail safe features of conventional pneumatic brake systems.

IV. Interoperability

Due to control methodology differences, ECP brake systems are not functionally compatible with conventional pneumatic air brake systems. For instance, while conventional pneumatic air brake systems command a brake application by reducing the air pressure in the brake pipe, ECP brake systems command a brake application through a digital communications link transmitted on the electrical train line cable.

Manufacturers have developed application strategies to address issues relating to car and locomotive fleet interchangeability. In particular, they have proposed three major schemes of ECP brake design: stand-alone systems using only ECP brakes; overlay (dual mode) systems capable of operating in either conventional or ECP brake mode; and emulation systems, also capable of operating in either conventional or ECP brake mode.

Since cars with stand-alone ECP brake systems do not include a fully pneumatic brake control valve, they are incompatible with conventionally braked cars and must be operated in train sets depending solely upon ECP brakes. Cars using stand-alone ECP brake systems cannot intermix in the same train with cars using conventional pneumatic brakes unless (1) the train uses ECP brakes and those cars using conventional pneumatic brakes are transported as cars with inoperative brakes or (2) the train uses conventional pneumatic brakes and the cars using ECP brakes are transported as cars with inoperative brakes. While the stand-alone ECP brake system is the least expensive alternative of the three design types, its incompatibility with conventional pneumatic brake systems requires train segregation, potentially posing significant operational problems until the entire car fleet is converted to ECP brakes.

Overlay configurations—cars equipped with both ECP CCDs and conventional pneumatic control valve portions—allow cars to operate with either ECP or conventional pneumatic brakes. To operate in ECP brake mode, compatible ECP equipment must be installed on the locomotive as well as on the freight car. While an overlay system's dual mode capability provides significant flexibility, railroad operators must purchase, install, and maintain equipment to support both types of brake systems for as long as dual mode capability is required.

Emulation configurations use a CCD capable of operating in either ECP or conventional mode without requiring conventional pneumatic controls. One manufacturer has provided an emulation ECP brake valve that monitors both the digital communications cable and the brake pipe for a brake command. If an electrical signal is present, the ECP brake valve operates in ECP brake mode. If the electrical brake command signal is not present, then the valve will monitor the changes in the brake pipe pressure like a conventional pneumatic control valve and the CCD will use a software program to emulate the function and response of a conventional pneumatic valve. An emulation ECP brake system can be operated in any train with any mix of emulation ECP and conventional brake systems. In a mixed train, the emulation ECP brake system will monitor the brake pipe for pressure changes and set up brake cylinder pressure like a conventional pneumatic valve.

In the NPRM, FRA did not propose any rules uniquely regulating trains or cars equipped with emulation ECP brake systems, but sought comments on whether or how it should regulate such systems differently than what was proposed. According to NYAB and Wabtec (collectively, the brake manufacturers), the current AAR standards do not require a pneumatic emulation mode, and this function should not be subject to FRA regulation. In the event future releases of the S–4200 specifications add pneumatic emulation as a requirement, the brake manufacturers suggest that the need for FRA regulation can be addressed at that time. FRA concurs and the final rule does not include regulations uniquely affecting emulation ECP brake systems.

Manufacturers have also addressed ECP brake compatibility with locomotives equipped with conventional pneumatic brakes, which must be equipped with an HEU unit to operate the brakes on cars equipped with ECP brakes. For instance, one manufacturer has developed a portable unit that will allow a locomotive lacking an ECP brake HEU to operate a train equipped with ECP brakes by converting the air pressure changes in the brake pipe to digital command signals that are transmitted to the freight cars through the electrical train line cable. The locomotive engineer operates the brakes with the conventional automatic brake valve in the control cab. The brakes,

however, will respond instantaneously and provide all of the benefits of an ECP brake system. While FRA recognizes that the technology for such a portable unit is in development and may provide a possible solution to the technological transition, it is not addressed or authorized by this final rule and the incorporated AAR standards.

V. Advantages of ECP Brakes Over Conventional Pneumatic Brakes

ECP brake technology overcomes many of the physical limitations inherent in conventional pneumatic brake technology. Field testing of AAR compliant ECP brake systems over the past decade has not revealed any indication of a catastrophic event that could be caused by an ECP brake system malfunctioning. With a high level of confidence, the ECP brake stake holders support the implementation of ECP brake systems on the Nation's railroads. FRA concludes that the advantages of ECP brake technology will significantly improve the safety and the performance of train operations. Examples of such benefits include better train handling through simultaneous brake applications, continuous brake pipe charging, and graduated brake operation. Derailments are expected to decline significantly. ECP brake benefits also include electronic train management, improved performance, and real time diagnostics of the train's brake system.

A. Simultaneous Brake Application

The conventional pneumatic brake system uses compressed air as the source for braking power and as the medium for communicating brake application and release commands and communicates the brake commands by changing brake pipe pressure through the use of the locomotive's automatic brake valve. These commands begin at the front of the train and propagate to the rear of the train at the speed of the air pressure moving from car to car. This slow propagation of the brake command contributes to uneven braking, excessive in-train and run-in forces, train handling challenges, longer stopping distances, safety risks of prematurely depleting air brake reservoirs, and a corresponding low brake rate until all cars in the train receive and fully respond to the brake command. FRA recognizes that the slow application and release of brakes in a train, causes excessive in-train forces, which have the potential to cause derailments when they occur in curves, cross-overs, or when heavier cars are placed at the rear of the train or after empty cars. When the brakes on the rear of the train release much more slowly than the brakes on the front of the train, the potential for a ''string-line'' derailment—where the train stretches out until one or more wheels are lifted off the inside rail of a curve—increases.

The ECP brake system reduces these problems by enabling cars to brake simultaneously at the command of an electronic signal. The electronic signal's speed ensures an instantaneous, simultaneous, and even activation of each car's brake valves, significantly reducing braking distances—40 to 60 percent for the longest trains—and minimizing the consequences of collisions or derailments by reducing the collision speed and slowing the non-derailed portion of the train.

B. Continuous Brake Pipe Charging

Propagating a brake command signal through the reduction or increase of air pressure in the brake pipe represents a significant limitation of conventional pneumatic brakes. The same brake pipe air used to propagate brake commands also charges reservoirs on each freight car. As a result, the brake pipe must be fully charged to restore full braking capacity to depleted reservoirs. Partially depleted air from the brake pipe, which occurs during the initial stage of braking, prohibits repeat applications of brakes until the brake pipe can be recharged. A brake pipe can only be recharged once the brakes have been fully released. This characteristic of conventional pneumatic brakes contributes to the risk of run-away trains caused by prematurely depleted brake pipe pressure, particularly on steep grades.

The ECP brake system reduces this risk by continuously charging the brake pipe. Since ECP brakes do not use the brake pipe as a brake command medium, the brake pipe is constantly being charged, allowing the locomotive engineer to operate the brake system more aggressively. With ECP brake systems, it is unnecessary to apply hand brakes on steep grades to recharge the brake pipe after the train stops on the grade.

C. Graduated Brake Application and Release

The conventional pneumatic brake system's inability to operate freight trains in graduated release has long hampered train operations and has increased fuel consumption. The conventional pneumatic brake system can only operate in direct release, preventing locomotive engineers from reducing the braking effort without completely releasing and resetting the brakes. In other words, after a direct release brake application with a conventional pneumatic brake system, braking effort can be increased but not decreased without fully releasing the brakes. In many cases, direct release leads to unnecessary train stops or insufficient initial brake applications. ECP brake systems overcome this deficiency by operating in graduated release, which enables the operator to reduce braking effort to a lower level after making a brake application without fully releasing the brakes. As a result, the operator can accurately adjust the braking level as each situation requires, eliminating the stops required to recharge and reset the brakes after excessive brake applications and prior to negotiating hills and valleys.

D. Train Management

The use of a train line cable allows real-time self-diagnostic functions to be incorporated in the brake system. The initial check of brake system conditions on each car and continuous monitoring of each car's braking functions provides immediate communication to the locomotive engineer of certain brake failures. The continuous monitoring of each car's braking functions and real-time diagnostics of the train's brake system is a significant advantage to the locomotive engineer for the operation of the train. These technical benefits also justify elimination of some of the currently required physical inspections of the train's brake system and support regulatory change to operate cars with non-functioning brakes out of the initial terminal. When the ECP brake system diagnostics detect a serious problem, including when the brake pipe pressure falls below 50 psi, the ECP brake system will automatically command a penalty brake application. ECP brake systems also eliminate the conventional pneumatic brake system's inability to apply all brakes in the train when there is a blockage in the brake pipe, which is handled through the use of a two-way EOT telemetry device not required by all trains. This failure will not affect brake applications in ECP brake systems, because each car is provided a braking command through a train line cable, not solely through the reduction of brake pipe pressure, which would not be propagated through the consist if the brake pipe is blocked. Therefore, ECP brake systems incorporate features that make them inherently safer than conventional pneumatic brakes. Using sensor-based technology to maintain a continuous feedback loop on train condition for the crew and any centralized monitoring, the electrical communication cable network can also serve as a platform for the gradual

addition of other train performance monitoring and management controls, including distributed power locomotive control, hand brake on/off detection system, automatic activation and release of hand brakes, hot bearing detection, and truck oscillation and vibration. These and other train management features will increase the reliability and overall safety of train operations.

E. Improved Performance

Ultimately, ECP brake technology also provides improved performance, which will contribute to safer train operations and significant cost savings over time. Since trains operated with ECP brakes can operate in graduated release, instead of direct release, fuel will not be wasted while pulling trains against a heavy brake application. Further, because all of the cars' ECP brakes release simultaneously, fuel will not be wasted on initial start-ups and power-ups after a brake release.

Operations utilizing ECP brake systems also promise increased average train speeds and decreased trip times. ECP brake systems allow the locomotive engineer to modulate the brake applications in territories with descending grades, thus increasing overall trip average speeds and reaching destinations sooner. While the slow release of the rear cars' brakes on conventional pneumatic braked trains cause drag, the brakes on ECP brake-equipped trains release simultaneously, improving start-up and acceleration times. Further, due to their shorter stopping distances, trains equipped solely with ECP brake systems may potentially permit higher train speeds within existing signal spacing, which will increase average system velocity, or permit use of shorter ''blocks'' between signals, facilitating greater system capacity.

The instantaneous application and release of ECP brakes will result in more uniform braking, thus improving wheel wear and increasing brake shoe life. In a conventional pneumatically braked train, the brake pipe gradient and slower response time causes the first third of the train's cars to provide the majority of the braking action, thus applying additional pressure and heat on those cars' wheels. Since ECP brake systems provide instantaneous braking on all cars, such pressure will be more uniformly distributed along the train, thus eliminating the uneven braking force on the wheels of those leading cars. The ECP brake system also self-monitors each car's brake cylinder pressure and maintains the prescribed pressure, thus reducing the potential for creating shelling and flat spots on wheels.

Due to minimized wheel defects, and their accompanying vibrations, freight cars and brake components will enjoy increased life. Further, instantaneous braking will also prevent draft gear assemblies from receiving the constant pressure caused by trains equipped with conventional pneumatic brake systems and will reduce lading damage by eliminating slack action and in-train forces caused by uneven braking. ECP brake systems will also reduce the number of brake parts and rubber diaphragms required by conventional pneumatic brake systems.

VI. Standards, Approval, and Testing

During the past 18 years, FRA has monitored the progression of ECP brake technology and has observed field testing on various revenue trains, both freight and passenger. In 1997, FRA participated in an AAR initiative to develop ECP brake standards and in 1999, FRA funded, through the Transportation Technology Center, Inc., a FMECA of the ECP brake system based on AAR's *Standards and Recommended Practices,* S–4200 Series. FRA also participated in programs to develop and enhance advanced components for ECP brake systems. After all of these efforts, FRA has determined that the AAR S–4200 Series of standards are appropriate substantively and legally for incorporation by reference in this rule and that the AAR Air Brake Systems Committee is an appropriate vehicle to rely upon in the implementation of ECP brake technology for this rule. FRA acknowledges that ECP brakes are an attractive, viable, and enabling technology with the potential to substantially improve the operational efficiency of trains and that by complying with AAR Standard S–4200, ECP braked trains offer significant safety and efficiency benefits in freight train handling, car maintenance, fuel savings, network capacity, self-monitoring, and fail-safe operation.

AAR administers the existing industry ECP brake standards through its Air Brake Systems Committee—consisting of representatives from the major railroads, brake manufacturers, and FRA—which requires demonstrated proof of compatibility, safety, and reliability of air brake systems to receive AAR approval. FRA is satisfied that the existing AAR S–4200 Series specifications, AAR approval procedures, and continuing oversight by the AAR Air Brake Systems Committee will best ensure the safety and reliability of ECP brake systems. An ECP brake monitoring system complying with AAR Standard S–4200 Series increases safety by communicating information on the location and quantity of defective equipment and by providing for the safe movement of equipment over longer distances and periods of time.

A. AAR Standards and Approval Process

In order to assure the safety and the interoperability of ECP brake system designs, AAR developed the S–4200 Series of standards. The first five standards (S–4200, S–4210, S–4220, S–4230, and S–4250)—issued in 1999 and updated in 2002, 2004, 2006, and 2007—specify the functional, operational, and interface requirements for cable-based ECP brake systems. AAR issued two additional standards in January 2007, specifying ECP brake equipment approval procedures (S–4240) and interoperability testing requirements (S–4260). In April 2008, AAR issued a standard for hardware and software configuration management plans (S–4270). At this time, AAR has not completed specifications for radio-based ECP brakes, which it considers technically immature and unsuitable. The purposes of the standards are to ensure that AAR-approved electronic brake systems are interoperable between different manufacturers and meet high standards of safety and reliability. The analysis of the S–4200 Series of standards indicates that the performance specifications for the cable-based ECP brake concept are complete.

The AAR Manual of Standards and Recommended Practices (MSRP) contain the following standards for cable-based ECP brake systems:

- S–4200, ECP Cable-Based Brake Systems—Performance requirements;
- S–4210, ECP Cable-Based Brake System Cable, Connectors, and Junctions Boxes—Performance Specifications;
- S–4220, ECP Cable-Based Brake DC Power Supply—Performance Specification;
- S–4230, Intratrain Communication Specification for Cable-Based Freight Train Control System;
- S–4240, ECP Brake Equipment—Approval Procedure;
- S–4250, Performance Requirements for ITC Controlled Cable-Based Distributed Power Systems;
- S–4260, ECP Brake and Wire Distributed Power Interoperability Test Procedures; and
- S–4270, ECP Brake System Configuration Management.

Standard S–4200 ensures that the functionality and performance of freight ECP brake systems are uniform and

consistent among equipment from different manufacturers, that cars equipped with AAR-approved ECP brake systems from different manufacturers are interoperable, and that AAR-approved electronic brake systems meet a high standard of safety and reliability. This standard defines ECP brake system elements, specifies their functionality in different implementation schemes—such as stand-alone, overlays, and emulators—and sets the requirements for all system functions. It covers all primary functions of ECP brakes, including graduated brake application and releases, continuous reservoir charging, adjustment of braking level to car load, continuous fault detection, equipment status monitoring, and pneumatic backup. It also specifies requirements for all modes of train operation and provides an extensive description of fault response and recovery functions for all possible faults of the system components. The standard also establishes environmental requirements for the designed systems, in-service testing, and rigorous approval procedures for the certification process of new ECP brake equipment.

Other standards in the AAR S–4200 Series contain requirements for critical ECP brake system components and communication protocols. Standard S–4210 contains the performance specifications and qualification test procedures for ECP brake system cables, connectors, and end-of-car junction boxes. The required testing verifies that the designed components have high reliability, will withstand harsh environmental conditions, and will have at least an 8-year operating life.

Standard S–4220 contains performance specifications for the DC power supply system through the hard-wired train line cable for ECP brake controllers and other electronic freight car components. Since a DC power supply conductor will also send communication control commands between a locomotive and its attached cars, the standard requires reliable separation and absence of interference between the DC power supply and the communication circuits.

Standard S–4230 contains the requirements related to intra-train communication systems on freight equipment used in revenue interchange service. The standard facilitates interoperability between freight cars and locomotives without limiting the proprietary design approaches used by individual suppliers. The communication protocol was developed for control of ECP brakes and multiple remote units, including distributed power locomotives, and for safety reporting of various car and locomotive components.

Standard S–4250 contains the methodology and communication flow requirements for controlling the operation of multiple locomotives in a freight consist through the intra-train communication network that is shared with ECP brake system. The locomotive control through the intra-train communication line is an alternative method of locomotive control, which was not available before the introduction of ECP brake system technology. The controlled locomotives can either trail a lead locomotive or be distributed (i.e., separated by cars) in a train. The standard establishes protocols for different types of locomotive controls through the intra-train line cable, depending on the location of the consist's multiple locomotives. While the current means of controlling ''distributed power'' is performed through radio control—which is susceptible to a loss of communication and is not ''fail safe'' in operation—locomotives operated with ECP brake systems can be relied upon to function as commanded in real time and automatically apply the brakes in the event of a communication loss.

Standard S–4260 contains the test procedures that must be completed by ECP brake manufacturers to establish interoperability baselines among ECP brake and wire distributed power (WDP) systems in compliance with the S–4200 standards series. The test procedures validate the functional interoperability of ECP brake and WDP systems developed by different manufacturers.

Standard S–4270 defines the procedures for managing the software and hardware configuration for AAR-approved ECP brake systems.

The AAR approval process and the work of the Air Brake Systems Committee has been the primary method of ensuring the safety and reliability of railroad brake systems and components for decades. Through its participation on the Air Brake Systems Committee, FRA can monitor any safety or reliability issues that may develop with ECP brake systems. In the event of a serious safety issue with a supplier's ECP brake system, FRA can appropriately respond by invoking its authority to intervene with additional rulemaking or an emergency order. FRA does not expect to use this authority, because the AAR Air Brake Systems Committee already has the authority to rescind AAR approval for brake systems that do not perform safely or reliably.

Standard S–4240 contains the acceptance procedure for seeking AAR approval of ECP brake equipment. The standard requires a manufacturer to apply for approval by submitting certain information under Administrative Standard S–060. Following review and approval of the initial application data and test plan by the AAR Air Brake Systems Committee, a manufacturer maintains the burden of establishing compliance with Standards S–4200, S–4210, S–4220, S–4230, S–4250, S–4260, and S–4270 to obtain conditional approval.

For laboratory testing, an AAR representative will select 150 CCDs from a lot of 200 and will select HEUs, train power supplying units (TPSs), and ECP–EOTs from lots of four each. The testing will be performed on a 150-car test rack configured in accordance with AAR specifications. The manufacturer will provide for AAR evaluation of the test results, which shall include a requirements traceability and compliance matrix for each AAR standard and all necessary test reports, and then conduct interoperability laboratory testing between new ECP brake equipment and AAR-approved ECP brake equipment in accordance with standard S–4260.

Upon satisfactory completion of the aforementioned laboratory tests, AAR will consider conditional approval for field testing of ECP brake equipment. If conditional approval is granted, 150 ECP brake CCDs shall be selected from a production lot of 200 test-approved CCDs, and 100 of those selected, plus at least two ECP brake-equipped locomotives and one ECP–EOT device, must be placed in railroad service for 24 months. Under conditional approval, at least 1,000 cars must be allotted for use. Within those 24 months, all in-service tests must be conducted. After those 24 months, the Air Brake Systems Committee continues to monitor the product for reliability and safety concerns. If a problem with any brake component is discovered, the Committee will discuss the issue and may either demand further tests or withdraw AAR approval.

Full AAR approval shall be provided after 4 years if during that time a manufacturer furnishes AAR at specified intervals various service reports, which must include accurate ECP brake equipment malfunction records. FRA agrees with AAR's assessment that 4 years are needed to collect a history of reliable data with minimum failures. In addition, the manufacturer must provide to AAR a semiannual report containing any repair material for the test ECP brake equipment. Under the standard, AAR reserves the right to withdraw

conditional test approval if it determines that safety is impaired, reliability degrades, or incompatibility of ECP brake operation develops, and may require any additional testing or performance evaluations it deems necessary. Standard S–4240 also contains specific procedures that must be followed when a manufacturer intends to change certain ECP brake equipment physical characteristics, software, or electronics.

FRA supports this effort as a timely measure for AAR to strengthen the regulatory package for ECP brake systems. Overall, FRA considers AAR approval a valuable step to ensure the reliability and safety of ECP brake systems and a minimum requirement for initial application of ECP brake systems on the Nation's railroads. However, FRA fully intends to monitor the application and safety of ECP and may, at its discretion, require additional safety analysis to be performed to confirm the safety of ECP brake systems installed and operating in revenue service. FRA reserves the right to witness the AAR approval testing of the product.

B. FMECA

AAR Standard S–4200 Series was developed to support the design of a safer, more reliable ECP braking system when compared with conventional air brakes. Once the standard was created, the railroad industry identified the need to perform a safety and reliability assessment of an ECP brake system built in accordance with this standard. Since actual S–4200 Series compliant ECP brake systems did not yet exist, the industry decided to conduct a FMECA for a hypothetical ECP brake system that satisfied all the requirements of the standard. At FRA's insistence, the FMECA on AAR Standard S–4200 was performed in 1999 by DEL Engineering with participation of AAR, FRA and a number of experts with significant experience in the development and application of ECP brake systems.

The FMECA team began the analysis by identifying all major ECP brake system components and their intended functions. The analysis examined each component and function and identified associated failure modes and effects. The failure modes were analyzed to determine severity, frequency of occurrence, and effectiveness of detection. The FMECA team created a numeric ranking criterion and determined and prioritized the level of risk posed by each failure mode. High-risk failure modes were identified and appropriate mitigation strategies were developed to decrease the risk.

The FMECA team analyzed the failure modes of all ECP brake components, including: CCDs with the battery; HEUs on the head locomotive; ECP–EOT devices; train line cables, communication and power supplies; power supply controllers; head end line terminators; car ID modules; locomotive ID modules; and operative brakes. The analysis included different types of ECP brake systems, including stand alone, overlay (dual mode), and emulator and all system functional requirements and operating modes, including Initialization, Switch, Run, and Cut-out. The FMECA failure log contained about 1,500 failure modes. For each high-risk failure mode, the FMECA team identified action items and offered recommendations on how to mitigate the consequences of component failures or system functional failures. The team primarily examined single-point failures but also identified and evaluated some cases of combined failures that had significant safety consequences.

The FMECA results confirmed that the ECP brake concept offers the potential for improved performance, reliability, and safety over that of conventional pneumatic brake systems. The FMECA concluded that no failure mode of an AAR-compliant ECP brake system exists that can cause a catastrophic accident due to single-point failure of the system itself. The AAR standards, as written, eliminate or mitigate critical outcomes of single-point failure of ECP brake systems.

The FMECA team encouraged manufacturers to pursue ECP brake technology, because the potential safety and efficiency benefits will far outweigh any disadvantages. If designed and maintained properly, ECP brakes will be substantially safer and more reliable than the conventional pneumatic brake system they are intended to replace. AAR and the brake manufacturers indicated that they were completely satisfied that ECP brake systems are significantly safer than conventional pneumatic systems. They accepted the results of the FMECA and concluded that no modifications were necessary to the AAR standards related to ECP brake systems.

VII. Market Maturity and Implementation

The U.S. market for ECP brake systems is mature enough to begin implementation of ECP brake technology. The equipment manufacturers have made a significant investment in the technology and have completed the preliminary design work and field testing of ECP brakes. For instance, they have provided technical solutions for different ECP brake implementation strategies, enabling non-ECP and ECP brake-equipped cars to run in combined trains and, in some cases, allowing ECP brake-equipped freight cars to run in ECP brake mode using locomotives with conventional pneumatic brake systems. In addition, they are ready to supply fully operational stand-alone ECP brake systems, overlays, and emulators for the U.S. market, easing the industry's migration process. A commitment by the railroad industry to change over to ECP brakes is necessary to inspire additional technological initiatives by the manufacturers.

ECP brake systems from the main U.S. manufacturers—all in different stages of AAR approval and testing in revenue service—have been built with the intention of complying with the AAR S–4200 Series of standards, proven safe through field testing, designed using fail-safe principles, and accommodated the industry's need for different implementation schemes. The AAR S–4200 Series standards are intended to assure the necessary level of safety, reliability, interoperability, and ultimately the applicability of this equipment in the U.S. market. The equipment of existing ECP brake manufacturers incorporates the conventional pneumatic emergency brake system as a backup in case of failure of the ECP brake control. In most cases, ECP brake systems will support enhanced safety even if the electronics fail, because continuous recharging of the brake pipe will ensure availability of an emergency application. Therefore, the ECP brake system reduces the risk caused by depleted air in the case of an emergency. There is no instance or record of a malfunctioning ECP brake system that resulted in a catastrophic or critical event.

To assess the benefits and costs of ECP brakes for the U.S. rail freight industry, FRA contracted with BAH in 2005 to conduct a study. An ECP brake expert panel of principal stakeholders in the conversion of the U.S. freight car fleet to ECP brake technology, including suppliers, railroads, private car owners, AAR, and FRA was assembled to participate in the study. The expert panel supported the conclusion that the AAR standards are sufficient for the ECP brake system designer to achieve a system safety level adequate for a safety-critical system. In particular, an AAR-compliant system, while providing a significant increase in safety and efficiency, does not introduce extra risks associated with single-point failure of the ECP system itself.

The final BAH report provided a comprehensive analysis and comparison of ECP and conventional air brake systems. BAH acknowledged that while trains with ECP brake systems have been operated in North America, South Africa, and Australia, U.S. implementation has been stalled due to the absence of an acceptable implementation plan for conversion and hard data to support a sound economic analysis, limited interoperability with traditionally braked trains, and insufficient capital investment required for conversion. It concluded that although the barriers to implementation are formidable, ECP brake systems are economically and technically ripe for adoption and should be implemented in phases. BAH suggests that implementing ECP brakes on 2,800 locomotives and 80,000 cars in the Powder River Basin (PRB) would cost the industry approximately $432 million. However, according to BAH, the annual $157 million in anticipated benefits—resulting from saved fuel, improved wheel and brake shoe life, and a reduction in necessary brake inspections—will allow railroads to recover those costs in less than three years. To justify the investment, the BAH report says, conversion must be focused first on the high-mileage, unit-train-type services that would most benefit from its use.

FRA acknowledges that BAH's fuel cost estimates are underestimated due to subsequently rising prices. It is notable that BAH did not attempt to quantify potential savings relating to capacity increases or emissions decreases due to the difficulty in arriving at acceptable values. Accordingly, the report's estimated internal rate of return should be viewed as conservative.

VIII. Related Proceeding

In a petition dated November 15, 2006, and filed November 21, 2006, BNSF and NS jointly requested that FRA waive various sections in parts 229 and 232 as it relates to those railroads' operation of ECP brake pilot trains. *See* Docket No. FRA–2006–26435. The FRA Safety Board held a fact-finding hearing on this matter on January 16, 2007, featuring testimony from representatives of the petitioners, air brake manufacturers, and labor unions. On March 21, 2007, the Safety Board granted the petitioners' request, in part, subject to various conditions designed to ensure that ECP brake equipped trains subject to the waiver will be as safe as trains equipped with conventional brakes and operated under the existing rules. *See id.*

IX. Legal Impediments and Proposed Relief

ECP brake operation provides for continuous electronic monitoring of the condition of air brake system components and brake pipe pressure, potentially limiting the need for certain physical brake inspections currently required under part 232. Accordingly, this final rule modifies, relaxes, and removes certain requirements, including intermediate terminal inspections (§§ 232.207, 232.209, and 232.211), single-car air brake tests (§ 232.305), and the required percent of operable brakes at initial terminal departure (§ 232.103(d)), as they apply to trains operating in ECP brake mode. The rail industry's implementation of ECP brakes is frustrated by such inapplicable and inefficient statutory and regulatory requirements. Without a large-scale proliferation and implementation of ECP brake technologies, the industry will not be able to enjoy economies of scale and to overcome the industry-wide limits caused by interoperability problems. FRA seeks to improve market efficiency by providing reliable and suitable standards and procedures that will support investments in ECP brake technology.

The current statutory and regulatory requirements, however—including those concerning brake inspections and the operation of trains with defective equipment—may reduce or eliminate incentives for railroads to implement new ECP brake technology and take advantage of its operational and safety benefits. For example, 49 U.S.C. 20303 presents an obstacle to cost-saving, safe, and efficient long hauls promised by ECP brakes. To avoid incurring civil penalties, operators are required under 49 U.S.C. 20303 to transport rail vehicles with defective or insecure equipment ''from the place at which the defect or insecurity was first discovered to the nearest available place at which the repairs can be made.''

The design and operation of ECP brakes renders strict application of the existing statutory movement for repair provision unnecessary as it will reduce efficiencies and may actually reduce the safety of such operations. When the defective equipment is an ECP brake, stopping for immediate repairs is not necessary. If more than 15 percent of the train's AAR approved ECP brakes become inoperable, the train automatically stops. It should be noted that a train with 85 percent operative ECP brakes will still have shorter stopping distances than a train equipped with conventional pneumatic brakes that are 100 percent operative. Considering the technology's continuous self-monitoring and constant communication with the engineer, it is highly unlikely that a train equipped with ECP brakes will ever reach such a level of inoperability. Further, FRA continues to believe that a freight train operated with ECP brakes may travel non-stop to its destination, not to exceed 3,500 miles, without intermediate brake inspections, because foundation brake rigging and brake shoes will safely operate this distance and redundant intermediate brake inspections within that distance do not increase ECP brake system safety. As an added benefit, the increased mileage allowance would provide for coast-to-coast travel. In the related proceeding, Docket No. FRA–2006–26435, FRA's Safety Board granted the request of BNSF and NS to allow the non-stop movement of an ECP brake operated train to its destination, each not to exceed 3,500 miles.

Nevertheless, 49 U.S.C. 20303 requires trains with defective safety appliances, including brakes, to travel to the nearest location where the necessary repairs can be made. If the nearest available location is in a direction other than that in which the train is traveling, the train with defective equipment may be required to switch the defective car out of the train and add it to another train traveling in the direction of the nearest repair location, referred to as a ''backhaul.'' ECP brake implementation has been complicated by the ECP brakes system's technological incompatibility with conventional pneumatic brake systems. To switch a car equipped with ECP brakes into a technologically incompatible train operating with conventional pneumatic brakes will create additional safety concerns for that train.

The potential risks involved in combining cars with incompatible braking systems coupled with the hazards normally associated in switching cars in the field, outweigh the potential harm of keeping the defective car in its existing ECP braked train and traveling to a repair location that is significantly further away. In circumstances where the defective safety appliance is a non-brake defect, it will often be safer and is certainly more efficient to allow ECP brake-equipped trains with non-brake defective equipment to travel to the nearest forward repair station. Moreover, due to the ability of ECP brake systems to continuously monitor the brakes on each car in a train and to provide specific information to the locomotive engineer regarding the location of any car with inoperative brakes and the

design of such systems to prohibit operation with less than 85 percent operative brakes in certain situations, the need to immediately set-out and handle cars with defective brakes for repair is unnecessary. There is also no safety need to require a railroad to incur the expense and delay involved with cutting the defective car out of the train or to run the safety risk of doing so. Currently, freight cars with defective mechanical conditions are permitted to be hauled long distances for repair. *See* 49 CFR 215.9. In light of the technological advances provided by ECP brake systems, it appears logical and necessary to permit more flexibility in moving equipment with defective brakes when equipped with ECP brakes and hauled in a train operating in ECP brake mode. However, the language of 49 U.S.C. 20303 prevents FRA from providing this flexibility.

When drafting the proposed rule in this proceeding, FRA recognized that the aforementioned statutory requirements governing conventional pneumatic braked trains may offset the increased safety and efficiency benefits afforded by ECP brakes, thus eliminating the incentives for rail operators to implement ECP brake technologies. To encourage implementation without hindering safety, FRA proposed to invoke its discretionary authority under 49 U.S.C. 20306 to exempt ECP brake-equipped trains from the specific statutory requirements contained in 49 U.S.C. 20303. The requirements for moving defective equipment were created over a century ago, during the infancy of pneumatic brakes and before all cars were equipped with power brakes. With many more reasons to stop train operation along tracks with frequent repair shops and exponentially more employees, the legislative drafters of that time could not have envisioned the type of safer and more efficient technologies available today.

Recognizing the importance of upgrading rail technologies, Congress in 1980 passed the Rock Island Railroad Transition and Employee Assistance Act (the ''Rock Island Act''), which, *inter alia,* provides statutory relief for the implementation of new technologies. More specifically, when certain statutory requirements preclude the development or implementation of more efficient railroad transportation equipment or other transportation innovations, the applicable section of the Rock Island Act, currently codified at 49 U.S.C. 20306, provides the Secretary of Transportation with the authority to grant an exemption to those requirements based on evidence received and findings developed at a hearing.

According to Senate Report No. 96–614, ''This section fosters rail technological improvements by giving the Federal Railroad Administration *discretionary* authority to grant exemptions from the Safety Appliance Acts' mandatory requirements *when those requirements preclude the development or implementation of new rail technology*.'' Senate Comm. on Commerce, Science, and Transportation, S. Rep. No. 96–614, at 8–9 (Mar. 4, 1980) (emphases added). The House version of the bill includes no similar provision, but the Conference substitute adds that the authority granted FRA in this section must be exercised after a hearing, absent an agreement between labor representatives and the developers or operators of the new equipment or technology. Joint Explanatory Statement of the Committee of Conference, H. Conf. Rep. No. 96–1041, § 117, at 30 (May 20, 1980).

Under 49 CFR 1.49(v), the Federal Railroad Administrator is delegated authority to carry out the functions vested in the Secretary by the Rock Island Act. Under this authority, FRA held two public oral hearings in Washington, DC on October 4, 2007, and near Chicago, IL, on October 19, 2007, to receive evidence and develop findings to determine whether FRA should invoke 49 U.S.C. 20306. While FRA solicited any information that would bear on this decision, it also asked a series of questions in the NPRM and at the hearing designed to invoke discussion and gather information regarding the safety of moving defective equipment as proposed and to determine whether existing statutory provisions impede the implementation of the technology.

At the hearing, the labor unions commented on the limitations of the ECP brake system's self-monitoring capabilities. According to the labor unions, since the technology cannot monitor a variety of brake defects, it should not be relied upon to allow a train to operate 3,500 miles without any intermediate brake inspections. On the other hand, the railroads support the increase in the allowable distance of 3,500 miles between brake inspections, believing the safety level of trains operating with ECP brakes that distance should equal or exceed the safety level of trains operating with conventional brakes over 1,000 miles. For the same reasons, some railroads even suggested that ECP brake operated trains be allowed to move 5,000 miles between Class I brake inspections.

The labor unions and railroads agree that a conventional freight car with the brakes cut out is no different than an ECP brake-equipped car with the brakes cut out and that switching a defective ECP brake-equipped car into a conventionally braked train will not increase current safety concerns. However, the railroads and the labor unions disagree when the defect is a non-brake safety appliance on a car equipped with ECP brakes. According to the labor unions, if a non-brake defect requires the car to be set out, there is no difference between a train operated with conventional brakes and a train operated with ECP brakes; the car should be set out for repair on site or moved under special circumstances to the nearest repair point. The railroads believe that such cars should be left in the train operated with ECP brakes for forward movement to a location where ECP brake repairs can be made instead of being switched out and hauled in a different direction. Any switching, says the railroads, causes the switching and pick-up crews more risk exposure.

The labor unions assert that the regulations proposed in this proceeding provide sufficient incentives for the implementation of ECP brake systems and that the restrictions within 49 U.S.C. 20303 do not provide a disincentive for such implementation. The railroads, on the other hand, assert that strict application of 49 U.S.C. 20303 provides a disincentive for the implementation and use of ECP brake technologies. According to the railroads, they are required under section 20303 to handle cars with defective equipment more times than necessary, resulting in lost time and revenue. The resulting undue and unreasonable financial burden and significantly negative financial impact on rail operations, say the railroads, provides no relief from the added expense of equipping rail cars with ECP brakes and is a strong disincentive for ECP brake system implementation. The railroads claim that eliminating the requirements under 49 U.S.C. 20303 would provide a necessary and significant economic incentive to the widespread adoption of ECP braking technology in the U.S.

Based on the comments and information submitted at those hearings, FRA has decided to invoke its discretionary authority under 49 U.S.C. 20306 to exempt application of 49 U.S.C. 20303 as it applies to the operation of ECP brake operated freight trains and freight cars. FRA believes that application of section 20303 will clearly provide a disincentive towards the implementation of ECP brake systems, a

technology that promises safer operation of trains throughout the U.S.

FRA is confident that this initiative is consistent with improving railroad safety. As further discussed below, through oversight of present train operations, including extended haul operations, FRA has observed that properly inspected trains can proceed for extended distances without loss of braking effort due to wear or damage to foundation brake rigging. FRA further notes that hauling of cars with defective safety appliances to the next forward point where repairs can be accomplished poses virtually no incremental risk to employees, particularly if defects have been identified and communicated to the crew of the train. In the great majority of cases, damaged or insecure safety appliances pose a risk only during switching operations, not during line haul movements. Indeed, back hauling of safety appliances introduces additional risk, as the car is first removed from one road train and then added to another for the reverse movement.

X. Additional Issues

A. Part 229

In the ECP brake waiver proceeding, Docket No. FRA–2006–26435, BNSF and NS sought relief from various provisions of parts 229 and 232. In relation to part 229, BNSF and NS sought relief from the requirements relating to daily locomotive inspections and electronic record keeping. FRA sought comments and information whether this final rule should include any exceptions to part 229 for operations using ECP brake systems.

No commenting party supported or suggested any exceptions to part 229. On the contrary, UTU and BLET agreed with the FRA's proposal not to modify part 229 in this rulemaking. According to BLET, there is no basis for relief from the daily inspection or recordkeeping requirements of Part 229. FRA continues to believe that there is insufficient information available to consider any exceptions to part 229 for operations using ECP brake systems. Thus, under this rulemaking, part 229 remains unaffected.

In its comments, Wabtec lists a number of minimum requirements that it proposes should be added to existing event recorder parameters, applicable to the lead locomotive when in ECP brake operation. BLET filed a supplemental response in which it responded to this particular filing, stating that it ''cannot serve as a basis for FRA requirements pertaining to event recording of ECP data because of [an] omission [relating to the 'ECP train brake source' parameter described in UP's comments].'' The scope of this proceeding does not include information relating to event recorder data. The NPRM did not discuss or seek comments on this issue. Accordingly, FRA will not include in this final rule any modifications to the regulations governing event recorders, since many parties interested in event recorders would not have been put on notice that the issue was being raised. FRA believes that these issues would best be resolved in a separate proceeding concerning part 229.

B. Dynamic Brake Requirements

At the public hearing conducted in relation to the waiver proceeding, BNSF requested relief from some of the dynamic brake requirements contained in 49 CFR part 232. On this issue, FRA only received comments from BLET, which indicated that relief relating to dynamic brake requirement is not necessary as it applies to ECP brake systems. According to BLET, it would be unwise and unsafe to further erode braking capacity by diluting the existing dynamic brake requirements.

FRA remains unsure of what specific relief BNSF requested regarding dynamic brakes. Section 232.109 provides for the continued operation of a locomotive found with inoperative dynamic brakes for a period of up to 30 calendar days. It appears that railroads will continue to require locomotive engineers to rely on extended range dynamic brakes where they sufficiently control the braking effort without introducing excessive buff forces. Locomotive engineers will need to know what level of braking effort is available, particularly in extreme cases operating over territory with significantly descending grades. Otherwise, an engineer may lose control of the train due to brake fade when the speed precludes a timely application of the automatic brake due to insufficient dynamic brake capacity. FRA recognizes that this scenario is much less likely to occur with availability of ECP braking, but that does not mean it could not occur. FRA continues to believe that more flexibility in this area is not necessary and declines to make any such modifications in this final rule.

C. Single Car Air Brake Test Approval Procedures and Single Car Air Brake Tests

The NPRM included a provision requiring the submission and approval of single car air brake test procedures for cars with ECP brake systems in accordance with the special approval procedures in § 232.17. FRA also reserved the right to modify § 232.17 to make clear the applicability of proposed subpart G, including, but not limited to, adding cross-references.

Section 232.305(a) provides that a single car air brake test may be performed partially in accordance with ''Section 4.0, 'Special Tests,' of the Association of American Railroads Standard S–486–01, 'Code of Air Brake System Tests for Freight Equipment,' contained in the AAR *Manual of Standards and Recommended Practices, Section E* (January 1, 2001).'' That standard has since been amended and FRA has approved the use of the new Standard S–486–04 as the procedure to use when performing a single car air brake test. Accordingly, FRA proposed to amend § 232.305(a) by replacing the directly preceding quoted text with the following: ''Section 4.0, 'Special Tests,' of the Association of American Railroads Standard S–486–04, 'Code of Air Brake System Tests for Freight Equipment,' contained in the AAR *Manual of Standards and Recommended Practices, Section E* (January 1, 2004).''

BLET submitted comments supporting FRA's proposed amendments to sections 232.17 and 232.305(a). No other comments were filed on these issues. Consequently, the final rule amends §§ 232.17 and 232.305(a).

D. Train Handling Information

Section 232.111 requires railroads to adopt and comply with written procedures ensuring that railroad train crews receiving trains are provided accurate information concerning each train's condition. The continuous monitoring capabilities of ECP brake systems provide information regarding the location of equipment with inoperative or cut out brakes. BLET commented that none of the information provided by the ECP brake system appears to satisfy the requirements of 232.111(b) and that it agrees with FRA that there is no reason for excepting any portion of or provision contained in § 232.111.

FRA continues to see no reason to excepting any portion of or provision contained in § 232.111. FRA continues to believe that, if anything, ECP brake systems' continuous monitoring capabilities will assist railroads in complying with the train handling information rules in § 232.111 by monitoring defects and potentially allowing for the manual input of defects not monitored electronically and then

electronically providing such information to subsequent train crews.

E. Piston Travel Limits

For cars equipped with 8½-inch or 10-inch diameter brake cylinders receiving either a Class I brake test or a periodic inspection while on a shop or repair track, §§ 232.205(c)(5) and 232.303(c) currently limit piston travel to 7 to 9 inches. An industry-wide waiver currently in effect, however, permits piston travel limits to range from 6 to 9 inches on these types of cylinders. In the NPRM, FRA proposed the incorporation of that waiver into the rules by amending §§ 232.205(c)(5) and 232.303(c) accordingly.

BLET, Wabtec, and NYAB concur with FRA's proposal to incorporate the current, industry-wide waiver permitting piston travel limits to range from 6 to 9 inches by amending sections 232.205(c)(5) and 232.303(c). Similarly, AAR states that there is no reason to refrain from incorporating the industry-wide waiver in the regulations. Consequently, this final rule amends sections 232.205(c)(5) and 232.303(c) by revising the piston travel range limit of 7 to 9 inches to a range limit of 6 to 9 inches.

F. Extended Haul Trains

Section 232.213(a)(6) requires inbound inspections for extended haul trains and states that, ''After April 1, 2007, the inbound inspection described in this paragraph shall not be required unless FRA provides notification to the industry extending the requirement to perform inbound inspections on extended haul trains.'' Section 232.213(a)(7) requires railroads to maintain a record of all defective, inoperative, or ineffective brakes and all conditions not in compliance with parts 215 and 231 discovered during train movement. In addition, that section says that, ''After April 1, 2007, the records described in this paragraph need not be maintained unless FRA provides the notification required in paragraph (a)(6) of this section extending the requirement to conduct inbound inspections on extended haul trains.''

In the NPRM, FRA proposed to amend Part 232 by deleting §§ 232.213(a)(6) and (a)(7) from the regulations. These regulations ''sunsetted'' on April 1, 2007, without further FRA action. Since this proposal remains uncontested and the ''sunsetted'' provisions serve no purpose by remaining in the CFR, the final rule deletes § 232.213(a)(6) and (a)(7).

G. Part 238

Amtrak informally expressed interest in potentially using ECP brake system technology for its Auto Train that runs from Lorton, Virginia to Sanford, Florida. Amtrak previously employed overlay ECP braking on that train, and presumably would benefit from some additional flexibility with respect to the conduct of intermediate inspections. However, since FRA does not currently have sufficient information regarding the use of ECP brake systems on passenger trains and passenger equipment, FRA did not propose any amendment to 49 CFR part 238. FRA continues to believe that the functions of freight and passenger trains and cars, evidenced by the varied rules applicable to each, are too disparate to provide a one-size-fits-all solution for ECP brake integration and use.

In the NPRM, FRA stated that it may consider Part 238's applicability to ECP brake systems in another rulemaking or in other proceedings and would consider requests for waivers relating to the regulation of freight trains and freight cars equipped with ECP brake systems for passenger trains on a case-by-case basis. BLET agrees that the issue of ECP brakes and Part 238 should be addressed in a separate rulemaking. For this reason, BLET does not believe that it is appropriate for FRA to regulate ECP brakes on passenger trains via the waiver process or on a case-by-case basis.

FRA continues to believe that any regulations affecting the implementation and use of ECP brake systems on passenger trains are better left for a separate rulemaking proceeding relating to Part 238. FRA will also consider requests for waivers for such implementation and use on passenger trains. Although BLET expresses its opinion that a rulemaking would be a better venue for permitting the implementation and use of ECP brake systems on passenger trains, it provides no reasons why it would not be prudent to allow for the use of waivers to achieve similar goals.

XI. Section-by-Section Analysis

49 CFR Part 232

Unless otherwise noted, all section references below refer to sections in title 49 of the Code of Federal Regulations (CFR). FRA sought comments on all proposals made in the NPRM to this proceeding.

Subpart A—General

This subpart contains amendments to the definitions listed in subpart A of part 232.

Section 232.5 Definitions

In the NPRM, FRA proposed the amendment of section 232.5 by adding an extensive set of definitions to introduce the regulatory relief and regulations applicable to ECP brake systems. FRA worded these definitions to mirror, to the extent possible, the definitions provided in existing AAR standards. FRA intends these definitions to clarify the meaning of important terms that are used in the text of the proposed rule. The definitions are carefully worded in an attempt to minimize the potential for misinterpretation of the rule. Some of the definitions introduce new concepts or new technologies.

These new definitions acknowledge the two general types of ECP brake systems—dual mode and stand-alone. The definition of a dual mode ECP brake system, which means a brake system that can work either as a conventional pneumatic brake system or an ECP brake system, intends to cover both an overlay ECP brake system and an ECP brake system equipped with an emulator CCD. The definition of CCD is intended to describe an important and necessary part of ECP brake system technology.

FRA did not receive any comments on the proposed definitions. Consequently, except for reasons set forth below, the final rule retains the definitions as proposed.

Subpart G—Electronically Controlled Pneumatic (ECP) Braking Systems

FRA is adding a new subpart G to part 232. The new subpart contains various design and operational requirements that provide both regulatory relief and regulatory modification to allow implementation of ECP brake systems on the Nation's railroads and to ensure the safety of such operations.

Section 232.601 Scope

This section contains a formal statement of the final rule's purpose and scope. The final rule contains specific requirements relating to the operation of freight trains and freight cars equipped with ECP brake systems and operating in ECP brake mode. The final rule also provides specific exceptions from various requirements contained in part 232 for ECP brake-equipped freight trains and freight cars.

Section 232.602 Applicability

As a general matter, this section makes clear that these rules apply to all railroads that operate freight trains or freight cars equipped with ECP brakes on track which is part of the general railroad system of transportation. The final rule applies to freight trains

operating in ECP brake mode, freight cars equipped with ECP brake systems, and conventionally braked freight trains and freight cars when operated in conjunction with ECP brake equipment.

The regulatory relief provided in the final rule and the need to ensure the safe operation of trains and vehicles equipped with this advanced technology requires that exception of certain existing part 232 provisions be afforded. Many of the provisions that the final rule excepts either apply awkwardly or should otherwise not apply to ECP brake systems due to the new technology's design or additional safety benefits. Similarly, the addition of various requirements directly related to ECP brake systems is necessary to ensure that the equipment is properly designed, inspected, tested, maintained, and safe to operate.

To fulfill these goals and to avoid an excess of confusing cross-references, this final rule excepts specific provisions and an entire subpart of part 232 from application to ECP brake systems. Each section of subpart G contains specific exceptions from various provisions contained in other portions of part 232 or contain appropriately rewritten provisions directly applicable to ECP brake systems. Those portions and sections of part 232 not specifically excepted by this final rule remain applicable to ECP brake-equipped freight trains and freight cars.

Section 232.603 Design, Interoperability, and Configuration Management Requirements

In order to ensure the safety and interoperability of ECP brake systems, this section incorporates by reference the existing AAR standards and approval procedures for ECP brake systems. The AAR, its member railroads, and various brake manufacturers have invested considerable time and effort in developing the identified industry standards addressing the design, performance, and interoperability of ECP brake systems. FRA has reviewed the industry standards it intended to incorporate by reference in this final rule and has determined that the standards effectively address and ensure the safe and proper operation of the brake system technology. As noted previously in this preamble, FRA funded a FMECA, which validated the safety and applicability of AAR's ECP brake system standards for freight railroads.

FRA believes that compliance with the AAR standards identified in paragraph (a) will ensure the safety and efficiency of freight trains and freight cars equipped with ECP brakes. Implementation of ECP braking systems complying with these standards will bring benefits and efficiencies encompassing train handling, car maintenance, fuel savings, network capacity, self-monitoring, fail-safe operation, accurate and instantaneous brake commands throughout the train, and continuous, real-time self-diagnostics. Paragraph (a) requires all manufacturers to meet existing AAR standards when developing and installing ECP brake systems.

Paragraph (a) incorporates the most recent AAR standards related to ECP brake systems. FRA recognizes that ECP brake systems are a growing technology and realizes that the existing AAR standards may need to change as the technology advances. Accordingly, this final rule includes two methods by which the incorporated industry standards may be changed. Paragraph (a) permits the submission of an alternate standard under the special approval procedures contained in § 232.17. In addition, paragraph (f) permits the AAR or other authorized representative of the railroad industry to seek modification of the approved industry standards through the modification procedures contained in § 232.307. Only the party that initially submits a standard approved by FRA pursuant to paragraph (a) may subsequently seek modification of that standard under paragraph (f). For instance, only AAR may seek modification of its own AAR S–4200 Series Standards already incorporated by reference into this final rule. If another authorized representative of the railroad industry submits an alternative standard under paragraph (a) and pursuant to § 232.17, then only that representative may seek modification of their alternate standard under paragraph (f).

The modification procedures in § 232.307 were developed to permit modification of the other incorporated AAR standards and FRA believes that the procedures are equally applicable to the regulations contained in this final rule. The industry has successfully utilized both these methods to change or modify industry standards incorporated in part 232 and FRA believes it is appropriate and necessary to provide this latitude for the standards related to ECP brake systems and components.

BLET filed comments supporting § 232.603(a) and (f) to utilize the alternate standards of § 232.17 and the modification procedures of § 232.307, respectively. GE requests that an exception be granted to certain stand-alone ECP brake systems in § 232.603(a)(1)–(6). We will address GE's comments below when providing analysis of § 232.603(e).

FRA recognizes that while most of the S–4200 Series apply technical standards concerning the mechanical attributes and capabilities of ECP brake systems, S–4240 and S–4270 delegate additional responsibilities to those manufacturing, implementing, and using ECP brakes and have been the subject of various comments filed in this proceeding. Thus, FRA believes they require further discussion.

FRA has reviewed the approval procedures contained in AAR Standard S–4240 and believes that they provide an appropriate review process to ensure the safe and proper operation of ECP brake systems. FRA believes that AAR is in the best position to approve those ECP brake systems that will be used by its member railroads and, over time, other non-member railroads interchanging traffic on the general rail system. FRA does not intend this section to necessarily preclude the introduction and acceptance of alterative standards subsequently approved in accordance with the rules.

FRA recognizes, however, that enforcement of S–4240 against the railroads would be difficult without additional regulatory language. Accordingly, paragraph (b) requires that all ECP brake systems developed under the AAR standards incorporated by reference in paragraph (a) receive conditional or final approval under AAR Standard S–4240 prior to use and that they maintain such approval while in use. In this paragraph, FRA prohibits the use of ECP brake systems developed under the AAR standards incorporated in paragraph (a) that do not receive conditional or final AAR approval or that cease to comply with the incorporated AAR standards relating to ECP brake systems.

BLET filed comments stating that it does not oppose paragraph (b). However, BLET believes that FRA's Railroad Safety Board should review petitions for conditional approval via the waiver process. FRA does not believe this level of scrutiny is necessary at this time. Under 232.103(l), all conventional brake systems must comply with AAR Standard S–469–47. Compliance with this standard is determined by the AAR brake committee, subject to FRA technical oversight. There are no more specific FRA requirements for these systems. For similar reasons, FRA is incorporating into the final rule the appropriate ECP brake standards. FRA has successfully relied on AAR for approving

conventional brake standards and there is nothing suggesting why FRA should perform a materially different approval process oversight role for the ECP brake standards. For the purposes of this rulemaking, FRA has closely reviewed and scrutinized the ECP brake design standards adopted by AAR. FRA also funded and participated in a FMECA analysis of the S–4200 series standards. We feel confident relying on AAR's approval process. Just like FRA enforces Standard S–469–47 after a system is introduced into service, FRA will equally enforce the S–4200 series standards on trains in service with ECP brake systems.

In paragraph (a), FRA also requires that all ECP brake systems meet the configuration management requirements contained in an industry recognized, FRA approved standard such as AAR Standard S–4270. FRA believes that configuration management of ECP brake system hardware and software components is an absolute requirement to ensure the interchangeability, interoperability, compatibility and continued proper and safe operation of ECP brake systems. Compatibility of ECP hardware and software will have a direct affect on the safety and reliability of ECP brake systems running on the Nation's railroads.

In the NPRM, FRA cautioned that the limited configuration management plan requirements in Sections 5.1 and 5.2 of AAR Standard S–4240 may not have been sufficiently robust to adequately control ECP brake system components. The more recently developed AAR Standard S–4270 eliminates this shortcoming by adequately addressing issues relating to configuration management, including a sufficient set of requirements that properly allocate the responsible party and necessary procedures to be followed by this party to assure proper management of ECP brake system software and hardware configurations.

The AAR approval process and Air Brake Systems Committee requires various procedures to ensure the interoperability and interchangeability of AAR-approved ECP brake systems and their components. These same requirements and procedures have been used for many years to successfully manage the configuration of conventional pneumatic AAR approved air brake valves. Therefore, FRA believes that responsibility for the configuration management of AAR-approved brake systems and their components should continue to reside with AAR and its Air Brake Systems Committee.

As discussed above, FRA has reviewed and approved AAR Standard S–4270 and has determined that the standard should be incorporated by reference into this final rule. In a notice issued on April 18, 2008, FRA sought comments and concerns on AAR Standard S–4270, which at that time was in draft form, and indicated that it would consider inclusion of the final draft if it was timely adopted with no substantial changes. 73 FR 21092, 94 (Apr. 18, 2008). AAR adopted and implemented Standard S–4270 on April 30, 2008, without any changes from the draft referenced in FRA's public notice dated April 18, 2008, and placed in the docket to this proceeding on April 21, 2008.

Since the NPRM was issued prior to the development of an acceptable configuration management plan standard, paragraph (c) as proposed included language delineating minimum requirements for acceptance of a subsequently submitted configuration management plan standard. Since paragraph (a) incorporates by reference AAR Standard S–4270 and provides for the submission of alternative standards under § 232.17, the extraneous text of proposed paragraph (c) has been removed from the final rule. However, FRA continues to believe that alternative configuration management plans must maintain the same minimum standards. More specifically, to receive approval in accordance with § 232.17, a configuration management plan must be structured in accordance with accepted configuration management standards and define all of the purposes, procedures, organizational responsibilities, and tools to be used for ECP brake system hardware and software configuration management including: The purpose and scope of the application; control activities to be performed; responsibilities and authorities for accomplishing the activities; implementation schedules; tools and resources for executing the plan; and periodic updating of the plan to maintain currency.

In the NPRM, FRA suggested that any submitted alternate configuration management plan be structured in accordance with accepted configuration management standards such as IEEE Std 28–1990, IEEE Standard for Software Configuration Management Plans, American National Standards Institute, 1990; or IEEE Std 1042–1987, IEEE Guide to Software Configuration Management, American National Standards Institute, 1987. The brake manufacturers, however, argue that these IEEE standards are not considered appropriate or necessary for achieving adequate configuration management control for ECP brake systems. Despite their promise to recommend alternatives, nothing on this issue was subsequently filed.

The NPRM's references to the various aforementioned IEEE standards were provided for use by the railroads in the event that AAR did not develop its own configuration management standard. As previously mentioned, AAR issued a configuration management standard, S–4270, subsequent to the initial comment period in this proceeding. FRA understands the brake manufacturers to mean that some items specified in the IEEE standards may not be applicable because they are superseded by the more restrictive standards and processes developed by the brake manufacturers. While FRA concedes that this may be true, it does not speak to the overall applicability of the IEEE standards to any alternate configuration management plan that might be submitted by any other party. FRA expects all configuration management plans to be tailored to the requirements of accepted IEEE standards or a more restrictive, proprietary, or industry-specific standard has been developed and implemented. FRA believes AAR Standard S–4270 complies with the latter expectation.

FRA continues to believe that any ECP brake configuration management plan should consider issues beyond initial approval. For instance, use of improper or out-of-date software versions for microprocessor controlled systems has been an issue in a variety of industries. Therefore, FRA continues to caution that any alternate configuration management plan should be sufficiently robust to adequately control ECP brake system components, especially as more manufacturers apply for AAR approval of ECP brake systems. Further, safety or reliability issues may dictate that hardware or software configurations be changed once ECP brake systems are put in service on a large scale in the U.S. FRA continues to encourage AAR, railroads, and manufacturers to ensure their ability to continually monitor and respond to hardware and software issues affecting ECP brake systems after initial approval.

FRA continues to believe that AAR is capable of setting appropriate configuration management standards and related approval procedures and FRA intends to rely on AAR to monitor ECP brake component approval, configuration and compatibility for systems designed and approved under its standards incorporated herein. However, FRA, in its federal oversight

role, will continue to monitor the activities of the Air Brake Systems Committee and the AAR ECP brake approval process to ensure that any safety or reliability issues that may emerge are addressed promptly and comprehensively. FRA will also issue additional configuration management requirements for the operation of ECP brake systems if, in the sole opinion of the FRA, the oversight of the AAR and the AAR Air Brake Systems Committee proves inadequate for the continued safe operation of ECP brake systems. In this case, FRA may take a variety of approaches including requiring railroads and car owners to develop their own configuration management plans for monitoring ECP brake system interchangeability, interoperability and compatibility.

In relation to the issue of ECP brake system configuration management plans, FRA received comments from BLET at the public hearing and written comments in response to FRA's notice seeking comment on AAR Standard S–4270. At the hearing, BLET stated that configuration management plans must conform to the requirements of part 236, subpart H. According to BLET, ''There is a strong likelihood that the majority of the routes over which ECP will be deployed also will see the implementation of positive train control ('PTC'). Given the manner in which PTC will enforce speeds and authorities, the ECP head-end unit and its associated appurtenances will become a core element of the PTC system.'' In its written comments, BLET added, ''We continue to believe that—to the extent ECP-equipped trains operate on routes where PTC has been or will be installed—the ECP technology is a processor-based train control system. Braking algorithms for speed and authority enforcement for ECP-equipped trains will differ significantly from those utilized for conventionally-braked trains.''

FRA understands BLET's contention to be that, if an ECP brake system ''is considered a core element of PTC system'' or ''is considered a train control system,'' then it must comply with the configuration management requirements contained in Part 236, Subpart H, 905(b)(4). While FRA acknowledges the importance of configuration management, it does not agree that ECP brake systems must conform to the requirements of part 236, subpart H. Although ECP brakes may have a significant impact on the safety case prepared under subpart H of part 236 for train control systems, FRA does not consider the brake system, standing alone, to constitute a train control system.

The current implementation of ECP brake technology and processor based train control technology are two independent industry initiatives. FRA recognizes the potential for the future use of both technologies onboard a single locomotive and FRA looks forward to such integration. Of course, operations that contemplate using both PTC and ECP brakes in a common operation must include the ECP brake system as an integral part of the Product Safety Plan for the train control system. While the ECP brake system itself is not subject to subpart H of part 236, ECP brakes may not be utilized with processor based train control systems until the impact on their use has been included in the required analysis of the train control system under subpart H of part 236 and that analysis has been approved by FRA. Given the superior characteristics of ECP brake systems, and assuming straightforward integration with new train control systems, the use of ECP braking should be helpful in the formulation of persuasive safety case documents.

FRA acknowledges BLET's concern that ''AAR's proposed S–4270 Standard is materially inferior to the other S–4200 standards,'' and their strong recommendation to FRA to insist on ''(1) the use of identified, scientifically-proven configuration management plans, and (2) the delineation of 'bright line' triggers governing the urgency with which hardware and/or software changes must be made.'' FRA further acknowledges BLET's concern regarding ''[delegation] to AAR's Air Brake System Committee oversight of [ECP brake] product approval, implementation, and operations.''

In the NPRM, FRA recommended the use of acceptable IEEE software configuration management standards such as IEEE–828 and IEEE–1042 for the development of ECP brake system configuration management plans. 72 FR 50820, 50831 (Sept. 4, 2007). As BLET notes, neither of these standards are referenced in the proposed AAR S–4270 standard, and the proposed standard passes the responsibility to develop and maintain the configuration management plan for the ECP brake product to the manufacturers. FRA, however, does not believe that such actions are inconsistent with either IEEE–828 or IEEE–1042, since both standards provide for and encourage tailoring appropriate to individual products and the system developers' operational needs. For example, IEEE–828 makes the following provisions:

> This standard permits significant flexibility in preparing an SCM Plan. A successful Plan reflects its project environment. It should be written in terms familiar to its users and should be consistent with the development and procurement processes of the project. To conform to the requirements set forth in other applicable standards or to accommodate local practices, a Plan may be tailored upward, to add information, or tailored to use a specified format. The Plan may also be tailored downward, omitting information required by this standard, when specific standard requirements are identified as not applicable to this project. * * * The information may be presented in the Plan in any sequence or presentation style deemed suitable for the Plans users.

Similarly, IEEE–1042 states:

> The application (and thus the planning) of SCM is very sensitive to the context of the project and the organization being served. If SCM is applied as a corporate policy, it must not be done blindly, but rather should be done in such a way that the details of a particular SCM application are reexamined for each project (or phase for very large projects). It must take into consideration the size, complexity, and criticality of the software system being managed, and the number of individuals, amount of personnel turnover, and organizational form and structure that have to interface during the life of the software system being managed.

The AAR S–4720 standard, particularly in § 3.3.2, outlines the main requirements to the ECP brake system configuration management plan that are common to the requirements of the IEEE and other standards referenced in the NPRM. Section 3.3.2 additionally requires that ''the manufacturer shall maintain a readily retrievable record of all software and hardware changes and make that record available to the AAR and FRA at any time.'' In any event, the NPRM merely stated that FRA expected any configuration management plan to conform to an accepted standard; the IEEE standards referenced were simply provided as acceptable examples.

FRA would also like to address BLET's concern regarding the ''delineation of 'triggers' governing the urgency of the software/hardware changes implementation.'' FRA has reviewed industry practice regarding software changes and has determined that the levels contained in AAR Standard S–4270 are consistent with the IEEE 1044 and 1044.1. These standards differentiate the urgency of software and hardware implementation schedules in order to assure gradual implementation without significantly affecting operations. FRA considers the use of the three levels of software and hardware implementation strategy given in § 3.6 of S–4270 as reasonable and practically justified.

To further assure and enforce compliance of the ECP brake manufacturers' configuration management plans with the final rule and appropriate standards, FRA makes vendor and railroad compliance with S–4270 a regulatory mandate subject to regulatory oversight in paragraph (c) of this section in the final rule. AAR Standard S–4270 places the responsibility for configuration management on the brake manufacturers. Paragraph (c) of this section, however, requires the railroads implementing and using ECP brake technology to ensure that the brake manufacturers' configuration management plans comply with the existing applicable standards. FRA believes that the users of rail technologies are ultimately responsible for their safe use.

Paragraph (c) also provides for regulatory oversight of configuration management plans, which could include a review of the manufacturer's commitment and adherence to the general requirements of accepted or scientifically proven configuration management plans. Based on the allowances for customization of the configuration management standards to support a specific vendor's mode of operation, and the inclusion of FRA regulatory oversight to ensure that vendor's standards are appropriate, FRA considers the content of S–4270 standard sufficient to be incorporated by reference in this final rule.

Paragraph (d), of this section excepts a freight car or freight train equipped with ECP brakes from certain existing provisions contained in part 232. FRA recognizes that part 232 requires compliance with other AAR standards not applicable to ECP brake systems. For instance, section 232.103(l) requires compliance with AAR Standard S–469–47 (''Performance Specification for Freight Brakes''), which specifies a train's air brakes must respond to the decrease and increase of brake pipe pressure. However, ECP brake systems respond to an electronic signal, not brake pipe pressure, rendering S–469–47 inapplicable to ECP brake systems. Accordingly, paragraph (d) excepts ECP brake systems from the requirements of AAR Standard S–469–47.

In addition, GE requests that an exception be granted to certain stand-alone ECP brake systems to the AAR standards referenced in § 232.603(a)(1)–(6), where a suitable justification is provided. To this end, GE supplied proposed language to be inserted in a new paragraph of the final rule. While FRA agrees that the rules should provide for alternative standards, such flexibility is already provided in the introductory text to paragraph (a) of this section. If GE or any other potential brake manufacturer seeks to enter the marketplace with ECP brakes relying on standards other than AAR's, then it may submit alternative standards for FRA approval pursuant to § 232.17. Accordingly, a new paragraph providing for exception from the incorporated AAR standards under suitable justification is unnecessary.

Moreover, paragraph (e), provides further flexibility for the introduction of new technologies by providing for the possible exceptions from the requirements of subpart F of this part. BLET objects to exempting railroad operators from the requirements of subpart F. According to BLET, the pre-revenue service acceptance testing plan requirements set forth in subpart F provide data and other information that is necessary in order to safely regulate the technology. BLET also asserts that ''FRA does not propose that an exception be granted if testing or demonstration is conducted pursuant to an AAR standard that has been incorporated by reference after being subject to public review and comment. Rather, FRA proposes a lower requirement, that the testing/demonstration standard only be FRA-recognized.'' (Emphasis removed.)

Subpart F of part 232 contains general requirements for introducing new brake system technologies. More specifically, it requires a pre-revenue acceptance testing plan. As FRA views existing ECP brake system technology to be a fully mature and well-tested technology, FRA disagrees with BLET on this issue and does not believe the provisions contained in subpart F are applicable to this existing technology. When subpart F was originally added to part 232, ECP brake technology was just beginning to gain prominence. Since that time, experience with the technology is far more developed and the technology is being used on many different trains around the world. Moreover, FRA believes that requiring ECP brake systems to initially and continually comply with a FRA approved standard and to be approved in accordance with AAR's approval procedures prior to being placed in service obviates the need for existing ECP brake system technology to comply with the requirements under subpart F. Accordingly, paragraph (d)(2) provides for an exception from the requirements contained in subpart F freight trains and freight cars equipped with existing ECP brake system technology that has been conditionally or finally approved by AAR in accordance with its approval procedures prior to the effective date of the final rule in this proceeding. FRA has limited the exception to ECP brake system technologies approved by AAR as of the effective date of a final rule to provide an incentive to the industry to move the introduction of the technology along in a timely fashion.

In anticipation of future ECP brake technologies not currently contemplated within the scope of the incorporated AAR standards or not approved by AAR prior to the effective date of a final rule in this proceeding, paragraph (e) provides a procedure for introducing such technologies without going through the pre-revenue testing procedures contained in subpart F. Paragraph (e) permits a party interested in using new ECP brake system technologies or using an ECP brake system technology not approved by AAR prior to the effective date of the final rule in this matter to file a written request with the FRA seeking an exception from subpart F. FRA would expect any such request to include a comprehensive narrative statement and any evidence or facts justifying the exception of the new ECP brake technology from the testing and demonstration requirements of subpart F. The material should fully explain the testing or demonstration that will be conducted pursuant to an FRA-recognized industry standard and ensure that FRA is able to monitor such testing or demonstration. FRA's Associate Administrator may revoke the exception in writing for any reason after providing an opportunity for the affected party or parties to respond.

GE supports the adoption of proposed § 232.603(e), but recommends that ''FRA clarify that 'new technology' does not include functionally equivalent replacement components, consistent with past practice.'' To this end, GE suggests adding a ''new technology'' definition to part 232, clarifying this interpretation in the preamble to the final rule, or including some additional clarifying language to paragraph (e), indicating that in lieu of an FRA recognized industry standard, testing or demonstration of new technologies should be performed in an environment with a safety equivalent to that in paragraph (a).

Subpart F, as indicated in § 232.501, already addresses the issue of new technology. FRA intends subpart F to continue to apply to the introduction of new ECP brake technologies. However, as previously mentioned, the purpose of paragraph (e) is to provide a more liberal alternative to subpart F for the demonstration and testing of new ECP brake technologies subject to the

discretion of the Associate Administrator on a case-by-case basis.

GE's suggestion that the final rule include language requiring some type of adherence to an FRA approved ECP brake design standard misses the mark, since demonstration and testing may occur before any determination on design standards. Chronologically speaking, new ECP brake technologies can be tested and demonstrated under paragraph (e) ''right out of the box.'' Then, if the testing or demonstration results in an ECP brake technology worthy of use in revenue service, the manufacturer of that technology may need to apply for FRA approval of that technology's new design standard under paragraph (a) or (f). It appears that GE may have mixed apples (testing and demonstration) with oranges (subsequently seeking FRA approval or new alternative design standards). During the testing and demonstration phase, design standards may not even be contemplated.

Section 232.605 Training Requirements

The general training requirements for railroad and contractor employees performing the inspection, testing, and maintenance on brake systems under this part are contained in § 232.203. Paragraph (a) of this section makes clear that all of the training requirements contained in § 232.203 are applicable to ECP brake system operations and requires that all railroads operating ECP brake-equipped trains update their training, qualification, and designation programs to include provisions for these operations. Accordingly, FRA expects that railroad and contract personnel responsible for performing brake system inspections, tests, and maintenance on ECP brake systems be trained, tested, and designated in accordance with the requirements contained in § 232.203 on the ECP brake systems they will be required to inspect, test, and maintain.

Section 232.203(c) contains general requirements or elements which must be part of any training and qualification plan adopted by a railroad or contractor. FRA continues to believe that the elements contained in this section are specific enough to ensure high-quality training and broad enough to permit a railroad or contractor to adopt a training plan that is best suited to its particular operation. FRA continues to believe that the required training must provide employees with the necessary knowledge, skills, and abilities to perform the tasks required for the various types of brake systems the individual employee will be required to inspect, test, or maintain. Since FRA expects only a limited number of employees will be involved initially with ECP brake operations, a railroad or contractor may tailor its training programs only for those individuals involved with ECP brake systems, based on the tasks that employee will be required to perform on those specific systems.

Section 232.203(e) contains recordkeeping requirements, the cornerstone for training requirements accountability. FRA continues to believe that such records should be kept for employees inspecting, testing, and maintaining ECP brake-equipped freight cars and freight trains. Such documentation will allow FRA to judge the effectiveness of the training provided and will provide FRA with the ability to independently assess whether the training provided to a specific individual adequately addresses the skills and knowledge required to perform the tasks that the person is deemed qualified to perform. Moreover, requiring these records will deter railroads and contractors from circumventing the training requirements and discourage them from attempting to utilize insufficiently trained personnel to perform the inspections and tests required by this rule. The required records may be maintained either electronically or on paper in the same manner as required under section 232.203.

Paragraph (a) of this section also requires ECP brake operations to comply with § 232.203(f), which requires that each railroad or contractor adopt and comply with a plan to periodically assess the effectiveness of its training program. To ensure that affected employees receive timely, effective training relating to ECP brake technology, UTU encourages FRA to audit the training functions that are required under § 232.605. BLET agrees with UTU that FRA should reserve the right to audit such training programs and also proposes that training programs should be submitted to FRA for approval. AAR argues that the regulations should not require FRA approval of railroad training programs, since it would delay any changes that railroads might want to make.

FRA currently performs audits on the training provided to railroad employees and contractors under § 232.203. These audits examine the course content, learning objectives, testing methods, refresher training, and methods for ensuring the effectiveness of the training. FRA intends to continue to audit these training programs, including those for transportation and mechanical employees working with ECP brake operations. FRA does not require submission of training programs relating to conventional brake operations for FRA approval and does not see a need to require a submission of training programs relating to ECP brake operations. Accordingly, paragraph (a) extends this requirement to employees and contractors utilizing ECP brake operations.

In addition, FRA continues to believe that railroads and contractors should periodically assess the effectiveness of their training programs that would include an assessment of the training related to ECP brake systems. FRA continues to believe that periodic assessments may be conducted through a number of different means and each railroad or contractor may have a need to conduct the assessment in a different manner. By referencing the requirements contained in § 232.203, paragraph (a) requires that a railroad or contractor institute a plan to periodically assess its training program regarding ECP brake systems and permits the use of efficiency tests or periodic review of employee performance as methods for conducting such review. While FRA continues to believe that many railroads are capable of assessing the quality of the training their employees receive by conducting periodic supervisory spot checks or efficiency tests of their employees' performance, FRA also believes that on larger railroads the periodic assessment of a training program should involve all segments of the workforce involved in the training.

Paragraph (b) of this section requires each railroad to appropriately amend or modify its operating rules to include safe train handling procedures when utilizing ECP braking systems. The developed operating rules should address the equipment and territory operated by the railroad. FRA insists that training on proper train handling procedures is essential to ensuring that locomotive engineers can properly handle their trains with or without ECP braking systems. FRA also continues to believe that it should not specify the specific knowledge, skill, and ability criteria that a railroad must adopt into its locomotive engineer training program. Given the considerable differences among railroads, FRA believes that each railroad is in the best position to determine what these criteria should be and what training is necessary to provide that knowledge, skill, and ability to its employees operating ECP brake-equipped trains. However, to ensure that the railroads and contractors provide and complete training, paragraph (c) of this section

requires each to adopt and comply with such criteria and training procedures and to incorporate them into its locomotive engineer certification program required by 49 CFR part 240. In the final rule, the text of paragraph (c) has been modified from the proposed text for clarification purposes.

Section 232.607 Inspection and Testing Requirements

Except for transfer trains, the existing part 232 regulations require that each train operating with conventional brake systems receive a Class I brake test at its initial terminal and when certain events occur en route, a Class IA brake test every 1,000 miles, and Class III brake tests when the train consist continuity is interrupted. When operating as an extended haul train, the existing regulations require that a Class I brake test be performed at the train's initial terminal and at the train's 1,500-mile location, if operating further than 1,500 miles. In addition, under certain circumstances, cars and solid blocks of cars are required to receive either a Class I or a Class II brake test when they are added to a train. Each of these inspections is expensive and time-consuming.

An ECP brake system's self-monitoring capabilities, fail-safe operation, and enhanced safety and performance provide railroads the ability to reduce the number of physical inspections on a train. In a letter dated January 26, 2007, filed in the related ECP brake waiver proceeding, BNSF and NS assert that ''[t]his performance-based technology supercedes [sic] the need for a scheduled inspection based on the amount of mileage that can be accumulated within the boundaries of the U.S. rail system.'' Docket No. FRA–2006–26435. Similarly, in the same docket, two ECP brake manufacturers, NYAB and Wabtec, state that when an ECP brake system enters ''Run'' mode, it provides diagnostics, continuous monitoring, and fault reporting to the locomotive display. According to the manufacturers, ECP brakes provide to the locomotive monitoring and feedback of the most important brake data and ''while it is not economically practical to monitor for all potential brake system failures, the increased level of monitoring and data reporting should allow safely extending the distance between inspection points, coupled with revised railroad procedures.'' Letter dated January 29, 2007, in Docket No. FRA–2006–26435.

FRA is convinced that if a train is properly and thoroughly inspected, with all of the defective conditions being eliminated, then the train is capable of traveling distances much greater than 1,000 miles between brake inspections. FRA's experience with extended haul trains over the last four years has established that trains with conventional pneumatic brake systems that are inspected by highly qualified individuals can safely operate up to 1,500 miles between brake inspections. FRA is not aware of any significant incident or derailment related to a brake or mechanical component failure on an extended haul train. Accordingly, in paragraph (h) of this section, FRA excepts trains operating exclusively in ECP brake mode from the Class IA and Class II brake inspections currently required under §§ 232.207 and 232.209. Paragraph (h) also excepts such trains from en route Class I inspections required under § 232.205(a) and (b). Various comments were submitted relating to these exceptions of en route brake inspections. Since the exceptions in paragraph (h) substantially relate to the other paragraphs of section 232.607, we will discuss them as appropriate below.

Paragraph (a) requires continued compliance with § 232.205(c)—which describes the tasks and requirements of a Class I brake test—for an ECP brake-equipped train at its initial terminal. To offset safety concerns regarding the exceptions to intermediate inspections, FRA requires that Class I brake tests performed at initial terminals on ECP brake-operated freight trains be performed by a qualified mechanical inspector (QMI). FRA continues to believe that a Class I brake test performed on a train at its initial terminal needs to be as in-depth and comprehensive as possible and, thus, should be performed by an individual possessing the knowledge not only to identify and detect a defective condition in all of the brake equipment required to be inspected, but also to recognize the interrelated workings of the equipment and the ability to trouble-shoot and repair the equipment. Similarly, FRA will require that all of the mechanical inspections required to be performed on a train at its initial terminal be conducted by an inspector designated pursuant to 49 CFR 215.11 in order to ensure that all mechanical components are in proper condition prior to the train's departure.

FRA believes that the regulatory relief provided by paragraph (h) of this section is justified by the increased level of safety provided by ECP brake technologies and the requirement under paragraph (a) that a Class I brake test of car equipped with ECP brakes be performed by a QMI at its initial terminal. The exceptions provided in paragraph (h), in conjunction with the requirements of paragraph (a), would allow most trains equipped and operated with ECP brakes to travel to their destinations without stopping for any required intermediate inspections. The regulatory relief provided by this elimination of intermediate brake tests will significantly reduce operating and train delay costs.

In its comments, UP argues that it is not necessary to utilize a QMI to perform a Class I brake inspection for movements up to 3,500 miles. UP instead proposes that a qualified person (QP) perform Class 1 inspections for movements up to 3,500 miles and that a QMI be required to perform inspections for longer movements. UP also notes that some trains operated with ECP brakes may originate at a point where a QMI is not present and where train crews containing a QP may perform the inspections. AAR also objects to the requirement in paragraph (a) that Class I inspections on ECP brake operated trains be performed by a QMI. AAR asserts that the QMI requirement is more stringent than the existing inspection requirements for trains equipped with conventional brakes. According to AAR, since a QMI is not present at all initial terminals, requiring a QMI to perform Class I brake inspections would discourage railroads from implementing ECP brake systems.

BRC supports paragraph (a), stating that a QMI will help ensure the proper condition of ECP brake systems prior to departure. According to BRC, the leeway requested by AAR and the carriers to designate any person as qualified is premature and should not be considered until data can be provided showing that inspections by a QMI are unnecessary. BLET wholeheartedly concurs that each Class I brake test at an initial terminal should be performed by a QMI. According to BLET, the industry's objection is without merit and its two-standard proposal will produce an oversight nightmare.

FRA agrees that, at this time, a two-tiered approach requiring a QMI for only some Class I inspections of ECP brake operations would result in significant monitoring and enforcement difficulties. In any event, as discussed in more detail below, the final rule will only allow freight trains and freight cars operated with ECP brakes to operate to their destination, not to exceed 3,500 miles, or up to 3,500 miles for unit or cycle trains, before receiving an additional Class I brake inspection. Accordingly, there will be no ''longer movements'' between Class I brake

inspections that would allow for such a two-tiered approach.

FRA also believes that the railroads' concerns relating to QMIs are without merit. FRA is not mandating the railroads to operate with ECP brake systems. Thus, if the railroads opt to implement such systems, they will need to adjust their operations accordingly. FRA already requires that a QMI perform Class I brake inspections on extended haul operations, which are limited to 1,500 miles between such inspections. By more than doubling the allowable distance, FRA insists that there is an even greater need to require that a QMI perform the Class I brake tests on operations traveling further than the currently allowed distances. Moreover, the railroads' concerns are further mitigated by the reduction of the number of Class I brake inspections required en route. Since a QMI is required for extended haul operations at only 1,500 miles, it is unclear why AAR asserts that requiring the use of a QMI for ECP brake operations at 3,500 miles would be more stringent.

In light of the significant benefits provided by the extension of allowable distance between Class I inspections to 3,500 miles, FRA does not believe that requiring a QMI to perform a Class I brake test on for an ECP brake operation would discourage implementation of this technology. The railroads have had little difficulty in ensuring QMI placement at facilities where Class I inspections are required on extended haul trains. Since the number of Class I inspections for an ECP brake operation will be less than those for a conventional brake operation in extended haul status, FRA does not foresee this requirement becoming sufficiently burdensome to effectively discourage the implementation of ECP brake system technology.

In paragraph (b), FRA permits a train operating in ECP brake mode to travel up to 3,500 miles or to its destination, whichever is less, without any additional brake inspections. FRA believes that 3,500 miles allows virtually all ECP brake operated trains to travel to their respective destinations and provides for coast-to-coast travel. FRA also bases this mileage amount on the fact that foundation brake rigging and brake shoes will safety operate this distance and redundant intermediate inspections will not necessarily increase ECP brake system safety. Because many unit or cycle trains operate in a continuous loop with multiple loading and unloading locations, FRA has not included the destination of the train as a limiting factor for them. FRA is specifically making this distinction in order to prevent misinterpretation of the final rule as it relates to unit or cycle trains. As these trains may have multiple destinations, a strict application of destination could result in Class I brake tests being performed more frequently than intended by this final rule. Thus, in paragraph (b)(2), FRA treats unit and cycle trains differently by only requiring them to receive Class I brake inspections by qualified mechanical inspectors at least once every 3,500 miles. To be clear, under the final rule, no freight car or freight train equipped with ECP brakes would be allowed to travel more than 3,500 miles without receiving an additional Class I brake inspection by a qualified mechanical inspector.

UTU encourages FRA to continue to consistently regulate the need for mechanical inspections and repairs. UTU asserts that the self-monitoring feature of ECP brake equipment will have no effect on monitoring the mechanical functions of the freight car involved. According to UTU, ECP brake equipment will not monitor the condition of draft gear, brake shoes and hangers, coupling devices, safety appliances and grab irons, sill steps, springs, hopper doors, and the multitude of items a normal mechanical inspection is designed to check. UTU also asserts that a well trained and qualified mechanical inspector must not be removed from the safety equation because of advanced brake equipment that is only designed to improve the braking functions.

BLET agrees, asserting that continuous monitoring capability is not quite as robust as FRA claims. According to AAR Standard S–4260, § 3.5.4.2, ''CCDs with a low or missing battery are counted as inoperable, but may not be displayed as inoperable until the total inoperable reaches less than 90% with trainline power OFF, or less than 85% with trainline power ON, at which time a penalty brake application will be commanded.''

TWU similarly argues that ECP braking does not have capabilities to perform the safety critical inspections indicated in FRA Technical Bulletin MP&E 98–59. In contrast, says TWU, ECP brake systems, as designed today, while having the ability to monitor certain aspects of the braking system, are not designed or equipped to monitor or detect defects on most equipment of a train braking system, in particular the complex brake rigging systems on the various types of equipment. According to TWU, 122 of the potential 127 brake-related defects (96%) are not detectable by ECP brake monitoring, making clear that the advantages of real-time monitoring are both overstated and misleading. BRC asserts that the ECP brake system technology cannot detect 65 defects. Moreover, TWU states that FRA accident data indicates that the highest percentage of accidents are caused by brake-related mechanical defects not monitored by ECP brake systems.

TWU further asserts that, in addition to a serious decrease in the level of safety based on brake system considerations, the reduction in inspection frequency will seriously decrease the level of safety as it relates to other mechanical systems and components. ''There should be no question that reducing the number of inspections will reduce opportunities to detect defective equipment. The reduction in frequency of inspections will also reduce opportunities for detecting bent, broken, loose, or missing safety appliances.'' TWU points out that FRA previously noted that ''railroads have not conducted the excellent initial terminal inspections that were contemplated in 1982, when FRA extended the 500-mile inspection interval to 1,000 miles.'' (Citing 66 FR 4113 (Jan. 17, 2001)). TWU also claims that from January 2005 to July 2007, FRA accident data includes 24 derailments, 2 collisions, and 3 other type of accidents resulting from mechanical defects, including ''Tiedowns, doors, etc.'' TWU asserts that a comprehensive mechanical inspection is critically important, citing FRA Technical Bulletin MP&E 98–57, which states, ''In order to conduct a proper Freight Car Safety Standards inspection, both sides of a car must be inspected.''

AAR counters by questioning the significance of the brake rigging issue. According to AAR, from 1990 to 2006, ''the industry averaged five mainline accidents attributable to brake rigging down and dragging,'' identified by FRA cause code E07C. In addition, says AAR, U.S. railroads have 2,415 dragging equipment detectors placed across the country, which provide immediate radio feedback to train crews.

FRA understands the concerns relating to the ECP brake system's self-monitoring limitations. FRA acknowledges that the ECP brake system developed under the applicable AAR design standards does not monitor a number of brake components. However, FRA believes that the labor unions' concerns, while relevant, do not take into account a number of factors. By requiring a QMI to perform a Class I brake inspection at initial terminal on an ECP brake operated freight train, FRA expects a reduction in all en route brake

defects. While performing a Class I brake inspection every 1,000 miles would provide more opportunities to detect defective equipment, FRA believes that such detection is limited to only obvious en route defects and that an inspection by a QMI at initial terminal will significantly reduce those defects. Based on its experience with extended haul operations, FRA feels that a good, quality inspection conducted by a QMI at the initial terminal will ensure that the items not monitored by the ECP brake system computer will safely travel a distance of 3,500 miles.

For instance, in FRA's experience, en route Class IA brake inspections performed subsequent to Class I brake inspections performed at initial terminals by QPs have significantly higher defect ratios than those found at en route Class I brake inspections performed on extended haul operations that received an earlier Class I brake inspection performed by a QMI. As indicated in Technical Bulletin MP&E 07–01, issued on April 3, 2007, in addition to the numerous regular inspections of extended haul operations, FRA performed several formal week-long audits at various locations to determine the railroads' compliance with the regulations and whether the quality of the inspections and tests would justify allowing the inbound inspections and record-keeping requirements to sunset in April of 2007. Most of the non-compliance identified during the audits included the railroads' inability to create, maintain, and produce the required records of defects found during the inbound inspections. It was also noted that the railroads occasionally failed to perform the necessary inspections on cars picked-up or set-out of extended haul trains on certain corridors. Actual defective conditions found at inbound inspections were minimal.

FRA further believes that any remaining concerns relating to en route defects are offset by the ECP brake system's other significant safety benefits, including increased train control, a reduction of in-train forces, shorter stopping distances, and its self-monitoring capabilities. Moreover, while some commenters provided data on what portion of brake parts remain unmonitored by the ECP brake system, they did not establish the relationship between those parts and the quantity and significance of defects found and derailments caused. FRA continues to believe that the ECP brake system monitors the more crucial aspects of the brake system.

FRA believes that TWU's references to freight car inspection standards and guidance are misplaced. Although freight car defects may be incidentally detected during a Class I brake inspection, part 232 does not govern such issues. Freight car defects should still be found when cars are added to a train en route and when they are otherwise required to receive a freight car inspection under part 215.

FRA also continues to believe that ECP brake system self-monitoring is sufficiently robust. BLET's citation of § 3.5.4.2 of AAR Standard S–4260 is misplaced. Section 3.5.4.2 sets the limit for the number of CCDs that report a low or missing battery. This does not reference or mean inoperable CCDs. All CCDs may remain operable when reporting low or missing batteries. The ECP brake system is powered by the train line and § 3.5.4.2 only indicates that a back-up battery is necessary to cover for a temporary loss of power. Accordingly, to have a battery malfunction is not critical to train brake system operation. The purpose of the limitation in § 3.5.4.2 is to eliminate the possibility of train line power disappearing when back-up battery power is unavailable.

FRA recognizes and appreciates the use of additional wayside detection equipment, which AAR claims should reduce concerns relating to brake rigging malfunctions. However, FRA has not had an opportunity to review that equipment with respect to key attributes such as network coverage, sensitivity, and availability, and does not require use of that equipment. Accordingly, FRA does not feel comfortable relying on such unreviewed technology, which can be removed or modified at any time. However, FRA does recognize that the combination of on-board and wayside monitoring does provide an additional layer of safety for all train operations and that the use of such technologies may offer opportunities for further liberalization of visual inspections requirements in the future, given proper safeguards.

UP believes that the allowable distance between brake inspections using ECP brake technology should be extended to 5,000 miles, instead of the 3,500 miles proposed by the FRA, in order to provide a significant incentive for the railroad industry to implement ECP braking in high-mileage services. For example, says UP, an intermodal train with ECP braking could be operated round-trip between Chicago and any of the west coast ports within such a 5,000 mile limit. According to UP, a 5,000 mile limit for ECP brake operated trains between Class I brake inspections with no intermediate inspections would enable the operation of sets of intermodal equipment in very high-mileage, high-utilization, rapid turnaround service.

To support its request, UP points to the success of a previous operation. In April 2004, UP operated a round-trip test train 4,400 miles at a maximum speed of 74 MPH between Chicago and East Los Angeles. Based on that test's findings, UP and CSX jointly operated one pair of high-speed trailer on flat car (''TOFC'') trains for UPS between Kearney, New Jersey and East Los Angeles, California, a trip that took 59 hours. While there was some economic penalty involved in this dedication of equipment, UP says that it proved that locomotives and cars could be selected, maintained and operated in high-speed, high-mileage transcontinental freight service. In addition to the Class I inspections performed at Kearney and East Los Angeles, three Class 1A inspections occurred en route. UP asserts that a 3,500 mile limit would have been extremely valid and useful. According to UP, the elimination of 3 intermediate brake inspections of 40 minutes each could have potentially reduced overall one-way transit time by 120 minutes or 2 hours. An ECP brake operated train resulting in the same running time as a conventional brake operated train would require a lower operating speed and would have reduced fuel consumption and exhaust emissions.

AAR also supports a higher limit of 5,000 miles between Class I inspections, asserting that it would be more consistent with FRA's objective in this proceeding to facilitate conversion to ECP brake technology and provide regulatory relief without adversely affecting safety. According to AAR, a 5,000 mile limit would facilitate the efficient operation of intermodal trains in high-mileage, rapid turn-around service. AAR claims that there is no technical justification for setting the limit at 3,500 miles instead of 5,000 miles given the capability of ECP systems to monitor the critical functions of the air brakes.

BRC supports paragraph (b), stating that the proposed distance of 3,500 miles is ''more than generous.'' According to BRC, AAR and the carriers have not provided real evidence that the safety benefits offered by ECP brake technologies will offset any of the numerous safety risks that the technologies cannot detect over long distances. BRC asserts that without such data, the railroads' request for a 5,000 mile allowable distance between Class I

brake inspections should not be considered at this time.

After consideration of all the comments provided and based upon existing information available to the agency, FRA is not convinced that the allowable distance for ECP brake operations should exceed 3,500 miles between Class I brake inspections. FRA believes that an extension of the allowable distance to 3,500 miles is justified by the increased safety promised by ECP brake technology and provides a suitable incentive for railroads to implement and use ECP brake technology. While FRA supports the railroads' interest in operational and fuel efficiency, FRA believes the extension to 3,500 miles provides such efficiency. Moreover, based on its experience and the lack of safety data supporting a 5,000 mile allowable distance between Class I brake inspections for ECP brake operations, FRA does not feel comfortable further extending the allowable distance limit at this time. The only example provided by UP was a 4,400 mile joint operation with CSX that received three Class 1A brake inspections while en route. Although such demonstrations, with proper documentation, are helpful, acquisition of further experience will be needed to achieve confidence in less restricted longer hauls.

AAR and UP also commented on FRA concerns relating to brake shoe wear. AAR claims that brake shoe wear should not be a concern in ECP brake operations moving with up to 5,000 miles between brake inspections. According to AAR, ECP brakes reduce brake shoe wear and the AAR condemning thickness of 3/8'' provides an ample safety margin over a 5,000 mile run. UP stated that it would consider establishing its own minimum brake shoe criteria to properly configure the train for the entire round trip.

FRA appreciates UP's offer to consider establishing its own minimum brake shoe criteria for trips involving more than 3,500 miles between Class I inspections. However, FRA cannot rely on that voluntary offer, which would apply only to one railroad and could be withdrawn at any time. In any event, FRA continues to find cars with brake shoes that are well past the brake shoe replacement condemning limits for trains equipped with conventional brakes. On some trains not permitted to travel beyond 1,500 miles between Class I brake inspections, brake shoes have been found worn into the backing plate. Accordingly, FRA does not feel comfortable at this time permitting trains to operate more than 3,500 miles between comprehensive brake inspections until more data can be obtained to support such an initiative.

Currently, no extended haul train is permitted to travel more than 1,500 miles without receiving another comprehensive brake inspection. For trains equipped with ECP brakes, FRA more than doubles the currently allowed distance to 3,500 miles. FRA acknowledges that in the related proceeding, Docket No. FRA–2006–26435, the Safety Board provided for the movement of trains equipped with ECP brakes up to 3,500 miles. During the pendency of this rulemaking, FRA closely monitored those trains' operations and collected information on the equipment operated in those trains. FRA reserved the right to make appropriate modifications in the final rule based on any further data then available. Since cars equipped with ECP brakes have only operated for a limited time since the recent issuance of the waiver under Docket FRA–2006–26435 and are not typical of those in the general fleet with respect to the age of components, FRA has not received any data convincing it to modify the rule as proposed in the NPRM. Accordingly, paragraph (b) provides for a train operated with ECP brakes to travel to its destination, not to exceed 3,500 miles, between brake inspections.

FRA acknowledges, however, that notwithstanding the proposed allowance of a train equipped and operated with ECP brakes to travel up to 3,500 miles without an additional brake inspection, instances exist where certain trains would require the performance of a Class I brake inspection en route. For instance, the regulations governing operations utilizing conventional brake systems require that certain tests be performed when a car is off a source of compressed air for more than 4 hours. FRA acknowledges that an ECP brake-equipped train's on board diagnostics reduce concerns relating to cars remaining off air for extended periods of time. Accordingly, in this proceeding's NPRM, FRA proposed to extend the allowable off-air period to 24 hours. For the purposes of organizational clarity, the final rule includes the off-air requirement in paragraph (b).

BLET opposes the 24-hour off-air limitation. According to BLET, the allowable off-air period should remain at 4 hours and the Class I brake inspections required on ECP brake operated trains after an off-air period exceeding 4 hours should be performed by a QMI, not a qualified person.

AAR, UP, NYAB, and Wabtec all assert that the allowable off-air period should be extended to 120 hours (five days). According to UP, providing for a 120 hour off-air period will be especially relevant for equipment such as grain hoppers and coal cars in unit train operations serving grain elevators or electrical generating plants, where intact train sets may be parked for several days awaiting either loading or unloading. UP further asserts that the self-diagnostic capability of ECP braking systems, with results displayed in the locomotive cab upon powering-up the ECP train line cable, will enable this to occur without compromising safety. Moreover, being off-air for up to 120 hours should not result in any measurable or visually identifiable deterioration of the non-ECP brake components in the braking system. The ECP brake manufacturers see no technical or safety issues with extending the allowable off-air period to 120 hours and state that, when the ECP brake system initializes, self testing will verify the car is ready for service, including the battery charge status.

FRA believes that an expansion of the time allowed off-air for ECP brake operations is justified based on the capabilities of ECP brake systems or the combination of those capabilities and protection against vandalism. Accordingly, FRA will require under paragraph (b) that an en route Class I brake inspection be performed by a qualified person if a train operating in ECP brake mode is off air for more than 24 hours. However, if such a train is located within an ''extended-off-air facility,'' as more fully described below, the time limit is extended to 80 hours. FRA continues to believe that dangers, although reduced, remain when an ECP brake-equipped train remains off air for too long. Thus, the final rule retains the proposed off-air time limit of 24 hours since cars moving in service generally have a dwell time of 24 hours or less and this limit provides sufficient flexibility while allowing the industry to move equipment without impacting timely inspections and maintaining an acceptable level of safety.

In light of the comments filed in this proceeding and upon further internal deliberation, FRA believes that extending the off air requirement to 80 hours for trains left in extended-off-air facilities effectively ensures the safe operation of ECP brake systems while providing suitable flexibility for certain operations. FRA recognizes that additional flexibility may be reasonable when a freight train or freight car operated with ECP brakes is left at a protected location controlled by the shipper or consignee and not accessible to the railroad or potential vandals. For instance, a train or car equipped with ECP brakes may be dropped off at a

consignee's plant on one morning and will be inaccessible to the railroad for several days, such as over the weekend or a holiday.

Since railroads may not be able to pick up the equipment from the extended-off-air facility immediately when it opens, FRA believes that some additional operational flexibility should be provided during this time. FRA also recognizes that providing a limited number of hours after the opening of the facility on a given day may result in enforcement issues when attempting to determine the actual number of hours the train may have been off air or in the facility.

Accordingly, the final rule provides for the retrieval of the equipment up until the close of business on the fourth day it is at the facility. Assuming the extended-off-air facility maintains an 8-hour work day, this would provide a time span of up to 80 hours in that facility. For instance, FRA believes that the 80-hour time differential between the facility opening on Friday morning and closing on the directly subsequent Monday provides suitable flexibility for such operations.

From a safety standpoint, FRA believes that an 80-hour off-air limitation is justified if the train is left in an extended-off-air facility. FRA previously expressed its belief that in certain circumstances the length of time that equipment is removed from a source of compressed air can impact the integrity and operation of the brake system on a vehicle or train. Particularly, FRA indicated that the potential for vandalism may be high due to the location where equipment is left standing. *See* 66 FR 4122 (Jan. 17, 2001). While a train remains off air for any period of time, it may be unattended, providing an opportunity for vandalism. FRA continues to believe that the potential for vandalism is one of various factors justifying an off-air limitation.

If steps are taken to substantially reduce the potential for vandalism, however, FRA believes additional flexibility is justified. Thus, if a freight train or freight car operated with ECP brakes is at an extended-off-air facility and is not accessible to the carrier or potential vandals, FRA believes an 80-hour off-air limitation is warranted. For the purposes of this final rule, an extended-off-air facility is a private location controlled and access-restricted by a sole shipper or consignee. The location must be suitably designed to effectively and significantly reduce the possibility of vandalism. For instance, a suitably fenced-in power plant with sufficient entry-prohibitive security would suffice.

Also for the purposes of this final rule, the times the equipment enters and departs the extended-off-air facility shall presumptively be when the off-air time period begins and ends, respectively. Otherwise, enforcement would be difficult, since FRA would be unable to ascertain when a train or car went off and on air within the restricted area. This presumption, however, may be rebutted with evidence showing when the equipment actually went off air and when it was reconnected to an air source.

For trains operating in ECP brake mode and off air for more than 24 hours, the Class I brake inspection may be performed by a qualified person. FRA acknowledges that while a qualified mechanical inspector must be stationed at each route's initial terminal, it is not reasonable or feasible at this time to require one at each location a train operating in ECP brake mode is off air for more than 24 hours, because many of those locations will be unpredictable. Requiring a qualified mechanical inspector at each point a train is off air for more than 24 hours would likely result in a significant disincentive for a railroad to equip its trains with ECP brake systems.

FRA also intends for these requirements to apply to trains operating in ECP brake mode, located at their initial terminals, and off air for more than 24 hours without the train consist being changed. In other words, under paragraph (b), if a qualified mechanical inspector performs a Class I brake test on a train operating in ECP brake mode at the train's initial terminal and that train then goes off air for more than 24 hours before departing from the initial terminal, another Class I brake test must be performed prior to departure. However, FRA believes that requiring a qualified mechanical inspector at an initial terminal to perform a Class I brake test twice on the same train with unmodified consist would be unnecessary and possibly too onerous. FRA does not expect this situation to occur often, since trains rarely sit off air for more than 24 hours after receiving a Class I brake test. The train will not have traveled at all, but if the same train spent 24 hours off air after traveling 500 miles, a Class I brake test by a qualified person would suffice. Thus, the second Class I brake test may be performed by a qualified person.

While FRA recognizes that additional experience with ECP brakes may show that brake tests are no longer needed after being off air, FRA does not believe the evidence suffices to prove that proposition today. FRA's intent in providing these narrow expansions of the existing 4 hour rule is not to alter the tenet that equipment should be retested when it is removed from a source of compressed air for any lengthy period of time. The 24 and 80 hour off-air requirements apply to any ECP brake operated train, regardless of whether it is a unit or cycle train, and replace the 4 hour off-air requirement under § 232.205(a), which is excepted under paragraph (h), as previously indicated. The 24 hour allowance gives railroads the flexibility to perform switching operations while ECP brake-equipped trains are en route and provide flexibility to efficiently move cars from one ECP brake-equipped train to another when necessary, yet retain the concept that such cars or trains be retested when left disconnected from a source of compressed air for longer periods of time. The 24 and 80 hour time frames are also consistent with the general dwell time that cars experience while en route and while in extended-off-air facilities. FRA further believes that a limitation on the amount of time that such equipment may be off air is necessary for ensuring that such equipment is inspected in a timely and predictable manner. If no time limit were imposed or if too much time was permitted, an ECP brake-equipped car could lawfully sit for days or weeks at various locations while en route to its destination and be switched in and out of numerous trains without ever being reinspected. Such an approach would drastically reduce the number of times that the brake systems on such equipment would ever be given a visual inspection from what is currently required and, in FRA's view, would seriously degrade the safety of the trains operating with such equipment in their consists.

Furthermore, if an ECP brake-equipped train was allowed to be off-air for an excessive amount of time, it would be virtually impossible for FRA to ensure that equipment is being properly retested as it would be extremely difficult for FRA to determine how long a particular piece of equipment was disconnected from a source of compressed air. In order to make such a determination, FRA would have to maintain observation of the equipment for days at a time. Consequently, a 24-hour limit on the amount of time equipment can be disconnected from a source of compressed air as it maintains current levels of safety and provides an enforceable and verifiable time limit that FRA believes provides the railroads some additional benefit over what is currently required both in terms of

operational efficiency and cost savings. An FRA inspector could monitor a 24 hour off-air period by merely returning to the same accessible location the very next day. FRA believes that a limited extension to 80 hours off air at extended-off-air locations provides for further flexibility where the safe custodianship of the equipment is ensured and where the amount of off-air hours can be easily determined.

In paragraph (c), the final rule retains the proposed requirement that a Class I brake test be performed by a qualified person on each ECP brake-equipped car added en route to a train operating in ECP brake mode. However, FRA believes that this requirement may not be necessary if other safety precautions are taken. Thus, the final rule will not require a Class I brake test on such cars when being added to a train operating in ECP brake mode if the car had previously received a timely and proper Class I brake test by a QMI, the train crew is provided documentation of that test, the car has not been off air for more than what is allowed under the final rule, and a proper visual inspection is performed prior to use or departure.

Accordingly, if an ECP brake-equipped car has received a Class I brake test by a qualified mechanical inspector within the last 3,500 miles, documentation of that test is provided to the train crew, the car has not been off air for more than the amount of time allowed by this final rule, and a proper visual inspection is conducted when the car is added to the train, FRA believes that it would be unnecessary to require an additional Class I brake test when that car is added to an en route train operating in ECP brake mode. However, to account for those cars that have not received a Class I brake test by a qualified mechanical inspector within the last 3,500 miles and that will be added to a train operating in ECP brake mode, paragraph (c) requires a new Class I brake test under those circumstances. Paragraph (c) is necessary in light of paragraph (h) excepting compliance with section 232.205(b). Unless a car operating in ECP brake mode is off air for more than the allowable time frame under this final rule, it would not require a Class I brake test when it is added to a new train, since the rules contemplate that the car would have already received a Class I brake test within the previous 3,500 miles or at its initial terminal. The documentation would be required to ensure that a Class I brake test by a qualified mechanical inspector will be performed every 3,500 miles. Under paragraph (c), any ECP brake-equipped car being added to a train operating in ECP brake mode would require a Class I brake test when the car has been off air for more than the allowable amount of time for the same reasons stated above concerning paragraph (c).

FRA believes that a visual inspection of the car's brake components is a suitable replacement for an additional Class I brake test when the car or cars added in these circumstances have received a Class I brake test by a qualified mechanical inspector within the last 3,500 miles. The visual inspection required by paragraph (c) could be performed while the car is off air and in conjunction with the mechanical inspection required under part 215 whenever a car is added to a train. Thus, FRA believes that the visual inspection required by paragraph (c) does not impose any significant burden on the railroads as they are already required to visually inspect the mechanical components on any car added to a train under part 215. FRA also acknowledges that the brake systems on cars not equipped with ECP brakes would be inoperative after being added to a train operating in ECP brake mode. To ensure the safe operation of such equipment and trains, paragraph (c)(2) of the final rule requires that cars equipped solely with conventional brake systems and placed into trains operating in ECP brake mode also be given a visual inspection to ensure their safe operation and to ensure compliance with § 232.15 when added to the train.

In the event that a car would be required to receive a Class I brake test when added to an en route train, the final rule requires that the Class I brake test be performed by a qualified person for the same reasons stated in the above analysis. To be clear, although any car added to a train en route may receive a Class I inspection by a qualified person, the entire train's travel distance is limited to its destination or the distance remaining until the train or any individual car picked up en route has traveled 3,500 miles since its last Class I brake inspection performed by a qualified mechanical inspector, whichever is less. A Class I brake inspection by a qualified person does not reset the mileage clock for the entire train.

FRA also sought comments on the application of a Class III brake test to an ECP brake system. NS expressed its concern that the specifications outlined under § 232.211(c) cannot be met. According to NS, that section relates to the increase and decrease of brake pipe pressure as indicated by a rear end gauge or electronic telemetry device. ECP braking systems provide for the constant charge of the brake pipe and this rear end value will not reflect the air pressure differential currently experienced with conventional braking systems. NS asserts that since those brake reductions will be made electronically rather than pneumatically from the locomotive, the end of train device will not display a change in brake pipe pressure to indicate a brake application.

A freight train operating with conventional brakes receives a Class III brake test at the location where its configuration is changed in order to ensure the integrity of the train line. Basically, a Class III brake test ensures that the train brake pipe is properly delivering air to the rear of the train. Upon further review and consideration of the comments, FRA recognizes that for an ECP brake system, a traditional Class III test may not be completely applicable.

Accordingly, paragraph (d) requires a Class III brake test for ECP brake operated trains with certain modifications. Paragraph (d)(1) includes the locations and events that require the performance of a Class III brake test on an ECP brake operated train. Accordingly, § 232.211(a) is being excepted under paragraph (h). Paragraph (d)(2) recognizes that the Class III brake test requirements relating to using EOT devices to observe brake pipe pressure changes at the rear of the train is not practical with ECP brake operations. The diagnostic capabilities of ECP brake systems will identify defective brake conditions on all of the train's cars, including the rear car. Under the applicable AAR standards, this information should automatically appear on the ECP brake system monitor.

Paragraph (e) includes requirements relating to the sequential initialization of ECP brake operated trains. The applicable AAR standards—as defined in § 4.2.3 and its subsections in AAR Standard S–4200 and in § 5.2 of AAR Standard S–4230—provide procedures for the initialization of the ECP brake system. The standards provide for the ECP brake system's initialization to occur by car either randomly or sequentially. FRA believes that the sequential initialization of an ECP brake system provides the train crew with the exact placement of the cars in the train, which can help satisfy the consist comparison requirements also under this paragraph. An electronic version of the train consist displayed on the locomotive cab's ECP brake system monitor can also help during emergencies and when identifying the exact location of cars with brake problems.

Due to the possibility of an ECP brake system not recognizing the inclusion of cars not equipped with ECP brake systems, paragraph (e) requires the train crew compare the total number of cars indicated by the train consist documentation with the total number of cars identified by the ECP brake system.

Under the existing regulations, tests and inspections include brake pipe service reductions and designate specific psi specifications. In the NPRM, FRA indicated that modifications to the brake pipe reduction standard are appropriate to reflect the technological differences between ECP brakes and conventional pneumatic brakes. Brake pipe pressure in ECP brake-equipped trains remains important, since these trains still employ a pneumatic emergency brake application for safety back-up purposes and rely on the pneumatic parts when used in an overlay system. Accordingly, for trains equipped with ECP brake systems, FRA proposed to replace the existing brake pipe service reductions and increases with an alternative requirement for an electronic signal that provides an equivalent application or release of the brakes. FRA indicated that any alternative test procedures must include, at a minimum, either the electronic equivalent to each existing test's brake pipe reduction requirements or the equivalent of a full service brake pipe reduction initiated by an electronic signal.

FRA sought comments on this proposal, including the appropriate type of alternative test. In light of how the brake pipe's use in an ECP brake train will be limited to charging brake air reservoirs, FRA sought comments on how the existing regulatory brake pipe leakage limits should be modified, if at all, for ECP brakes and whether changes in the leakage requirements will affect the pneumatic backup capability of the ECP brake system. In addition, FRA indicated that comments should address the need to include the specific electronic reduction that is to be made on ECP equipped trains during the required brake tests and what type of electronic signals would be suitable equivalents to the currently mandated 20-psi and 15-psi brake reductions.

NS asserts that compliance with the brake pipe service reduction requirements cannot be met with ECP brake operations. For instance, NS notes that § 232.211(c) relates to the increase and decrease of brake pipe pressure as indicated by a rear end gauge or electronic telemetry device. According to NS, ECP braking systems provide for the constant charge of brake pipe and this rear end valve will not reflect the air pressure differential currently experienced with conventional braking. Since those brake reductions will be made electronically rather than pneumatically from the locomotive, NS says that the ECP EOT device will not display a change in brake pipe pressure to indicate a brake application.

On the other hand, BLET believes that there is a need to include both the specific electronic reduction that is to be made on ECP brake-equipped trains during the required brake tests and a determination of what type of electronic signals would be suitable equivalents to 20-psi and 15-psi brake reductions mandated in part 232. BLET believes that the appropriate alternative would be one that correlates a particular psi reduction with its digital percentage equivalent. According to BLET, assuming that the train brake command scale is relatively linear, a 20 psi reduction represents approximately 77 percent of a full service reduction and a 15 psi reduction represents approximately 58 percent of a full service reduction. Regarding brake pipe leakage, BLET urges FRA to retain current regulatory limits, since overlay and emulator systems permit conventional pneumatic operations. Furthermore, AAR Standard S–4200, § 3.8, states that a ''pneumatic backup (PB) system shall be required on each car to apply emergency brake cylinder pressure in the event of a vented brake pipe.'' Establishing different brake pipe leakage limits, says BLET, is a prescription for confusion and unnecessary risk.

AAR supports retaining the existing brake pipe leakage limits. NYAB and Wabtec also commented, suggesting that, in order to maintain the same functionality as with conventional brakes, an ECP train brake command should be applied in the range of 80 to 85 percent to address both the 15 and 20 psi reduction. According to the brake manufacturers, the brake pipe continuity can be verified by a procedure that requires watching the end of train brake pipe pressure as reported to the locomotive.

FRA believes that an electronic or digital equivalent of the current brake pipe reduction test should apply during a Class I brake test on ECP brake operations. Since the brake manufacturers are in the best position to determine that equivalent metric, FRA will rely on the percentages proposed by NYAB and Wabtec. Accordingly, paragraph (f)(1) will remain as proposed with the understanding that the electronic equivalents of 80 percent and 85 percent ECP train brake command shall replace the 15 and 20 psi reductions, respectively, when conducting brake tests on ECP brake systems.

Further recognizing the disparity between the requirements of part 232 and the reality of ECP brake technology, paragraph (f) addresses piston travel requirements as they apply to ECP brake operations. Paragraph (f) modifies certain regulatory requirements related to piston travel limits and adjustments during applicable brake inspections under part 232. For instance, under § 232.205(c)(5) a person performing a Class I brake test must ensure that piston travel be adjusted to specific distances. Although FRA believes that ECP brake operations require specific piston travel limits, FRA recognizes that the piston travel limits contained in § 232.205(c)(5) may not be fully applicable to ECP brake systems. Since the ECP brake system precisely measures and maintains the amount of brake cylinder pressure for each specified brake application, piston travel tolerances for ECP brakes may not require the level of specificity as those for conventional pneumatic brake operations. Further, FRA acknowledges that a ''one-size-fits-all'' requirement for ECP brake system piston travel may not be ideal or applicable. AAR and BLET support paragraph (f)(1). BLET believes that paragraph (f) adequately addresses the subject of nominal piston travel and AAR believes that manufacturers should be permitted to establish alternative minimum piston travel ranges.

Accordingly, paragraph (f) provides flexibility for the piston travel limits in § 232.205(c)(5) as they apply to ECP brake systems. While FRA limited this flexibility in the proposed rule to minimum piston travel limits, the final rule provides this flexibility to all piston travel limits in part 232 as applicable to ECP brake operations. FRA anticipates that recommended piston travel limits for each ECP brake system will be determined by the car's design, weight, and engineered brake ratio.

The final rule requires that such limits be stenciled or marked on the car or badge plate in the same fashion FRA requires for systems and equipment subject to § 232.103(g). FRA believes that requiring the affixation of a legible decal, stencil, or sticker or the equipping of a badge plate displaying the permissible brake cylinder pistol travel ranges will effectively communicate the acceptable ranges to train crew members and will ensure the proper operation of a car's brakes after being inspected. FRA believes that this information is essential in order for a person to properly perform the required brake inspections. Ultimately, all

modifications provided under paragraph (f) apply to part 232 as it relates to ECP brake operations.

In the preamble to the NPRM, FRA anticipated that placing a car equipped with conventional pneumatic brakes into an ECP brake-equipped train may be awkward at best, requiring use of an electrical ''run around cable'' and manual inputs into the locomotive control system. In a letter dated February 5, 2007, which is part of the docket to this proceeding, AAR provided a list of recommended ''enhancements and modifications'' to Part 232 to facilitate the use of ECP brakes. In that communication, the AAR stated that railroads ''do not plan to commingle non-ECP equipment in stand-alone ECP trains.'' However, FRA expressed its belief that foreseeable—though rare—circumstances should be considered in this rulemaking to the extent possible. Accordingly, FRA sought comments and information on what requirements may be necessary to safely allow the addition of cars equipped with conventional pneumatic brakes into a train equipped with ECP brakes, including, but not limited to, the placement and securement of cables along cars equipped with conventional pneumatic brakes to preserve their continuity between non-consecutive cars equipped with ECP brakes and the appropriate placement in the consist of cars equipped with conventional pneumatic brakes.

AAR asserts that the railroads can wrap ECP brake cables around the conventionally braked cars. BLET urges FRA to adopt a standard similar to that set forth in § 229.89(a), which requires that jumpers and cable connections between locomotives shall be located and guarded to provide sufficient vertical clearance.

In response to the comments provided, FRA has added paragraph (g) to ensure the safe handling of train line cables for the same reasons § 229.89 addresses jumpers and cables. Considering the unique logistical and operational issues relating to train line cables—including their placement between and throughout cars and the potential need to somehow bypass cars equipped with only conventional brakes—FRA has added additional requirements. For instance, the final rule intends to ensure that the train line cable does not drag, catch, or snag and does not interfere with any human or train movements. Paragraph (g) also provides the same electrical related protections provided under § 229.89(a).

Section 232.609 Handling of Defective Equipment With ECP Brake Systems

In § 232.609, FRA modifies certain part 232 requirements as they apply to freight cars and freight trains equipped with ECP brake systems and hauling defective equipment. In particular, for such trains and cars, paragraph (k) excepts certain existing requirements and paragraphs (a) through (j) provide alternative requirements.

Under § 232.15 and 49 U.S.C. 20303, railroads may be immune to civil penalty liability if a car or train with certain inoperative or defective equipment is hauled under certain conditions. Section 232.15(a) contains various parameters that must exist in order for a railroad to be deemed to be hauling a piece of equipment with defective brakes for repairs without civil penalty liability. The vast majority of the requirements contained in § 232.15(a) are a codification of the existing statutory requirements contained in 49 U.S.C. 20303 and are based on the voluminous case law interpreting those provisions. The statutory provisions require hauling defective equipment only to the nearest place where necessary repairs can be made and require 100 percent operative brakes from any location where such repairs can be effectuated. Thus, because many locations where trains are initiated with any frequency are also locations where brake system repairs can be effectuated, the statutory provisions essentially require 100 percent operative brakes from a train's initial terminal. FRA continues to believe that the proposed requirements relating to the movement of equipment with defective ECP brakes are generally consistent with the statutory requirements, ensure the safe and proper movement of defective equipment, and clarify the duties imposed on a railroad when moving such equipment.

As indicated above, in light of the increased safety levels produced by ECP brake systems, FRA has decided to use its discretionary authority under 49 U.S.C. 20306 to provide an exception from the rigid statutory provisions and modify the regulations governing the movement of defective equipment concomitant to 49 U.S.C. 20303. Under certain circumstances, the statute and related regulations provide immunity from civil penalty when a train with defective equipment is hauled to the nearest location where the necessary repairs can be made, regardless of direction. Since a train equipped with an ECP brake system and operating in ECP brake mode with a minimum percentage of cars with defective ECP brakes is capable of traveling safely for long distances, the final rule permits the operation of such a train and any cars with defective ECP brakes to its destination, not to exceed 3,500 miles, for repair without incurring a civil penalty.

While FRA believes that a train operating in ECP brake mode with some ineffective or inoperative ECP brakes may continue to travel safely, concerns remain if such a train includes cars with defective non-brake or conventional pneumatic brake equipment. ECP brake systems do not monitor that equipment and do not otherwise reduce the danger of traveling with such defects. FRA is cognizant of the need for logistical flexibility to efficiently accomplish repairs during the transition from conventional pneumatic to ECP brake operations. Furthermore, requiring strict adherence to the statutory requirements related to moving defective equipment ignores the safety features provided by ECP brake system technology and could potentially stifle the industry's ability and desire to implement the technology. The final rule invokes this statutory and regulatory relief in paragraph (k) of this document, by excepting application of §§ 232.15(a)(2), (a)(5), (a)(6), (a)(7), (a)(8), and 232.103(d)–(e) as applied to ECP brake operated trains.

Under § 232.103(d), no train may depart a location where a Class I brake test is required to be performed on the entire train with any inoperative or ineffective brakes. FRA recognizes that some trains operated with ECP brakes may need to include cars equipped with conventional brakes, especially while a fleet makes the transition to ECP brake technology. Under such and similar circumstances, FRA believes that some leeway needs to be provided for trains operating in ECP brake mode. To provide for such flexibility, and in light of ECP brake operations' higher levels of safety, including shorter stopping distances and constant real-time monitoring of the brake system, FRA believes that a train operated with ECP brakes may depart its initial terminal with less than 100% operative brakes. However, FRA also acknowledges that allowing a car to depart an initial terminal with inoperative or ineffective brakes may permit such equipment to move indefinitely without receiving the proper repairs. For this and other reasons noted below, FRA believes there needs to be a limit on the types and number of cars that may depart in a train operating in ECP brake mode from a location where the train is required to receive a Class I brake test.

Per paragraph (k), a train operating in ECP brake mode is excepted from § 232.103(d), which requires that one-hundred percent of the brakes on a train shall be effective and operative prior to use or departure from any location where a Class I brake test is required to be performed on the train pursuant to § 232.205. For ECP brake-equipped trains, this requirement is replaced by the ninety-five percent effective and operative brake requirement contained in paragraph (a). FRA believes that this provides flexibility from the rules governing conventional pneumatic braking systems while rendering a sufficient brake failure buffer between departing an initial terminal with ninety-five percent effective and operative brakes and experiencing a penalty stop upon reaching eighty-five percent effective and operative brakes, as required under paragraph (d) of the final rule.

The one-hundred percent effective and operative brake requirement contained in § 232.103(d) is based on FRA's long-standing interpretation and application of AAR's inspection and testing standards as they existed in 1958 as well as the statutory provisions related to the use of power brakes and the movement of equipment with defective safety appliances. See 66 FR 4104, 4124, 4128 (Jan. 7, 2001). However, the design, operation, and safety benefits derived from the use of ECP brake systems dictate a need to modify this long-standing requirement. Under the AAR standards, if at any time the ECP brakes on a train become less than eighty-five percent operative, the train will automatically stop via a computer induced penalty brake application. In addition, it has been determined that a train with eighty-five percent operative ECP brakes will still have better stopping distances than a conventional pneumatic braked train with one-hundred percent operative brakes. Moreover, ECP brake system technology provides the ability to continuously monitor the real-time status of the braking system on each car in a train. This allows a locomotive engineer to always know the exact status of his train's braking system. In light of this increased level of safety, FRA believes that a partial reduction in the percentage of operative brakes is justified. Accordingly, for ECP brake operations, FRA hereby modifies the requirement to 95 percent effective and operative brakes, which it believes strikes a balance between the current regulation and the need to allow for in-transit failures that could compromise the operation of the train or otherwise automatically shut it down when it reaches 85 percent effective or operative brakes.

Under paragraph (a), a train can only leave its initial terminal if a Class I brake test is performed by a qualified mechanical inspector and all ECP braked cars that are known to have arrived at the location with ineffective or inoperative brakes are repaired or handled accordingly. The final rule intends to ensure that at least 95 percent of the cars equipped with ECP brakes have effective and operative brakes prior to departure from an initial terminal and that cars are repaired in a timely fashion. The purpose of the 95 percent threshold is to prevent the delay or disassembly of a train for the removal or repair of a very small percentage of cars that are discovered to be defective for the first time while the railroad is conducting its in-depth inspections required at a train's initial terminal. The 95 percent requirement also acknowledges that some initial terminals may not initially have the capabilities of repairing ineffective or inoperative ECP braking systems. Accordingly, paragraph (b) allows for the movement of cars with such defects known to exist upon arrival at its destination to be moved only to the nearest forward location where repairs may be performed and restricts the car from being loaded or unloaded while being so moved. However, to ensure the safe operation of trains operating in ECP brake mode, operators are reminded that, under the final rule, the inclusion of such defective cars cannot make the train have less than ninety-five percent effective or operative brakes.

TWU asserts that the widely recognized cornerstone of train brake system safety is a comprehensive train brake inspection and test at the initial terminal, which requires 100 percent effective brakes. According to TWU, there is no valid basis for extending inspection intervals to 3,500 miles and permitting trains to operate out of an initial terminal without 100 percent effective brakes. BLET is also strongly opposed to paragraph (a). According to BLET, AAR Standard S–4260, § 3.5.4.2, indicates that the exact status is not always known. Thus, says BLET, a HEU display of 95 percent operable brakes may not reflect all the brakes in the train that are inoperable, meaning that the locomotive engineer does not always know the exact status of the braking system. FRA notes that BLET's concern was based on a misunderstanding of ECP brake system design, as discussed previously during the analysis of § 232.607(b).

UTU contends that the overall braking capacity of each freight car has not changed with the introduction of ECP brake technology. According to UTU, when the number of operable brakes on an ECP brake-equipped train is reduced by 5 percent, the train has lost 5 percent of its total braking capacity. Thus, says UTU, an ECP brake operated train with only 95 percent operative brakes is less safe than a conventional brake operated train with 100 percent operable brakes. UTU also asserts that the issue of allowing ECP brake-equipped trains ''to operate in and out of terminals, from one Class IA brake test to another with only 95 percent of the brakes operable is also a significant degradation to safety.'' If these trains depart an initial terminal, says UTU, an additional brake failure en route may occur in potentially unsafe territory and not in a yard's controlled environment.

On the contrary, UP believes that FRA's proposed limitation to not allow less than 95 percent effective ECP brakes per train is too restrictive. The current regulations allow a conventionally braked train to depart after a Class I brake inspection with 100 percent operative brakes, with a cumulative failure of up to 15 percent of the brakes, equivalent to operating a train with 85 percent operative brakes. Therefore, says UP, there is no logical reason to establish a more stringent requirement on an ECP braked train. AAR agrees, adding that FRA has determined that a train can safely operate with 85 percent operative brakes and that an ECP brake operated train with fewer than 85% operative brakes will engage in a penalty brake application. According to AAR, no adverse safety consequences would flow from such an event. Since the train will automatically engage in a penalty brake application when it reaches that 85 percent threshold, the railroads assert the minimum amount of effective or operative brakes at departure should be a business or operational decision by the railroad.

BRC supports paragraph (a) and objects to the railroads' proposal, arguing that an 85 percent operating rule ''goes against all the claims of operating efficiency, convenience, and incentive for the railroad industry to employ ECP brakes.'' According to BRC, this is especially a concern for ECP equipped trains traveling long distances without intermediate inspections. If these trains are allowed to leave the initial terminal at 85 percent operating capacity, the likelihood that these trains will have to stop and make repairs or set outs at intermediate locations significantly increases. UTU adds that,

if these trains depart an initial terminal, an additional brake failure en route may occur in potentially unsafe territory and not in a yard's controlled environment.

FRA is not persuaded that it should modify paragraph (a) from that proposed in the NPRM. The purpose of paragraph (a) is to provide operators flexibility in an environment of technological change. Although FRA understands TWU's and UTU's concerns about ensuring 100 percent effective and operative brakes on trains departing from initial terminals, FRA believes that the ECP brake system's self-monitoring system and significant increase in braking capabilities provides a level of comfort to maintain such flexibility without compromising safety. That comfort level is also increased by requiring only limited movement of that train for the purpose of repair.

UTU also seems to misunderstand paragraph (a) when it asserts that the issue of allowing ECP brake-equipped trains ''to operate in and out of terminals, from one Class IA brake test to another with only 95% of the brakes operable is also a significant degradation to safety.'' The final rule does not require Class IA brake tests on trains operated with ECP brakes. In any event, paragraph (b), further discussed below, requires that each car equipped with ECP brakes, and known to have arrived at a location of a train's initial terminal or at a location where a Class I brake test is required, shall not depart that location with ineffective or inoperative brakes in a train operating in ECP brake mode, except when that initial terminal does not have facilities capable of repairing defective ECP brakes. Paragraph (b), however, also requires the entire train to stop at the nearest forward repair location, causing further delays. Thus, FRA expects paragraph (b) to provide an incentive for the operator to repair the defective brakes or set out those cars at the initial terminal. For these reasons, FRA expects the railroads to quickly ensure that all initial terminals and locations where Class I brake tests are otherwise performed are fully equipped with ECP brake repair facilities and that most repairs would be made at those locations so that trains will depart with 100 percent effective and operative ECP brakes.

FRA intends that the only exceptions are ECP brake-equipped cars whose brake defects were found after arrival at the initial terminal and conventional brake-equipped cars. For instance, if defects to a car's ECP brake system were found during a pre-departure Class I brake inspection, the ECP brake operated train may depart and travel to destination. While paragraph (a) and (b) imply this as a possibility, paragraph (e) makes it clear.

FRA believes that the railroads misinterpret the existing regulations under subpart C and this final rule's paragraph (a) as they relate to the minimum number of effective and operative brakes on a train departing from its initial terminal. Under §§ 232.103(d) and (f), trains operated with conventional brakes cannot move with any ineffective or inoperative brakes except under the safe harbor provisions provided under § 232.15. Even moving with the immunities afforded under § 232.15, however, § 232.103(e) absolutely prevents such trains from moving if the level of operative or effective brakes reaches 85 percent. Accordingly, FRA is not increasing the 85 percent limitation up to 95 percent, but is decreasing the 100 percent limitation to 95 percent.

In any event, FRA believes that the 95 percent limitation at initial terminals provides sufficient flexibility for the implementation of new technology and does not feel comfortable further reducing that amount at this time. While the railroads contend that the buffer between departure and the ECP brake system's potential penalty brake application (i.e., an automatic and immediate emergency or full brake application made by the ECP brake system in accordance with the current AAR standards) at 85 percent should be a market or operational decision since it is much safer than conventional brake operations at that level, FRA believes that the railroads fail to appreciate the aforementioned reasons for the 95 percent limitation and the effects no limitation may have. By further reducing or eliminating the limitation, the potential for an automatic application of the brakes at 85 percent effective and operative brakes increases. In such an event, the stopped train may delay other trains, potentially causing a serious domino effect of non-movement. Safety concerns also remain. FRA is certainly sensitive to UTU's concern that such an event may occur in unsafe territory, putting the train and its crew at risk. Accordingly, FRA does not think it reasonable to allow an ECP brake operated train to depart its initial terminal with as little as 85 percent effective and operative brakes.

Paragraph (b)(4) also requires that a car with ineffective or inoperative ECP brakes be tagged in accordance with § 232.15(b). FRA believes that § 232.15(b) should equally apply to trains operating in ECP brake mode and should be a prerequisite for the movement from the initial terminal of any car with defective brakes. Section 232.15(b) contains the specific requirements regarding the tagging of equipment found with defective brake components and recognizes that the industry may attempt to develop some type of automated tracking system capable of retaining the information required by that section and tracking defective equipment electronically. Thus, paragraph (b)(4), through § 232.15(b), proposes to permit the use of an automated tracking system in lieu of directly tagging the equipment if the automated system is approved for use by FRA. FRA continues to believe that these provisions are necessary to ensure the agency's ability to monitor such systems and potentially prohibit the use of the system if it is found deficient. The proposed rule makes clear that, by ensuring application of § 232.15(b) to ECP brake systems, an automated tracking system approved for use by FRA would be capable of being reviewed and monitored by FRA at any time. This paragraph also notifies the railroads that FRA reserves the right to prohibit the use of a previously approved automated tracking system if FRA subsequently finds it to be insecure, inaccessible, or inadequate. Such a determination would have to be in writing and include the basis for taking such action.

Paragraph (c) permits, with certain limitations, trains operating in ECP brake mode to move cars equipped with conventional pneumatic brakes. If a freight car equipped with only conventional pneumatic brakes would have effective and operable brakes in a train equipped with a ''stand-alone'' conventional pneumatic brake system, the final rule permits a freight train operating in ECP brake mode to move such a car. If a car has defective conventional pneumatic brakes—which would be ineffective or inoperative in a train with a ''stand-alone'' conventional pneumatic brake system—the final rule permits its movement by a freight train operating in ECP brake mode, but only if the movement is made in accordance with § 232.15. By referring to § 232.15, paragraph (c) intends to, amongst other things, include the exceptions delineated in paragraph (k) and limit the movement of such cars to the nearest location where repairs can be made. Paragraph (c) also reminds regulated parties to comply with the tagging requirements of § 232.15(b) for the same reasons as paragraph (b). FRA notes that the inclusion of cars with defective or non-defective conventional pneumatic brakes into a train operating in ECP brake mode shall not cause the train to

have less than ninety-five percent effective and operative brakes in accordance with paragraph (a). FRA believes that permitting a limited inclusion of cars equipped with conventional pneumatic brakes will provide some flexibility as operators transition their fleets from conventional pneumatic to ECP brake systems while ensuring a satisfactory level of safety.

BLET believes that § 232.15(e) should apply with respect to placement of cars equipped with conventional brakes in trains operated with ECP brakes. As previously stated, FRA expects that, except for the sections and paragraphs specifically excepted and the limitations modified by the final rule, subpart C continues to be fully applicable and enforceable for trains and cars equipped with ECP brakes. Since the final rule does not except or modify § 232.15(e), FRA intends its continued application and enforcement. While the final rule may remind the regulated parties that certain specific existing paragraphs in subpart C continue to apply (*e.g.*, paragraphs (b)(4) and (c) referencing § 232.15(b)), this does not imply that sections and paragraphs not referenced do not apply. References to more specific paragraphs may exist for the purposes of clarity. FRA recognizes that mixing technology may confuse application of the existing law. For instance, while it may be clear to most how § 232.15 may apply to conventionally braked cars even in trains operated with ECP brakes, FRA foresees confusion when applying § 232.15 to ECP braked cars in trains operated with conventional brakes. Thus, the final rule includes specific paragraph references when regulating the latter under paragraph (g).

Once an ECP brake system detects that the train has less than eighty-five percent operative brakes, AAR standard S–4200 requires an automatic and immediate full service brake application. Paragraph (d) mirrors S–4200 by requiring a train operating in ECP brake mode to cease moving once less than eighty-five percent of the train's cars have effective and operative brakes. In other words, under paragraph (d), no train shall move with more than fifteen percent of its brakes being defective or otherwise inoperative or ineffective until certain conditions are met. Recognizing, however, that foundation brake rigging defects may not be detected by the electronic system, and that calculation of the percentage may require an accurate manual entry of the total cars in the train by the train crew, FRA proposes paragraph (d) to continually ensure the safe operation of trains operating in ECP brake mode with ineffective or inoperative brakes.

Although there is no explicit statutory limit regarding the number of cars with inoperative brake equipment that may be hauled in a train, the fifteen percent limitation is a longstanding industry and agency interpretation of the hauling-for-repair provision currently codified at 49 U.S.C. 20303, and has withstood the test of time. This interpretation is extrapolated from another statutory requirement which permits a railroad to use a train only if ''at least 50 percent of the vehicles in the train are equipped with power or train brakes and the engineer is using the power or train brakes on those vehicles and on all other vehicles equipped with them that are associated with those vehicles in a train.'' 49 U.S.C. 20302(a)(5)(B). As originally enacted in 1903, section 20302, also granted the Interstate Commerce Commission (ICC) the authority to increase this percentage, and in 1910 the ICC issued an order increasing the minimum percentage to 85 percent. *See* 49 CFR 232.103(e), which codifies the ICC order. FRA believes that if the rule is read in its entirety, there should be no confusion as to the movement of defective equipment, and that this provision merely sets an outside limit on the percentage of cars that may be hauled in any train with inoperative brakes. Consequently, FRA will continue to require that equipment with inoperative air brakes make up no more than 15 percent of any train.

FRA acknowledges that § 232.103(e) already prevents a train's movement ''if less than 85 percent of the cars in that train have effective and operative brakes.'' However, FRA has also stated that § 232.103(e) ''contains a clear and absolute prohibition on train movement if more than 15 percent of the cars in a train have their brakes cut out or have otherwise inoperative brakes.'' Because ECP brake systems are designed to automatically stop the train whenever and wherever the brake system has less than 15 percent operative brakes, FRA recognizes that some flexibility is needed to ensure that such trains are not stranded on the main track. To provide flexibility in those rare instances where a train experiences a penalty brake application as a result of having less than 85 percent operative brakes, paragraph (d) includes requirements to ensure the safe movement of such trains. FRA recognizes the need for some trains operating in ECP brake mode to continue to an appropriate repair facility or nearest siding after experiencing a penalty brake application. Since ECP brake implementation is in its infant stages, FRA acknowledges that a railroad may not initially have a significant number of repair facilities beyond the initial terminals of ECP equipped cars. Accordingly, paragraph (d) permits limited movement of such trains for repair or consist modification purposes. In any event, in light of the Class I inspection required under § 232.607, the minimum number of ineffective or inoperative brakes allowed under § 232.609, and an ECP brake system's continuous monitoring and diagnostics functions, FRA believes that trains operating in ECP brake mode will rarely, if ever, reach fifteen percent inoperative or ineffective brakes. However, FRA believes that paragraph (d)—in an abundance of caution and in anticipation of such a possibility occurring—will ensure safe and efficient operations. In order to move a train operating in ECP brake mode that experiences a penalty brake application due to having less than 85 percent effective and operative brakes, paragraph (d) requires the train crew to perform a visual inspection of the entire train, ensure the safe operation of the train, and determine that it is safe to move the train.

Under the current regulations, visual inspections are generally performed when moving defective equipment since a ''qualified person'' must determine that the car is safe to move. It is FRA's understanding that most, if not all, railroads require a crew member to make a visual inspection of a car when a problem occurs en route. A proper visual inspection ensures that the brakes are cut out on a faulty car and eliminates the possibility of dragging or stuck brakes. A dragging or loose part or piece of equipment can find its way under a wheel, causing a derailment. A brake that will not release—due to bent or fouled brake rigging or a problematic control valve—will cause the wheel to slide. A sliding wheel will not properly traverse a switch or cross-over, setting up a potential derailment. A sliding wheel may also cause a severe flat spot to occur on the wheel, which can also lead to a derailment and stress on the rail. By requiring that the train crew ensure the safe operation of the train and determine that it is safe to move the train, FRA intends to make clear that it is the railroad's responsibility, through its crew, to do whatever is necessary to ensure safe train operation under the flexibility provided by paragraph (d). Any deviation from the requirements under paragraph (d) while moving a train with less than eighty-five percent

effective brakes would pose a significant safety hazard and violate the rule.

In addition, under paragraph (d), the train's subsequent movement must be made in a restricted ECP brake Switch Mode to the nearest or nearest forward location where necessary repairs or changes to the consist can be made. Under AAR Standard S–4200 § 4.2.6.2.2, the speed of an ECP brake-equipped train in Switch Mode shall not exceed 20 mph. The purpose of the 20 mph limitation, among Switch Mode's other restrictions, is to ensure the safe movement of the train with less than ideal brake operations while allowing the train to operate to a location where defective braking systems can be repaired or where cars can be added or removed from the train so that it will have at least eighty-five percent effective and operative brakes.

BLET notes that paragraph (d)(4), as proposed in the NPRM, appeared to prohibit a railroad from opting to move an ECP brake operated train with less than 85% operative brakes in Switch Mode to the nearest rearward repair location. If FRA intended to prohibit a backhaul, BLET expressed interest in FRA's rationale. The proposed rule provided for the movement of defective equipment to the ''nearest forward'' repair location and did not intend to prohibit a backhaul of equipment when appropriate. The purpose of FRA invoking its discretionary authority under 49 U.S.C. 20306 to partially except application of 49 U.S.C. 20303 to ECP brake operations was to remove a disincentive towards ECP brake implementation by providing operational flexibility when hauling defective equipment for the purposes of repair. FRA intends to allow the railroads to move defective equipment to the first suitable location for repairs in either direction it so chooses. Accordingly, FRA has clarified the final rule to provide for such movement to the ''nearest or nearest forward repair location.'' Paragraph (e) permits trains operating in ECP brake mode with defective ECP brakes to be used or hauled without civil penalty liability under part 232 to its destination, not to exceed 3,500 miles. Such defects must be found for the first time during a Class I brake test or en route. As previously mentioned, FRA believes that a train operating in ECP brake mode can safely continue to its destination with some ineffective or inoperative brakes. Accordingly, paragraph (e) proposes that all such trains be permitted to travel to its destination, not to exceed 3,500 miles, without incurring civil penalty liability in relation to the use of those brakes. Paragraph (e) also proposes that this civil penalty immunity be extended to such trains with ECP brake defects found at the initial terminal. If such defects are found after a train is put together in preparation for its next departure, it may be overly burdensome to require that the train be taken apart for repair. If a brake repair may be performed without taking the train apart, FRA acknowledges that the repair may cause undue delay. If the ECP brake defect is found at the location where a Class I inspection is performed, FRA believes that such burdens and delays may be avoided in light of the increased safety afforded by ECP brake systems.

FRA believes that this flexibility needs to be afforded differently to defects that are known to exist upon a car's arrival at its destination or at a location where a Class I brake test will be required on the train than to defects found for the first time at the location where a Class I brake test is performed. If a freight car equipped with an ECP brake system is known to have arrived with ineffective or inoperative brakes at the location of a train's initial terminal or at a location where a Class I brake test is required under § 232.607(b), that car is subject to the limitations in paragraph (b), not paragraph (e). Paragraph (b) intends to ensure that known defects are repaired before continued use and to prevent trains operating in ECP brake mode from traveling indefinitely without repairing their defective ECP brakes. On the other hand, by retaining paragraph (e) as proposed, FRA recognizes the burden placed on operators to comply with such a rule when it discovers the defect when it is in the process of putting a train together or after a train is already put together and inspected. Paragraph (e) recognizes that burden by treating the train similarly to a train that detects a defective ECP brake while it is en route.

Paragraph (f) provides limited flexibility for trains operating in ECP brake mode with a non-brake safety appliance defect on a car equipped with ECP brakes. To enjoy such flexibility under paragraph (f), the car may only be used or hauled to the nearest or nearest forward location for repairs. As noted above, in light of the increased safety levels afforded by ECP brake system technologies, the final rule allows trains operating in ECP brake mode with defective ECP brakes to travel to its destination, not to exceed 3,500 miles. FRA does not believe it prudent to provide the same level of flexibility to cars operating in ECP brake-equipped trains with non-brake safety appliance defects, since an ECP brake system's increased safety level does not reduce the dangers of such defects. However, FRA does believe that flexibility should be afforded to permit the direct hauling of such equipment to the nearest or nearest forward repair location. To require the hauling of ECP brake equipment to the nearest location where necessary repairs can be effectuated, rather than allowing such to the nearest forward location, could create unnecessary safety hazards. As there initially will only be a limited number of ECP brake-equipped trains in operation at any given time, the ability to switch cars from one ECP train to another, merely for the purposes of getting the car to a closer repair facility, will be severely limited. Rather than requiring cars equipped with ECP brakes to be hauled in non-ECP braked trains, where their brakes will be inoperative, FRA believes it is safer to permit the car to continue in the train equipped with ECP brakes to the next forward location where the necessary non-brake safety appliance repairs can be made.

In the event trains must include cars equipped with brake systems not compatible with the train's brake system, the final rule includes requirements to ensure the safe operation of such trains. Paragraph (g) allows a train operating with a conventional pneumatic brake system-regardless of whether it is a train with ''stand-alone'' conventional pneumatic brakes or an ECP brake-equipped train operating in conventional pneumatic brake mode—to include cars with stand-alone ECP brake systems. To maintain an acceptable level of safety, however, paragraph (g) requires that such trains must have at least 95 percent effective and operative brakes at the conclusion of a Class I brake test, inclusive of all cars regardless of braking systems. Further, to meet the same level of safety intended by 49 CFR 232.103(d), paragraph (g) also requires that the train have 100 percent effective and operative conventional pneumatic brakes at the Class I brake test site when operating in conventional pneumatic mode.

Accordingly, paragraph (g) allows trains equipped with a conventional pneumatic brake system—or with ECP brake systems and operating in conventional pneumatic brake mode—to operate with freight cars equipped with stand-alone ECP brake systems under limited circumstances. Under paragraph (g), any such train not in compliance with those circumstances shall not be operated. The purpose of these limitations is to ensure the safe operation of such trains that contain cars with incompatible stand-alone ECP brake systems. FRA understands that

some trains operating with conventional pneumatic brakes may need to carry cars with incompatible stand-alone ECP brake systems, especially when the implementation of ECP brake system technology is in its infant stages. For instance, FRA anticipates that a need may arise to move a new ECP brake-equipped car in a train operating with conventional pneumatic brakes from the car manufacturer's facility or a repair shop to a location where the railroad operates trains equipped with ECP brakes. FRA also anticipates that a dual mode ECP brake system operating in ECP brake mode may incur a malfunction—such as a broken train line cable or locomotive controller—forcing the operator to switch the train's operation to conventional pneumatic brake mode. As long as the train's total number of cars with ineffective or inoperative brakes does not fall below the threshold percentage contained in paragraph (g)—via reference to paragraph (d)—FRA believes that the train may safely include cars with incompatible stand-alone ECP brake systems.

Paragraph (g) includes requirements for the subject train and each of its stand-alone ECP brake-equipped cars. For such a train to operate, it must comply with the minimum percentage of operative brakes required by paragraph (h) when at an initial terminal—which will be discussed below—or paragraph (d) when en route for the same reasons discussed in paragraph (d). Under paragraph (g), a stand-alone ECP brake-equipped car in a train operating with conventional pneumatic brakes can only be moved for delivery to a railroad receiving the equipment or to a location where the car may be added to a train operating in ECP brake mode. Otherwise, the movement of the car is restricted to the nearest available location where necessary repairs can be effectuated. In addition, such cars must be tagged in accordance with § 232.15(b) for the same reasons as stated for the analysis of paragraph (b) and placed in the train in accordance with § 232.15(e). Section 232.15(e) contains the requirements regarding the placement of cars in a train that have inoperative brakes. The requirements contained in that paragraph are consistent with the current industry practice and are part of almost every major railroad's operating rules. By incorporating § 232.15(e) by reference, paragraph (g) prohibits the placing of a vehicle with inoperative brakes at the rear of the train and the consecutive placing of more than two vehicles with inoperative brakes, as test track demonstrations have indicated that when three consecutive cars in a train operating with conventional pneumatic brakes have their brakes cut-out, it is not always possible to obtain an emergency brake application on trailing cars. To remain consistent with existing industry practice, paragraph (g), by referencing § 232.15(e), requires that such equipment shall not be placed in a train if it has more than two consecutive individual control valves cut out or if the brakes controlled by the valve are inoperative.

NS is concerned that § 232.609 does not adequately allow for the handling of defective equipment with ECP brake systems. NS notes that § 232.609(g)(2)(iii) requires compliance with § 232.15(e)(2), which states that ''no more than two freight cars with either inoperative brakes or not equipped with power brakes shall be consecutively placed in the train.'' Due to the efficiencies gained in stopping and the drastically reduced slack action, says NS, for ECP trains this should be increased to ''no more than five freight cars with defective air brakes to being cut out electronically.'' NS supports that no more than five cars that are electronically cut out shall be placed consecutively within the train, two of which may be pneumatically cut out. ECP brake-equipped cars that have the brakes electronically cut out, says NS, will retain the same rapid venting of brake pipe in order to produce a pneumatic emergency with no adverse effects on the braking system. NYAB and Wabtec make the same proposal.

FRA sees the merit in the proposal of NS, NYAB, and Wabtec and continues to believe that § 232.15(e)(1) should apply to the placement of cars equipped with ECP brakes in trains operated with ECP brakes, since it is always dangerous when the last car in the train is without braking capacity. FRA also continues to believe that no more than two consecutive cars should be placed in a train with their brakes pneumatically cut out, since the train's pneumatic brake application should remain available in emergency situations, especially in trains operating with ECP overlay systems. FRA recognizes that a train operated with ECP brakes may safely initiate an emergency brake application with up to five ECP brake-equipped cars electronically cut out via the car's CCD. Pneumatically cut out brakes will increase the length of the brake pipe, which may slow the rapid venting of brake pipe pressure to the point where an emergency brake application cannot be made. However, all effective and operative ECP brakes should be able to apply in an ECP brake operated train, since the train line cable continues to carry the emergency transmission with equal strength and speed throughout the entire train. Accordingly, any increase in consecutive cars equipped with ECP brakes with ineffective or inoperative brakes may only affect train handling, not train line braking communications.

FRA recognizes that a railroad may be more familiar with each territory it traverses and may be in a better position to determine how many consecutive cars with electronically cut out brakes may be allowed without causing safety issues. However, in the interests of public safety, and in light of the comments made by the brake manufacturers and railroads, FRA believes that the performance characteristics of the ECP brake system will safely allow for up to five consecutive cars to be electronically cut out in a train.

FRA further recognizes that a one-to-one CCD-to-car ratio does not exist for all cars. Intermodal cars, for example, have more platforms than CCDs and control valves. Accordingly, for the same reasons provided above, the final rule prevents more than five consecutive platforms with electronically cut out brakes on intermodal trains. Thus, to ensure sufficient train handling safety, the final rule also requires that the sets of consecutive cars with electronically cut out brakes be sufficiently spaced. FRA expects the number of cars with operative brakes buffering between these sets to differ depending upon a variety of factors including, but not limited to, the length of the train, the weight of the train and certain cars, the types of cars, and the territory. The sufficiency of buffer cars, therefore, must be determined by each railroad and enforced by FRA on a case-by-case basis.

Paragraph (h) includes additional requirements for freight trains equipped and operating with conventional pneumatic brakes when departing an initial terminal with stand-alone ECP brake-equipped freight cars. On such trains, paragraph (h) allows the train to depart its initial terminal with at least ninety-five percent effective and operative brakes and up to five percent of the cars to be equipped with ECP brakes. However, each car equipped with conventional pneumatic brake systems must have effective and operative brakes and each car equipped with dual mode ECP brake systems must operate in conventional pneumatic brake mode and have effective and operative conventional pneumatic brakes. The five percent of cars with

potentially defective brakes may only be cars equipped with stand-alone ECP brake systems.

Paragraph (i) provides for the electronic tagging of defective ECP brake equipment when being moved in a train operating in ECP brake mode. FRA recognizes that § 232.15(b) already provides requirements for electronic tagging of defective equipment. However, in view of the ECP brake system's unique characteristics, it is not entirely clear how § 232.15(b) would appropriately apply to electronic records developed, retained, and maintained by ECP brake systems. Accordingly, paragraph (i) contains the criteria necessary to determine whether an ECP brake system complies with § 232.15(b).

In the NPRM, FRA stated that, in order for an ECP brake system to provide electronic tagging of equipment with defective safety appliances, the ECP brake system must provide appropriate, constant, and accurate information to the crew via a display in the cab of the lead locomotive, and ensure that the information is securely stored and is accessible to FRA and appropriate operating and inspection personnel. To ensure the integrity of electronic tagging, FRA asserted, the ECP brake system must securely store the information. FRA sought comments on how secure a system must be.

BLET and AAR responded to this proposal with concerns relating to the secure storage of information requirement. According to BLET, any resolution of electronic recordkeeping issues should consider the solutions provided by the RSAC Locomotive Safety Standards Working Group. AAR does not believe it likely that an employee would seek to override the ECP software. In any event, AAR points out that since there is no information security requirement for paper records, there is no reason to require information security for electronic records. FRA agrees with BLET and AAR on this issue and has not included the information security requirement in the final rule. However, the remainder of the proposal has been retained in the final rule. FRA continues to believe that the electronic tag information must be accessible for safety and oversight purposes. Paragraph (i) makes clear that an automated tracking system approved for use by FRA must be capable of being reviewed and monitored by FRA at any time. The information should also be accessible to subsequent train crews that require notification of defects.

In the NPRM, FRA acknowledged that some railroads may also desire to use the ECP brake system to electronically tag defective non-ECP brake equipment. FRA anticipates that such electronic tagging would have to be manually entered into the system, since safety appliances are not monitored by the ECP brake system. FRA sought comments on whether the rule should include provisions allowing for the manual input of non-ECP brake defects into ECP brake systems for electronic tagging purposes. FRA also sought comments on what requirements and allowances should be made in consideration of that interest, including means to associate or merge ECP brake system information with information not monitored electronically by the ECP brake system. No comments were received on this issue. Accordingly, FRA has not provided for such electronic tagging capabilities in the final rule. This does not mean that a railroad is prevented from bringing an electronic tagging program to FRA for its approval under § 232.15(b) when it pertains to non-ECP brake defects and utilizes the ECP brake technology to electronically tag and track such equipment.

In the NPRM, FRA acknowledged that locomotive engineers may be distracted or subjected to information overload by multiple monitors or displays in the locomotive cab, thus potentially endangering the safe operation of the train. FRA sought comments and information on this issue. In Wabtec's and NYAB's experience, the additional display has not been an issue with the operators. In the event that an additional display is added, say the brake manufacturers, the information displayed is minimal and straight forward. In the case where ECP brake system information is integrated into the existing displays, ECP information replaces air brake information. BLET states that Appendix E to Part 236 addresses the issue of human-machine interface design where positive train control technology is implemented. Otherwise, says BLET, this issue is not ripe for resolution in the final rule. AAR agrees, stating that information overload caused by multiple monitors or displays in the locomotive cab is better suited for a separate proceeding. In light of the comments, the final rule does not include any requirements relating to ECP brake system monitors and displays.

Paragraph (j) requires that the railroads adopt and comply with written procedures governing the movement of defective equipment. The procedures must comply with the related regulatory requirements, including those in the final rule. FRA expects each railroad to develop appropriate procedures regarding its handling and repair of defective equipment containing ECP brake systems or hauled in trains operating in ECP brake mode. FRA acknowledges that many railroads may already have such procedures in place. FRA believes that the establishment of these procedures is the most effective means by which to minimize the possibility of future accidents caused by the movement of defective equipment on cars and trains equipped with ECP brake systems or operating in ECP brake mode. Given the introduction of new technology and its partial incompatibility with existing systems, FRA believes the need for adoption and compliance with such procedures is critical for continued safety in the rail industry.

BLET suggests that the procedures governed by paragraph (j) should be filed with, rather than merely be made available to, FRA. FRA has placed the burden on the railroads to be custodians of the information referenced in paragraph (j)(1). FRA only needs access to the information in certain situations and does not require ownership or custodianship. Accordingly, FRA sees no need to expend its resources on receiving and maintaining such files.

In contrast, however, the information required in paragraph (j)(2) must be filed with FRA for continual enforcement purposes. FRA cannot be expected to enforce its rules relating to the handling of defective equipment without this information instantly and continually available. To ensure compliance with the requirements concerning the performance of ECP brake system repairs, paragraph (j)(2) requires railroads to submit to FRA, prior to operating ECP brake systems in revenue service, a list identifying locations where such repairs may be made. FRA believes that the list should encompass a sufficient number of locations to ensure that Class I brake tests are performed at appropriate intervals and that trains equipped with ECP brake systems do not travel further than their destination or 3,500 miles without being inspected and repaired at Class I brake test locations and repair facilities. If a railroad adds or removes any repair facility from its system, paragraph (j)(2) requires that the railroad amend or modify that list by timely notifying FRA of those changes at least 15 days in advance.

Paragraph (k) explicitly excepts other portions of part 232 as they apply to ECP brake systems. For instance, paragraph (k) excepts application of § 232.15(a)(2) and (a)(5) through (a)(7), which generally require that equipment with defective safety appliances be

repaired at the location where they are first discovered to be defective or that they be moved only to the nearest available location where necessary repairs can be performed. As noted above, FRA believes that freight cars equipped with ECP brakes and freight trains operating in ECP brake mode need to be provided some flexibility in being handled for repair and when moving equipment with defective safety appliances. The provisions contained in § 232.15(a), if applied, would frequently frustrate the purpose of FRA's proposal and ignore the safety advances provided by ECP braking systems.

Paragraph (k) also excepts § 232.15(a)(8), which prohibits the movement of a defective car or locomotive in a train required to receive a Class I brake test at that location. As discussed in detail above, paragraph (a) allows a train operated with ECP brakes to leave its initial terminal with only ninety-five percent operative brakes after a Class I brake test. By doing so, paragraph (a) implicitly excepts trains operating in ECP brake mode from § 232.103(d), which prohibits a train from departing from its initial terminal with any inoperative or ineffective brakes. Nevertheless, paragraph (k) intends to clearly and explicitly except § 232.103(d). An explicit exception in this rule does not imply that there are no independent and implicit exceptions elsewhere. Finally, § 232.103(e) ''contains a clear and absolute prohibition on train movement if more than 15 percent of the cars in a train have their brakes cut out or have otherwise inoperative brakes,'' thus preventing a train's movement ''if less than 85 percent of the cars in that train have effective and operative brakes.'' Due to relief proposed by this section, however, the strict limits imposed by § 232.103(e) would no longer be applicable to trains regulated under these proposed rules. Accordingly, paragraph (k) excepts § 232.103(e).

BLET does not support 232.609(k) and does not believe that FRA should invoke its discretionary authority under 49 U.S.C. § 20306 to exempt railroads from the requirements of 20303. As noted above in the discussion contained in Section IX of this document, FRA has considered BLET's concerns and has decided to invoke its discretionary authority.

Section 232.611 Periodic Maintenance

FRA intends that all unexcepted and unmodified rules under part 232 apply to ECP brake operations. For the purposes of further clarity, however, paragraph (a) of § 232.611 reminds the operators of equipment with ECP brake systems to comply with the maintenance requirements contained in § 232.303(b) through (d), which require the performance of certain tests and inspections whenever a car is on a shop or repair track. FRA continues to believe that a repair or shop track provides an ideal setting for railroads to conduct an individualized inspection on a car's brake system to ensure its proper operation. FRA also continues to believe that such inspections are necessary to reduce the potential of overlooking cars with excessive piston travel during the performance of ordinary brake inspections. If any problems are detected at that location, the personnel needed to make any necessary corrections are already present. Furthermore, performing these inspections at this time ensures proper operation of the cars' brakes and eliminates the potential of having to cut cars out of an assembled train and, thus, should reduce inspection times and make for more efficient operations.

FRA continues to believe that § 232.303(b) and (c) should apply to all operations, including those with ECP brake systems. Section 232.303(b) requires testing of each car on a shop or repair track to determine that its air brakes apply and remain applied until a release is initiated. If the brakes fail to apply or to remain applied until a release is initiated, the car must be repaired and retested. Section § 232.303(c) requires piston travel to be inspected and, if necessary, adjusted. FRA intends for this to be accomplished in accordance with the stencil or badge plate on cars equipped with ECP brakes in accordance with § 232.607(f)(2).

FRA also continues to believe that § 232.303(d) should apply to all operations, including those with ECP brake systems. Section 232.303(d) lists brake system components requiring inspection prior to releasing a car from a shop or repair track. This section requires inspection of a car's hand brakes, angle cocks to ensure proper positioning to allow maximum air flow, and brake indicators, if equipped, to ensure their accuracy and proper operation. A periodic inspection is an ideal time for the railroad to inspect these items while imposing the least burden on the railroad's inspection and repair forces.

In addition to requiring continued compliance with § 232.303(b) through (d), paragraph (a) requires further inspection of freight cars equipped with ECP brake systems prior to release from a shop or repair track. These additional requirements afford the inspector the opportunity to look at each car more thoroughly and take into consideration an ECP brake system's unique characteristics. For instance, while § 232.303(d) requires inspectors to ensure that brake pipes are securely clamped, paragraph (a) provides the equivalent for ECP brake systems by requiring the secured clamping of ECP brake system wires. Accordingly, paragraph (a) requires inspectors to check the ECP brake system's wiring and brackets, electrical connections, electrical grounds, and any car mounted ECP brake system component. During such inspections, inspectors must look for problems such as frayed wiring, loose or damaged brackets, and wires that have become loose due to a fallen bracket. FRA believes that a missing bracket may be overlooked during a regular train yard inspection or Class I brake test and the final rule requires shop or repair track inspections of such ECP brake related components to ensure their safe operation.

Paragraph (a)(3) as proposed required the testing of the train line cable's electrical grounds and impedance. NYAB and Wabtec asserted that paragraph (a)(3) as proposed should be removed entirely. According to these brake manufacturers, train line integrity tests, which should be performed subsequent to repairs or replacement of the ECP brake-equipped train line or as part of a single car air brake test, do not require impedance testing, since they can be performed via resistance and grounds tests using commonly available measurements tools. AAR concurs with the brake manufacturers' submission, asserting that an impedance test is unnecessary. One of the labor representatives disagrees with the manufacturers, urging FRA to retain impedance testing of train line cables in the final rule.

FRA believes that the main purpose of cable impedance testing is checking the integrity of the train line electrical cable to assure that there is no electrical shortage between the wires and electrical current leakage through the ground connections. Since the current leakage testing of train line cable is a routine single car air brake test procedure and the ECP brake system continuously monitors the integrity of the train line cable, the additional impedance testing of train line cable wires is redundant and therefore unnecessary. FRA also believes that independently testing for grounds (i.e., check for the legitimate presence of cable shield connections to the car frame) is not necessary since paragraph (a)(2) already requires that a single car air brake test include a review and repair of the ECP brake system electrical connections. FRA continues to believe

that the brake manufacturers are in the best position to determine the level of testing that can be integrated into a single car air brake test. Accordingly, the proposal that periodic testing include electrical impedance and grounds testing is not being included in the final rule.

Paragraph (b) requires railroads to submit periodic single car air brake test procedures to FRA for approval and paragraph (c) requires railroads to comply with such submitted and approved procedures whenever they perform a single car air brake test. FRA must be given an opportunity to review and comment on any revision of the procedures by which these tests are performed to ensure that there is no degradation in safety resulting from any such modification and to ensure consistency in how the tests are performed. FRA notes that the review and approval required by paragraph (b) are necessary to prevent railroads from making unilateral changes to the test procedures. Paragraph (b) requires the industry to follow the special approval process contained in § 232.17 in order to initially submit the procedures to FRA for approval.

Paragraph (c) requires the performance of a single car air brake test on a car equipped with ECP brakes upon the occurrence of most of the events identified in § 232.305. Except for the exceptions provided herein, FRA continues to believe that § 232.305 adequately covers the parameters and timeliness of single car air brake tests. Paragraph (f), however, excepts application to a car equipped with stand-alone ECP brakes of § 232.305(b)(2), which requires a car that is on a shop or repair track to receive a single car air brake test if one has not been performed on the car within the previous 12 months. FRA believes that since the car's CCD performs a self-diagnostic of the brake system each time the car is initialized and used in a train, there is no need to perform a single car air brake test on a car that has not received such a test within the last 12 months.

FRA acknowledges that railroads may retrofit ECP brake systems on existing cars equipped with conventional pneumatic brake systems. While § 232.305(e) requires a single car air brake test on each new or rebuilt car prior to placing or using it in revenue service, it is unclear whether this rule applies to cars retrofitted with ECP brake systems. Accordingly, to ensure the proper and safe operation of cars with newly installed ECP brake systems, paragraph (d) requires the performance of a single car air brake test prior to placing the car in revenue service. FRA believes that it is essential for retrofitted cars to receive this test prior to returning to revenue service in order to ensure the proper operation of the vehicle's new brake system. Since this is a requirement when installing a new brake system, the cost of this requirement is minimal and merely incorporates the industry's current practices.

FRA acknowledges that, after receiving approval of the single car air brake test standard from FRA in accordance with paragraph (b), a railroad or an industry representative may—through its experience—subsequently determine better procedures applicable to single car air brake tests of cars equipped with ECP brake systems. Accordingly, FRA recognizes that the industry may find it necessary to modify the single car air brake test procedures from time to time. Section 232.307 provides regulatory procedures for those seeking modification of an approved single car air brake test procedure. Paragraph (b) extends the application of § 232.307 to single car air brake test procedures for cars equipped with ECP brake systems.

FRA believes that § 232.307 provides the industry with a quick and efficient procedure to seek modification of an incorporated or approved testing procedure and provides both FRA and other interested parties an opportunity to review potential changes prior to their becoming effective. The process under § 232.307 permits the industry to modify the single car air brake test procedures and permits those modifications to become effective 75 days from the date that FRA publishes the requested modification in the **Federal Register**, if no objection to the requested modification is raised by either FRA or any other interested party. The process allows FRA and other interested parties 60 days to review and raise objections to any proposed modification requested by the industry and submitted to FRA. FRA believes the process established in § 232.307 will meet the needs of AAR and the industry to expeditiously modify the single car air brake test procedures required by and approved under paragraph (b).

FRA continues to believe that, for the process to work at optimum efficiency, AAR and the industry would be best served if they ensure that there is open communication regarding any modifications with both FRA and the representatives of affected employees prior to requesting any modification of the procedures. This will ensure that interested parties are fully informed of any potential modification and their concerns are addressed or allayed before a request for modification is submitted to FRA. This information and dialogue will eliminate the potential for objections being submitted when the requested modification is officially sought.

As previously noted, for ECP brake-equipped freight cars, the final rule contemplates replacing application of the single car air brake test in § 232.305(a) with a new single car air brake test submitted and approved under § 232.611(b). To make this clear, paragraph (f) excepts application of § 232.305(a) as it applies to all cars equipped with ECP brakes, regardless of whether they are dual mode or stand-alone. To preserve the requirement of using a qualified person to perform single car air brake tests on cars equipped with ECP brakes, however, the final rule includes appropriate language in paragraphs (c) and (d).

FRA acknowledges that the self-monitoring capabilities of ECP brake systems may eliminate the need to perform single car air brake tests on a time-specific basis. Accordingly, paragraph (f) also excepts § 232.305(b)(2) as it applies to single car air brake tests for cars with stand-alone ECP brake systems. Since cars with dual mode ECP brake systems include all of the components of a conventional pneumatic brake system and may be operated in conventional pneumatic brake mode at any time, paragraph (f) does not intend to provide those cars relief from section 232.305(b)(2).

BLET asserts that there should be no exception from § 232.305(b)(2). According to BLET, the FMECA recommends the continuation of periodic single car testing to assure power brake functionality. UP states that it disagrees with the FRA proposal to require a single car air brake test whenever an ECP braked car is shopped for a non-braking defect. Under current AAR rules, says UP, a conventionally braked freight car is only subject to a single car air brake test when the braking system itself is service or repaired, or if 5 years have passed since the last such test or if 8 years had passed since the equipment was built.

UP apparently misunderstands the existing rule and the proposed rule. In addition to the requirements under § 232.305(c) and (d) that cars must be tested every 5 or 8 years, § 232.305(b)(2) requires a single air brake test when the car is found on a repair track ''for any reason'' and it has not received a single car air brake test within the previous 12-month period. Since this rule was enacted, it has always applied to all freight cars. The single car air brake test

is critical to ensuring the safe and proper operation of the brake equipment on the Nation's fleet of freight cars. When FRA issued § 232.305(b)(2), the single car air brake test was the sole method by which air brake equipment on freight cars is periodically tested to identify potential problems before they result in a brake becoming inoperative. It will now also apply to dual mode ECP brake-equipped freight cars.

However, stand-alone ECP brake-equipped freight cars will be exempt from § 232.305(b)(2) pursuant to paragraph (f). Accordingly, each stand-alone ECP brake-equipped car will not require a single car air brake test each time it is on a repair track. FRA believes that a reduction in the frequency of single car air brake tests is justified for stand-alone ECP brake-equipped cars in light of the ECP brake system's self-monitoring capabilities. However, the final rule maintains most of the requirements under § 232.305. FRA agrees with BLET and the FMECA that such periodic testing should continue and FRA continues to believe that insufficient information exists at this time to completely eliminate the need to conduct periodic single car air brake tests on ECP brake-equipped cars.

Section 232.305(f) was initially enacted to allow the continued operation of cars already in service that had received a single car air brake test before a more formal standard was adopted by the 2001 final power brake rule. While paragraph (f) of § 232.611 as proposed also excepted the application of § 232.305(f), FRA believes that § 232.305(f) should actually be removed from the rules in its entirety, since it no longer applies to any car, regardless of its brake system technology. Accordingly, § 232.305(f) is hereby deleted.

With the need for the submission and adoption of a new single car air brake test for ECP brake systems, FRA recognizes that the same flexibility initially afforded by § 232.305(f) may be necessary to allow for the continued operation of ECP brake-equipped cars currently in service under the existing waivers. New paragraph (g) intends to provide for such flexibility by considering the last single car air brake test performed on any ECP brake-equipped car prior to June 15, 2009, pursuant to the then existing standards, to be considered the last single car air brake test for that car. Accordingly, each such car would not require an additional single car air brake test in accordance with § 232.305(e) and 232.611(d).

Under paragraph (b), no car should be in service if it has not received a single car air brake test under a procedural standard submitted to and approved by FRA. Since no such standard has yet been submitted and approved, all trains under the existing waiver would be required to be taken out of service upon the publication of this rule. To avoid this unintended consequence and to provide flexibility for ECP brake-equipped cars already in service, paragraph (g) provides more time for the submission and approval of a single car air brake test standard submitted pursuant to paragraph (b) and § 232.17.

FRA understands that AAR has formed a group, which includes AAR Brake Committee members, the ECP brake manufacturers, and FRA, for the purpose of developing single car air brake test procedures for freight cars equipped with ECP brakes. FRA expects these procedures will become part of the AAR Standards and Recommended Practices once they are developed and adopted by the AAR. Accordingly, for the same reasons FRA implemented § 232.305(f) (2001), the date that all cars equipped with ECP brakes will receive a single car air brake test under the existing standard prior to June 15, 2009, shall be considered the date for the last single car air brake test for that car.

Section 232.613 End-of-Train Devices

Current FRA regulations specify design and performance standards for one-way and two-way EOT telemetry devices, which, at a minimum, have the capability of determining rear-of-train brake pipe pressure and of transmitting this information by radio to a receiving unit in the controlling locomotive. Most EOT units in service are battery operated and also incorporate a rear end marker required under 49 CFR part 221. Optional features include transmission of information regarding rear end motion and battery status. Most units operate on the same ultra high frequency (UHF), but each rear unit has a discrete identification code which must be recognized by the HEU before the message is acknowledged. The more modern two-way EOT device, in addition to the features of the one-way EOT device, has the ability of activating the emergency air valve at the rear of the train upon receiving an emergency brake application command from the HEU. This is a desirable feature in event of a blockage in the brake pipe that would prevent the pneumatic transmission of the emergency brake application throughout the entire train.

Provisions governing the use of one-way EOT telemetry devices were initially incorporated into the power brake regulations in 1986. Pursuant to the Rail Safety Enforcement and Review Act, Public Law 102–365 (Sept. 3, 1992), which amends the Federal Rail Safety Act (FRSA) of 1970 (45 U.S.C. 421, 431 et seq.), FRA held rulemakings to amend the power brake regulations, including those concerning one-way and two-way EOTs. 62 FR 278 (Jan. 2, 1997); 66 FR 4104 (Jan. 17, 2001). The resulting regulations, contained in subpart E of part 232, specify the requirements related to the performance, operation, and testing of EOT devices for conventional pneumatic braking.

The new ECP–EOT devices—which must comply with AAR standards such as S–4200 and S–4220—will provide many of the same functions that conventional two-way EOT devices use on trains with conventional pneumatic brakes. In addition to serving as the final node on the ECP brake system's train line cable termination circuit and as the system's ''heart beat'' monitoring and confirming train, brake pipe, power supply line, and digital communications cable continuity, the ECP–EOT device transmits to the HEU a status message that includes the brake pipe pressure, the train line cable's voltage, and the ECP–EOT device's battery power level. Since the ECP–EOT device—unlike a conventional EOT device—will communicate with the HEU exclusively through the digital communications cable and not via a radio signal, it does not need to perform the function of venting the brake pipe to atmospheric pressure to engage an emergency brake application. However, ECP–EOT devices do verify the integrity of the train line cable and provide a means of monitoring the brake pipe pressure and gradient, providing the basis for an automatic- rather than engineer-commanded-response if the system is not adequately charged. In the case of ECP brakes, the brake pipe becomes a redundant- rather than primary-path for sending emergency brake application commands. Under certain communication break downs between the ECP–EOT device, the HEU, and any number of CCDs, the system will self-initiate an emergency brake application.

FRA acknowledges that ECP–EOT devices, with their additional and changed features, may not comply with the rules under subpart E. Accordingly, paragraph (d) excepts trains operating in ECP brake mode from having to comply with subpart E of part 232 and the remainder of section 232.613 provides alternative requirements. Paragraph (a) provides for the minimum requirements under which an ECP–EOT device must operate. Paragraph (b) requires that each ECP brake operated includes a properly connected ECP–EOT device that

comports with the requirements under paragraph (a).

AAR and NS noted that, similarly to trains operating with conventional air brake systems, a train operated with ECP brakes may include a locomotive as the train's rear vehicle performing the same function as an EOT device. According to AAR, a locomotive at the rear of a train can perform all the functions performed by an EOT device. BLET concurs with AAR and NS and proposes that § 232.613(c) be redrafted to permit the use of a locomotive in lieu of an ECP–EOT device. FRA agrees because a locomotive equipped with ECP brakes functions the same as an ECP–EOT device. They both provide the same feedback loop between the HEU and end of the train. Accordingly, paragraph (c) provides for a locomotive equipped with ECP brakes to be used in lieu of an ECP–EOT device in a train operated with ECP brakes.

NYAB and Wabtec state that a conventional EOT unit is subject to annual calibration to address issues relating to its radio and BP pressure transducer. However, since an ECP–EOT device does not require a radio and the ECP brake system continuously monitors the brake pipe pressure transducer, the brake manufacturers contend, it does not require annual calibration.

FRA agrees with the brake manufacturers' comments regarding annual ECP–EOT device calibration. Unlike conventional EOT units, ECP–EOT devices do not require radios. Annual calibration of the brake pipe pressure transducer is not necessary in light of the ECP brake system's brake pipe pressure readings at each individual ECP brake operated car and ability to confirm train line integrity. Accordingly, the final rule does not require annual calibration and testing.

XII. Regulatory Impact and Notices

A. Executive Order 12866 and DOT Regulatory Policies and Procedures

This final rule has been evaluated in accordance with existing policies and procedures, and determined to be significant under both Executive Order 12866 and DOT policies and procedures (44 FR 11034; Feb. 26, 1979). FRA has prepared and placed in Docket No. FRA–2006–26175 a Regulatory Analysis addressing the economic impact of this final rule. Document inspection and copying facilities are available at the DOT Central Docket Management Facility located in Room W12–140 on the Ground level of the West Building, 1200 New Jersey Avenue, SE., Washington, DC 20590. Access to the docket may also be obtained electronically through the Federal eRulemaking Portal at *http://www.regulations.gov*. Photocopies may also be obtained by submitting a written request to the FRA Docket Clerk at Office of Chief Counsel, Stop 10, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590.

For purposes of analysis, FRA has assumed that this final rule will support business decisions by Class I railroads to convert unit train service, such as coal and intermodal, to ECP brake operations over a 10-year period. This type of service is characterized by intensive utilization of assets and is reasonably discrete in terms of operational requirements. Although carload service is dispersed over the national rail network, unit train service tends to be concentrated in certain corridors. Locomotives are or could be dedicated to this service (e.g., as in the extensive use of high traction alternating current (AC) locomotives in coal service). FRA believes that, as costs and benefits are validated and the technology's market enjoys economies of scale, additional markets will benefit from ECP brake technology.

The benefits of voluntarily implementing and using ECP brakes under this rule substantially exceed the costs. If the industry were to implement ECP brakes to the extent estimated in this final rule, it would cost it approximately $1.7 billion (discounted at 7%). The largest portion of these voluntary costs, $1.2 billion, would be the cost to convert freight cars to ECP brakes and the remaining costs relate to locomotive conversion and training. The total benefits of the final rule would total approximately $9.7 billion (discounted at 7%), if ECP brakes are adopted as estimated. Of those benefits, the $1 billion in regulatory relief and the $1.2 billion in fuel savings together exceed the costs. The remaining benefits include accident risk reduction, environmental cleanup savings, track out-of-service time reduction, wheel replacement savings, and network velocity improvements. The expected benefits of ECP braking technology appear to justify the investment, provided that the conversion is focused first on the high-mileage, unit and unit-like train services that would most benefit from its use.

As presented in the following tables, FRA estimates that the present value (PV), discounted at 7 percent of the total 20-year benefits and costs which the industry would be expected to incur if it elected to comply with the alternative requirements contained in this rule is $9.7 billion and $1.7 billion, respectively:

TOTAL 20-YEAR BENEFITS AND DISCOUNTED BENEFITS

[At 3% and 7%]

	Benefits	3% Discount	7% Discount
Highway-Rail Accident Risk Reduction	$25,802,114	$17,897,484	$11,513,191
Rail Equipment Accident Risk Reduction	286,687,494	198,859,081	127,923,151
Environmental Cleanup Savings	113,296,427	78,587,395	50,554,127
Track Out-of-Service Time for Accidents	10,825,104,763	7,508,769,780	4,830,282,231
Regulatory Relief	2,283,662,829	1,586,425,219	1,022,855,259
Fuel Savings	2,745,000,000	1,904,052,986	1,224,849,552
Wheel Replacement Savings	1,601,250,000	1,110,697,575	714,495,572
Network Velocity Improvement of 1 mph	2,500,000,000	2,101,494,145	1,698,459,555
Total Benefits	20,380,803,627	14,506,783,665	9,680,932,638

TOTAL 20-YEAR COSTS AND DISCOUNTED COSTS

[at 3% and 7%]

	Costs	3% Discount	7% Discount
Freight Car Costs	$1,746,326,400	$1,467,957,882	$1,186,425,904
Locomotive Costs	582,624,000	489,752,370	395,825,320
Employee Training	231,470,835	165,421,968	111,016,540
Total Costs	2,560,421,235	2,123,132,221	1,693,267,763

B. Regulatory Flexibility Act and Executive Order 13272

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) and Executive Order 13272 require a review of proposed and final rules to assess their impact on small entities. FRA has prepared and placed in Docket No. FRA–2006–26175 an Analysis of Impact on Small Entities (AISE) that assesses the small entity impact of this rule. Document inspection and copying facilities are available at the Department of Transportation Central Docket Management Facility located in Room W12–140 on the Ground level of the West Building, 1200 New Jersey Avenue SE., Washington, DC 20590. Docket material is also available on the Federal eRulemaking Portal at *http://www.regulations.gov*. Photocopies may also be obtained by submitting a written request to the FRA Docket Clerk at Office of Chief Counsel, Stop 10, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590.

''Small entity'' is defined in 5 U.S.C. 601 as a small business concern that is independently owned and operated, and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has authority to regulate issues related to small businesses, and stipulates in its size standards that a ''small entity'' in the railroad industry is a railroad business ''line-haul operation'' that has fewer than 1,500 employees and a ''switching and terminal'' establishment with fewer than 500 employees. SBA's ''size standards'' may be altered by Federal agencies, in consultation with SBA and in conjunction with public comment.

Pursuant to that authority FRA has published a final statement of agency policy that formally establishes ''small entities'' as being railroads that meet the line-haulage revenue requirements of a Class III railroad. See 68 FR 24891 (May 9, 2003). Currently, the revenue requirements are $20 million or less in annual operating revenue. The $20 million limit is based on the Surface Transportation Board's threshold of a Class III railroad carrier, which is adjusted by applying the railroad revenue deflator adjustment (49 CFR part 1201). The same dollar limit on revenues is established to determine whether a railroad, shipper, or contractor is a small entity. FRA uses this alternative definition of ''small entity'' for this rulemaking.

For this rulemaking, there are approximately 523 small railroads that could potentially receive regulatory relief. However, railroads are not mandated to convert to ECP brake technology. Regulatory relief provides an incentive for most long-haul services to convert. Smaller railroads do not operate over 1,000 miles or 1,500 miles and would not benefit economically by converting to this technology. Hence, FRA does not expect this regulation to impact any small railroads.

The small entity segment of the railroad industry faces little in the way of intramodal competition. Small railroads generally serve as ''feeders'' to the larger railroads, collecting carloads in smaller numbers and at lower densities than would be economical for the larger railroads. Smaller railroads that carry unit and unit-like commodities often operate the train with the locomotives and cars without ownership of the equipment. They transport those cars over relatively short distances and then turn them over to the larger systems, which transport them relatively long distances to their ultimate destination, or for handoff back to a smaller railroad for final delivery. Although there are situations in which the relative interests of large and small railroads may not always coincide, the relationships between the large and small entity segments of the railroad industry are more supportive and co-dependent than competitive.

It is also extremely rare for small railroads to compete with each other. As mentioned above, small railroads generally serve smaller, lower density markets and customers. They exist, and often thrive, doing business in markets where there is not enough traffic to attract the larger carriers that are designed to handle large volumes over distance at a profit. As there is usually not enough traffic to attract service by a large carrier, there is also not enough traffic to sustain more than one smaller carrier. There are also significant barriers to entry in the railroad industry, including the need to own rights-of-way, build track, purchase fleets. Thus, even to the extent that the rule may have an economic impact, it should have no impact on the intramodal competitive position of small railroads.

The AISE developed in connection with this final rule concludes that this final rule will only likely impact four Class I railroads that voluntarily choose to implement ECP brakes in their operations and therefore should not have any economic impact on small entities. Smaller railroads that carry unit and unit-like commodities often operate and transport trains owned by other parties over relatively short distances and turn them over to larger systems that, in turn, transport those trains relatively long distances to their ultimate destination or to another small railroad for final delivery. FRA recognizes that small entities may, in some cases, be involved in specific route segments for trains that originate or terminate on a Class I railroad. In these cases, the cars involved are more likely to be owned or provided by shippers or a Class I railroad. Mutual support arrangements and shared power practices are likely to ensure that the smaller railroad will not require trains equipped with ECP brakes for this service. Further, FRA anticipates that train operations using ECP brakes will be limited to long hauls of commodities such as intermodal, coal, ore, non-metallic minerals, motor vehicle parts, and grain for many years. Since small railroads do not handle such commodities, they will not likely receive large blocks of cars equipped with ECP brakes from Class I railroads.

Since FRA does not expect small railroads to convert to ECP brake technology within the period of the analysis, this final rule is not anticipated to affect any small entities. Thus, FRA certifies that this final rule is not expected to have a significant economic impact on a substantial number of small entities under the

Regulatory Flexibility Act or Executive Order 13272.

C. Paperwork Reduction Act

The information collection requirements in this final rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 *et seq*. The sections that contain the new information collection requirements and the estimated time to fulfill each requirement are as follows:

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours
229.27—Annual tests	30,000 locomotives	30,000 tests	15 minutes	7,500 hours.
232.3—Applicability—Export, industrial, & other cars not owned by railroads-identification.	559 railroads	8 cards	10 minutes	1 hour.
232.7—Waivers	559 railroads	20 petitions	40 hours	800 hours.
232.11—Penalties—Knowingly falsifying a record/report.	559 railroads	1 falsified recd/rpt	10 minutes	.17 hour.
232.15—Movement of Defective Equipment:				
—Tags	1,620,000 cars	128,400 tags	2.5 minutes	5,350 hours.
—Written Notification	1,620,000 cars	25,000 notices	3 minutes	1,250 hours.
232.17—Special Approval Procedure:				
—Petitions for special approval of safety-critical revision.	559 railroads	4 petitions	100 hours	400 hours.
—Petitions for special approval of pre-revenue service acceptance plan.	559 railroads	2 petitions	100 hours	200 hours.
—Service of petitions	559 railroads	4 petitions	40 hours	160 hours.
—Statement of interest	Public/railroads	14 statements	8 hours	112 hours.
—Comment	Public/railroads	13 comments	4 hours	52 hours.
232.103—Gen'l requirements—all train brake systems.	114,000 cars	70,000 stickers	10 minutes	11,667 hours.
232.105—Gen'l requirements for locomotives—Inspection.	30,000 locomotives	30,000 forms	5 minutes	2,500 hours.
232.107—Air source requirements and cold weather operations—Monitoring Plan (Subsequent Years).	10 new railroads	1 plan	40 hours	40 hours.
—Amendments to Plan	50 railroads/plans	10 amendments	20 hours	200 hours.
—Recordkeeping	50 railroads/plans	1,150 records	20 hours	23,000 hours.
232.109—Dynamic brake requirements—status.	559 railroads	1,656,000 records	4 minutes	110,400 hours.
—Inoperative dynamic brakes	30,000 locomotives	6,358 records	4 minutes	424 hours.
—Tag bearing words ''inoperative dynamic brakes''.	30,000 locomotives	6,358 tags	30 seconds	53 hours.
—Deactivated dynamic brakes (Sub. Yrs.).	8,000 locomotives	10 stencilings	5 minutes	1 hour.
—Operating rules (Subsequent Years).	5 new railroads	5 op. rules	4 hours	20 hours.
—Amendments	559 railroads	15 amendments	1 hour	15 hours.
—Requests to increase 5 mph overspeed restriction.	559 railroads	5 requests	30 min/20 hrs.	103 hours.
—Knowledge criteria—locomotive engineers—Sub Yrs.	5 new railroads	5 amendments	16 hours	80 hours.
232.111—Train information handling	5 new railroads	5 procedures	40 hours	200 hours.
—Sub. Yrs.—Amendments	100 railroads	100 amendments	20 hours	2,000 hours.
—Report requirements to train crew	559 railroads	2,112,000 reports	10 minutes	352,000 hours.
232.203—Training requirements—Tr. Prog.:				
—Sub Yr	15 railroads	5 programs	100 hours	500 hours.
—Amendments to written program	559 railroads	559 amendments	8 hours	4,472 hours.
—Training records	559 railroads	67,000 records	8 minutes	8,933 hours.
—Training notifications	559 railroads	67,000 notific	3 minutes	3,350 hours.
—Audit program	559 railroads	1 plan/559 cop	40 hours/1 min	49 hours.
—Amendments to validation/assessment program.	559 railroads	50 amendments	20 hours	1,000 hours.
232.205—Class 1 brake test—Notifications/Records.	559 railroads	1,646,000 records	45 seconds	20,575 hours.
232.207—Class 1A brake tests—Subsequent Years.	559 railroads	5 des. Lists	1 hour	5 hours.
—Notification	559 railroads	5 amendments	1 hour	5 hours.
232.209—Class II brake tests—intermediate inspection.	559 railroads	1,597,400 commun	3 seconds	1,331 hours.
232.213—Extended haul trains	83,000 long dist. movements.	100 letters	15 minutes	25 hours.
—Record of all defective/inoperative brakes.	N/A	N/A	N/A	N/A.
232.303—Gen'l requirements—single car test.	1,600,000 frgt. cars	5,600 tags	5 minutes	467 hours.

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours
—Last repair track brake test/single car test.	1,600,000 frgt. cars	320,000 stncl	5 minutes	26,667 hours.
232.305—Single Car tests	1,600,000 frgt. cars	320,00 tests/records ..	45 minutes	240,000 hours.
232.307—Modification of Single Car Air Brake Test Procedures (Old Rqmnt)—Req.	AAR	1 req. + 3 copies	4 hrs. + 5 min	4 hours.
—Affirmation Statement on Mod. Req. to Employee Representatives.	AAR	1 statement + 4 copies.	30 min. + 5 min	1 hour.
—Comments on Modification Request.	Public/Int. Parties	2 comments	60 minutes	2 hours.
232.309—Repair track brake test	640 shops	5,000 tests	30 minutes	2,500 hours.
232.403—Unique Code	245 railroads	12 requests	5 minutes	1 hour.
232.407—Operations requiring 2-way EOTs	245 railroads	50,000 comm	30 seconds	417 hours.
232.409—Insp. and Testing of EOTs	245 railroads	447,500 comm	30 seconds	3,729 hours.
—Telemetry Equipment—Testing and Calibration.	245 railroads	32,708 mar. units	1 minute	545 hours.
232.503—Process to introduce new brake technology.	559 railroads	1 letter	1 hour	1 hour.
—Special approval	559 railroads	1 request	3 hours	3 hours.
232.505—Pre-revenue svc accept. test plan—Sub Yr.	559 railroads	1 procedure	160 hours	160 hours.
—Amendments	559 railroads	1 procedure	40 hours	40 hours.
—Design description	559 railroads	1 petition	67 hours	67 hours.
—Report to FRA Assoc. Admin. for Safety.	559 railroads	1 report	13 hours	13 hours.
—Brake system technology testing	559 railroads	5 descriptions	40 hours	200 hours.
232.603—Configuration Management—New Requirements.				
—Configuration Management Plan Submitted to FRA.	4 railroads	1 plan	160 hours	160 hours.
—Subsequent Years	4 railroads	1 plan	60 hours	60 hours.
—Modification of Standards	4 railroads	1 request + 2 copies ..	8 hours + 5 min	8 hours.
—Affirmative statement + statement copies re: modification request.	4 railroads	4 statements + 24 copies.	1 hour + 5 min	6 hours.
—Comments on requested modification.	Public/Int. Parties	4 comments	2 hours	8 hours.
232.605—ECP Brakes: Training—New Requirements.	4 railroads	4 programs	100 hours	400 hours.
—Adopt/Developing an ECP Training Prog.—Yr. One. —Subsequent Years.	4 railroads	2 programs	100 hours	200 hours.
—ECP Brakes Training of Employees—Yr. One.	4 railroads	6,409 tr. Empl	8 hrs/24 hrs	105,512 hours.
—ECP Brakes Training of Employees—Sub. Yrs.	4 railroads	6,409 tr. Empl	1 hour/8 hours	30,264 hours.
—ECP Training Records—Yr. One	4 railroads	6,409 records	8 minutes	855 hours.
—ECP Training Records—Subsequent Years.	4 railroads	6,409 records	4 minutes	428 hours.
—Assessment of ECP Training Plan	4 railroads	4 plans	40 hours	160 hours.
—Adopt Operating Rules for ECP Brakes.	4 railroads	4 Op. Rules	24 hours	96 hours.
—Loco. Engineers—ECP Brakes Systems: Criteria For Certification.	4 railroads	4 amended Programs	40 hours	160 hours.
232.607—ECP Inspection and Testing—New Requirements:				
—Initial Terminal—Inspections and Notification of Class I Brake Tests.	4 railroads	10,000 insp. + 10,000 notific.	90 min. + 45 sec	15,125 hours.
—Cars added or removed en route—Class I Br. Test.	4 railroads	1,000 insp. + 500 notific.	60 min. + 45 sec	1,006 hours.
—Non-ECP cars added to ECP Trains—Inspections and Tags for Defective Cars.	200 Cars	200 insp. + 400 tags/ rcds.	5 min. + 2.5 min	34 hours.
232.609—Handling of Defective Equipment with ECP Brake Systems—New Requirements:				
—Freight Car w/defective conventional brakes moved in train operating in ECP brake mode.	25 Cars	50 tags	2.5 minutes	2 hours.
—Inspections/Tagging for ECP Train moving w/less than 85 percent operative/effective brakes.	20 Cars	20 Insp. + 40 tags/ records.	5 min. + 2.5 min	3 hours.

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours
232.609—Freight Car with ECP brake system found with defective non-brake safety appliance—Tagging.	75 Cars	150 tags	2.5 minutes	6 hours.
—Conventional Train with stand-alone ECP brake equipped cars—Tagging.	500 Cars	1,000 tags	2.5 minutes	42 hours.
—Procedures for handling ECP brake system repairs and designation of repair locations.	4 railroads	4 procedures	24 hours	96 hours.
—List of repair locations	4 railroads	4 lists	8 hours	32 hours.
—Notification to FRA Safety Administrator regarding change to repair location list.	4 railroads	1 notification	1 hour	1 hour.
232.611—Periodic Maintenance—New Requirements:				
—Inspections before being released from repair Shop.	500 fr. Cars	500 insp. & records	10 minutes	83 hours.
—Procedures for ECP Single Car Tests.	1 Railroad Rep	1 procedure + 2 copies.	24 hours + 5 min	24 hours.
—Single Car Air Brake Tests—Records.	2,500 fr. Cars	2,500 tests/rcd	45 minutes	1,875 hours.
—Modification of Single Car Test Standards.	1 Railroad Rep	1 mod. Proc	40 hours	40 hours.

All estimates include the time for reviewing instructions; searching existing data sources; gathering or maintaining the needed data; and reviewing the information. For information or a copy of the paperwork package submitted to OMB, contact Mr. Robert Brogan, Information Clearance Officer, at 202–493–6292, or contact Ms. Nakia Jackson at 202–493–6073; or via e-mail at *robert.brogan@dot.gov* or *nakia.jackson@dot.gov*.

OMB is required to make a decision concerning the collection of information requirements contained in this final rule between 30 and 60 days after publication of this document in the **Federal Register**. Therefore, a comment to OMB is best assured of having its full effect if OMB receives it within 30 days of publication. Comments to OMB may be sent by mail to: The Office of Management and Budget, 725 17th St., NW., Washington, DC 20503, attn: FRA Desk Officer. Comments may also be sent to OMB at the following address: *oira_submissions@omb.eop.gov*.

FRA is not authorized to impose a penalty on persons for violating information collection requirements which do not display a current OMB control number, if required. FRA intends to obtain current OMB control numbers for any new information collection requirements resulting from this rulemaking action prior to the effective date of this final rule. The OMB control number, when assigned, will be announced by separate notice in the **Federal Register**.

D. Federalism Implications

Executive Order 13132, ''Federalism'' (64 FR 43255, Aug. 10, 1999), requires FRA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' are defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' Under Executive Order 13132, the agency may not issue a regulation with Federalism implications that imposes substantial direct compliance costs and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or the agency consults with State and local government officials early in the process of developing the proposed regulation. Where a regulation has Federalism implications and preempts State law, the agency seeks to consult with State and local officials in the process of developing the regulation.

In the NPRM, FRA stated that this proposed rule has preemptive effect. Subject to a limited exception for essentially local safety or security hazards, FRA stated that its requirements will establish a uniform Federal safety standard that must be met, and state requirements covering the same subject are displaced, whether those standards are in the form of state statutes, regulations, local ordinances, or other forms of state law, including state common law. Section 20106 of Title 49 of the United States Code, FRA said, provides that all regulations prescribed by the Secretary related to railroad safety preempt any State law, regulation, or order covering the same subject matter, except a provision necessary to eliminate or reduce an essentially local safety hazard that is not incompatible with a Federal law, regulation, or order and that does not unreasonably burden interstate commerce. This is consistent with past practice at FRA and within the Department of Transportation. In particular, the notice of proposed rulemaking did not change the preemption provision of part 232; this final rule amends the preemption provision, § 232.13, to conform to the recent clarifying amendments to 49 U.S.C. 20106.

AAJ filed comments expressing its belief that FRA should revise the ''Federalism Implications'' section of the preamble to reflect Congress's intention that federal rail safety regulations do not preempt an individual's right to pursue a state tort law claim against a railroad company. According to AAJ, section 1528 of the ''Implementing Recommendation of the 9/11 Commission Act of 2007'' (the 9/11 Act) clarifies that 49 U.S.C. 20106 does not preempt State law causes of action. AAR disagrees, stating that, by its plain language, section 1528 ''is intended solely to reject a preemption

defense where the defendant has violated the federal standard of care embodied in a federal regulation or a plan created pursuant to a federal regulation.'' According to AAR, section 1528 does not eliminate preemption of common law claims, but reaffirms that state law is preempted whenever the Secretaries of Transportation and Homeland Security issue a regulation or order covering the applicable subject matter, unless the local safety or security hazard exception applies.

Normal State negligence standards apply where there is no Federal action covering the subject matter. In Section 1528 of Public Law 110–53, Congress clarified the availability of State law causes of action under section 20106 where there is Federal action covering the subject matter. As amended, 49 U.S.C. 20106 provides that issuance of these regulations preempts any State law, regulation, or order covering the same subject matter, except an additional or more stringent law, regulation, or order that is necessary to eliminate or reduce an essentially local railroad safety or railroad security hazard; that is not incompatible with a law, regulation, or order of the United States Government; and that does not unreasonably burden interstate commerce. Section 20106 permits State tort actions arising from events or activities occurring on or after January 18, 2002, for the following: (a) A violation of the Federal standard of care established by regulation or order issued by the Secretary of Transportation (with respect to railroad safety, such as these regulations) or the Secretary of Homeland Security (with respect to railroad security); (b) a party's violation of, or failure to comply with, its own plan, rule, or standard that it created pursuant to a regulation or order issued by either of the two Secretaries; and (c) a party's violation of a State standard that is necessary to eliminate or reduce an essentially local safety or security hazard, is not incompatible with a law, regulation, or order of the United States Government, and does not unreasonably burden interstate commerce. Nothing in Section 20106 creates a Federal cause of action on behalf of an injured party or confers Federal question jurisdiction for such State law causes of action.

While this recent amendment has altered the preemptive reach of Section 20106, it is important to note that there are limits to this exception allowing state tort actions under this statute. For example, Congress provided an exception only for an action in State court seeking damages for personal injury, death, or property damage. The statute does not provide for the recovery of punitive damages in the permitted common law tort actions. In addition, the statute permits actions for violation of an internal plan, rule, or standard only when such internal plan, rule, or standard is created pursuant to a Federal regulation or order issued by DOT or DHS. While parties are encouraged to go beyond the minimum regulatory standard in establishing internal safety and security standards, such standards that exceed the requirements of Federal regulation or order are not created pursuant to Federal regulation or order. Accordingly, there is no clear authorization of a common law tort action alleging a violation of those aspects of such an internal plan, rule, or standard related to the subject matter of this regulation that exceed the minimum required by the Federal regulation or order.

FRA has analyzed this final rule in accordance with the principles and criteria contained in Executive Order 13132. This final rule will not have a substantial effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among various levels of government. FRA concludes that this final rule will not impose any direct compliance costs on State and local governments and has no federalism implications, other than the preemption of state laws covering the subject matter of this final rule, which occurs by operation of law under 49 U.S.C. 20106 whenever FRA issues a rule or order. Elements of the final rule dealing with safety appliances affect an area of safety that has been pervasively regulated at the Federal level for over a century. Accordingly, the final rule amendments in that area will involve no impacts on Federal relationships.

E. Environmental Impact

FRA has evaluated this final rule in accordance with its ''Procedures for Considering Environmental Impacts'' (FRA's Procedures) (64 FR 28545, May 26, 1999) as required by the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), other environmental statutes, Executive Orders, and related regulatory requirements. FRA has determined that this final rule is not a major FRA action (requiring the preparation of an environmental impact statement or environmental assessment) because it is categorically excluded from detailed environmental review pursuant to section 4(c)(20) of FRA's Procedures. See 64 FR 28547, May 26, 1999. Section 4(c)(20) reads as follows: (c) Actions categorically excluded. Certain classes of FRA actions have been determined to be categorically excluded from the requirements of these Procedures as they do not individually or cumulatively have a significant effect on the human environment. * * * The following classes of FRA actions are categorically excluded: * * * (20) Promulgation of railroad safety rules and policy statements that do not result in significantly increased emissions or air or water pollutants or noise or increased traffic congestion in any mode of transportation.

In accordance with section 4(c) and (e) of FRA's Procedures, the agency has further concluded that no extraordinary circumstances exist with respect to this regulation that might trigger the need for a more detailed environmental review. As a result, FRA finds that this final rule is not a major Federal action significantly affecting the quality of the human environment.

F. Unfunded Mandates Reform Act of 1995

Pursuant to Section 201 of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4, 2 U.S.C. 1531), each Federal agency ''shall, unless otherwise prohibited by law, assess the effects of Federal regulatory actions on State, local, and tribal governments, and the private sector (other than to the extent that such regulations incorporate requirements specifically set forth in law).'' Section 202 of the Act (2 U.S.C. 1532) further requires that ''before promulgating any general notice of proposed rulemaking that is likely to result in the promulgation of any rule that includes any Federal mandate that may result in expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $132,000,000 or more in any 1 year, and before promulgating any final rule for which a general notice of proposed rulemaking was published, the agency shall prepare a written statement'' detailing the effect on State, local, and tribal governments and the private sector. This final rule may result in the expenditure, in the aggregate, of $132,000,000 or more in any one year. However, those expenses are not mandated and would only be incurred by the private sector if it wishes to take advantage of the regulatory relief provided by this final rule. Although the preparation of such a statement is not required, the analytical requirements under Executive Order 12866 are similar to the analytical requirements under the Unfunded Mandates Reform Act of 1995 and, thus, the same analysis complies with both analytical requirements.

G. Energy Impact

Executive Order 13211 requires Federal agencies to prepare a Statement of Energy Effects for any ''significant energy action.'' 66 FR 28355 (May 22, 2001). Under the Executive Order, a ''significant energy action'' is defined as any action by an agency (normally published in the **Federal Register**) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking: (1)(i) That is a significant regulatory action under Executive Order 12866 or any successor order, and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action. FRA has evaluated this final rule in accordance with Executive Order 13211. FRA has determined that this final rule is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Consequently, FRA has determined that this regulatory action is not a ''significant energy action'' within the meaning of Executive Order 13211.

List of Subjects in 49 CFR Part 232

Electronically controlled pneumatic brakes, Incorporation by reference, Penalties, Railroad power brakes, Railroad safety, Two-way end-of-train devices.

The Rule

■ In consideration of the foregoing, FRA amends chapter II, subtitle B of title 49, Code of Federal Regulations as follows:

PART 232—BRAKE SYSTEM SAFETY STANDARDS FOR FREIGHT AND OTHER NON-PASSENGER TRAINS AND EQUIPMENT; END OF TRAIN DEVICES

■ 1. The authority citation for Part 232 continues to read as follows:

Authority: 49 U.S.C. 20102–20103, 20107, 20133, 20141, 20301–20303, 20306, 21301–21302, 21304; 28 U.S.C. 2461, note; and 49 CFR 1.49.

■ 2. Section 232.5 is amended by adding definitions *car control device (CCD), dual mode ECP brake system, ECP, ECP brake mode, ECP brake system, ECP–EOT device, emulator CCD, overlay ECP brake system, stand-alone CCD, stand-alone ECP brake system, switch mode,* and *train line cable;* by revising the definition *train, unit or train, cycle* and adding the definition *yard limits* as follows in alphabetical order:

§ 232.5 Definitions.

* * * * *

Car control device (CCD) means an electronic control device that replaces the function of the conventional pneumatic service and emergency portions of a car's air brake control valve during electronic braking and provides for electronically controlled service and emergency brake applications.

Dual mode ECP brake system means an ECP brake system that is equipped with either an emulator CCD or an overlay ECP brake system on each car which can be operated in either ECP brake mode or conventional pneumatic brake mode.

ECP means ''electronically controlled pneumatic'' when applied to a brake or brakes.

ECP brake mode means operating a car or an entire train using an ECP brake system.

ECP brake system means a train power braking system actuated by compressed air and controlled by electronic signals from the locomotive or an ECP–EOT to the cars in the consist for service and emergency applications in which the brake pipe is used to provide a constant supply of compressed air to the reservoirs on each car but does not convey braking signals to the car. ECP brake systems include dual mode and stand-alone ECP brake systems.

ECP–EOT device means an end-of-train device for an ECP brake system that is physically the last network node in the train, pneumatically and electrically connected at the end of the train to the train line cable operating with an ECP brake system.

* * * * *

Emulator CCD means a CCD that is capable of optionally emulating the function of the pneumatic control valve while in a conventionally braked train.

* * * * *

Overlay ECP brake system means a brake system that has both conventional pneumatic brake valves and ECP brake components, making it capable of operating as either a conventional pneumatic brake system or an ECP brake system. This brake system can operate in either a conventionally braked train using the conventional pneumatic control valve or in an ECP braked train using the ECP brake system's CCD.

* * * * *

Stand-alone CCD means a CCD that can operate properly only in a train operating in ECP brake mode and cannot operate in a conventional pneumatically braked train.

Stand-alone ECP brake system means a brake system equipped with a CCD that can only operate the brakes on the car in ECP brake mode.

* * * * *

Switch Mode means a mode of operation of the ECP brake system that allows operation of that train at 20 miles per hour or less when the train's ECP–EOT device is not communicating with the lead locomotive's HEU, the train is separated during road switching operations, or the ECP brake system has stopped the train because the percentage of operative brakes fell below 85%. Many of the ECP brake system's fault detection/response procedures are suspended during Switch Mode.

* * * * *

Train line cable is a two-conductor electric wire spanning the train and carrying both electrical power to operate all CCDs and ECP–EOT devices and communications network signals.

Train, unit or train, cycle means a train that, except for the changing of locomotive power or for the removal or replacement of defective equipment, remains coupled as a consist and operates in a continuous loop or continuous loops without destination.

* * * * *

Yard limits means a system of tracks, not including main tracks and sidings, used for classifying cars, making-up and inspecting trains, or storing cars and equipment.

* * * * *

■ 3. Section 232.13 is amended by revising paragraph (a) to read as follows:

§ 232.13 Preemptive effect.

(a) Under 49 U.S.C. 20106, issuance of the regulations in this part preempts any State law, rule, regulation, order or standard covering the same subject matter, except for a provision necessary to eliminate or reduce a local safety hazard if that provision is not incompatible with this part and does not impose an undue burden on interstate commerce. Nothing in this paragraph shall be construed to preempt an action under State law seeking damages for personal injury, death, or property damage alleging that a party has failed to comply with the Federal standard of care established by this part, has failed to comply with its own plan, rule, or standard that it created pursuant to this part, or has failed to comply with a State law, regulation, or order that is not incompatible with the first sentence of this paragraph.

* * * * *

■ 4. Section 232.17 is amended by revising paragraphs (a) and (b) to read as follows:

§ 232.17 Special approval procedure.

(a) *General.* The following procedures govern consideration and action upon requests for special approval of a plan under § 232.15(g); an alternative standard under § 232.305, § 232.603, or a single car test procedure under § 232.611; and pre-revenue service acceptance testing plans under subpart F of this part.

(b) *Petitions for special approval of an alternative standard or test procedure.* Each petition for special approval of a plan under § 232.15(g); an alternative standard under § 232.305 or § 232.603; or a single car test procedure under § 232.611 shall contain:

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The plan, alternative standard, or test procedure proposed, in detail, to be submitted for or to meet the particular requirement of this part;

(3) Appropriate data or analysis, or both, for FRA to consider in determining whether the plan, alternative standard, or test procedure, will be consistent with the guidance under § 232.15(f), if applicable, and will provide at least an equivalent level of safety or otherwise meet the requirements contained in this part; and

(4) A statement affirming that the railroad has served a copy of the petition on designated representatives of its employees, together with a list of the names and addresses of the persons served.

* * * * *

■ 5. Section 232.103 is amended by revising paragraph (f) to read as follows:

§ 232.103 General requirements for all train brake systems.

* * * * *

(f) Each car in a train shall have its air brakes in effective operating condition unless the car is being moved for repairs in accordance with §§ 232.15 and 232.609. The air brakes on a car are not in effective operating condition if its brakes are cut-out or otherwise inoperative or if the piston travel exceeds:

(1) 10 1/2 inches for cars equipped with nominal 12-inch stroke brake cylinders; or

(2) The piston travel limits indicated on the stencil, sticker, or badge plate for the brake cylinder with which the car is equipped.

* * * * *

■ 6. Section 232.205 is amended by revising the first two sentences of paragraph (c)(5) to read as follows:

§ 232.205 Class I brake test-initial terminal inspection.

* * * * *

(c) * * *

(5) For cars equipped with 8½-inch or 10-inch diameter brake cylinders, piston travel shall be within 6 to 9 inches. If piston travel is found to be less than 6 inches or more than 9 inches, it must be adjusted to nominally 7½ inches. * * * * * * * * *

§ 232.213 [Amended]

■ 7. Section 232.213 is amended by removing paragraphs (a)(6) and (a)(7) and redsignating paragraphs (a)(8) and (a)(9) as (a)(6) and (a)(7) respectively.

■ 8. Section 232.303 is amended by revising the first three sentences of paragraph (c) to read as follows:

§ 232.303 General requirements.

* * * * *

(c) A car on a shop or repair track shall have its piston travel inspected. For cars equipped with 8½-inch or 10-inch diameter brake cylinders, piston travel shall be within 6 to 9 inches. If piston travel is found to be less than 6 inches or more than 9 inches, it must be adjusted to nominally 7½ inches. * * * * * * * * *

■ 9. Section 232.305 is amended by revising the first sentence of paragraph (a) and removing paragraph (f); the revision reads as follows:

§ 232.305 Single car air brake tests.

(a) Single car air brake tests shall be performed by a qualified person in accordance with either Section 3.0, ''Tests-Standard Freight Brake Equipment,'' and Section 4.0, ''Special Tests,'' of the Association of American Railroads Standard S–486–04, ''Code of Air Brake System Tests for Freight Equipment,'' contained in the AAR *Manual of Standards and Recommended Practices, Section E* (January 1, 2004); an alternative procedure approved by FRA pursuant to § 232.17; or a modified procedure approved in accordance with the provisions contained in § 232.307. * * *

* * * * *

■ 10. Part 232 is amended by adding a new subpart G to read as follows:

Subpart G—Electronically Controlled Pneumatic (ECP) Braking Systems

Sec.

§ 232.601 Scope.

This subpart contains specific requirements applicable to freight trains and freight cars equipped with ECP brake systems. This subpart also contains specific exceptions from various requirements contained in this part for freight trains and freight cars equipped with ECP brake systems.

§ 232.602 Applicability.

This subpart applies to all railroads that operate a freight car or freight train governed by this part and equipped with an ECP brake system. Unless specifically excepted or modified in this section, all of the other requirements contained in this part are applicable to a freight car or freight train equipped with an ECP brake system.

§ 232.603 Design, interoperability, and configuration management requirements.

(a) *General.* A freight car or freight train equipped with an ECP brake system shall, at a minimum, meet the Association of American Railroads (AAR) standards contained in the AAR Manual of Standards and Recommended Practices related to ECP brake systems listed below; an alternate standard approved by FRA pursuant to § 232.17; or a modified standard approved in accordance with the provisions contained in paragraph (f) of this section. The incorporation by reference of the AAR standards identified in this section was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the incorporated documents may be obtained from the Association of American Railroads, 50 F Street, NW., Washington, DC 20001, 202–639–2100, *www.aar.org.* You may inspect a copy at the Federal Railroad Administration, 1200 New Jersey Avenue, SE., Washington, DC, 202–493–6300 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* The applicable standards, which are incorporated into this regulation by reference, include the following:

(1) AAR S–4200, ''Electronically Controlled Pneumatic (ECP) Cable-Based Brake Systems—Performance Requirements,'' (Adopted 1999; Revised: 2002, 2004, 2008);

(2) AAR S–4210, ''ECP Cable-Based Brake System Cable, Connectors, and Junction Boxes—Performance Specifications,'' (Adopted: 1999; Revised 2002, 2007);

(3) AAR S–4220, ''ECP Cable-Based Brake DC Power Supply—Performance Specification,'' Version 2.0 (Adopted: 1999; Revised: 2002);

(4) AAR S–4230, ''Intratrain Communication (ITC) Specification for Cable-Based Freight Train Control System,'' Version 3.0 (Adopted: 1999; Revised: 2002, 2004);

(5) AAR S–4240, ''ECP Brake Equipment—Approval Procedure'' (Adopted: 2007);

(6) AAR S–4250, ''Performance Requirements for ITC Controlled Cable-Based Distributed Power Systems,'' Version 2.0 (Adopted: 2003; Revised: 2004);

(7) AAR S–4260, ''ECP Brake and Wire Distributed Power Interoperability Test Procedures'' (Adopted: 2007); and

(8) AAR S–4270, ''ECP Brake System Configuration Management'' (Adopted: 2008).

(b) *Approval.* A freight train or freight car equipped with an ECP brake system and equipment covered by the AAR standards incorporated by reference in this section shall not be used without conditional or final approval by AAR in accordance with AAR Standard S–4240, ''ECP Brake Equipment—Approval Procedures'' (2007).

(c) *Configuration management.* A railroad operating a freight train or freight car equipped with ECP brake systems shall adopt and comply with the configuration management plan developed in accordance with the AAR standards incorporated by reference in this section. FRA reserves the right to audit a manufacturer's configuration management plan at any time.

(d) *Exceptions.* (1) A freight car or freight train equipped with a stand-alone ECP brake system shall be excepted from the requirement in § 232.103(l) referencing AAR Standard S–469–47, ''Performance Specification for Freight Brakes.''

(2) The provisions addressing the introduction of new brake system technology contained in subpart F of this part are not applicable to a freight car or freight train equipped with an ECP brake system approved by AAR in accordance with paragraph (b) of this section, conditionally or otherwise, as of the effective date of this rule.

(e) *New technology.* Upon written request supported by suitable justification and submitted pursuant to the special approval procedures in § 232.17, the Associate Administrator may except from the requirements of subpart F of this part the testing of new ECP brake technology, demonstration of new ECP brake technology, or both, where testing or demonstration, or both, will be conducted pursuant to an FRA-recognized industry standard and FRA is invited to monitor the testing or demonstration, or both.

(f) *Modification of standards.* The AAR or other authorized representative of the railroad industry may seek modification of the industry standards identified in or approved pursuant to paragraph (a) of this section. The request for modification will be handled and shall be submitted in accordance with the modification procedures contained in § 232.307.

§ 232.605 Training requirements.

(a) *Inspection, testing and maintenance.* A railroad that operates a freight car or freight train equipped with an ECP brake system and each contractor that performs inspection, testing, or maintenance on a freight car or freight train equipped with an ECP brake system shall adopt and comply with a training, qualification, and designation program for its employees that perform inspection, testing or maintenance of ECP brake systems. The training program required by this section shall meet the requirements in §§ 232.203(a), (b), (e), and (f).

(b) *Operating rules.* A railroad operating a freight train or freight car equipped with an ECP brake system shall amend its operating rules to govern safe train handling procedures related to ECP brake systems and equipment under all operating conditions and shall tailor its operating rules to the specific equipment and territory of the railroad.

(c) *Locomotive engineers.* A railroad operating a freight car or freight train equipped with an ECP brake system shall adopt and use in its training program under part 240 specific knowledge, skill, and ability criteria to ensure that its locomotive engineers are fully trained with the operating rules governing safe train handling procedures related to ECP brake systems and equipment under all operating conditions and tailored to the specific equipment and territory of the railroad.

§ 232.607 Inspection and testing requirements.

(a) *Trains at initial terminal.* A freight train operating in ECP brake mode shall receive the following inspections at its point of origin (initial terminal):

(1) A Class I brake test as described in § 232.205(c) by a qualified mechanical inspector (QMI); and

(2) A pre-departure inspection pursuant to part 215 of this chapter by an inspector designated under § 215.11 of this chapter.

(b) *Trains en route.* (1) Except for a unit or cycle train, a train operating in ECP brake mode shall not operate a distance that exceeds its destination or 3,500 miles, whichever is less, unless inspections meeting the requirements of paragraph (a) of this section are performed on the train.

(2) A unit or cycle train operating in ECP brake mode shall receive the inspections required in paragraph (a) of this section at least every 3,500 miles.

(3) The greatest distance that any car in a train has traveled since receiving a Class I brake test by a qualified mechanical inspector will determine the distance that the train has traveled.

(4) A freight train operating in ECP brake mode shall receive a Class I brake test as described in § 232.205(c) by a qualified person at a location where the train is off air for a period of more than:

(i) 24 hours, or

(ii) 80 hours, if the train remains inaccessible to the railroad and in an extended-off-air facility. For the purpose of this section, an extended-off-air facility means a location controlled by a sole shipper or consignee which restricts access to the train and provides sufficient security to deter vandalism.

(c) *Cars added en route.* (1) Each freight car equipped with an ECP brake system that is added to a freight train operating in ECP brake mode shall receive a Class I brake test as described in § 232.205(c) by a qualified person, unless all of the following are met:

(i) The car has received a Class I brake test by a qualified mechanical inspector within the last 3,500 miles;

(ii) Information identified in § 232.205(e) relating to the performance of the previously received Class I brake test is provided to the train crew;

(iii) The car has not been off air for more than 24 hours or for more than 80 hours, if that train remains in an extended-off-air facility; and

(iv) A visual inspection of the car's brake systems is conducted to ensure that the brake equipment is intact and properly secured. This may be accomplished as part of the inspection required under § 215.13 of this chapter and may be conducted while the car is off air.

(2) Each car and each solid block of cars not equipped with an ECP brake system that is added to a train operating in ECP brake mode shall receive a visual inspection to ensure it is properly placed in the train and safe to operate and shall be moved and tagged in

accordance with the provisions contained in § 232.15.

(d) *Class III brake test* (1) A Class III brake test shall be performed on a freight train operating in ECP brake mode by a qualified person, as defined in § 232.5, to test the train's brake system whenever the continuity of the brake pipe or electrical connection is broken or interrupted.

(2) In lieu of observing the brake pipe changes at the rear of a freight train with the end-of-train telemetry device referred to in §§ 232.211(c) and (d), the operator shall verify that the brakes applied and released on the rear car of the freight train by observing the ECP brake system's display in the locomotive cab.

(e) *Initialization.* (1) A freight train operating in ECP brake mode shall be initialized as described in paragraph (e)(2) whenever the following occurs:

(i) Class I brake test.

(ii) Class III brake test.

(iii) Whenever the ECP brake system is powered on.

(2) Initialization shall, at a minimum:

(i) initialize the ECP brake system pursuant to AAR Series Standard S–4200; and

(ii) be performed in the sequential order of the vehicles in the train.

(3) Whenever an ECP brake system is initialized pursuant to this paragraph, the train crew must ensure that the total number of cars indicated by the ECP brake system is the same as the total number of cars indicated on the train consist.

(f) *Modifications to existing brake inspections.* (1) In lieu of the specific brake pipe service reductions and increases required in this part, an electronic signal that provides an equivalent application and release of the brakes shall be utilized when conducting any required inspection or test on a freight car or freight train equipped with an ECP brake system and operating in ECP brake mode.

(2) In lieu of the specific piston travel ranges contained in this part, the piston travel on freight cars equipped with ECP brake systems shall be within the piston travel limits stenciled or marked on the car or badge plate consistent with the manufacturers recommended limits, if so stenciled or marked.

(g) *ECP brake system train line cable.* Each ECP brake system train line cable shall:

(1) be located and guarded to provide sufficient vertical clearance;

(2) not cause any tripping hazards;

(3) not hang with one end free whenever the equipment is used in a train movement;

(4) not be positioned to interfere with the use of any safety appliance; or

(5) not have any of the following conditions:

(i) Badly chafed or broken insulation.

(ii) Broken plugs, receptacles or terminals.

(iii) Broken or protruding strands of wire.

(h) *Exceptions.* A freight car or a freight train shall be exempt from the requirements contained in §§ 232.205(a) and (b), 232.207, 232.209, and 232.211(a) when it is equipped with an ECP brake system and operating in ECP brake mode.

§ 232.609 Handling of defective equipment with ECP brake systems.

(a) Ninety-five percent of the cars in a train operating in ECP brake mode shall have effective and operative brakes prior to use or departure from the train's initial terminal or any location where a Class I brake test is required to be performed on the entire train by a qualified mechanical inspector pursuant to § 232.607.

(b) A freight car equipped with an ECP brake system that is known to have arrived with ineffective or inoperative brakes at initial terminal of the next train which the car is to be included or at a location where a Class I brake test is required under §§ 232.607(b)(1) through (b)(3) shall not depart that location with ineffective or inoperative brakes in a train operating in ECP brake mode unless:

(1) The location does not have the ability to conduct the necessary repairs;

(2) The car is hauled only for the purpose of repair to the nearest forward location where the necessary repairs can be performed consistent with the guidance contained in § 232.15(f);

(3) The car is not being placed for loading or unloading while being moved for repair unless unloading is necessary for the safe repair of the car; and

(4) The car is properly tagged in accordance with § 232.15(b).

(c) A freight car equipped with only conventional pneumatic brakes shall not move in a freight train operating in ECP brake mode unless it would otherwise have effective and operative brakes if it were part of a conventional pneumatic brake-equipped train or could be moved from the location in defective condition under the provisions contained in, and tagged in accordance with, § 232.15.

(d) A freight train operating in ECP brake mode shall not move if less than 85 percent of the cars in the train have operative and effective brakes. However, after experiencing a penalty stop for having less than 85 percent operative and effective brakes, a freight train operating in ECP brake mode may be moved if all of the following are met:

(1) The train is visually inspected;

(2) Appropriate measures are taken to ensure that the train is safely operated to the location where necessary repairs or changes to the consist can be made;

(3) A qualified person determines that it is safe to move the train; and

(4) The train is moved in ECP brake Switch Mode to the nearest or nearest forward location where necessary repairs or changes to the consist can be made.

(e) A freight car or locomotive equipped with an ECP brake system that is found with inoperative or ineffective brakes for the first time during the performance of a Class I brake test or while en route may be used or hauled without civil penalty liability under this part to its destination, not to exceed 3,500 miles; provided, all applicable provisions of this section are met and the defective car or locomotive is hauled in a train operating in ECP brake mode.

(f) A freight car equipped with an ECP brake system that is part of a train operating in ECP brake mode:

(1) that is found with a defective non-brake safety appliance may be used or hauled without civil penalty under this part to the nearest or nearest forward location where the necessary repairs can be performed consistent with the guidelines contained in § 232.15(f).

(2) that is found with an ineffective or inoperative brake shall be hauled in accordance with the following:

(i) § 232.15(e)(1).

(ii) No more than two freight cars with brakes pneumatically cut out or five freight cars or five units in a multi-unit articulated piece of equipment with brakes electronically cut out shall be consecutively placed in the same train.

(g) A train operating with conventional pneumatic brakes shall not operate with freight cars equipped with stand-alone ECP brake systems unless:

(1) The train has at least the minimum percentage of operative brakes required by paragraph (h) of this section when at an initial terminal or paragraph (d) of this section when en route; and

(2) The stand-alone ECP brake-equipped cars are:

(i) Moved for the purpose of delivery to a railroad receiving the equipment or to a location for placement in a train operating in ECP brake mode or being moved for repair to the nearest available location where the necessary repairs can be made in accordance with §§ 232.15(a)(7) and (f);

(ii) Tagged in accordance with § 232.15(b); and

(iii) Placed in the train in accordance with § 232.15(e).

(h) A train equipped and operated with conventional pneumatic brakes

may depart an initial terminal with freight cars that are equipped with stand-alone ECP brake systems provided all of the following are met:

(1) The train has 100 percent effective and operative brakes on all cars equipped with conventional pneumatic brake systems;

(2) The train has at least 95 percent effective and operative brakes when including the freight cars equipped with stand-alone ECP brake systems; and

(3) The requirements contained in paragraph (g) of this section are met.

(i) *Tagging of defective equipment.* A freight car equipped with an ECP brake system that is found with ineffective or inoperative brakes will be considered electronically tagged under § 232.15(b)(1) and (b)(5) if the car is used or hauled in a train operating in ECP brake mode and the ECP brake system meets the following:

(1) The ECP brake system is able to display information in the cab of the lead locomotive regarding the location and identification of the car with defective brakes;

(2) The information is stored or downloaded and is accessible to FRA and appropriate operating and inspection personnel; and

(3) An electronic or written record of the stored or downloaded information is retained and maintained in accordance with § 232.15(b)(3).

(j) *Procedures for handling ECP brake system repairs and designation of repair locations.* (1) Each railroad operating freight cars equipped with ECP brake systems shall adopt and comply with specific procedures developed in accordance with the requirements related to the movement of defective equipment contained in this subpart. These procedures shall be made available to FRA upon request.

(2) Each railroad operating freight trains in ECP brake mode shall submit to FRA's Associate Administrator for Safety a list of locations on its system where ECP brake system repairs will be performed. A railroad shall notify FRA's Associate Administrator for Safety in writing 30 days prior to any change in the locations designated for such repairs. A sufficient number of locations shall be identified to ensure compliance with the requirements related to the handling of defective equipment contained in this part.

(k) *Exceptions:* All freight cars and trains that are specifically identified, operated, and handled in accordance with this section are excepted from the movement of defective equipment requirements contained in § 232.15(a)(2), (a)(5) through (a)(8), and 232.103(d) and (e).

§ 232.611 Periodic maintenance.

(a) In addition to the maintenance requirements contained in § 232.303(b) through (d), a freight car equipped with an ECP brake system shall be inspected and repaired before being released from a shop or repair track to ensure the proper and safe condition of the following:

(1) ECP brake system wiring and brackets;

(2) ECP brake system electrical connections; and

(3) Car mounted ECP brake system components.

(b) *Single car air brake test procedures.* Prior to placing a freight car equipped with an ECP brake system into revenue service, a railroad or a duly authorized representative of the railroad industry shall submit a procedure for conducting periodic single car air brake tests to FRA for its approval pursuant to § 232.17.

(c) Except as provided in § 232.303(e), a single car air brake test conducted in accordance with the procedure submitted and approved in accordance with paragraph (b) of this section shall be performed by a qualified person on a freight car equipped with an ECP brake system whenever any of the events identified in § 232.305 occur, except for those paragraphs identified in paragraph (f) of this section.

(d) A single car air brake test conducted in accordance with the procedure submitted and approved in accordance with paragraph (b) of this section shall be performed by a qualified person on each freight car retrofitted with a newly installed ECP brake system prior to placing or using the car in revenue service.

(e) *Modification of single car test standard.* A railroad or a duly authorized representative of the railroad industry may seek modification of the single car test standard approved in accordance with paragraph (b) of this section. The request for modification will be handled and shall be submitted in accordance with the modification procedures contained in § 232.307.

(f) *Exceptions.* A freight car equipped with a stand-alone or dual mode ECP brake system is excepted from the single car air brake test procedures contained in § 232.305(a). A freight car equipped with a stand-alone ECP brake system is excepted from the single car test requirements contained in § 232.305(b)(2).

(g) For purposes of paragraphs (c) and (d) of this section, if a single car air brake test is conducted on a car prior to June 15, 2009, pursuant to the then existing AAR standards, it shall be considered the last single car air brake test for that car, if necessary.

§ 232.613 End-of-train devices.

(a) An ECP–EOT device shall, at a minimum, serve as the final node on the ECP brake circuit, provide a cable terminal circuit, and monitor, confirm, and report train, brake pipe, and train line cable continuity, cable voltage, brake pipe pressure, and the status of the ECP–EOT device battery charge. The ECP–EOT device shall transmit a status message (EOT Beacon) at least once per second, contain a means of communicating with the HEU, and be equipped with a brake pipe pressure transducer and a battery that charges from the train line cable.

(b) A railroad shall not move or use a freight train equipped with an ECP brake system unless that train is equipped with a functioning ECP–EOT device designed and operated in accordance with this subpart. The ECP–EOT device must be properly connected to the network and to the train line cable at the rear of the train.

(c) A locomotive equipped with ECP brakes can be used in lieu of an ECP–EOT device, provided it is capable of performing all of the functions of a functioning ECP–EOT device.

(d) *Exception.* A freight train operating in ECP brake mode is excepted from the end-of-train device requirements contained in subpart E of this part, provided that it is equipped with an ECP–EOT device complying with this section.

■ 11. Appendix A to part 232 is amended by revising footnote 1 and by adding an entry for subpart G to the end of the table to read as follows:

Appendix A to Part 232—Schedule of Civil Penalties [1]

[1] A penalty may be assessed against an individual only for a willful violation. Generally when two or more violations of these regulations are discovered with respect to a single unit of equipment that is placed or continued in service by a railroad, the appropriate penalties set forth above are aggregated

Section	Violation	Willful violation
* * * * * * *		
Subpart G—Electronically Controlled Pneumatic (ECP) Braking Systems		
232.603 Design, interoperability, and configuration management requirements:		
(a) Failure to meet minimum standards	7,500	11,000
(b) Using ECP brake equipment without approval	7,500	11,000
(c) Failure to adopt and comply with a proper configuration management plan	7,500	11,000
232.605 Training Requirements:		
(a) Failure to adopt and comply with a proper training, qualification, and designation program for employees that perform inspection, testing or maintenance	(1)	(1)
(b) Failure to amend operating rules	12,500	16,000
(c) Failure to adopt and comply with proper training criteria for locomotive engineers	12,500	16,000
232.607 Inspection and testing requirements:		
(a)(1), (b), (c)(1) Complete or partial failure to perform inspection	(1)	(1)
(a)(2) Complete or partial failure to perform pre-departure inspection	7,500	11,000
(c)(1)(iv), (c)(2) Failure to perform visual inspection on a car added en route	4,500	6,500
(d) Failure to perform inspection	(1)	(1)
(e)(1), (2) Failure to properly initialize the train	7,500	11,000
(e)(3) Failure to ensure identical consist and system information	7,500	11,000
(f)(1) Failure to apply a proper brake pipe service reduction	(1)	(1)
(f)(2) Failure to properly adhere to the proper piston travel ranges	(1)	(1)
(g)(1)–(4) Improperly located and guarded cable	7,500	11,000
(g)(5) Condition of cable and connections	7,500	11,000
232.609 Handling of defective equipment with ECP brake systems:		
(a) Failure to have proper percentage of operative brakes from Class I brake test	(1)	(1)
(b) Failure to prevent a car known to arrive with defective brakes to depart location where a Class I brake test is required	7,500	11,000
(c) Improper movement of a car equipped with conventional pneumatic brakes	7,500	11,000
(d) Operating with less than 85 percent operative brakes	(1)	(1)
(f)(2)(i) Improper placement of defective conventional brake equipment	(1)	(1)
(f)(2)(ii) Improper placement of defective ECP brake equipment	7,500	11,000
(g) Improper movement of defective stand-alone ECP brake equipment in a train operating with conventional pneumatic brakes	(1)	(1)
(h) Improper movement from initial terminal of stand-alone ECP brake equipment in a conventional brake operated train	(1)	(1)
(i) Failure to tag equipment	(1)	(1)
(j)(1) Failure to adopt and comply with procedures for the movement of defective equipment	7,500	11,000
(j)(2) Failure to submit list of ECP brake system repair locations	7,500	11,000
232.611 Periodic maintenance:		
(a) Failure to ensure the proper and safe condition of car	7,500	11,000
(b)–(d) Failure to perform test	7,500	11,000
232.613 End-of-train devices:		
(a) Failure to meet design standards for ECP–EOT devices	7,500	11,000
(b) Moving with an improper or improperly connected ECP–EOT device	9,500	13,000

Failure to observe any condition for movement of defective equipment set forth in § 232.15(a) will deprive the railroad of the benefit of the movement-for-repair provision and make the railroad and any responsible individuals liable for penalty under the particular regulatory section(s) concerning the substantive defect(s) present on the equipment at the time of movement.

Failure to provide any of the records or plans required by this part pursuant to § 232.19 will be considered a failure to maintain or develop the record or plan and will make the railroad liable for penalty under the particular regulatory section(s) concerning the retention or creation of the document involved.

Failure to properly perform any of the inspections specifically referenced in § 232.209, § 232.213, § 232.217, and subpart G may be assessed under each section of this part or this chapter, or both, that contains the requirements for performing the referenced inspection.

Issued in Washington, DC, on September 19, 2008.

Joseph H. Boardman,

Federal Railroad Administrator.

[FR Doc. E8–22549 Filed 10–15–08; 8:45 am]

BILLING CODE 4910–06–P

up to a maximum of $11,000 per day. An exception to this rule is the $15,000 penalty for willful violation of § 232.503 (failure to get FRA approval before introducing new technology) with respect to a single unit of equipment; if the unit has additional violative conditions, the penalty may routinely be aggregated to $15,000. Although the penalties listed for failure to perform the brake inspections and tests under § 232.205 through § 232.209 may be assessed for each train that is not properly inspected, failure to perform any of the inspections and tests required under those sections will be treated as a violation separate and distinct from, and in addition to, any substantive violative conditions found on the equipment contained in the train consist. Moreover, the Administrator reserves the right to assess a penalty of up to $27,000 for any violation where circumstances warrant. *See* 49 CFR part 209, appendix A.